

DST-NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

ANNUAL PROGRESS REPORT & GATE REVIEW

Reporting Period

From: Date of signature of MoU

To: 31 December 2004

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Identification

Name of Director	:	Professor Steven L Chown
Name of CoE	:	DST-NRF Centre of Excellence for Invasion Biology
Abbreviated CoE Name	:	Centre for Invasion Biology
Host institution	:	Stellenbosch University
Date completed	:	03/03/2005

EXECUTIVE SUMMARY

1. Financial Information (Funding of the CoE)

Total NRF funding for 2004	:	R 2,997,000.00
Funding from Host institution in 2004	:	R 81,458.56
Funding from other sources for the CoE in 2004	:	R 27,834.67
Total funding	:	R 3,106,293.23

Building costs: R 1,040,000.00

2. Summary of progress against 5 KPAs. (Please limit your responses to completed tasks or work in progress and exclude plans for the future.)

(i) Research

Research is fully underway for the bulk of the long-term research projects being undertaken within the C-I-B, with the exceptions of work on roadsides as reserves and bridgeheads, and invasion and remediation effects on biodiversity, which has commenced. The short-term research projects are already delivering results. The C-I-B address has appeared on eight published papers to date.

(ii) Education and Training

Nine students (two at undergraduate, six at Hons. level, one Ph.D.) were funded in 2004, and those that took finals passed their courses, with the six Hons. students all going on to do M.Sc. degrees, typically with C-I-B core team members or in close association with them. No post-doctoral associates were registered in 2004, but many applications for studentships and post-doctoral positions were received for the 2005 year and more than 50 students were provisionally funded for 2005.

(iii) Information Brokerage

Scientific information has been provided via conventional publication, conference and teaching routes to students and peers. A fully functional home page is in place that provides general information on the C-I-B as well as specific news items. The *Limbacu* Outreach programme is underway and the Darwin Initiative bid is through to the second stage. A knowledge and data management strategy is presently being developed and capacity built in this area.

(iv) Networking

Several memoranda of agreement have been negotiated with partners both in South Africa and abroad. Locally, these include Working for Water, Kruger National Park, South African Institute for Aquatic Biodiversity, and the SA Antarctic Programme (as well as the logistics section within DEA&T). Formal MoUs are due to be signed in 2005. An agreement was also reached with the University of the Western Cape to support a student registered there.

(v) Service rendering

The C-I-B has become extensively involved in the development of the regulations for alien and invasive species for the Biodiversity Act. This has been accorded priority owing to the strategic importance of reducing the scale and extent of impacts by alien and invasive species. Other service provision includes revision of the Prince Edward Islands Management Plan and a risk

assessment for the likelihood and pathways of invasion of the islands, as well as service to the NRF.

3. What was the gender impact of your work?

Research within the C·I·B has just commenced. In consequence it is not possible to indicate the gender impacts thereof at this point. However, gender equity has been a primary consideration in the appointment of staff within the Centre and in the recruitment of students. Moreover, negotiations with a sociologist concerned with gender issues in science commenced in 2004.

4. Red Flags. Please indicate any major concerns you have for the future of your CoE

Undoubtedly the single largest concern that the C·I·B has is the likely scale of work that it might face if the regulations flowing from the Biodiversity Act are developed in a “guilty until proven innocent” manner. Any institution concerned with alien and invasive species will be overwhelmed by work, and this means requests for service provision. The only other concern we have is the uncertainty of our operations in the face of the cash flow changes made by the NRF. All of the equipment purchases and several of the long-term initiatives have been put on hold while we try to ascertain the likely impact of the change in cash flow. Building up a savings to move to an April to March model is not straightforward for a Centre that has arisen *de novo*. Finally, we are concerned that what exactly the NRF envisages as a knowledge management system is not yet as clear as we would prefer.

5. General Comments

The C·I·B has been, and continues to be vigorously active. Unlike many of the other CoEs, we have few problems with soliciting service provision or engaging with like-minded groups both locally and abroad. If anything we have gained prominence more rapidly than we had anticipated. Nonetheless, this has not yet translated into the kinds of research prominence for which we are striving. Such distinction will be achieved only with careful, quiet, and dedicated research effort. It is hoped, at least from the core research group’s perspective, that this will now become possible. The climate of initial excitement is giving way to one of winding up the interdisciplinary aspects and settling into vigorous research production. In other words, we think that we are through the teething-phase of forming and are already geared up into the storming phase.

PROGRESS REPORT

Please record progress against specific objectives, projects and / or themes listed in your proposal. Please limit the discussion to complete work and work in progress. Use the following layout:

- a) Objective (Briefly restate the objective)
- b) Progress (Discuss progress against objective)

Please limit your reporting to less than two pages per KPA or reporting point.

1. Scientific Research

A. Objectives

The major objective of the research proposed within this Centre of Excellence is to understand the biodiversity consequences of biological invasions. A combination of long- and short-term research, on biodiversity patterns and processes, the way invasive species alter these, the lessons invasions can teach about biodiversity processes, and the approaches that might need to be taken to reduce the scale and impact of invasions form the key elements of this research.

B. Progress

Research work within the C-I-B had been ongoing for four months (September to December 2004) for the period of this report. In consequence, much of the research has been in the planning stages, including agreement by the core team members on long-term priorities, and initialization of the short-term research that was set out in the proposal and strategic plan. Nonetheless, good progress has been made in several of these areas and this progress is listed below. The boldfaced titles refer to the major research goals listed in the Strategic Plan. As a matter of principle, the C-I-B will not list outputs that have not been funded by or had funding contributions from the C-I-B.

