DARWIN INITIATIVE FOR THE SURVIVAL OF THE SPECIES AB248

APPLICATION FOR GRANT

Please read the attached Guidance Note before completing this form. Give a full answer to each section; applications will be considered on the basis of information submitted on this form. Applicants are asked not to use the form supplied to cross refer to information in separate documents. The space provided indicates the level of detail required but you may provide additional information on a separate sheet if necessary.

1. DETAILS OF APPLICANT

1.1 Name of Organisation applying

Royal Geographical Society

1.2 Address for Correspondence

1, Kensington Gore, London SW7 2AR

1.3 Person who may be contacted about this Application, and position in organisation

Nigel Winser, Deputy Director and Head of Overseas Research Projects

1.4 Telephone and Fax numbers

1.5 Nature of the organisation (e.g. is it an academic institution, a registered charity, company limited by guarantee?)

The Royal Geographical Society (RGS) is a Learned Society with 11,000 members and a Registered Charity (No 208791).

1.6 Describe briefly the aims, activities and structure of your organisation:

Aims: The principal aim of the Society is to collect and disseminate geographical information locally, nationally and globally.

Activities: The RGS:
- organizes overseas field research programmes which address priorities in conservation, development and environmental monitoring
- provides a forum on environmental issues through lectures and seminars
- provides an information service through its library, map room and archives
- publishes the Geographical Journal and the Geographical Magazine and other geographical reports
- offers advice to university field researchers through its Expedition Advisory Centre

Structure: (enclose chart if appropriate): see attached organogram (Annex 1).

1.7 Provide brief details of the relevant past experience and achievements of the person to be responsible for the activities for which the funding is sought. (This will normally be either the person completing this form or the contact at Section 1.3)

Dr Malcolm Coe (64), senior lecturer at the Department of Zoology, Oxford University, has had 38 yrs experience as an ecologist in East Africa, beginning in 1956 as lecturer at Nairobi University. His fieldwork experience includes surveys on Mt Kenya '57, Mt Nimba, Liberia '64 & '66, South Turkana, Kenya '68-'70, Aldabra (Giant Tortoise Prog.) '70-'73, Kora Reserve, Kenya '82-'84, Mkomazi Reserve, Tanzania '92 & '93. Dr Coe has specialised as an ecologist in arid and humid environments and has 61 single and 21 joint author publications.

Dr Coe was asked by RGS to direct the Mkomazi Programme following the success of the joint National Museums of Kenya and RGS survey of *Acacia-commiphora* savanna in Kora National Park, Kenya. This team of 50 Kenyan and European biologists and geomorphologists included both research and training inititatives and resulted in a scientific monograph and popular book *`Islands in the Bush'*. Dr Mark Ritchie, then with National Museums of Kenya, was member of that team and has been asked to head the biodiversity element of the Mkomazi Programme.

1.8 Have you received funding under the Initiative before? If so, please give details.

No

1.9 How did you learn about this Initiative?

From the Prime Minister's announcement at the UNCED Conference, Rio, and through officers of the Department of the Environment.

1.10 Geographical coverage of the organisation as a whole.

Global - but with an emphasis on the Tropics.

1.11 A brief description of the organisation's recent achievements. (Please note that while short pamphlets may be useful, the Department does not wish to receive books or lengthy reports.)

At the invitation of the host governments and in conjunction with the appropriate Ministries, in the past decade the Society has undertaken seven multi-disciplinary geographical research programmes, in Kenya / savanna (1983), Oman / sand desert (1986), Brazil / rain forest (1987-89), Kimberley, Australia / savanna (1988), Brunei / rain forest (1991-93), Nepal, hillslope erosion (1992-94), Jordan / desert (1992-95), and now Tanzania / savanna (1994-1997).

All these projects have had research, training and education components and have involved working closely with those concerned with local land-management issues and/or protected habitat priorities. All projects have had a strong biodiversity commitment and have involved international and local scientists and students. All have published substantially.

Please see the accompanying RGS brochure and Annual Report for 1992

2. PROJECT DETAILS

It is important that applicants set out precisely their objectives and the activities of their proposal. Please be explicit as possible.

2.1 In what ways can this project be considered a Darwin project? How does the project relate to the Darwin principles? How would the project be advertised as a Darwin project and in what ways would the Darwin name and logo be used?

Terrestrial invertebrate biodiversity of the Mkomazi Game Reserve, Tanzania.

