



**THE ROYAL SOCIETY/NATIONAL RESEARCH FOUNDATION (NRF)**  
**SCIENCE, ENGINEERING AND TECHNOLOGY PROGRAMME**  
**Evaluation Report**  
**1996 -2001**

**Review Panel**

Professor Brian Heap, Chair of the Review (Foreign Secretary and Vice President: Royal Society)  
Professor Mike Mingos (Fellow of the Royal Society)  
Professor Ray Haines (University of Natal)  
Professor Sevid Mashego (Rand Afrikaans University)

(The Royal Society April 2001)

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## EXECUTIVE SUMMARY

1. The Panel concluded that the five-year programme had successfully stimulated a research culture in a range of Departments in the 4 historically black universities. Staff development activities resulted in all staff being exposed to international conferences and training in UK laboratories. 11 Masters and 4 Doctoral degrees were awarded to staff, and seven more are ready to complete their PhDs. More remarkably, a total of 92 obtained Honours Degrees, 50 Masters and 13 PhDs. A significant number worked for part of the time in the UK towards their doctorates.

2. The Royal Society's pump-priming role, working in synergy with NRF's bursaries, increased the numbers of black staff and students with UK laboratory experience and British higher degrees. Without this programme, the access of black staff to UK research institutions would have been negligible. The Panel concluded that enhancement of research capacity, leading to publications (total of all publications 104) and participation in local and international conferences (165 and 98 respectively), created an intellectual hub in most of the universities. Research capacity provided the necessary foundation for the establishment of a national centre of excellence in each institution, but conditions were not sufficient for the full designation.

3. The Panel found that the crucial support of each university in staffing, infrastructure and in itself creating an environment conducive to the nurturing of research was not always present. Local institutional problems were to blame, as well as wider external factors such as the poverty of students and the competition from industrial employers. In the face of unfavorable external factors, it was difficult for relatively isolated project leaders, usually with heavy teaching loads, to lead their teams to research excellence in so short a time.

4. The Panel concluded that despite the disadvantages, project leaders in both countries worked hard to achieve results not previously attempted, and established personal links which will ensure the continuation of the projects beyond the initial boost given by the programme. The biotechnology project at the University of the Western Cape started later than the others, so will officially end rather later. Other projects should continue with support from other sources, but we believe that a start has been made towards collaboration between UK and SA scientists in HBUs, fulfilling one of the original aims of the programme.

5. Against the background of SA's higher education and research policies the Panel strongly recommends the continuation of support for students mid-way through their degrees, and hopes that the momentum built up through the close links between the UK and SA project leaders will be maintained through continuation of exchange visits, funded either through the Royal Society, NRF or other organization.

6. The Royal Society already operates a small scheme to cater for study visits between established scientists of both countries, but formal links with the Academy of Science of South Africa in addition to those existing with the NRF would open up further avenues of exchange. The NRF and RS should examine further ways to identify and fund promising young scientists for periods of study and research experience in leading institutions in South Africa and the UK.

## GENERAL INTRODUCAION TO THE RS/NRF PROGRAMME

1. This is the final evaluation report of a five-year joint programme<sup>1</sup> (1996 - 2001) administered by the Royal Society and the National Research Foundation (NRF)<sup>2</sup> of South Africa. It was aimed at assisting Historically Black Universities (HBUs) to develop research capacity.

2. The joint review panel comprised four scientists, two from the Society and two appointed by NRF. They were Professor Brian Heap, FRS, Foreign Secretary; Professor Michael Mingos, FRS, Principal of St Edmund Hall, Oxford; Professor Ray Haines, Dean of Science and Agriculture at the University of Natal, Pietermaritzburg; and Professor Sevid Mashego, Professor of Zoology at Rand Afrikaans University, Johannesburg.

3. This programme arose from post-apartheid inter-governmental discussions, including cooperation in science and technology. It should be viewed in the context of NRF's policy to correct the effective historical exclusion of HBUs from its funding framework, and in particular its aim to address the research development needs and aspirations of disadvantaged communities and the disadvantaged higher education institutions. The participation of the Society provided the international element to NRF's own measures to rectify the uneven development in South African universities.

4. The objectives of the programme were to

- Increase the number and quality of black researchers and lecturers in SET in selected South African Universities
- Improve access of black staff to UK research and research institutions
- Establish centres of excellence in historically disadvantaged universities through the assistance of UK experts
- Encourage collaborative research projects between centres of excellence in the UK and S Africa

5. Five research projects in 4 HBUs were selected by the NRF; the Royal Society identified project leaders from the UK side. A table with the project topics and names of project leaders is on Page 6.

6. £25,000 was allocated for the first year of each project, and £50,000 for the following four years of each project, until 2001. In addition to public funds, the Rhodes Trust contributed £20K to the Royal Society. The NRF provided R175,000 per project in the first year, and R350,000 per project for the following four years.

7. An unstated third party to each element of the programme was the institution in which the research group was based. It was assumed that the universities would provide the basic infrastructure, computing, internet links, large-scale equipment, instrument maintenance

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<sup>1</sup> RS/NRF Science, Engineering & Technology Programme 1996-2001

<sup>2</sup> The National Research Foundation is successor to the Foundation for Research Development. Its function is to support outstanding research at S African tertiary institutions.

and servicing. Programme funds were meant largely to support individuals for recurrent costs such as travel and subsistence, conference attendance, and field trips. In reality, financial and other pressures on the universities prevented them from contributing as expected, and some of the programme funds were used to complete essential equipment purchase for research groups. They were also used to contribute to the costs of course fees, and for salaries when lecturers on study leave were replaced.

8. The operation of the programme was agreed by the RS and NRF after each set of joint project group leaders submitted proposals, with a budget, research strategy, detailed schedule of visits and development plans for the team. Day-to-day management was left to each project leader, with annual reports submitted to the two organizations.

9. A significant departure from the Society's practice was the inclusion of SA postgraduate students in the programme, and payment of UK costs, including fees in some instances, for Masters and PhD students. A number of staff members from the participating universities travelled to the UK to gain their Masters and Doctoral degrees under the joint programme. Also included are students who read for honours degrees influenced by the RS/NRF programme in the 4 universities.

10. In March 1999, in accordance with the RS/NRF agreement, Professor Brian Heap and Professor Michael Mingos for the RS; Professor M Qhobela and Professor Leslie Glasser for the NRF carried out an interim assessment, using as background self-evaluation reports prepared by the South African project leaders. They also visited each team in South Africa and formed their own conclusions on the progress of the programme. At the end of the assessment, they agreed that the programme was in the main meeting its objectives, they made specific recommendations about individual projects and they recommended that the programme should continue for the remainder of the 5 years.

11. For this final Evaluation, the panel reviewed self-evaluation reports jointly submitted by UK and SA project leaders, and received external evaluations submitted by SA academics not involved in the programme. They spent the last two weeks of March 2001 visiting the four universities to meet university administrators, project leaders, students and other team members. The Panel also met the Vice Chancellors and senior staff of the University of Cape Town and Pretoria.

12. Members of the Panel would like to express their thanks to the NRF and RS and the many scientists and administrators who provided them with information, and without whose hospitality this evaluation could not have been completed.

**TABLE SHOWING RS/NRF PROGRAMME**

<b>S African University</b>	<b>Project Title</b>	<b>S A Project Leader</b>	<b>UK Project Leader</b>	<b>Start of Project</b>
University of the North, Sovenga	Computational Modelling in Materials Science	Professor Phute Ngoepe, Materials Modelling Centre	Professor Richard Catlow, Royal Institution	March 1996
University of the Western Cape, Belville	Strategic Zoological Studies in Aquatic and Terrestrial Environments	Professor Walter Veith Zoology Department	Dr Michelle Kelly, The Natural History Museum, London	March 1996
University of Fort Hare, Alice	Science of Free Range Animals	Professor Jan Raats, Dept of Livestock and Pasture Science	Dr Andrew Illius, Institute of Cell, Animal and Population Biology (ICAPB), Edinburgh University	March 1996
University of Zululand, Kwadlangezwa	Applications in Coordination and Organometallic Chemistry	Professor Gabriel Kolawole, Dept of Chemistry	Professor Paul O'Brien, Imperial College, London	November 1996
University of the Western Cape	Plant Biotechnology and Protein Engineering	Professor Jasper Rees, Dept of Biochemistry	Professor Toni Slabas, Dept of Biological Sciences, Durham	July 1998

## INITIAL SESSION WITH THE NATIONAL RESEARCH FOUNDATION

The Review Panel assembled at the NRF Headquarters for briefing and discussion sessions prior to their embarking on a tour of the four Universities at which the five programmes being reviewed are located.

In welcoming the Panel, Dr Khotso Mokhele, President of the NRF, presented a background review of the current situation in South Africa and HBUs<sup>3</sup> in particular. He explained that the Review Panel had been established to determine the nature and value of the outcomes from the joint investment in the five-year programme. He asked that the Team should be brutally honest in their appraisal and avoid impartiality.

It was stressed to the Panel that science and technology were of great importance in helping to solve the problem of poverty alleviation in South Africa. However, there were a number of areas of great concern to NRF. Firstly the economic position of families in the regions covered by the HBUs had a negative impact on the development of a research environment. Without financial support in the form of bursaries for graduates it was difficult to see how the numbers of students could be increased. Funding post-doctoral positions in HBUs was also a critical issue. While NRF supplied support for graduates the HBUs also needed funds for infrastructure. It was important to note that among the 11 HBUs that existed in South Africa the four involved in the current Programme were at the better end of the spectrum. Looking to the future it was obvious that infectious diseases such as tuberculosis and AIDS seriously threatened the growth of the country's prosperity and progress.

Dr Mokhele drew the attention of the Panel to some historical perspectives. The natural sciences had been better supported under the apartheid regime than the social sciences. Cross-disciplinary studies were now needed to tackle current problems and contribute to growth areas of knowledge and community projects. The recently published National Plan for Higher Education had emphasized these points and identified the importance of improving the quality of work in the social sciences over the next five years.

Visits to the Vice-Chancellors at the Universities of Cape Town (Professor N S Ndebele) and Pretoria (Professor J van Zyl) and their colleagues were very informative and open. The discussions helped to clarify the changing climate in the higher education sector. The National Plan sought to address equity issues but at the same time it underscored the need to focus by placing funds in areas with a critical mass of scientists of proven track record. It was envisaged that the Minister of Education would retain considerable influence on the direction of scientific programmes and that certain areas would disappear from some Universities. Some HBUs had very diverse programmes and an outstanding question would be whether sufficient political courage existed to achieve the surgery required. Concern was expressed to the Panel that NRF was behind the times and had been too slow to develop policies that strengthened individuals in science rather than institutions. Both Vice-Chancellors commented very favourably on the value of the RS/NRF Programme and the sense of pride that it had brought to those scientists associated with it. Small amounts of funding from international sources had great leverage potential.