Long-term work

Work on **listing and mapping species** has been initiated (partly ongoing work by core team members) and has already contributed to short-term research on large-scale patterns in diversity and on the status of several invasive groups (see below). The **risk assessment and scenario planning** work has been given additional impetus by the request, made by the National Task Team for developing the regulations for the National Environmental Management: Biodiversity Act, that the C-I-B assist with developing a risk assessment framework. This work is being pursued by core team members in the context of our developing interest in risk assessments and scenario planning. The large majority of the C-I-B core team will also participate in this work via a workshop scheduled for 2005. In addition, work on ecological impacts of genetically modified organisms (mostly crops) has been initiated. As a consequence of the commencement of duty of core staff only in 2005, little progress was made on the **invasive and remediation effects on biodiversity**. Initial meetings were held with Working for Water (Ahmed Kahn and Naomi Mdzeke) and these will be followed up in 2005 to settle on appropriate sites for the work. The **roadsides as reserves and bridgeheads** work is in a similar commencement state, although discussions are scheduled for 2005 with the National Roads Agency to facilitate interactions and research. Work on **spatial concordance in diversity and its temporal change** has been ongoing and is largely a continuation of work initiated previously by two of the core team members. Whilst the Drakensberg transect will be developed in 2005 (though logging of temperature is ongoing), a fifth sampling session on the Cederberg was undertaken in October 2004. Much of the earlier data were also analysed. Across the transect (stretching from Lambert's Bay to Wupperthal) temperature explains significant proportions of the variation in ant species density and abundance, and, together with area and several vegetation variables, contributes significantly to the separation of the assemblages in the major vegetation types and biomes. These findings have major implications in the context of climate change forecast for the area,

especially regarding myrmecochores, which are of considerable importance for ecosystem functioning in fynbos.

Short-term work

Work on **large scale patterns in biodiversity** has progressed well. Initial analyses of the environmental correlates of alien species richness and their relationship with indigenous plant species richness have been completed. These analyses are based on previous assessments of the distribution of alien and indigenous species, highlighting the need for ongoing mapping and listing. A review of the status and distribution of all known marine alien species has been completed. Investigations of human population density change and patterns in avian and frog species richness are also nearing completion, as is a global scale analysis of pelagic seabird species richness and the environmental correlates thereof. A critical review of large scale variation in biodiversity across the hemispheres was also completed and published in the open access journal *PLOS Biology*. The review commences with the well established fact that the poles are less diverse than the tropics. It then goes on to show that this decline and other biological features show substantial asymmetries between the northern and southern hemispheres. More equitable temperatures and unpredictability of rainfall in the south not only mean substantial differences in species life histories compared to the north, but also differences in the mechanisms underlying biodiversity variation, and in diversity and species interactions. These differences suggest that the patterns of responses to environmental change in the north may differ substantially from those in the south. Research on **interactions between indigenous and invasive species on the southern ocean islands** has not yet fully entered its next experimental phase (some of this work is being rolled over from other projects). However, a comprehensive review of alien introductions to the Antarctic was completed and will be published in 2005 in *Biological Reviews*. This work has shown that despite reasonably low human occupation of the region, there have been substantial numbers of microbial, fungal, plant and animal invasions, many of which have had dramatic impacts on ecosystem functioning. The level of invasions seems set to increase with increasing global warming as well as with enhanced tourism to the region, which is quantified as part of the overall review. Much work has also been done on the **determinants of invasion and scenarios of change**. A synthetic work on *Opuntia stricta* in the Kruger National Park, a global survey and predictive framework for invasive conifers, and an assessment of the climatic potential for the spread of plant invaders in South Africa, based on a climate modelling approach, were all published in the past year. This work was published in a special issue of the journal *Diversity and Distributions* devoted to plant invasion ecology. The focus on **impacts of invasion** has likewise taken off at a pace. For example, the fast-growing tree, *Rhus pendulina* (White Karee), from the Orange River area of the Northern Cape, is widely planted throughout South Africa as a street and garden tree. It appears to be behaving like an invasive alien plant, spreading outside its natural range. Initial surveys of planted and volunteer plants of this species in the village of Prince Albert indicate that it is the most common of all fleshy-fruited trees and shrubs to establish beneath bird perches in watered microsites. This is remarkable as the species was first introduced to the village through horticulture only 12 years ago. Locally indigenous *Rhus lancea*, *R. longispina* and *R. undulata* species are seldom planted, and rarely volunteer in either dry or irrigated sites in this village. Research from the core team has also documented the first escape of farmed oysters, *Crassostrea gigas*, in South Africa, and ascertained that invasive crabs, *Carcinus maenas*, appear to be unable to colonize the open exposed coastline of RSA because they can grip the substratum far less strongly than indigenous crabs. In the **ecosystem services and alien invasions** section, work has commenced on quantifying ecosystem services in South Africa, building on initial investigations undertaken as part of the Millennium Ecosystem Assessment. This is a new project and will be developed over the following few years together with an investigation of carbon sequestration potential across South Africa, which forms the basis for understanding the effects of invasions on ecosystem services. The only area in which work has not, as yet, commenced, is in the **social perceptions of invasion**. However, the C-I-B has initiated discussions with Heidi Prozesky at Stellenbosch University, who is currently engaged, *inter alia*, with research on the publication productivity of South African women scientists as part of a broader project on the status of women in science commissioned by the Department of

Science and Technology. It is hoped that these discussions will develop into a full-scale research collaboration in 2005.