This project is a component of the *Mkomazi Ecological Research Programme*, a three-year venture to be undertaken jointly by the RGS and Oxford University at the request of the Government of Tanzania's Department of Wildlife under the overall direction of Dr Malcolm Coe, Oxford. Following signing of a memorandum of understanding in August 1993, the programme will commence in the field in April 1994. The estimated total cost of the programme will be £470,000 of which this project constitutes approximately 25%.

The project, and the overall Programme, relate strongly to Darwin principles in addressing the evaluation of biodiversity in a resource-poor country, Tanzania, which is faced with many calls on government funding to assess and protect major wildlife habitats, developing them sustainably to earn foreign exchange while ensuring their long-term survival. In so doing the project is closely aligned with principles 6,7,and 9 of the Rio Declaration on Environment and Development, relating to international cooperation and the needs of developing countries. While recognizing the value of Mkomazi, the Tanzanian government has been forced to spread its scarce resources over a wide range of protected areas, and has asked the RGS to raise funding for this programme. Without such funding the biodiversity of Mkomazi will remain poorly known and management decisions will to a large extent be taken in ignorance of their possible effects.

Darwin funding, if forthcoming, would act as a catalyst in attracting private sector funding to the overall Mkomazi programme and triggering a response from corporate donors. The Mkomazi programme is a new programme of research which does not overlap with any existing work in East Africa. Limited funding for an initial reconnaissance visit to Tanzania in 1993 was obtained from ODA Natural Resources Division under its Advisory and Support Commission. However no further funding from this source is anticipated and the invertebrate biodiversity project is not expected to attract funding from other agencies such as Research Councils.

In focussing on the biodiversity of savanna invertebrates, this project is addressing a neglected taxonomic group of organisms in an undervalued ecosystem. By studying the diversity of selected organisms at different trophic levels within the food chain (herbivores, predators, decomposers) and in conjunction with parallel studies of soil nutrients and fire-induced vegetation changes, the project will provide a detailed understanding of the effects of natural and man-induced processes on the environment.

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The project will leave behind a nucleus of trained Tanzanian staff and material resources for the assessment of biodiversity, including refurbished and greatly extended invertebrate reference collections at the Tropical Pesticides Research Institute (TPRI), Arusha, adequately housed and documented with an associated database facility which can be extended by the trained staff who will themselves become trainers in this field. The published data from the Programme will be readily available to Tanzanian researchers and decision-makers and will constitute a firm base for sustainable management of the Mkomazi Game Reserve.

The project draws on the expertise of senior British scientists at the Natural History Museum (NHM), the Natural Resources Institute (NRI) and Oxford University, working in the field of invertebrate biodiversity (Annex 2). They will be involved in field work, data analysis and training of Tanzanian nationals both in Mkomazi and in the UK.

The RGS and its UK collaborating institutions would advertize the work as a Darwin project through use and display of the Darwin name and logo on Programme vehicles and signs, on publications and descriptive literature, on sweatshirts, at workshops and seminars and in photographs, press releases and magazine articles. The provision of two Darwin Scholarships and one Darwin Fellowship, tenable in the UK, would provide a distinctive vehicle for the transfer of UK technology through the project to Tanzania.

2.2 Give brief details of the main objective(s) of the project.

Aim:
To describe in quantitative terms the diversity of the terrestrial invertebrate fauna of the MGR and to assess the influence upon it of natural and human-induced factors.

Objectives:
1. To conduct a baseline invertebrate inventory.
2. To provide quantitative measures of species number and diversity.
3. To measure degree of change in diversity and similarity between habitat types.
4. To determine effects of burning and grazing on species richness and diversity.
5. To develop secure, well-documented biodiversity collections in Tanzania.
6. To train Tanzanians in collection, preservation and interpretation of biodiversity data.

2.3 Which overseas institutions, if any, will be involved in the project? Give the names of individuals as well.

Division of Wildlife, Ministry of Tourism Natural Resources and Wildlife, Dar Es Salaam
Mr M A Ndolanga, Director
Mr Mungure, Warden, Mkomazi Game Reserve

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Department of Zoology, University of Dar es Salaam
Professor N Ndiwa, Head

Tropical Pesticides Research Institute, Arusha
Dr F W Mosha, Director
Mr R Makusi, Insect Museum Curator
Mr R Abdullah, National Herbarium

College of Wildlife Management, Mweka
Dr D Manyanza, Principal

2.4 Please give the proposed timetable for the achievement of the objectives.

The field phase of the project will be completed between April 1994 and March 1996. Processing of samples, analysis of data and writing of scientific papers will continue through 1996 until March 1997, culminating in a series of presentations to the Programme Review Conference in April 1997. Training activities will run in parallel with the field and laboratory phases from April 1994-July 1996. Published outputs will be completed by the end of March 1997.