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<sup>3</sup> HBU – historically black university

## UNIVERSITY OF THE NORTH

The Review Team met with the following:

Professor P Fitzgerald	(Administrator)
Professor DCJ Wessels	(Acting Dean of Research)
Professor PE Ngoepe	(Project Leader)
Dr NM Mokalong	(Dean of Natural Science)

### Introduction

Since the Interim report, the Minister of Education had appointed an Administrator to sort out its deep-seated problems of governance and management, which threatened its academic viability. The University Council had been dissolved in December 2000 and Professor Fitzgerald given one year to restructure the university and produce a new mission and academic plan.

The Review Panel met Professor P Fitzgerald and senior University managers including Professor DC Wessels, acting Dean of Research, and Dr N M Mokgalong, Dean of Natural Sciences. All were upbeat about the future, and attributed the growth of a research culture at the university to the NRF/RS programme. Space had been made available for Professor Ngoepe's group, and the position of Deputy to him had been created. After some searching, a recruit from Germany would join the university in August. The university had also addressed the problem of poor connectivity to the internet by arranging for greater bandwidth through a link with Telkom, to be effective at the end of April. Further, the university had deliberately not imposed any teaching duties on Professor Ngoepe, who continued to be funded by CSIR, and was contracted to spend part of his time on CSIR work.

### Computational Modelling in Materials Science

The Review Team met with the following:

Professor PE Ngoepe	(Project Leader)
Dr HM Sithole	(Team Member)
Dr TT Netshisaulu	(Team Member)
Mr PS Ntoahae	(Team Member)
Mr KR Kganyago	(Team Member)
Mr M Netsianda	(Team Member)
Mr MF Phala	(Team Member)



The group is large and active having, over the period 1995 to 2001, delivered 67 papers at local conferences, 16 at international meetings, and produced 13 publications.

Prof Ngoepe gave a characteristically enthusiastic presentation of the many projects under his guidance. Four of the students (KR Kganyago, H Sithole, HR Chauke and LRM Segooa) gave clear and well illustrated presentations and other members of the group showed posters to the Assessors and answered questions.

## **1. Research Capacity**

The programme had certainly led to a significant increase in research capacity. At a time when the number of students reading physics in SA was dropping the number of students at the University of the North increased. Furthermore, the number of students doing postgraduate work was currently nearly 20 making the University of the North's graduate school in this subject one of the largest in the country. This had been achieved by a combination of infectious enthusiasm on the part of the Project Leader, combined with a clear strategy for recruiting students into the research programme. Promising students were identified in their third year and offered summer vacation projects to encourage their participation. In addition, the honours and MSc students were subsidised by funds from industrial sources and the advantages of a postgraduate qualification was explained to the students and their parents. The fact that the Project leader was a local man had led to a greater understanding of the nature of these problems and also an identifiable role model for the students and their parents. The graduate programme also had been shown to be relevant to the local economy, because the students not only developed IT skills and were exposed to cutting-edge IT equipment, but also the research problems had been re-expressed in terms of studies, which had a relevance to the local mining and IT industries. The RS/NRF Programme had also made a significant impact on the attractiveness of graduate work by providing the potential for research in the UK, access to world experts and the possibility of participating in conferences locally and internationally.

The research capacity had been enhanced by the allocation of attractive office space by the University, which had been utilised to introduce a large number of inter-connected work stations. In addition access to the computer facilities and the UK partners' laboratories had removed the feeling that the research group was working in isolation. The presence of such a large number of work stations also created a high tech image in the minds of potential students and visitors from industry and other academic centers but internet access was still a problem.

The increased research capacity had resulted in a centre for computational modelling, which was recognised nationally and with the assistance of the UK partners has resulted in the flow of interactions with industrial companies in SA. This had been accompanied by an injection of research funds and bursaries, and had resulted in the development of new projects which were of interest not only to the academics at the University of the North, but also industry.

The conferences, which had been held every year at the University of the North on Molecular Modeling, had enhanced the research capacity in several important respects. They had provided a focus for the discussion of research in this field and brought in the UK partners into Pietersburg each year. This had enabled them to discuss research problems

with the students, but also provided a discussion of the progress of the project and its management. In addition it had afforded the students the opportunity of presenting their results to a sophisticated but supportive audience. In the presentations given during the visit it was clear that the students had gained valuable previous experience in presentations.

Talking to the students it was apparent that their visits to the UK institutes had enhanced the research capacity significantly by giving the opportunity to discuss the implementation of software, their results and their theses with the UK partners. Unlike some of those students who had been involved in experimental projects the students at the University of the North were able to maintain their computer based projects on their return and therefore did not experience the re-entry problems which the Panel had been made aware of at UWC.

## **2. Research Outputs**

The research programme had resulted in one PhD and three MSc graduates and two of the latter had received distinctions. In addition another PhD and two MSc students were expected to graduate later in the year and four more by the end of the calendar year. This output may also be described as staff development since many of these successful students also held staff positions in the University. Some of the initial graduates had been co-supervised by the UK partners and therefore this ensured the quality of the degrees and their recognition at an early stage. In future an increasing number of the students will be supervised exclusively in the University. The Panel was pleased to hear that it was a common practice to use external examiners in the UK and US. This should provide a good mechanism for maintaining quality.

The institution had made considerable progress in developing a research culture amongst its staff. The efforts were coordinated through the Director of Research Development who informed us of the following developments: the commissioning of a research policy strategy document; staff development plans which have led to a significant increase in the average level of staff qualifications; a staff evaluation procedure; and a publication incentive scheme.

An increase in the number of research students was being encouraged by bursaries, and research activities were being given a higher profile by means of a research newsletter and research related events.

Two major problems were brought to the attention of the University administration. Firstly, the e-mail and InterNet links which are so essential for this computer-based project were still unsatisfactory, and the problem needed to be addressed urgently. The problem seemed to be institutional and had not been corrected over a number of years in spite of many complaints and much effort. The University had set up an investigation but, in the meantime, it was suggested that Professor Ngoepe set up his own dial-up connection to an InterNet Service Provider. Secondly, the success of this group in attracting students and promoting conferences required additional administrative support.

### **3. Institutional Benefits and Contributions**

Many of the current problems of the group arose from its success and rapid growth. Specifically, the over-dependence of the group on Professor Ngoepe's scientific and organisational leadership; the attempts to enter into too many areas of computer modelling; the lack of development of a management style more appropriate to a large group. Changes needed to be made which would lead to more quality time for research supervision and monitoring and writing of papers.

It seemed essential that certain changes be made rather rapidly in order to maintain the group's operations. Thus, an experienced administrator (Deputy Director) has been appointed from Germany. Training of new group members was entirely in Professor Ngoepe's hands. This should be altered and developed into more of a joint group effort. Suggestions were made for a weekly seminar (discussion of theoretical bases, presentation of results, presentations of new publications, visitors, etc). This was also important in the training of group members in public presentations which, at present, were not of a uniformly adequate standard.

### **4. Programme Management**

Professor Ngoepe has considerable scientific ability and charisma and his establishment of the Computer Modelling Centre was a tribute to his energy, organisational skills and networking. Through his postdoctoral experience and his collaborations with top United Kingdom scientists in the materials field he had developed wide-ranging experience in a number of areas of materials chemistry and brought together at the University of the North the necessary computer hardware and software to enable his group to tackle cutting-edge problems in materials science. The project with RS/NRF therefore was based on a current strength of the institution.

Professor Ngoepe was supported by a Systems Manager (Mr Kganyago), four lecturers in the Physics Department, a former lecturer in this Department, and six full-time students. The size of the group was impressive and it had a major impact on staff development in Physics. The visits made by members of staff to United Kingdom laboratories, the conferences and visits which had been made to South Africa by senior United Kingdom scientists, have all had an excellent effect on the scientific development of the staff and students.

The group currently had two postdoctoral vacancies that it had been unable to fill despite advertising them internationally. Experienced postdoctoral researchers could have a major impact, not only on the research output of the group but also on the training of the more junior members. The possible conflicts between the qualified outsider and the other members needed to be sensitively managed.

The envisaged outputs justified the budgetary requirements; however, there seemed no need for further computing power at present.

## 5. Status of the Project and Research Group

The objectives of the project plan were well articulated, but in our opinion they were too widely drawn and the choice of individual projects was not always made on the basis of maximising their scientific impact. A critical evaluation of the research projects by the group leader was overdue.

The outputs of the project in terms of student training were good, but disappointing in terms of publications. Many of the publications were with senior authors in the United Kingdom (and this may be understandable within the context of the RS/FRD research programme). However, the aim should be for more publications in high quality journals where Professor Ngoepe was the senior author.

It will not prove possible to achieve all the presently diverse aims of the project and that is why it is essential to focus on a smaller range of projects. The project was wide-ranging and too diffuse, covering such areas as properties of solid ionics, diffusion in polymers and dynamics. As such, the impact in any one area was likely to be reduced. Professor Ngoepe should reduce the breadth of the programme in favour of depth. In a similar regard the students were well familiar (and competent) with a variety of programme packages focused on MSI products, but were not so well-versed in the fundamentals of the subject.

If a better focus of work could be obtained, there were prospects of the development of a local centre of excellence because of the wide and useful contacts, with both UK groups and some local industries. However the links with SA groups were more tenuous and required stronger development.

The research had definite potential in its relevance to national industry, in that computer modelling could produce information at a scale of detail and in physical ranges not available by experimental procedures.

The resources available to the group were excellent: the space available was large and pleasant and the computer power was considerable. The latter may be something of a disadvantage if students were not required to husband resources, if they did not guard against over-processing, and if too much effort was devoted to systems management rather than to active research. However, this was not a problem at present, and there was a proper arrangement for systems management and support.

The project has proved to be an excellent stimulus for collaborations not only between the University of the North and the United Kingdom laboratories, but also local industries and computing companies based abroad. There was an impressive list of collaborators. The participation of the collaborators in an annual conference at the University of the North was highly significant and will be beneficial to the country as a whole provided it ensured that participants from other South African universities and industrial laboratories were encouraged to attend and contribute.