2. Education and Training

A. Objectives

The C-I-B plans to educate students and provide them with career path opportunities from the undergraduate to the post-doctoral level and beyond.

B. Progress

Owing to the late start of the C-I-B, there was little opportunity for student education and training 2004. A total of nine students was funded in the latter part of the year, including two at the undergraduate level, six at the honours level, and one Ph.D. student. In those cases where exams were written all of the students passed their respective years. Ms. Gouws, Ms. Hampton, Ms. Irlich (top student in SU Zoology Hons)., Ms. Jordaan and Ms. Mgobozi have gone on to do Masters degrees, with the majority of them retaining their links with C-I-B core team members and enjoying funding from the C-I-B.

The C-I-B is effectively a new entity and thus we were not in a position simply to roll more senior post-graduate students over from other activities, nor was it considered wise to do so because the students typically were funded via other streams. However, a vigorous recruitment campaign was launched in the press, via the media (interviews on SAFM and Radio Sonder Grense), and using both electronic communication and hard copy advertisements via poster distribution. The response to the marketing was encouraging and by the end of 2004 the C-I-B and its core team members had received applications from well over 50 students (all levels) and 10 post-doctoral candidates. The large majority of these students had received provisional letters of funding from the C-I-B before the end of the year, and the statistics look good, with more than 50% female and more than 50% black students provisionally accepted at the end of the year.

In addition to the graduate student training, the C-I-B has also identified several HDI academics and approached one of them to engage in a collaborative programme as part of the development goals identified in the first SLA. Furthermore, the C-I-B supported travel by one core team member to the U.K. for in-service training in Bayesian statistical analysis. These skills will be returned to South Africa and transferred to both core team members and students. In late 2004 agreement was also reached with Dr. Lee Belbin, developer of the multivariate ecological package PATN, to present a workshop in 2005 on multivariate analysis of ecological data using this software. This workshop will be followed by intensive interactions between Dr. Belbin and the C-I-B Database Manager to ensure that a knowledge management structure is set in place, for data, metadata and for documentation emerging from the C-I-B.

3. Information Brokerage

A. Objectives

The objectives are to ensure access to scientific information by peers and students, enhance data availability to all scientists and to ensure long-term continued access, to facilitate communication amongst partners in the field, and to develop an outreach programme demonstrating the significance of biodiversity, and the threats posed to it by invasive species, to all sectors of society.

B. Progress

Scientific communication with peers

Information brokerage along conventional scientific routes has commenced with the publication of several papers in peer-reviewed scientific journals as well as plenary papers at both national and international scientific meetings (see *Outputs* below). Data from this work was not yet been archived centrally in the C-I-B owing to the fact that a database manager had not yet been employed. In addition, no knowledge management system was implemented in 2004. The development of an appropriate data and metadata archival and delivery system will be pursued in

2005. It should be noted that, in this context, the C-I-B has employed a relatively junior, though appropriately qualified data manager, to improve employment equity and to provide a career-path opportunity for a young, black South African scientist. The idea is that the database manager's skills will develop alongside the demand placed on the system. This will inevitably mean a learning curve for all, but in the interests of both performance and equity the C-I-B is prepared to follow this development process.

Scientific communication to students

Virtually all of the C-I-B's core team members are involved in teaching at their host institutions and remain closely involved with the development of undergraduate courses. Via this route, topical information on invasion ecology and biodiversity science can be provided from the C-I-B to undergraduates to attract them to a research career in ecology. The course scheduled for implementation at Stellenbosch University has been altered in keeping with the wholesale restructuring of the teaching and research programmes at the University. Nonetheless, a substantial element of invasion biology will still be taught both in the Faculty of Science and in the Faculty of Agricultural and Forestry Sciences.

The Database Manager is also in the process of developing an internal pdf library of reprints for use by members of the C-I-B. Owing to copyright issues, this library cannot be served up outside the University, but a WebCT-based interface will be explored in 2005 to do just this. If this route proves to be non-viable, then the library will still be accessible from the student computing area in the C-I-B.

Communication with partners

Communication with partner organizations via the Board has already proved effective in facilitating transfer of knowledge concerning the C-I-B and its activities. Interactions between researchers and their collaborators both locally and abroad have also ensured that the interests and goals of the C-I-B are now widely known both locally and internationally, and the C-I-B's activities have also featured both on international websites (e.g. USA Federal and State invasive species and activities programme <http://invasivespecies.gov/other/orginter.shtml>) and in the newsletters of prominent international organizations such as the Global Invasive Species Programme (GSIP News Issue 3 November 2004). In consequence, there has been substantial interest expressed in the development of research partnerships with the C-I-B (see *Networking* below).

The C-I-B has also agreed to act as a major sponsor for a one-day meeting on introductions, which constitutes the overlap day of the Zoological Society of Southern Africa and the Entomological Society of Southern Africa meetings to be held in Grahamstown, mid-2005. The theme will cover a range of topics including conventional invasion biology as well as re-introductions of species back into what is thought to have been their former natural ranges. Plenary speakers at this meeting will include Prof. D. Simberloff from the USA, as well as several local experts in their fields. A goal of this meeting is not only to promote the importance of work on the biodiversity consequences of biological invasions, but also to provide information on the activities of the C-I-B and to build appropriate research partnerships.