2.5 How has the need for the work been identified?

The RGS published the results of its ecological inventory of the Kora National Reserve, an area of *Acacia-Commiphora* savanna woodland in Kenya, in 1987. As a result of this study The Kenya Government upgraded Kora to National Park status. In 1989 the Tanzania Department of Wildlife invited the Society to undertake a similar survey in the Mkomazi Game Reserve to help underpin their developing programme of habitat protection and management. To date there is no systematic survey of the flora and fauna of the MGR. The findings will greatly extend those made in Kenya in 1983, will provide essential information for natural resource managers and will help to build up a more general picture of the evolution of savanna habitats in East Africa.

2.6 Will the project include an element of training? Please indicate how many trainees would be involved and from which countries? Would those trained then be able to train others? Where appropriate give the length of any training course.

The Mkomazi Ecological Programme is committed to providing training opportunities for up to 25 Tanzanian nationals to work with established UK scientists in all aspects of the Programme. In the invertebrate biodiversity project training is envisaged at three levels:

(a) field-based on-the-job technical training in techniques of invertebrate sampling (including canopy sampling with insecticidal mistblower, pitfall trapping , netting etc), specimen preparation and preliminary data analysis (4 trainees, intermittent).

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(b) UK-based technical training in taxonomic and curatorial methods including the use of diagnostic techniques and an introduction to the identification of the major savanna invertebrate groups. This would be provided by staff of the NHM, NRI and the CAB International Institutes (2 trainees, 3 month course).

(c) Split Tanzania/UK-based academic training to MSc level at Oxford University including taught course units in ecology and conservation, entomology, evolution and taxonomy, and the preparation of a supervised research dissertation based on original research in Mkomazi (1 traineee, 9 months (1 academic year)

It is envisaged that two of the four field-based trainees in (a) above would, if suitable, attend the UK-based training course in (b) while one graduate trainee would be selected to participate in (a) and then to proceed to (c) in year two of the project.

2.7 Set out in greater detail the proposed programme of work for which the grant is sought. What will be the programme's aims and measurable objectives including the estimated timing of their achievements, what qualitative performance measures are proposed and what will be the programme's outputs.

Aim:
To assess and describe in quantitative terms the diversity of the terrestrial invertebrate fauna of the MGR, to determine the influence upon it of natural and human-induced factors and to ensure technology transfer for biodiversity assessment to Tanzanian personnel. This overall aim will be broken down into the objectives briefly listed under section 2.2, above.

Objectives:
1. To conduct a baseline inventory of selected terrestrial invertebrate groups for the MGR by making representative taxonomic collections and identifying these where possible to genus and/or species.

2. To provide quantitative measures of the species numbers and diversity of key invertebrate groups for the major habitat types within the MGR, including calculation of appropriate indices of diversity.

3. To measure the degree of change in species diversity ß and faunal similarity between major habitat types within the MGR.

4. To determine the effects of burning and grazing on species richness and diversity in different habitat types.

5. To develop secure, well-documented savanna invertebrate biodiversity collections at the TPRI, Arusha, Tanzania.

6. To provide training for Tanzanian personnel in:
   (a) collection and preparation of biological material for diversity studies,
   (b) maintenance of biodiversity reference collections,
   (c) taxonomy of appropriate invertebrate groups, and
   (d) measurement and interpretation of ecological parameters including diversity indices.

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Methodology: These objectives will be met by focussing on appropriate "keystone" groups at different trophic levels, including predators (spiders), primary consumers (grasshoppers, plant bugs), detritivores (termites, dung beetles, millipedes), as well as ecologically dominant groups with wide ecological roles (ants). A range of qualitative and quantitative sampling techniques will be employed, including hand sweepnetting, malaise trapping, pitfall trapping, and insecticidal knockdown. The invertebrate survey will be concentrated in the western half of the MGR in areas selected as representative of the major Acacia-Commiphora and grassland habitat sub-types for which information is already available on density, canopy cover and species composition.