Complementary modelling studies were undertaken at other South African universities and a real opportunity existed for these components to be brought together to create a network for molecular and materials modelling in South Africa. Professor Ngoepe should be

encouraged to provide leadership for the development of such a network in South Africa. This broad area was one where South Africa could make an international impact and also it would be of considerable importance to the national economy.

## **6. Summary**

- i. The improvement in the research climate improvement was significant.
- ii. The prospect for progression from postgraduate to doctoral level research was encouraging. The knowledge / training base was expanding.
- iii. The administration/infrastructure for this project had been effective and supportive even though there were serious administrative problems within the University which were not part of our brief.
- iv. The impact on institutions in SA had not been extensive but could develop well in the future.

## UNIVERSITY OF THE WESTERN CAPE

The Review Team spent two days at UWC and met with the following:

Professor I van de Rheede	(Acting Vice-Chancellor)
Professor T Pretorius	(Vice-Rector: Academic)
Professor R Christie	(Dean of Research)
Professor JM van Bever Donker	(Dean of Science)

### Introduction

The acting Vice-Chancellor outlined for the Team the major changes that had occurred since the Interim Report. The former Vice-Chancellor had completed his term of office, and he, Professor van de Rheede, had been appointed acting Vice-Chancellor until a new person was recruited. He referred to the National Plan for Higher Education and noted that there were attempts to redress the effects of the apartheid years but no special treatment for HBUs was indicated. A National Students Financial Aid fund was to be available to support black students. Much more entrepreneurial activity was required to diversify the sources of university income, though the idea of an industry-university linkage was not yet a priority at UWC.

The Dean of Research, Professor R Christie, reminded the review panel in dramatic terms that the country was dying of AIDS. The current population of 40 million would see a reduction of 10 million. For example, the number of pregnant mothers testing HIV positive in KwaZulu Natal was 36% in 2001.

Professor van Bever Donker, Dean of the Faculty of Natural Sciences and Professor of Geology, explained that as a result of recruitment the university had an intake of 380 into the science faculty with an additional 139 at the discretion of Senate. However, the University had been unable to purchase equipment for the last 5 years and at least 2m Euros would be needed to meet their requirements.

Apart from the gloomy prognostications of the Dean's verbal report, his formal opinion submitted in writing was reasonably upbeat about the achievements at UWC. He emphasized three points; the Programme was a good idea; a greater involvement of Fellows of the Royal Society would have been much welcomed and of mutual benefit (though on the latter point he was imprecise); and that the discontinuation of the Programme would be an error. His overriding concerns were the future of the young black graduates and their contact with the very best of British science. He reiterated his strong plea for a renewal and expansion of the Programme.

## Biotechnology Programme

The Review Team met with the following:

Professor DJG Rees	(Project Leader)
Dr D Pugh	(Deputy Project Leader)
Professor CA Gehring	(Department of Biotechnology)
Dr G Bradley	(Department of Biochemistry)

The plant biotechnology and protein engineering programme of the University of the Western Cape, a joint initiative of the Departments of Biochemistry and Microbiology, is led by Prof DJG Rees of the Department of Biochemistry with the main international partner being at the University of Durham in the United Kingdom. Other UK laboratories involved were at the Universities of Oxford and Cambridge. The programme has two components, Plant Biotechnology (with Prof Rees as project leader) and Protein Engineering (with Dr D Pugh as project leader). The project had a late start and this report represents an interim review.

The scientific objectives of the project are multifaceted and are provided in detail in a comprehensive joint report of the programme, produced by the UK and SA programme project leaders. The following projects were identified:

### Plant Biotechnology:

- Disease resistance genetics in apples
- Genetics of chilling requirements and dormancy in fruit trees
- Plant cell wall biochemistry and proteomics
- Arabidopsis* genetics and model systems

### Protein Engineering:

- Expression of recombinant proteins
- Purification and analysis (NMR) of recombinant proteins
- Structural characterisation of chosen proteins

## 1. Research Capacity

The programme has attracted a considerable number of postgraduate students – in 2000 there were 3 Honours, 15 Masters and 7 PhD students – and has the highest number of black postgraduate students in biotechnology in South Africa. The currently registered students in the programme were funded by the NRF through its Institutional Research Development Programme (IRDP), with the programme resources being used primarily for the purchase of new equipment, for the creation of international links between SA and the UK, and for the provision of international exposure for the postgraduates to new technologies and knowledge. This was an effective allocation of resources in the early stages of the programme when there were few students and it was necessary to build up the infrastructure of the laboratory to a level where the students could be prepared for their overseas visits. It was noted that, provided the programme was not terminated at this stage, the RS/NRF resources would, in future, be used primarily for exchange visits.

It is important to note that the biotechnology programme had been active prior to the establishment of the RS/NRF programme. A fair number of UWC graduates from this programme had received prestigious awards such as the Rhodes and Commonwealth Scholarships for study in the UK. As far as staff development is concerned: Ms Marlene du Preez, lecturer in the Department of Biochemistry, had made substantial progress in her PhD studies in the field of colour and dormancy mutations in Bon Chretien pears and this progress had been facilitated by study leave made possible by grants from the Mellon Foundation and the UWC study leave programme. The purchase of equipment through the programme had been very important in developing research capacity. In this way it had been possible to obtain a Silicon Graphics O<sub>2</sub> workstation and a BioCAD protein purification work station. Funding from other sources had enabled the team to purchase two ABI 310 DNA sequencers, a BIACore Surface Plasmon resonance system for protein-protein interactions and a wide range of smaller equipment. The receipt of funding from a variety of sources was considered a strength in the project's infrastructure and continued sustainability. In this context it should be recorded that although the previous report had recommended that it was important to specifically outline the contribution of the RS/NRF funds, particularly in relation to individuals, the significance of the role of RS/NRF funding in the progression of black students towards postdoctoral positions was still not clearly made.

The students within the programme were without question keen and enthusiastic, with the climate in the laboratory being highly conducive to research activity. There was a healthy mixture of Honours, Masters and Doctoral students. A decline in undergraduate student numbers in Biochemistry had occurred since the report two years previously and it was difficult to determine whether this had resulted from institutional difficulties or because the discipline had become less attractive to students at UWC. The introduction of a significant number of postdoctoral fellows into the programme had been of prime significance and had been a very important contribution to the development of a research culture. Unfortunately it had not been possible to recruit the full complement of postdoctoral fellows and in particular, those with experience in protein chemistry and protein expression. It was of considerable concern that these additional recruits had not led to an increase in the publications of the group. The fact that some of the postdoctoral fellows came from the University of Cape Town, a historically white institution, was noted as a significant development.

The exchange of staff from UWC and from the UK had also played an important part in the development of a research culture. These interchanges had not only the effect of providing significant input into the development of research methodologies at UWC, but also of exposing staff and students to international experts by means of workshops and research seminars. The exchange had primarily been in one direction and the reciprocal visits from academic staff in the UK to South Africa had not been as numerous or fruitful in part because of other commitments of these senior scientists.

Students had also been involved in successful visits and in particular to the following institutions: University of Durham (Professor T Slabas), Oxford University (Professor I Campbell and Dr N Campbell) and University of Cambridge (Professor T Blundell and Dr N Grey).



## **2. Research Outputs**

A major output of the programme was the healthy number of qualified postgraduates. This had been quite significant and has been noted above. In the early stages of the programme able students were identified and encouraged to embark on PhD programmes at some top Universities in the UK, but more recently an increasing number of students had graduated through UWC. Five MSc theses had been completed or were nearing completion.

The publication output in internationally recognised journals had been disappointing and was commented on by the three referees who evaluated the group's outputs on behalf of NRF. The interim report made a similar criticism two years ago. The work undertaken had not resulted in peer-reviewed publications. This had been acknowledged by Prof. Rees, and reasons for the lack of publications offered, but it was important that the project leaders addressed this deficiency as a matter of some urgency.

On the other hand the team had participated extensively, particularly of late, in four national and seven international conferences. This had provided the students with the opportunity of gauging the quality of their research compared to that of colleagues at other universities.

As a result of the presentation of one of the students to the review team it was noted that intellectual property may accrue to the University because of the potential of the scientific discoveries. The Dean of Research indicated that the University had developed mechanisms to ensure that any intellectual property obtained will be utilised effectively by the University.

## **3. Institutional Benefits and Contributions**

The Acting Vice-Chancellor and the Deans of Research and Science discussed a range of issues which impacted on the long-term viability and sustainability of the programme. The University had made a strategic decision to increase the percentage of postgraduate students and recognised the importance of cutting edge research at UWC, both in terms of developing a research infrastructure and for the economic development of the country. The important role to be played by universities in reacting to the AIDS epidemic was stressed by the Dean of Research as an important national priority. It was pointed out that the recently released National Plan for Higher Education had indicated that the proposed new formula for the funding of universities would have the MSc and PhD completion rates as well as the numbers of publications as important parameters.

It was noted that the University of the Western Cape had faced serious financial challenges in the recent past which had impacted on its ability to fund research at an appropriate level. Although the University had not put any significantly large amounts of money into the programme it was important to note that no administrative overheads were charged against the project, while it continued to provide good quality research management systems. More importantly, the University had recently approved the establishment of new staff and professorial positions and had contributed to the refurbishment of laboratories. This appeared to be a clear commitment to the growth and development of research in the

plant sciences. However, because of the financial stringencies developments in IT and library facilities had been limited.

The University had experienced declining student numbers up to 1998 when there was student unrest, but numbers had shown an upturn recently. The number of students entering the University who had the necessary mathematics and science backgrounds for the biochemistry and molecular biology programme was problematic, but was being tackled by the introduction of foundation courses for those with an inadequate training in mathematics, physics and chemistry.

It was hoped that the improving financial position of the University would enable it to provide permanent employment for those contract staff (e.g. David Pugh) before they were made permanent job offers elsewhere.

#### **4. Programme Management**

Academically the project is very well supported. It was the view of the Review Panel that the programme has quality scientific leadership and that Professor Rees is supported by bright, capable and committed senior scientists. Professor Rees is a respected biochemist who had an impressive publication record prior to his appointment at UWC. Professor Rees is, however, not a plant molecular biologist or biotechnologist, and furthermore is also involved in a large number of other scientific projects. This appears to be having an adverse effect on the programme and as indicated above the panel was of the opinion that, given the resources which have been committed to it in terms of students, postdoctoral students and academics, there was serious concern about the lack of publications. However, the appointment of Professor Gehring had provided the programme with new expertise in the field of plant biotechnology and would help to relieve the pressure on Professor Rees.