Publication of the annual reports of the C-I-B have yet to take place, but a report series will commence shortly including both these reports and those that are drafted as part of the other activities of the C-I-B (e.g. discussion documents on risk assessment protocols). These documents will be made available via the home page of the C-I-B. At present this site is regularly updated with news and features on the C-I-B and will shortly also include links to published research, as well as abstracts of this material.

Communication with the public

The *Limbaçu* Outreach programme has not yet commenced, although preparations for the work are well underway. Purchase of the equipment was delayed owing to cash-flow problems experienced by the NRF and a consequent adjustment of the way that the C-I-B does its

business. Nonetheless, the preparatory work has begun and included a successful first round bid to the Darwin Initiative for funding to support this programme with the assistance of skilled biodiversity scientists from the University of Sheffield (BIOME Group with whom an MOU is in the process of being signed). Development of the final proposal had commenced and was due to be submitted in early 2005. Because of restructuring within Stellenbosch University, the appointment of the science liaison officer on the Ellerman Foundation funds did not take place in 2004. However, the appointment is scheduled for 2005, and in the meantime, the Director has kept close touch with the local trustees of the Ellerman Resources Centre ensuring that they are fully aware of developments. The delay has meant that the more conventional outreach programme has not yet commenced. Kirsten Mahood, the Outreach Coordinator for the C-I-B (who took up office in January 2005), is managing the implementation of both programmes and has made excellent progress. The interactive parts of the C-I-B home page have also not yet been developed because both the Outreach Coordinator and Database Manager only commenced work in 2005. Further developing the home page is a priority for the coming year. Nonetheless, it should be noted that a strategic decision on the part of the C-I-B has meant that 40% of her time is presently devoted to service provision as part of the development of the regulations for the Biodiversity Act (see *Service Rendering* below).

By contrast with slow progress on the home page, there has been much success in the media campaign. Negotiation with a freelance journalist, Leonie Joubert, meant that the C-I-B enjoyed considerable media coverage over the time of the launch of the CoEs. Ms. Joubert published articles featuring the C-I-B in the Mail & Guardian (2-8 July 2004), Cape Times (2 July 2004), Farmers Weekly (23 July 2004), District Mail (30 July 2004), Wine News (17 September 2004), and Engineering News (14 October 2004). In October, as a consequence of the efforts of Engela Duvenhage (the freelance marketing consultant employed for six months by the C-I-B), radio interviews with the Director were featured both on SAFM and Radio Sonder Grense. The SAFM (Cape to Midnight Show) interview was particularly noteworthy because it took the form of talk radio, allowing direct communication between the Director and members of the public from across the country.

The letter of award from the NRF made clear the need to convince the public that invasions are problem that must be taken seriously, and the need to promote invasion biology as widely as possible in the media. At the first board meeting the need for consistent media interaction was also emphasized. To realise these requests, the Director signed an MoU with Dave Pepler, co-host and the force behind the popular *Kyknet* TV programme "*Groen*". Dave Pepler now occupies an office in the C-I-B and works closely with the team. In consequence, he promotes invasion biology issues on the programme both directly, and via the credits thanking the C-I-B, to a broad range of viewers across the country. M-NET has recently purchased rights to the programme which will now be translated and screened to tens of millions of viewers across Africa. A special edition of the programme featuring the C-I-B is planned for 2005.

Knowledge Management System

The C-I-B is in the process of developing a document management system that consists of a centralized electronic document warehouse which is fully searchable by author, title, category, and date, for its reporting and correspondence with the NRF, DST, host institution, partners, core team members and students. Two options are being investigated. An in-house MS-Access based system, and a very simple system based on the file and document management programme "EndNote" produced by the Institute for Scientific Information. Both are capable of providing direct, clickable links to word documents, images, pdfs, notes and a variety of electronic sources.

Metadata forms will be developed in 2005 in consultation with Dr. Lee Belbin (previous head of the Australian Antarctic Data Centre), as will a data archiving system.

4. Networking

A. Objectives

The C-I-B will formalize its interactions with local partners and will seek interactions with international partners working in the same broad fields. The partnerships will involve both research partnerships and partnerships based on complementarity of skills and core business directions.

B. Progress

An important component of networking by the C-I-B is the series of networks developed by core team members in their collaborations with researchers both locally and abroad. These are considered an indispensable part of modern scientific work and generally are far too extensive to report on here. Perhaps the best guide to their existence is the authorship lists of papers, the student co-supervisions developed by team members and their collaborators, and the invitations to present plenary papers at international and local meetings. Collaborations include those between D.M. Richardson and B.J. van Rensburg, Sue Milton and Karen Esler, Bettine J. van Vuuren and M.A. McGeoch, S.L. Chown and M. Somers, many of which involve shared student supervision.

In addition to these informal networks, the C-I-B has begun developing formal agreements with a variety of institutions and research groups. Meetings were held with the South African Institute for Aquatic Biodiversity, Kruger National Park (Llewellyn Foxcroft), Working for Water, the Biome Group at the University of Sheffield, the Directorate Antarctica and Islands of DEA&T, and the South African National Antarctic Programme. In the case of the SAIAB co-funding of one Ph.D. student (L. Vumazonki) and a post-doctoral associate (J. Wilson) is in place, and additional funding from the Global Environment Facility has been secured for further student training both in general invasion biology and in biological control. The partnership includes Prof. J. Hoffmann at the University of Cape Town. Formal MoUs have not yet been signed with the organizations listed above, although the plan is to do so in 2005. An additional collaboration has been established between the CSIR partner and the University of the Western Cape which will involve a student at the Masters level.