#### **5. Status of the Project and Research Group**

Although the Review Panel was impressed with the energy and commitment of Professor Rees and the other members thereof but it had been concerned by the group's poor publication record. The Panel found it difficult to assess the scientific output of the programme because of the lack of publications in refereed journals.. Nevertheless, it was clear that the programme had already made significant contributions in terms of the development of a research culture and capacity building.

Members thereof the group had different degrees of international and national standing but this had been attributed to their earlier research accomplishments rather than their achievements in the programme.

## 6. Summary

It was agreed that a positive research climate had been established and that the structure for a mechanism to progress graduate students through to postdoctoral level was becoming established. It was acknowledged that the increase to the knowledge base was still at an early stage of development. The Review Panel noted that the university administration was supportive and sound, even though limited in its own financial contribution to this project.

## 7. Interim Recommendations:

- i. The Biotechnology programme at the University of the Western Cape has the potential to fulfil the objectives of this RS/NRF programme. As such continued support of the programme is recommended as long as the following conditions is fulfilled: that the group provide evidence before March 2002 that it has published or has accepted for publication up to five or more papers in internationally recognised and peer reviewed journals
- ii. It is recommended that the UWC biotechnology team should focus its objectives and work plans, and set targets on goals to be achieved in the immediate future.
- iii. Specific reference to the significance of this RS/NRF funding needs to be made especially in relation to its use in the progression of black students through to postdoctoral positions.
- iv. It is recommended that more UK senior scientists should visit and contribute to the programme by giving seminars and interacting with the students in an academic and social manner.
- v. The students appear to experience some problems when they return from UK trips and some steps should be taken to reduce the impact of re-entry into the group.
- vi. The RS/NRF will discuss the possibility of return fellowships to UK laboratories for students who complete their PhDs or post-doctoral work overseas.

## Strategic Zoological Studies in Aquatic and Terrestrial Environments

The Review Team met with the following:

Professor WJ Veith	(Project Leader)
Professor MJ Gibbons	(Team Member)
Professor MD Hofmeyr	(Team Member)
Dr M Kelly	(UK Project Leader)

Professor WJ Veith, an ecophysiologicalist, who was responsible for preparing the original submission to the FRD, leads this programme. After setting up the programme of research he went on sabbatical in 1998 and his role was carried out very effectively by Dr MD Hofmeyr, also an ecophysiologicalist. The RS Project Leader is Dr Michelle Kelly, formerly of the Natural History Museum (NHM), London but now based in New Zealand and attached to the NHM. Dr Hofmeyr and Dr Kelly-Borges have worked together closely in order to ensure that the project progressed in Professor Veith's absence

The session was introduced by Professor Veith who described the situation 5 years ago when there were hardly any postgraduates compared with the present. Numbers have risen to 48 over the time of the Programme. He spoke of the collaborations developed in South Africa and overseas. His personal research focused on nutrition and the impact of the quality of protein intake on calcium loss and in particular on osteoporosis, cardiovascular disease and fertility.

Professor MJ Gibbons, now Head of Department, was investigating population genetics of fishes and commercially important sponges. As a marine ecologist he was concerned to train young black scientists for employment in the highly successful fisheries industry as well as to discover new knowledge about many unique species found in South African waters. Professor Gibbons' work is highly valued because marine biology was an area previously not available to students from HBUs. Dr Hofmeyr was studying tortoises in respect of their reproductive biology and oviparity. South Africa houses about a third of the world's species and Dr Hofmeyr had gathered valuable data about their genetics, population dynamics and reproductive ecology. Professor AE Channing had joined the Department of Zoology (from the Department of Biochemistry) during the life of the Programme. He worked on biodiversity of indigenous frogs studying systematics, molecular genetics and evolutionary biology.

Graduate students made excellent Powerpoint presentations on topics that included studies on chameleons, sponges, Bryozoans and antibiotic resistance in bacteria recovered from poultry abattoirs. A private session with about 24 students illustrated that they welcomed the improved research ambience of the department stimulated by the RS/FRD programme. Several graduates spoke enthusiastically about their overseas experience, in particular at the Natural History Museum. UK postdoctoral scientists who visited and worked in the Department had played a major role.

## **1. Research Capacity**

A total of 48 black scientists had graduated at the Honours, Master and Doctoral levels during the course of the Programme. Four members of staff had achieved degrees at the PhDs, Masters or Honours levels including one person who was awarded a Harvard Postdoctoral Fellowship. In some cases this became possible because the RS/NRF funding provided replacement staff to cover for teaching responsibilities. Seven students worked abroad and 16 international collaborations were established in the UK and elsewhere. Evidence was given of 10 linkages with South African institutions. Two workshops were attended in the UK and Brazil.

## **2. Research Outputs**

Thirty-four students had completed their degrees at the Honours level, 12 Masters and 2 PhDs. In terms of publications there were 35 scientific papers, 5 books and/or chapters in books and 11 popular articles. A total of 42 presentations were made at international conferences and 40 at local conferences or workshops. During the course of taxonomical studies about 30 species new to science were described. The introduction of molecular techniques had been a strong element of the Programme since the Interim Review. Taken together, the publication output was numerically good, publications in marine ecology were strong, but, as noted by the external referees, other papers were 'workmanlike at best and pedestrian to poor at worst'. Questions were raised by the external referees about the length of time that some students had spent in the Department (e.g. 10 years) and whether the lifestyle had become too comfortable with the injection of the RS/NRF funding. In this respect it was noted that at least two of the students had assumed teaching positions in the Department and there was little doubt that the educational development had been very beneficial.

## **3. Institutional Benefits and Contributions**

As pointed out by the Dean of Research the privileged universities are not producing enough scientists so that places like UWC are of special value to the future of South Africa. This project has produced numbers of black and female graduates from the 'bright poor' who are clever but have no money. It was our opinion that the Programme had helped to create a research environment in which valuable work of national, and in some instances international importance had been achieved. It is possible that some of this work, particularly in the area of ecology, will gain further international prominence because of the unique features provided by South Africa. The enthusiasm and motivation that was evident among staff and students should propel them to higher levels of recognition. The external referees' reports recognised this. However, it is all the more important that the Department seeks to publish in internationally recognised journals. This had not always occurred.

A further benefit had been the establishment of a cohort of graduates who were highly motivated and gave excellent presentations comparable to the best in internationally recognised laboratories. Relevant equipment had been purchased, additional staff had been attracted to the Department, though some staff movement to other Departments including Bacteriology and Physiology was anticipated.

One concern was the wide range of research topics found in the Department. Professor Veith argued that this was one of their strengths because the Department had the responsibility to teach the full range of Zoology. For the first time there were black oceanographers from South Africa in the international scene, and these were young blacks with their career ahead of them. The Team were not impressed by Professor Veith's first point because research programmes requires a strict focus if they are to compete internationally, but they noted his second point.

#### **4. Programme Management**

The management of this project had gone through a difficult phase early on because of the sabbatical leave of Professor Veith. In contrast to the Interim visit report, it was encouraging to see that no permanent damage had been done and that the two Project Leaders had sustained good progress throughout largely facilitated by the excellent and dedicated work of Dr Hofmeyr and Dr Kelly.

From the point of view of the RS/NRF side there had been annual meetings at the Royal Society in addition to occasional special meetings in London and regular email contact with the UK project managers. This interaction had been invaluable. The temptation to the RS to become involved in micromanagement such as the resolution of staff issues at UWC had been successfully resisted.

#### **5. Status of the Project and Research Group**

The project was highly rated for capacity building, well rated in terms of the quantity of publications, although many were published in moderately rated journals with the exception of marine ecology that had published some papers in internationally recognised journals. The move of Professor Veith to Physiology was welcomed. His initiation of the Project had been successful but his move would enable greater focus to be placed on aquatic and terrestrial ecology, a particular strength for the future.

#### **6. Summary**

- i. The project had successfully met the objectives of increasing the number and quality of black researchers and lecturers in Science Education and Technology, improved access of black scientists to UK research and research institutions, and encouraged collaborative research projects between centres of excellence in the UK with laboratories in HBUs.
- ii. The Review Panel was in agreement with the energy and publication record of Professor Gibbons, and welcome his appointment to Head of Department of Zoology.
- iii. Many of the recommendations of the Interim Review had been addressed but it was not clear that a black scientist had been identified as Deputy Project Leader.

- iv. It would be premature to classify Zoology at UWC as an international centre of excellence though marine biology showed the potential if other conditions were to be satisfied.
- v. The Department had developed as a centre for zoological studies of aquatic and terrestrial environments and the proposed staff movements would facilitate its progress to greater recognition in the scientific community at home and abroad.

## UNIVERSITY OF ZULULAND

The Review Panel first met with the following:

Professor CRM Dlamini	(Vice Chancellor)
Professor TA Dube	(Deputy Vice Chancellor)
Professor MF Coetsee	(Dean: Faculty of Science)
Professor GA Kolawole	(Project Leader)
Dr N Revaprasadu	(Deputy Project Leader)
Professor P O'Brien	(UK Project Leader)

### Introduction

The Vice-Chancellor began the meeting by expressing his thanks the RS and NRF for allowing the University to take part in the programme. The University had gone through a difficult financial situation resulting in the loss of staff. However, the situation is now more stable and the University is in a better position to give support to this programme.

Professor Dube spoke briefly about the impact that the programme had made in attracting students to undertake courses at MSc and PhD levels. The number of students has increased and the University is now trying to collaborate with the University of the North (Physics Department and Materials Group) as well as collaboration with the University of Natal. One way in which the University is trying to encourage students into science is by looking at fund raising through local business involved in S&T (eg Anglo-American).

The Team commented that in the past it had been difficult for staff to undertake a period of sabbatical leave to the UK. This situation had not changed but Professor Dube informed the Team that the University had made exceptions and was trying to be more flexible to this.

### Applications in Coordination and Organometallic Chemistry

The Review Team met with the following:

Professor GA Kolawole	(Project Leader)
Professor P O'Brien	(UK Project Leader)
Dr N Revaprasadu	(Senior Lecturer and Deputy Leader)
Dr T Radhakrishnan	(Visiting Research Fellow from the University of Kerela, India)

Presentations on the programme were made by Professor O'Brien, Professor Kolawole and Dr Revaprasadu and a number of posters were presented and discussed. The poster presentations showed that the students had made considerable progress since the last meeting and were articulate and knowledgeable about their research. They also showed an enthusiasm for their research.



## 1. Research Capacity

The numbers of students participating in chemistry research at the University of Zululand had always been very small and, in fact, the Department of Chemistry had never produced a doctoral graduate or for that matter, by 1996, a Masters graduate. As a consequence of the programme the situation had been improved and at present the group had two PhD and two MSc students with a third MSc student having completed her degree in January of this year.

The programme had played a very important role as far as staff development is concerned. Firstly were it not for the programme it would not have been possible to attract Professor Kolawole to the University of Zululand to fill the post which had become vacant as a consequence of the untimely death of Professor MacPherson Zulu. Secondly, through being granted special leave by the University and by being funded by the programme, Dr Revaprasadu was able to obtain a PhD degree at Imperial College under the direction of Prof P O'Brien. Thirdly Mr MJ Molato was currently registered for a PhD at the University of Zululand.

A major impact on the research capacity of the group had been the acquisition of equipment through funds provided by the programme. Particular pieces of equipment which had been purchased included a Perkin Elmer FT infrared spectrophotometer, a Varian AA spectrometer, a Perkin Elmer UV-visible spectrophotometer, a magnetic susceptibility balance, a liquid nitrogen cryostat for the spectrophotometer and a Perkin Elmer Thermal Gravimetric Analyser.

Professor O'Brien had played a very important part in leading the support from the UK through numerous visits. He himself had visited the university on eight occasions to assist with the research supervision. Others who had visited include Dr Otway of Imperial College (three visits), Dr MA Malik, also of Imperial College (two visits), Dr N Long, again from Imperial College (four visits) and Professor C Orvig of the University of British Columbia (one visit).

It was concluded that the programme had developed some research capacity in the Department and assisted in promoting a research culture. However, this capacity was somewhat fragile and one or two resignations could totally reverse the successes of the programme.

## 2. Research Output

The number of publications produced by the group over the period of the programme had been substantial considering the size of the group and the circumstances (17 plus 3 submitted). The quality of the journals in which the papers had been published ranged from excellent to average but the majority of the publications stemmed from the PhD of Dr Revaprasadu. At the same time it was noted that two of the three publications awaiting editorial decisions involved only authors from the University of Zululand.

With the programme being in its infancy the number of higher degree graduates who had progressed through the programme was still very small (one at the University of Zululand) but a number of new MSc degrees could be anticipated in the not too distant future.

The group had made good use of conferences to publicise its research and 6 oral presentations and 12 poster presentations were made. The majority of the latter were at international conferences. Significantly, a poster which Dr Revaprasadu presented at the 33<sup>rd</sup> International Conference on Co-ordination Chemistry held in Florence in 1998 was a joint prize winner in the poster session for Materials.

### **3. Institutional Benefits and Contributions**

There was a Senate Research Committee through which research was managed, and a research fund of R3 million was made available. There were about 4 500 students, with about 60 senior postgraduates (MSc and PhD) and about two PhD degrees were awarded annually by the University. The number of PhD's awarded in the sciences was relatively low and the large majority graduated in education and the humanities.

The Rector explained that during the period of the programme the University had experienced significant financial difficulties, but nonetheless because it valued the programme it had tried to support it. Specifically it had granted study leave to two members of staff to enable them to pursue research studies in the UK, they had provided a University car for the postdoctoral fellow supported by the programme, had advertised for research studentships in 1999 and 2000 and adopted a flexible approach to requests made by the chemistry department. Recently a laboratory technician had been approved for the Chemistry Department.

The recruitment of undergraduates to science courses was hindered by the absence of satisfactory maths and science teaching in schools at the secondary level. This was being addressed at the University by foundation courses. It was also a real problem to attract quality students into the honours and MSc programmes and this problem had been addressed by an advertising campaign. The number of undergraduates reading chemistry had increased as a result of the improvements in the undergraduate course introduced by Professor Kolawole and the enthusiasm engendered by the visiting academics from the UK.

The visit to the research laboratories showed that a great improvement had occurred since the Interim Assessment. Specifically the research laboratories showed a greater activity and were better equipped to carry out a wider range of chemistry. Also the research equipment available to the research students had markedly improved as a result of the funds which the programme had made available. The presence of this equipment and the use of analytical and spectroscopic services at other Universities would now make it possible to mount a research effort in synthetic inorganic chemistry. The library facilities and IT equipment were also adequate for these purposes.

There was a sabbatical scheme in place (six months leave after five years service), but the appointment of leave replacements was problematical in such a small department. Nonetheless, the University was willing to adopt a flexible approach to requests for leave.

Although there had been a general fall in student numbers in science, those in Chemistry had risen.

The Organometallic Research Group had received a tremendous setback with the death of its leader, Professor Zulu. The University did not delay in appointing Professor GA Kolawole in July, 1998, and he had made a sterling effort in trying to revive the research activity and improve the quality of the teaching.

#### **4. Programme Management**

The Project leaders expressed general satisfaction with the way in which the programme had been managed by the NRF and the Royal Society and appreciated the flexibility which they had been afforded. Professor O'Brien expressed the view that it was unfortunate that the programme had not been able to meet the costs of student fees for more than one year, because the students who had come for training in the UK were not likely to obtain ORS<sup>4</sup> Awards and consequently a large financial burden was placed on the UK Project Leader. We were impressed with the way in which the UK and SA Project Leaders had worked so well together and had effectively managed the programme. Specifically, the energy and commitment shown to the programme by Prof O'Brien was laudable. He had made many visits to South Africa, he had encouraged others from the UK to come to SA for research discussions and also to give undergraduate lectures. He had encouraged visits by specialists in spectroscopy and had put great effort into running the programme after Professor Mac Zulu had died.

The appointment of Dr Revaprasadu as Deputy Project Leader had been consistent with the recommendations of the interim review committee and his commitment to the project and the University augered well for the future.

#### **5. Status of the Project and Research Group**

Bearing in mind the postgraduate science profile at the University of Zululand prior to the initiation of the project it must be given a moderate to high rating in terms of capacity building. Compared to many other institutions in SA the rating would have to be classified as weak. The programme had produced some high quality publications and research, but this had been mainly achieved as a result of Dr Revaprasadu's PhD research project at Imperial College supervised by Professor O'Brien.

None of the South African researchers in the group could be judged at this stage as having a high national, let alone, international profile. Dr Revaprasadu was clearly a most promising researcher with potential and required encouragement and further nurturing.

#### **6. Summary**

- i. It can be safely concluded that the programme had developed a research capacity in the Department and the input of funds and expertise had assisted in promoting a research culture. However, this capacity was somewhat fragile and one or two resignations could totally reverse the development of the programme.

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<sup>4</sup> ORS awards are made by the Foreign and Commonwealth Office of G Britain for the part-funding of postgraduate fees

- ii. It was recommended in the interim report that the programme needed a clearer focus and these criticisms still applied. Fewer projects should be in the research portfolio and a greater emphasis should be placed on projects which may have more relevance to the local scene.

## UNIVERSITY OF FORT HARE

The first meeting at UFH involved a discussion with the newly appointed Vice-Chancellor and University executives. The following were present:

Professor D Swartz	(Vice-Chancellor)
Professor N Rembe	(Acting Executive Dean of Research)
Mr A Shaw	(Registrar)
Professor J Tyler	(Acting Executive Dean of S & T)
Professor JG Raats	(Acting Executive Dean of Agriculture)

### Introduction

The Vice-Chancellor gave a brief history of the University over the last five years. He explained that the University had experienced very serious problems during the funding period of the RS/NRF Programme and called in an Administrator. At the time when the Vice-Chancellor was appointed the University had a deficit of R90 million, there was a leadership crisis and the core academic business of the university had virtually collapsed.

He realised that strategic shifts were urgently needed in order to turn the university around. Strategic planning workshops were organised and major decisions were taken with the reduction of the number of faculties from eight into four, refocusing the goals of the University and a contraction of the research areas to five research fields. The University has now been transformed and the prospects for the future were much better. It had been reinvigorated, the staff were vibrant and the financial deficit had been reduced by half, due in large measure to the Vice-Chancellor's dynamic leadership and commitment.

The Faculty of Agriculture was identified as a Centre of Excellence by the University during Strategic Planning exercises held in 1995 and 2000. The University is one of the institutions that provides training and research in the Eastern Cape Province. The Science of Free Ranging Animals Research Programme is housed in the Department of Livestock and Pasture Science. In this area, which is characterised by an exceptionally diverse ecological and agricultural environment, extensive livestock and game farming are dominant forms of land use. The University established this research programme with the central theme of range ecology which comprises the autecology and ecology and environmental influences on savanna plants and interactions between them; the physiology of livestock and wild ungulates; and the interactions between animals and plants.

### Science of Free Ranging Animals

The Review Team met with the following:

Professor JG Raats	(Project Leader)
Professor JM Brand	(Team Member)
Mr AB Joubert	(Team Member)
Mr RM Baxter	(Team Member)
Dr PF Scogings	(Team Member)
Mr WM Goqwana	(Team Member)

Professor WSW Trollope	(Team Member)
Professor SM Waladde	(Team Member)
Dr P Masika	(Team Member)

The Programme Leader is Professor TG Raats whose interest is in animal nutrition and foraging behaviour. The Programme Co-leader is Mr A Magadlela who is a lecturer and his interest is in animal nutrition and particle flow dynamics; and the UK Project Leader is Professor AW Illius, University of Edinburgh and his interest is in animal-plant interactions, foraging behaviour and savanna ecology.

In his presentation Professor Raats gave an overview of the programme on the science of free ranging animals, explaining, among other things, the mission of the faculty with respect to research. He raised serious concerns about matters that impeded research within the faculty including the lack of permanent staff within departments and the standard of students recruited to this programme.

The review panel was taken on a field trip to research sites where various experiments were explained in detail by the researchers and students. This was followed by a meeting between the review panel and students giving them an opportunity to make inputs with respect to the RS/NRF Programme.

## **1. Research Capacity**

During the five-year period of funding by the RS/NRF Programme seven graduates were produced (one PhD, three MSc and one honours), 11 were involved with MSc research, three MSc students completed their theses but had not yet graduated, two were completing their PhD theses and two intended to register for the PhD degree.

A total of 29 visits involving 13 individuals by UK scientists were conducted during the period. Three staff members of the UFH visited the UK partners on various occasions to discuss their collaborative work.

## **2. Research Outputs**

With respect to direct research outputs there were nine publications in peer-reviewed journals, two in other journals, two in peer-reviewed proceedings, one chapter in a book, six theses, six technical reports and 15 unpublished conference presentations.