5. Service rendering

A. Objectives

The C-I-B plans to become known, within its first full year of operation, as *the* centre for obtaining reliable, credible scientific information on a wide range of biodiversity and biological invasion issues at a national level, or as the point of contact for reaching those who have much of this information.

B. Progress

Perhaps the most surprising development within the forming stage of the C-I-B has been the considerable demand for service provision by the Centre. The most important aspect of this service provision has been the request by Dr. Guy Preston, Head of the Working for Water Programme, for the C-I-B's core team members to assist with the development of the regulations for the alien species section of the National Environmental Management: Biodiversity Act. These regulations represent one of the most significant practical contributions that can be made to limiting the extent, diversity and impacts of alien and invasive species in South Africa. In consequence, in consultation with the core staff available at the time, the Director elected to make a considerable amount of time available, at no cost, to the National Task Team developing these regulations. This Task Team now includes several C-I-B members, and several person days per week have been set aside for the process. Whilst constituting a considerable amount of time, the importance of the regulations cannot be overestimated and the development thereof may well be the single largest contribution the C-I-B will make to the prevention of the introduction and spread of alien and invasive species in South Africa. Moreover, the process is due to be completed by October 2005 at the latest. The decision to make so much time available was not taken lightly, nor did it fail to consider impacts on other C-I-B strategic goals. However, it would be

ludicrous to stand back from the process when the vision of the C-I-B is to "...provide the scientific understanding required to reduce the rate and impacts of biological invasions in a manner that will improve the quality of life of all South Africans", and when there is such a clear requirement for scientific guidance in the development of the regulations. If the C-I-B were to cease all service rendering after the completion of the regulatory process it would, at least from the core staff's perspective, still have achieved more than if it had undertaken dozens of other smaller service rendering tasks over its entire lifespan.

The C-I-B also made and won a bid to revise the Prince Edward Islands Management Plan and to provide a risk assessment for the introduction of alien species to the islands. Leonie Joubert has been appointed as a part time contractor in the C-I-B and is working closely with the Director on the project. The bid made to the Directorate Antarctic and Islands of DEA&T was a relatively low one, in keeping with the Guidelines provided by the NRF that CoEs should "provide information, analysis, policy, and other services, including informed and reliable advice to government, business, and civil society." Perhaps what has been less clear to the C-I-B is the charge which can be levied especially where government is concerned, and clarity on the rates at which services should be rendered to government is required.

Members of the C-I-B have undertaken six reviews for the NRF over the 2004 period and have also participated in a variety of capacities in NRF-related activities, ranging from grant review panels to SA-ICSU committees such as the South African National Committee for SCAR.

The members also serve on the editorial boards or edit several journals including, in the former case *American Naturalist*, *Biodiversity and Conservation*, *Conservation Biology*, *Diversity and Distributions*, *Global Ecology and Biogeography*, *Journal of Arid Environments*, *Journal of Applied Ecology*, *Journal of Biogeography*, *Odonatologica*, and in the latter case *Functional Ecology* (SLC is Executive Editor) and *Diversity and Distributions* (DMR is Editor in Chief).

6. Gender impact of research

The C-I-B has not yet produced a large body of research. Hence, it is not possible at this point to assess the gender impact thereof. Our activities have had some impacts on gender in the sense that gender equity has been a strong consideration in the appointment of staff and students. The C-I-B core staff (including contractees) comprises seven females and three males, and more than 50% of the students recruited are female. In addition, negotiations are underway to involve Heidi Prozesky, a sociologist concerned with the gender dimensions of science, and interested in the social aspects of conservation and invasive species, as a core team member within the C-I-B.

HUMAN RESOURCES

Please report on the people who worked within the CoE during the reporting period (or part thereof).

1. Core Team Members

Title	Surname	Citizenship	Institution	Gender	Race	% time spent working in CoE
Prof.	Chown	South Africa	SU	♂	W	80
Prof.	Richardson	South Africa	SU	♂	W	100
Prof.	Esler	South Africa	SU	♀	W	15
Prof.	Griffiths	South Africa	SU	♂	W	15
Dr.	Jansen Van Vuuren	South Africa	SU	♀	W	10
Prof.	Johnson	South Africa	UKZN	♂	W	10
Prof.	McGeoch	South Africa	SU	♀	W	10
Prof.	Milton	South Africa	SU/UCT	♀	W	10
Prof.	Samways	South Africa	SU	♂	W	10
Dr.	Somers	South Africa	UNITRA	♂	W	10
Prof.	van Jaarsveld	South Africa	SU	♂	W	5
Dr.	van Rensburg	South Africa	UP	♂	W	10
Dr.	van Wilgen	South Africa	CSIR	♂	W	5
Dr.	Wossler	South Africa	SU	♀	W	10

2. Post Docs

Title	Surname	Citizenship	Institution	Gender	Race	% time spent working in CoE

3. Students

Title	Surname	Citizenship	Institution	Gender	Race	Degree	Status
Ms.	Cooke	SA	SU	♀	W	BSc Agric.	Incomplete
Ms.	Faber	SA	SU	♀	W	BSc Agric.	Incomplete
Ms.	Jordaan	SA	UNITRA	♀	B	BSc	Completed
Ms.	Gouws	SA	SU	♀	W	BSc Hons.	Completed
Ms.	Hampton	SA	UCT	♀	W	BSc Hons	Completed
Ms.	Irlich	Namibia	SU	♀	W	BSc Hons	Completed
Ms.	Mgobozi	SA	UNITRA	♀	B	BSc Hons	Completed
Mr.	Schoeman	SA	SU	♂	W	BSc Hons	Incomplete
Mr.	Lado	Sudan	SU	♂	B	PhD	Incomplete