The postal reviewers agreed that on the whole the research outcomes were unimpressive and that most publications were in low profile journals. The postal reviewers indicated that the self-assessment report by the project leader included work that was unrelated (or is at best marginally related) to the research Programme. The report seemed to be inflated.

The research outputs emanating from this project were clearly important to farming practices in southern Africa; however, they had not led to the production of new scientific knowledge. The work was best described as developmental.

### **3. Institutional Benefits and Contributions**

Throughout the five-year period of this project, the UFH was in a financial crisis and the University's contribution to this project was, therefore, limited in extent. The following items exemplified the contributions made by the University; maintenance of basic infrastructure (i.e. salaries, telephone, postage, lecture materials, electricity and water); repair and maintenance of vehicles and laboratory equipment; management of external funds through the establishment of the Fort Hare Foundation. The latter initiative had proved very successful as a mechanism to safeguard external funds.

The University had adequate facilities with respect to the experimental farm and equipment. In financial terms the UFH claimed to have invested R 141 021,00 (approximately R10 = £1).

The UFH continued to experience difficulties in attracting and retaining good quality postgraduate students. With the exception of links with UK scientists, the University appeared to have problems in establishing and sustaining any other collaboration. This was made clear by the self-evaluation report.

### **4. Programme Management**

The South African project leader, Professor J Raats, expressed satisfaction with the management of the programme by the RS/NRF managers. However, registered Masters students appeared not to have benefited from overseas visiting scientists, in fact, the students interviewed did not recall meeting such visitors, although the list of visiting scientists was impressive. This may have been due to the fact that students of longer standing had moved on to other work and the present group were relatively new. Students seemed to be struggling with experimental design and research methodologies. The success of an investment of this nature depended largely on the supervision given to students.

### **5. Status of the Project and Research Group**

The project leader was very enthusiastic about the RS/NRF Programme. If the momentum and enthusiasm could be maintained it could have long term benefits for the UFH.

The mini-symposium on communal rangelands held at the UFH raised the academic profile of the Department and had the desired impact on students at UFH.

The Team confirmed the views of the postal reviewers that the research outcomes judged on international standards were unimpressive and on the national scale had a very low impact. Much more could have been achieved given the extent of financial investment by the RS/NRF Programme.

## 6. Summary

- i. The staff at UFH seemed to have concentrated their efforts on capacity development only and largely ignored the objective of building a centre of research excellence. In fact in the specific objectives of this project, building a centre of excellence was omitted, although in the main objectives of the RS/NRF Programme it was listed as one of the objectives.
- ii. The research outcomes with respect to attracting postgraduate students and the degrees obtained by staff and students were impressive. It appeared, however, that students benefited minimally from overseas visitors.
- iii. The number of PhD students had increased only slightly, although enthusiasm for research was much higher than it was initially. Both staff and students raised the concern that if RS/NRF Programme was not extended, the Faculty of Agriculture would experience financial difficulties and these projects might be discontinued. This would affect the progress of registered students because there would be no money to sustain their research projects.
- iv. The work done by the Faculty of Agriculture at this University was of a more developmental nature and will not lead to production of original knowledge. There were reservations as to whether the RS/NRF can justify funding this type of work.



## OVERALL EVALUATION

### Fitness of Purpose

The main objectives of the programme when it was first conceived were:

- To increase the number and quality of black researchers and lecturers in Science Engineering and Technology in selected South African universities
- To improve access of black scientists to UK research and research institutions
- To establish centres of excellence in specific historically black universities through collaboration with UK partner institutions
- To encourage collaborative research projects between centres of excellence in the UK and S Africa

At the time of Programme's inception, the above objectives were believed to be deliverable. However, the Review Panel noted that the objectives did not give due cognisance to the deeper structural problems in S African education, viz poor provision in schools for science education, problems in undergraduate science recruitment, and the need for students to support their families. In addition, the poor resourcing of HBUs and their geographical restrictions were perhaps underestimated. Achieving all the original aims was likely to be difficult in the short span of 5 years. Perhaps more effort could have been made towards meeting the objective of capacity building through interactions between S African HBUs and HWUs<sup>5</sup>, in addition to adopting the route of doing this through international, and in this case, UK interactions.

Given the realities of the situation in HBUs, the focus of the programme quite understandably shifted over time to emphasise the developmental and community aspects of the programme.

In those universities which were able to attract other sources of funds even before this programme, the original aims were realised more easily than those where the RS/NRF funding was virtually the only avenue towards improving infrastructure and retaining students and staff. There were also clear synergies between the RS/NRF funding and bursaries and equipment grants from other programmes, in particular the IRDP. This leads to the question of whether each of the programmes chosen was appropriate to realising the objectives, and to the issue of suitability of the project leaders, both in S Africa and in the UK. The Review Panel believes, even within the overall policies of the S African government on widening of participation, that some form of open competition, could have identified stronger programmes and leaders.

Overall, the objective of creating centres of excellence in research was over-ambitious.

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<sup>5</sup> HWU- historically white university

## **Fitness for Purpose**

The programme structure and mechanisms were sensibly designed to be flexible, with the lightest touches of management. At the Royal Society, budgets submitted by project leaders were agreed yearly in advance, and variations applied for if necessary.

The institutions were expected to make significant contributions to ensure the success of the programmes, even though they were operating under considerable disadvantages. Given the subsequent severe governance, management and financial problems experienced by two of the four universities, and the limited ability to provide essential support (IT, instrument maintenance, staff appointments) at the other two, the Panel feel that greater guidance could have been given to institutions in the role they were expected to play.

## **Performance and Goal Attainment**

The programme achieved a great deal in capacity building, as evidenced by the number of university staff gaining higher degrees, and in the progression of graduates to Honours and MSc courses. The number of doctoral students had increased overall. The programme had made it possible for participating laboratories to be equipped with machines and instruments and for staff and students to travel overseas and to attend conferences in S Africa or overseas.

While it was clear that the involvement of UK project leaders contributed to the essential international linkages, the Team could not conclude that the programmes had achieved outputs of international standing.

## **Stakeholder Satisfaction and Impact**

Stakeholders include the HBUs, NRF, RS, projects leaders, staff and students. Without exception, the institutions housing the programmes reported benefits from participation which ranged from tangible additions such as instrumentation to those of perception, such as the feeling of being included in the international science scene, and increased esteem of peers. All urged the continuation of support to enable the start of previously untried activity to continue. SA and UK project leaders showed commitment and satisfaction as well as gratitude to the programme principals, and acknowledged the intellectual and personal contribution it made. From the point of view of realising the goals of capacity building, it had considerable impact.

Bearing in mind the political impetus given to the programme at its inception, it was noted that Britain's science Minister, Lord Sainsbury praised this programme when he visited one of the projects at the University of Western Cape in 1999 'as a model of international bilateral collaboration.' For the Royal Society, this experiment in capacity building can be shown to have been successful in addressing equity problems in S Africa by the real increase in numbers of black lecturers with PhDs and Masters degrees, by the remarkable numbers of undergraduates encouraged to stay on for postgraduate training, and more significantly, to have bolstered a research culture and elevated the status of HBUs in S African higher education. The Society has also benefited from its hugely raised profile in S Africa. Against the background of the unfavourable circumstances in many of the HBUs

when the programme began, it was necessary to acknowledge the difficulty of achieving research results in a short time; in terms of becoming internationally competitive centres of research excellence, the HBUs supported have some distance to travel.

## CONCLUSIONS

1. The RS/NRF Programme has successfully stimulated a research culture in a range of Departments in four HBUs and it has been accompanied by a beneficial ripple effect in each of them.
2. Considerable advances have been made within each project in terms of research outputs and building research capacity compared with the situation five years ago. The broad objective of increasing the number and quality of black researchers and lecturers in Science, Engineering and Technology has been achieved to a variable degree.
3. A further broad objective was to establish centres of excellence in each of these HBUs through collaboration with UK partners. This objective proved overly ambitious in the time allowed and has not yet been fully realised. Only the University of the North (and possibly the University of Western Cape) provided evidence of the potential to become such centres.
4. In several of the four Universities young black scientists have collaborated with centres of excellence by visits to UK laboratories. Some of these scientists are establishing themselves nationally and have made good use of international contacts through study visits, attending conferences overseas and publishing their work in peer reviewed journals. None have yet published their work in high profile internationally recognised journals independently.
5. The partnership model developed by the RS and NRF has worked well and achieved several of its objectives. The management arrangements based on shared leadership between UK and South African project leaders have been generally successful. The uneven development of each project highlights the need for strong leadership in such a programme, in the most successful examples it was the dynamics of the individuals who made the essential differences. Thus, the tragic death of one of the South African Project Leaders set the project back for at least 10 months. Two of the four HBUs had required intervention by the Education Minister at the Council or Vice-Chancellor level. The Team acknowledged that there were other ways to rapidly increase the number of black scientists by providing mechanisms that enable them to work in the competitive ambience of international science in the leading laboratories in SA.

## RECOMMENDATIONS

1. The RS/NRF Programme had successfully initiated a research culture in certain Departments and enhanced it in others of the four selected HBUs, and in building their research capacity. It is recommended that the Royal Society and NRF should examine mechanisms to build on the successes to establish a larger cohort of doctoral students. This recommendation has in mind the National Plan for Higher Education, and aims to address issues of equity, the predicted need for greater numbers of black doctoral students for the future demands of the South African economy, and the requirement for highly qualified people in higher education.
2. The NRF should ensure young black scientists in this Programme who are currently registered for a Masters or PhD degree are able to complete their studies. The Royal Society should publicise its existing schemes of study visits and joint project arrangements to encourage applications from black postdoctoral scientists.
3. It is recommended that the Royal Society should work with the Academy of Science of South Africa to establish study visits and joint projects for the benefit of UK and South African black scientists. Both sides would provide funding for travel with the cost of subsistence being met by the host country. Currently, these arrangements are in place between the RS and NRF.
4. The NRF and the Academy are encouraged to examine parallel models such as schemes designed to identify the 'brightest poor' and introduce them to the best laboratories in South Africa. The purpose would be to provide experience of international science at the highest level. For example, a limited number of prestigious tenure-track awards could develop a cohort of young black scientists who would play a major part in the future of South African science and technology.
5. The RS should explore the opportunities of funding from the UK Department for International Development and other bodies concerned with equity and poverty eradication, central themes of this Programme and the NRF.

Student involvement in the project: Computational Modelling in Materials Science

UNIVERSITY OF THE NORTH

TABLE 1

Degree	Year	First Registration	Race		Gender			Part-time	Full-time	Numbers Graduated
			B	C	V	M	F			
Honours	1996	3	3	-	-	3	-	-	3	3
	1997	5	5	-	-	5	-	-	5	4
	1998	3	3	-	-	1	2	-	3	2
	1999	9	9	-	-	8	1	-	9	9
	2000	8	8	-	-	6	2	-	8	8
<b>TOTAL</b>		<b>28</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>5</b>	<b>-</b>	<b>28</b>	<b>26</b>
Masters	1996	1	1	-	-	1	-	1	-	-
	1997	4	4	-	-	4	-	3	1	1
	1998	2	2	-	-	2	-	-	2	4
	1999	1	1	-	-	-	1	-	1	2
	2000	3	3	-	-	2	1	1	2	1
	2001	-	-	-	-	-	-	-	-	3
<b>TOTAL</b>		<b>11</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>11</b>
Doctorate	1996	-	-	-	-	-	-	-	-	-
	1997	1	1	-	-	1	-	1	-	-
	1998	-	-	-	-	-	-	-	-	1
	1999	1	1	-	-	1	-	1	-	-
	2000	-	-	-	-	-	-	-	-	-
	2001	-	-	-	-	-	-	-	-	1
<b>TOTAL</b>		<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>

Student involvement in the project: Plant Biotechnology and Protein Engineering

UNIVERSITY OF THE WESTERN CAPE

TABLE 2

Degree	Year	First Registration	Race			Gender		Part-time	Full-time	Numbers Graduated
			B	C	W	M	F			
Honours										
	1998	9	7	2	-	2	7	-	9	9
	1999	4	3	1	-	2	2	1	3	3
	2000	3	3	-	-	2	1	-	3	3
<b>TOTAL</b>		<b>16</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>10</b>	<b>1</b>	<b>15</b>	<b>15</b>
Masters										
	1998	2	2	-	-	1	1	-	2	-
	1999	6	5	1	-	4	2	-	6	2
	2000	3	2	1	-	3	-	-	3	5
	2001	-	-	-	-	-	-	-	-	2
<b>TOTAL</b>		<b>11</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>3</b>	<b>0</b>	<b>11</b>	<b>9</b>
Doctorate										
	1998	1	-	1	-	1	-	1	-	-
	1999	2	1	1	-	1	1	1	1	-
	2000	1	1	-	-	-	1	1	-	-
<b>TOTAL</b>		<b>4</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>

**Student involvement in the project: Strategic Zoological Studies in Aquatic and Terrestrial Environments**

**UNIVERSITY OF THE WESTERN CAPE**

**TABLE 3**

Degree	Year	First Registration	Race			Gender		Part-time	Full-time	Numbers Graduated
			B	C	W	M	F			
Honours	1996	6	1	5	-	3	3	-	6	5
	1997	7	3	4	-	2	5	-	7	7
	1998	6	-	6	-	3	3	1	5	6
	1999	6	2	4	-	-	6	1	5	6
	2000	10	-	10	-	4	6	-	10	10
<b>TOTAL</b>		<b>35</b>	<b>6</b>	<b>29</b>	<b>0</b>	<b>12</b>	<b>23</b>	<b>2</b>	<b>33</b>	<b>34</b>
Masters	1996	5	-	4	1	3	2	3	2	0
	1997	4	-	3	1	3	1	2	2	1
	1998	2	-	1	1	2	-	1	1	3
	1999	4	1	3	-	2	2	1	3	4
	2000	3	1	2	-	2	1	1	2	2
	2001	-	-	-	-	-	-	-	-	4
<b>TOTAL</b>		<b>18</b>	<b>2</b>	<b>13</b>	<b>3</b>	<b>12</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>14</b>
Doctorate	1996	1	-	1	-	-	1	-	1	-
	1997	1	-	1	-	1	-	-	1	-
	1998	3	-	2	1	2	1	3	-	1
	1999	4	-	3	1	2	2	3	1	1
	2000	1	-	1	-	1	-	1	-	-
	2001	-	-	-	-	-	-	-	-	3
<b>TOTAL</b>		<b>10</b>	<b>0</b>	<b>8</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>7</b>	<b>3</b>	<b>5</b>



**Student involvement in the project: Applications in Coordination and Organometallic Chemistry**

**UNIVERSITY OF ZULULAND**

**TABLE 4**

Degree	Year	First Registration	Race			Gender		Part-time	Full-time	Numbers Graduated
			B	C	W	M	F			
Honours	1996	-	-	-	-	-	-	-	-	-
	1997	-	-	-	-	-	-	-	-	-
	1998	-	-	-	-	-	-	-	-	-
	1999	1	1	-	-	-	1	-	-	DECEASED
	2000	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>		<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>
Masters	1996	-	-	-	-	-	-	-	-	-
	1997	2	1	-	1	-	2	1	1	1
	1998	-	-	-	-	-	-	-	-	-
	1999	1	-	1	-	-	1	-	1	1
	2000	2	2	-	-	2	-	-	2	-
	2001	-	-	-	-	-	-	-	-	2
<b>TOTAL</b>		<b>5</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>4</b>
Doctorate	1996	-	-	-	-	-	-	-	-	-
	1997	1	1	-	-	1	-	-	1	-
	1998	-	-	-	-	-	-	-	-	-
	1999	-	-	-	-	-	-	-	-	-
	2000	2	2	-	-	1	1	1	1	1
	2001	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>		<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>

## Student involvement in the project: Science of Free Ranging Animals

### UNIVERSITY OF FORT HARE

**TABLE 5**

Degree	Year	First Registration	Race			Gender		Part-time	Full-time	Numbers Graduated
			B	C	W	M	F			
BSc Final Yr	1996	6	6	-	-	5	1	-	6	6
	1997	6	6	-	-	6	-	-	6	6
	1998	8	8	-	-	8	-	-	8	6
	1999	6	6	-	-	6	-	-	6	6
	2000	9	9	-	-	6	3	-	9	8
<b>TOTAL</b>		<b>35</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>4</b>	<b>0</b>	<b>32</b>	<b>26</b>
Honours	1996	10	10	-	-	10	-	1	9	8
	1997	4	4	-	-	4	-	2	2	2
	1998	3	3	-	-	3	-	2	1	2
	1999	3	3	-	-	3	-	3	-	2
	2000	2	2	-	-	2	-	2	-	-
	2001	-	-	-	-	-	-	-	-	3
<b>TOTAL</b>		<b>22</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>0</b>	<b>10</b>	<b>12</b>	<b>17</b>
Masters	1996	4	4	-	-	3	1	-	4	0
	1997	3	3	-	-	3	-	-	3	0
	1998*	9	9	-	-	9	-	-	9	1
	1999*	4	4	-	-	3	1	-	4	2
	2000*	6	6	-	-	4	2	-	6	3
	2001	-	-	-	-	-	-	-	-	10
<b>TOTAL</b>		<b>26</b>	<b>26</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>4</b>	<b>0</b>	<b>26</b>	<b>16</b>
Doctorate	1996	3	3	-	-	3	-	-	3	0
	1997	2	2	-	-	2	-	-	2	-
	1998	2	2	-	-	2	-	-	2	1
	1999	2	2	-	-	2	-	2	-	-
	2000	1	1	-	-	1	-	1	-	-
	2001	-	-	-	-	-	-	-	-	3
<b>TOTAL</b>		<b>10</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>3</b>	<b>7</b>	<b>5</b>

\* From 1998 graduates (4yr BSc.Agric.) were allowed to register for the 2 yr. MSc degree, which included the full Honours programme plus a full research thesis covering at least two season's fieldwork.

## Total Number of Student Involvement

### TABLE 6

Degree	Year	First Registration	Race			Gender		Part-time	Full-time	Numbers Graduated
			B	C	W	M	F			
Honours	1996	19	14	5	-	16	3	1	18	16
	1997	16	12	4	-	11	5	2	14	13
	1998	21	13	8	-	9	12	3	18	19
	1999	23	18	5	-	13	10	5	18	20
	2000	23	13	10	-	14	9	2	21	21
	2001	-	-	-	-	-	-	-	-	<b>3</b>
<b>TOTAL</b>		<b>102</b>	<b>70</b>	<b>32</b>	<b>0</b>	<b>63</b>	<b>39</b>	<b>13</b>	<b>89</b>	<b>92</b>
Masters	1996	12	7	4	1	8	4	4	8	-
	1997	13	8	3	2	10	3	6	7	6
	1998	15	13	1	1	14	1	1	14	10
	1999	16	11	5	-	9	7	1	15	7
	2000	17	14	3	-	13	4	2	15	10
	2001	-	-	-	-	-	-	-	-	17
<b>TOTAL</b>		<b>73</b>	<b>53</b>	<b>16</b>	<b>4</b>	<b>54</b>	<b>19</b>	<b>14</b>	<b>59</b>	<b>50</b>
Doctorate	1996	4	3	1	-	3	1	-	4	-
	1997	5	4	1	-	5	-	1	4	2
	1998	6	2	3	1	5	1	4	2	2
	1999	9	4	4	1	6	3	7	2	1
	2000	5	4	1	-	3	2	4	1	1
	2001	-	-	-	-	-	-	-	-	7
<b>TOTAL</b>		<b>29</b>	<b>17</b>	<b>10</b>	<b>2</b>	<b>22</b>	<b>7</b>	<b>16</b>	<b>13</b>	<b>13</b>

**SUMMARY OF STAFF DEVELOPMENT**

**TABLE 7**

Project	Degrees Completed			Gender		Awarding Institution		TOTAL
	Honours	MSc	PhD	M	F	Abroad	Home Institution	
UNO Computational Materials Modelling Professor PE Ngoepe	-	7	1	8	-	-	8	8
UWC Strategic Zoological and Terrestrial Environments Professor WJ Veith	1	1	2	2	2	1	3	4
UFH Science of Free Range Animals Professor JG Raats	-	1	-	1	-	-	1	1
UZ Applications in Co- ordination and Organometallic Chemistry Professor GA Kolawole	-	1	1	1	1	1	1	2
UWC Plant Biotechnology and Protein Engineering Professor DJG Rees	-	1	-	-	1	-	1	1
<b>TOTAL</b>	<b>1</b>	<b>11</b>	<b>4</b>	<b>12</b>	<b>4</b>	<b>2</b>	<b>14</b>	<b>16</b>