4. Collaborators (Loosely involved with CoE)

Title	Surname	Citizenship	Institution	Gender	Race	% time spent working in CoE

5. Administrative Staff

Title	Surname	Position	Based at	Gender	Race
Ms.	Garthwaite	PA to SLC	SU	♀	W
Ms.	Nortje	Technical Officer	SU	♀	W

OUTPUTS

Please record the following outputs generated by the CoE within the reporting period.

Books / Chapters in Books

None.

Articles in peer reviewed journals

Note: Click on the relevant publication for the article abstract. A link to the full article will also be available.

Chown, S.L., Sinclair, B.J., Leinaas, H.P. & Gaston, K.J. 2004. Hemispheric asymmetries in biodiversity – a serious matter for ecology. *PLoS Biology* **2**, e406, 1701-1707. (No IF yet)

[More >>](#)

Foxcroft, L.C., Richardson, D.M., Rouget, M. & MacFadyen, S. 2004. Reconstructing fifty years of *Opuntia stricta* invasion in the Kruger National Park: environmental determinants and propagule pressure. *Diversity and Distributions* **10**, 427-437. (No IF yet)

[More >>](#)

Parker-Allie, F., Richardson, D.M. & Holmes, P.M. (2004). The effects of past management practices for invasive alien plant control on subsequent recovery of fynbos on the Cape Peninsula, South Africa. *South African Journal of Botany* **70**, 804-815. (IF 0.462)

[More >>](#)

Prins, N., Holmes, P.M. & Richardson, D.M. 2004. A reference framework for the restoration of riparian vegetation in the Western Cape, South Africa, degraded by invasive Australian Acacias. *South African Journal of Botany* **70**, 767-776. (IF 0.462)

[More >>](#)

Rambuda, T.D. & Johnson, S.D. 2004. Breeding systems of invasive alien plants in South Africa: does Baker's Rule apply? *Diversity and Distributions* **10**, 409-416. (No IF yet)

[More >>](#)

Richardson, D.M. 2004. Plant invasion ecology – dispatches from the front line. *Diversity and Distributions* **10**, 315-319. (No IF yet)

[More >>](#)

Richardson, D.M. & Rejmánek, M. 2004. Invasive conifers: A global survey and predictive framework. *Diversity and Distributions* **10**, 321-331. (No IF yet)

[More >>](#)

Rouget, M., Richardson, D.M., Nel, J.L., Le Maitre, D.C., Egoh, B. & Mgidi, T. 2004. Mapping the potential spread of major plant invaders in South Africa using climatic suitability. *Diversity and Distributions* **10**, 475-484. (No IF yet)

[More >>](#)

[Appendix 2](#) shows other publications by the core team during 2004.

Published conference proceedings

Richardson, D.M., Rouget, R.M., Henderson, L. & Nel, J.L. 2004. Invasive alien plants in South Africa: macroecological patterns, with special emphasis on the Cape Floristic Region. In: *Proceedings 10th MEDECOS Conference, April 25-May 1, Rhodes, Greece. Millpress, Rotterdam*. M. Arianoutsou & V. Papanastasis, eds. [10-page paper published on CD-ROM.]

Products / Artefacts / Patents

None.

Conferences / meetings attended

Plenary/Keynote Presentations

International

Griffiths, C.L. & Day, J.A. Aquatic invasive species in South Africa - Environmental impacts and management responses. *Invited keynote address at the 13th International Conference on Aquatic Invasive Species, Ennis Ireland, September 2004.*

Richardson, D.M. Conifers as invasive aliens – emerging concepts. *Invited plenary paper at Conference on "Landscapes, genomics & transgenic conifer forests", Duke University, USA, November 2004.*

Richardson, D.M. Plant invasion ecology in 2004 – achievements and challenges. *Invited keynote plenary paper at 99th Italian Botanical Congress, Turino, Italy, September 2004.*

Oral presentations

International

Paul I., Barry G.H., Collingham Y.C., Huntley B. & van Jaarsveld A.S. Bio-climatic modelling – applications within citriculture. *International Society of Citriculture, Agadir, Morocco, August 2004.*

National

Richardson, D.M. & Chown, S.L. The DST Centre of Excellence for Invasion Biology - Implications and opportunities in the fynbos. *Oral presentation at Fynbos Forum 2004, Club Mycanos, Langebaan, August 2004.*

Conferences / meetings hosted

Centre for Invasion Biology, Team Members Workshop. Le Pommier Stellenbosch 23 October 2004.

Centre for Invasion Biology, Official Regional Launch. Stellenbosch University, 17 October 2004.