**NUMBER OF PUBLICATIONS**

**TABLE 8**

Project	Books and chapters in Books				Scientific Papers					
	1996 1997	1997 1998	1999 2000	2000 2001	1996 1997	1997 1998	1998 1999	1999 2000	2000 2001	TOTAL
UZ Applications in Coordination and Organometallic Chemistry Prof Kolawole	-	-	-	-	2	-	5	7	8	<b>22</b>
UNO Computational Modelling in Materials Science Prof Ngoepe	-	-	-	-	-	1	2	6	4	<b>13</b>
UFH Science of Free Range Animals Prof Raats	2	1	3	-	4	1	5	6	7	<b>23</b>
UWC Strategic Zoological Studies in Aquatic and Terrestrial Environments Prof Veith	-	-	3	2	-	5	12	16	13	<b>46</b>
<b>TOTAL</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>2</b>	<b>6</b>	<b>7</b>	<b>24</b>	<b>35</b>	<b>32</b>	<b>104</b>

## CONFERENCE PRESENTATIONS

TABLE 9

Project	International Conference Presentations						Local Conference Presentations					
	1996 1997	1997 1998	1998 1999	1999 2000	2000 2001	TOTAL	1996 1997	1997 1998	1998 1999	1999 2000	2000 2001	TOTAL
UZ Applications in Coordination and Organometallic Chemistry Prof Kolawole	1	1	5	5	6	<b>18</b>	-	-	-	-	-	-
UNO Computational Modelling in Materials Science Prof Ngoepe	3	3	6	2	2	<b>16</b>	-	14	17	17	19	<b>67</b>
UFH Science of Free Range Animals Prof Raats	7	3	-	4	-	<b>14</b>	23	5	12	6	7	<b>53</b>
UWC Strategic Zoological Studies in Aquatic and Terrestrial Environments Prof Veith	-	1	10	1	30*	<b>42</b>	-	2	10	27	1	<b>40</b>
UWC Plant Biotechnology and Protein Engineering Prof Rees	-	-	-	3	5	<b>8</b>	-	-	-	1	4	<b>5</b>
<b>TOTAL</b>	<b>11</b>	<b>8</b>	<b>21</b>	<b>15</b>	<b>43</b>	<b>98</b>	<b>23</b>	<b>21</b>	<b>39</b>	<b>51</b>	<b>31</b>	<b>165</b>

\*5 Conference attended but team gave total of 30 presentations.

## APPENDIX 1

### ITINERARY OF PROGRAMME

**Monday, 19 March 2001**

#### **Meeting with NRF Executive and staff**

Dr K Mokhele (President)  
Dr G von Gruenewaldt (Vice-President)  
Dr PA Nevhotalu (Executive Director)  
Mr CN Nxomani (Manager: Institutional Research Development Programme)  
Ms GU Schirge (Manager, Evaluation Centre)  
Mrs M Pienaar (Coordinator, Evaluation Centre)  
Mrs L Kleingbiel (Programme Organiser)  
Prof JPF Sellschop (President of the Royal Society of South Africa) – only lunch

**Tuesday, 20 March 2001**

#### **Meeting with Vice-Chancellor and executives at University of Fort Hare**

Prof D Swartz (Vice-Chancellor)  
Prof NS Rembe (Acting Executive Dean of Research and Development)  
Prof JG Raats (Acting Executive Dean of Agriculture)  
Mr R Olander (Deputy Vice-Chancellor Finance and Administration)  
Mr A Shaw (Registrar)  
Mr L Jacobs (Director Marketing and Communications)  
Mr A Magadlela (Project team member)

#### **Review of the project: *The Science of Free-Ranging Animals* Followed by field to research sites**

Review panel	Mr AB Joubert (Team member)
Prof D Swartz	Mr RM Baxter (Team member)
Prof JG Raats	Dr PF Scogings (Team member)
Prof NS Rembe	Mr A Magadlela (Team member)
Prof JM Brand	Mr WM Goqwana (Team member)
Mr R Olander	Prof WSW Trollope (Team member)
Mr A Shaw	Prof SM Waladde (Team member)
Mr L Jacobs	Dr P Masika (Team member)

Students:

Mr N Ganqa

Mr M Mpahla

Mr M Macanda

Mr S Nibe

Mr S Ndebele

Mr MM Kuselo

Mr M Mapekula

**Wednesday, 21 March 2001 (Public holiday)**

**Thursday, 22 March 2001**

**Meeting with Vice-Chancellor and executives at University of the Western Cape**

Prof I van de Rheede (Acting Vice-Chancellor)

Prof T Pretorius (Vice-Rector: Academic)

Prof R Christie (Dean of Research)

Prof JM van Bever Donker (Dean of Natural Science)

**Review of project: *Plant Biotechnology and Protein Engineering***

Prof DJG Rees (Project Leader)

Dr D Pugh (Deputy Project Leader and Protein structure specialist)

Prof CA Gehring (Team member, Department of Biotechnology)

Dr G Bradley (Team member, Department of Biochemistry)

**Meeting with Vice-Chancellor and University executives of the University of Cape Town**

Prof NS Ndebele (Vice-Chancellor)

Prof BD Reddy (Dean of Science)

Prof S Sibisi (Deputy Vice-Chancellor, Research)

**Meeting with members of the Royal Society of South Africa (RSSA) and the Academy of Science of South Africa (ASSA)**

Prof GFR Ellis (Past President of the RSSA; member of the ASSA)

Dr PA Whitelock (Member of the Council of the RSSA; nominated member of the ASSA)



Prof JA Thomson (Past Vice-President of the RSSA; member of the Council of the RSSA)

**Friday, 23 March 2001**

**Review of project: *Strategic zoological studies in aquatic and terrestrial environments***

Prof WJ Veith (Project Leader)  
Prof MJ Gibbons (Team member)  
Prof MD Hofmeyr (Team member)  
Dr M Kelly (UK Project Leader)

**Monday, 26 March 2001**

**Meeting with Vice-Chancellor and executives at University of Zululand**

Prof CRM Dlamini (Vice-Chancellor)  
Prof T Dube (Deputy Vice-Chancellor)  
Prof MF Coetsee (Dean: Faculty of Science)  
Prof GA Kolawole (Head of the Department of Chemistry and Project Leader)  
Dr N Revaprasadu (Deputy Project Leader)  
Prof PO'Brien (UK Project Leader)

**Review of project: *The Application in Coordination and Organometallic Chemistry***

Interaction with Postgraduate students / Research fellow

Dr T Radhakrishnan (Visiting Research fellow)  
Ms SP Nair (PhD Student)  
Mr J Moloto (PhD Student)  
Mr P Musetha (MSc Student)  
Mr L Sinuka (MSc Student)

**Tuesday, 27 March 2001**

**Meeting with Administrator, executives and staff at University of the North**

Prof DCJ Wessels (Acting Dean of Research)  
Dr NM Mokgalong (Dean of Natural Sciences)  
Mr SJ Mothapo (Administrator)

Mr MD Masipa (Administrator)  
Mr G van der Speck (Administrator)  
Mrs M Pretorius (Administrator)  
**Review of project: *Computational Modelling in Material Science***

Prof PE Ngoepe (Project Leader)  
Dr HM Sithole  
Dr TT Netshisaulu  
Mr PS Ntoahae  
Mr KR Kganyago  
Mr M Netsianda  
Mr MF Phala

**Wednesday, 28 March 2001**

**Meeting with Vice Chancellor and Executives of University of Pretoria**

Prof J Van Zyl (Vice-Chancellor)  
Prof NC Manganyi (Advisor to the Vice-Chancellor; Foreign Secretary of the Royal Society of South Africa)  
Prof JAG Malherbe (Executive Director)  
Prof T Erasmus (Vice-Rector)

**Dinner to be hosted by the NRF President**

Dr K Mokhele  
Dr G von Gruenewaldt  
Dr PA Nevhutalu  
Dr R Kfir (Executive Director, NRF)  
Mr R Krige (Head: International Science Liaison, NRF)  
Prof LG Nongxa (Deputy Vice-Chancellor (Academic), University of the Witwatersrand)  
Prof C Pistorius (Dean of Engineering, University of Pretoria)  
Prof E Tyobeka (Vice-Rector, Technikon Witwatersrand)  
Prof L Glasser (Panel member of the Royal Society / FRD SET Programme review panel, 1999.)

**Thursday, 29 March 2001**

**Review team to report back to the NRF Executive**

NRF Executive members  
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## APPENDIX 2

### Summary of the National Plan for Higher Education

Areas in which the National Plan for Higher Education may impinge on the evaluation of the RS/NRF Programme are as follows:

- It proposes that the participants in higher education should be increased from 15% to 20% in the long term with any increase in the short to medium-term being effected by improving the efficiency of the higher education systems through graduate outputs.
- It proposes to shift the balance in enrolments in the next five to ten years between the humanities, business and commerce and science, engineering and technology from the current ratio of 49% : 26% : 25% to 40% ; 30% : 30% respectively.
- It recognises that equity of access still remains a problem as black and women students are under-represented in business, commerce, science, engineering and technology programmes, as well as in postgraduate programmes in general.
- It states that institutions will be expected to establish equity targets.
- It states that institutions will be expected to develop employment equity plans with clear targets for rectifying race and gender inequities.
- It supports the view that to achieve the transformation goals of the government white paper, the higher education system must be differentiated and diverse.
- It indicates that the programme mix at each institution will be determined on the basis of its current profile.
- It states that redress for historically black institutions will be linked to agreed missions and programme profiles, including developmental strategies to build capacity, in particular, administrative, management, governance and academic structures.
- It proposes to introduce a separate component for research in the funding formula in order to ensure greater accountability and the more efficient use of limited research resources and that this formula will be based on research outputs, including, at a minimum, masters and doctoral graduates and research publications.
- It states that earmarked funds will be allocated to build research capacity, including scholarships to promote postgraduate enrolments, which would contribute to building the potential pool of recruits for the academic labour market.

- It proposes that the institutional landscape of higher education must be restructured to create new institutional and organisational forms to address the racial fragmentation of the system, as well as administrative, human and financial capacity constraints. They will be achieved through
  - i. Institutional collaboration at the regional level in programme development, delivery and rationalisation, in particular, of small and costly programmes, which cannot be sustained across all the institutions
  - ii. Investigating the feasibility of a more rational arrangement for the consolidation of higher education provision through reducing, where appropriate, the number of institutions but not the number of delivery sites on a regional basis.