Other relevant outputs

NRF Service Provision

Rating and project proposal reviews: 6

Panel and committee service

Conservation and Management of Ecosystems and Biodiversity Focus Area (McGeoch, Milton)

Sustainable Livelihoods: Eradication of Poverty Focus Area (Milton)

Distinct South African Research Opportunities Focus Area (McGeoch)

South African National Antarctic Programme Steering Committee (McGeoch)

South African National Committee for SCAR (Chown)

Media Interactions

Radio and Television

Chown, S.L. Life Sciences in the Antarctic. *Interviews on German National Public Radio concerning Antarctic Biodiversity and Invasions, July 2004.*

Chown, S.L. The Centre for Invasion Biology. *Interview on SABC Radio Sonder Grense, Spektrum, 18th November 2004.*

Chown, S.L. Invasive and alien species. *Interview and talk show on SABC Radio, SAFM Cape to Midnight, with John Richards and Lynette Francis, 22nd November 2004.*

Van Jaarsveld, A.S. Climate change and biodiversity. *TV Interview on Carte Blanche – September 2004.*

STAGE 1 PROGRESS

This section gives information to the Board that will enable them to decide whether the CoE has made sufficient progress to pass from Stage 1 (Forming) into Stage 2 (Storming).

Please answer these questions briefly (yes/no).

1. Did the CoE participate in the official launch of the DST-NRF CoE programme? *Yes.*
2. Has the CoE had its own local launch? *Yes, in October 2004.*
3. Did the CoE present its list of core team members and students to the NRF? *Yes.*
4. Did the CoE submit nuggets of information to the NRF in the last quarter of 2004? *Yes.*
5. Has an advisory Board been appointed and have they had an inaugural meeting? *Yes.*
6. Have you appointed all your administrative staff yet? *Yes.*

Briefly (in a few lines) comment on the following:

1. Has your CoE begun to develop a team spirit?
Yes. We are now collaborating on several research projects and have also started to work jointly on service provision via the development of the regulations for the National Environmental Management: Biodiversity Act. Collaborative approaches to national problems such as the issue of roadside verge clearing and the implications for invasions and conservation have also been set in motion and involve the National Roads Agency and Working for Water.
2. Did your first team meeting assist with creating a team spirit or was it ineffectual?
The first team members' workshop was, in my view, highly successful. We have generated and agreed on a set of long-term projects, shared knowledge on short-term initiatives, and developed additional collaborations as a consequence of the meeting. Much enthusiasm was expressed for work within the C-I-B and this enthusiasm has been translated into research collaborations.
3. Do all your core team members, especially those at remote sites, know and share your vision for the CoE?
The core team members have the documentation that has been put together for the C-I-B and especially the strategic plan. Based on the team members' workshop it is clear that there the overall strategy is shared because the workshop was instrumental in developing the strategy which gives power to the vision.

4. Is your administration functioning efficiently and effectively?

To date, owing to the late appointment of our Manager, matters have perhaps not functioned quite as effectively as they should have. The Director (and his PA) have carried much of the administrative load. In consequence, some efficiency has been sacrificed in favour of strategic goals. This situation has been resolved with Ms. Davies taking up the Manager's Position.

In a brief paragraph address the following issues.

1. What, if any, are the major stumbling blocks to the production of knowledge within your CoE?

In my view, there are no major stumbling blocks to knowledge production. However, I do think that we will need a greater coordinated effort to address the long-term project goals. These will require both internal and external collaboration, which will be much harder to achieve than simple collaborations within the team. Given that we now have a Manager in place to push the day-to-day running of the C-I-B, more time will be available for the Director to ensure that the required strategic alliances are developed, and that ongoing buy-in is obtained from the team. At present, I think that the roles of team members in the long-term projects need to be better defined and laid out to them.

2. What are the strengths of the new CoE that you have identified subsequent to writing your proposal?

There are a variety of strengths that have emerged since the proposal was drafted, and I will dwell on three that are, to my mind, most significant. First, the scope of our expertise is actually much wider than any of us had imagined. We cover the full range of fields from molecular biology through to macroecology. These interdisciplinary strengths first appeared to be a consequence of work on a range of systems and taxa, but the full range of research approaches has opened new vistas, as our workshop showed. Second, the C-I-B is in a position to make major contributions to the development of legislation in the country in a way that we had not imagined possible. Third, simply being "out there" in name has generated more interest from students, collaborators, and those seeking advice and assistance than we imagined would be the case. This interest has also not been superficial because, once interested parties have investigated us via the web, they seem even more interested in joining the group, soliciting interaction, or making use of our services.

3. In your opinion is your CoE ready for the next development stage and why?

Absolutely. We are fully formed. The staff are in place, the core team members are collaborating, we have students already working on projects, we have produced the first of our papers, we have identified and commenced implementation of our long- and short-term research goals, we have much demand for service provision and information, we have negotiated several MoUs with partners, and we are already known nationally and internationally as a Centre. What we now need to do is to gear up the C-I-B yet further and to start producing the outputs, refine our knowledge brokerage, and really get the long-term work going. That means we are ready for the next stage, and indeed in many ways have already embarked on it. It is truly amazing how fast this enterprise is growing.

FINANCES

Please attach audited financial records as described in the MoU (balance sheet, income and expenditure statement, cash flow statement and notes).

A note to the auditors: please confirm in your audit that all expenditure has been recorded by the CoE and that it is in compliance with the financial policies of the host institution and with the MoU between the NRF and the host institution, including all its attachments.

Balance Sheet
DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

BALANCE SHEET AT 31 DECEMBER 2004

	Notes	2004 R
ASSETS		
NON-CURRENT ASSETS		
		143,330.49
Equipment	2	143,330.49
CURRENT ASSETS		
		2,409,290.77
Stellenbosch University	3	2,409,290.77
TOTAL ASSETS		2,552,621.26
EQUITY AND LIABILITIES		
CAPITAL AND RESERVES		
		2,552,021.33
Accumulated funds		2,552,021.33
CURRENT LIABILITIES		
		599.93
Trade payables		299.95
Leave pay provision	4	299.98
TOTAL FUNDS AND LIABILITIES		2,552,621.26

Income and expenditure statement
DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

INCOME STATEMENT FOR THE YEAR ENDED 31 DECEMBER 2004

	Notes	2004 R
INCOME		3,106,293.23
NRF grant		2,997,000.00
Interest received		27,834.67
Other income		81,458.56
EXPENDITURE		554,271.90
Operational expenses		445,799.25
Consumables		6,109.09
Copying and stationery		11,321.96
Depreciation		3,205.61
Entertainment		14,523.50
Marketing		60,871.77
Non-capitalised books		589.90
Postage, telephone and fax		5,165.13
Rent paid for facilities		4,259.45
Repairs		750.00
Software and internet		110.00
Sundry expenses		169.00
Team member research costs		264,000.00
Transport and accommodation		74,723.84
Personnel expenses		108,472.65
Bursaries		55,000.00
Salaries and wages	5	53,472.65
NET SURPLUS FOR THE YEAR		2,552,021.33

DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED 31 DECEMBER 2004

	2004
	R
ACCUMULATED FUNDS	
At the beginning of the year	-
Net surplus for the year	2,552,021.33
At the end of the year	<u>2,552,021.33</u>

Cash flow and notes

DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

CASH FLOW STATEMENT FOR THE YEAR ENDED 31 DECEMBER 2004

	2004
	R
CASH FLOW FROM OPERATING ACTIVITIES	
Net surplus for the year	2,552,021.33
Adjustment for:	
Interest received	(27,834.67)
Depreciation	3,205.61
	<hr/>
Operating profit before working capital adjustments	2,527,392.27
Working capital adjustments	599.93
Increase in other payables	599.93
	<hr/>
Cash generated from operations	2,527,992.20
Interest received	27,834.67
	<hr/>
NET CASH FLOW FROM OPERATING ACTIVITIES	2,555,826.87
	<hr/>
CASH FLOW FROM INVESTMENT ACTIVITIES	
Equipment purchased	(146,536.10)
Increase in amount owed by Stellenbosch University	(2,409,290.77)
	<hr/>
NET CASH FLOW FROM INVESTMENT ACTIVITIES	(2,555,826.87)
	<hr/>
NET INCREASE IN CASH AND CASH EQUIVALENTS	-
CASH AND CASH EQUIVALENTS AT THE BEGINNING OF THE YEAR	-
	<hr/>
CASH AND CASH EQUIVALENTS AT THE END OF THE YEAR	-
	<hr/> <hr/>

DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 DECEMBER 2004

1. ACCOUNTING POLICY

The financial statements are prepared on the historical cost basis in accordance with South African Statements of Generally Accepted Accounting Practice, and incorporate the following accounting policies of the organisation:

EQUIPMENT

Equipment is stated at historical cost and depreciation is calculated on the straight-line method to write off the cost of the assets to their residual values over their estimated useful lives as follows:

3 years

FINANCIAL INSTRUMENTS

Financial instruments on the balance sheet include other payables and a loan to Stellenbosch University. These instruments are generally shown at their estimated fair value.

INCOME RECOGNITION

Income consists mainly of a NRF grant.

Interest income is recognised as it accrues (taking into account the effective return on assets) unless collectability is in doubt.

2. EQUIPMENT

	2004
	R
Additions during the year	146,536.10
Depreciation for the year	(3,205.61)
Carrying amount at the end of the year	143,330.49
Cost	146,536.10
Accumulated depreciation	(3,205.61)

3. STELLENBOSCH UNIVERSITY

The loan to Stellenbosch University is not secured and is subject to interest rates linked to prime. The loan has no fixed terms of repayment.

DST / NRF CENTRE OF EXCELLENCE FOR INVASION BIOLOGY

NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 DECEMBER 2004 (continued)

	31 December 2004 R
4. LEAVE PAY PROVISION	
Balance at beginning of year	-
Movement during the year	299.98
Balance at end of year	<u>299.98</u>
5. PERSONNEL EXPENSES	
Salaries	<u>53,472.65</u>
	Number
Number of people employed at year end (permanent and part time)	<u>2</u>

6. FINANCIAL INSTRUMENTS

Fair values

On 31 December 2004 the carrying amounts of the financial instruments shown in the financial statements, approximates their fair values.

Interest rate risk

The organisation is exposed to interest rate risk due to loans made at variable rates.

	Interest %	Interest-bearing R	Interest free R	Total R
31 December 2004				
<i>Financial assets</i>				
Stellenbosch University	5.90	2,409,290.77	-	2,409,290.77
<i>Financial liabilities</i>				
Other payables	-	-	599.93	599.93
Net financial assets/(liabilities)		<u>2,409,290.77</u>	<u>(599.93)</u>	<u>2,408,690.84</u>

CONCLUSION

The Centre for Invasion Biology is producing in all of its key performance areas. In our view we are formed and are now ready to move to the next stage. The past year has been busy and exciting and it is now time to settle down to implementing all of our projects and to enhancing delivery on our key performance areas. We are looking forward to a productive second stage.

The Director thanks Janine Basson, Josephine de Mink, Anel Garthwaite, Sue Jackson, Johan Mostert, Terry Robinson, Lieze-Carli Roux, Mari Sauerma, and Piet Steyn for their support.