An important element of the project will be to involve existing Tanzanian institutions with a biodiversity-assessment capability in the work. In particular staff of the TPRI, Arusha will be involved and TPRI will be the major repository for invertebrate material collected during the project. Appropriate Tanzanian personnel will receive the necessary training in the maintenance of the collections and their associated databases and the techniques of biodiversity assessment (see section 2.6, above).

Outputs and performance measures: (see section 3, below, also). In addition to annual project reports, Objectives 1-4 will give rise to a series of scientific papers in refereed primary journals. At least two such papers will deal with the diversity of the epigeal spider and insect faunas. At least one further paper will document the diversity of Acacia-Commiphora tree canopies. A review of the overall invertebrate biodiversity data from the MGR will be presented at the Review Conference and published by the RGS in the Proceedings volume. Peer review and demand for these dissemination outputs will provide a qualitative means of assessing performance. Objective 5 will have as its primary output the setting up of a well-documented biodiversity reference collection at TPRI, Arusha under the care of trained staff. Objective 6 will be met by on-the-job training in the techniques listed in (a) to (d), above and by the provision of two 10-week short course Darwin Scholarships and one Darwin Fellowship. Please see section 2.6, above, for a fuller description. The successful completion of their studies by the two Darwin Scholars and the Darwin Fellow will provide a performance measure for technology transfer by the project to Tanzanian personnel.

Timing: Please see section 2.4, above. The field invesitigations and training activities will be completed within the two years April 1994-March 1996, except for the Darwin Fellow who completes his/her studies in June 1996. Data analysis and writing up of papers will be completed by March 1997.

2.8 Give the proposed starting date and duration of the project.

Initial reconnaissance visit undertaken July-August 1993. Field phase begins April 1994, ends March 1996. Research data analysis ends March 1997. Final Review Conference April 1997

2.9 Is this a new project or the continuation of an existing one?

The proposed project is part of a new ecological research programme, which is being undertaken at the request of the Tanzanian Wildlife Department, under the overall leadership of the Oxford University ecologist, Dr Malcolm Coe.

2.10 Do you know of any other individual/organisation carrying out similar work? Give the details of the work, explaining the similarities and differences.

We are not aware of any comparable research on the invertebrate diversity of natural savanna habitats being undertaken anywhere in tropical Africa. In general quantitative data on savanna invertebrate biodiversity in Africa are scanty. During the 1960s studies were undertaken on the insect fauna of Guinea Savanna at Lamto, Ivory Coast, and in the late 1970s a study was undertaken of selected groups of savanna arthropods at Nylsvley, Transvaal, South Africa, but no comparable studies have been undertaken in East Africa. The ecological work of Larry Harris in Mkomazi (1964-67) did not include any consideration of invertebrate diversity. The RGS Kora Research Project (1983-84) provided limited information on the diversity of the epigeal and arboreal arthropod fauna in a small area of dry-season *Acacia-Commiphora* woodland in Kenya. However the proposed project aims to collect more representative data sets for selected groups of organisms during dry and wet seasons and relate the observed biological diversity to environmental variables such as fire, soil nutrients and resultant vegetation, This will provide valuable comparisons with the fragmentary data already available from other savanna localities in Africa.

3. MONITORING AND EVALUATION

Describe how progress on the project will be monitored and evaluated in terms of achieving its aims and objectives, both during the lifetime of the project and at its conclusion. How would you ensure that it achieves value for money? What arrangements will be made for disseminating results? If applicable, how will you seek the views of clients/customers?

A sub-committee of the RGS Research and Expeditions Committee, chaired by Professor Gren Lucas (Royal Botanic Gardens,Kew) will be responsible for monitoring progress on the individual projects of the Mkomazi Ecological Research Programme. Annual progress reports will be required from each of the project participants and an overall annual report will be submitted to the Darwin Initiative. The sub-committee will evaluate achievement of objectives and will ensure that individual projects remain within budget and that the results of the Programme are disseminated through publication of a final report and papers in refereed journals, through magazine articles, lectures, films and a popular book. Value for money will be ensured by the clear and realistic initial costing of activities contributing directly to objectives, by regular monitoring and reporting of progress, and by tight budgetary control.

To ensure that the requirements of the client remain paramount, there will be workshops and meetings in Tanzania to keep the Director of Wildlife and other government officials up to date with the progress of the project and to solicit their views. Mr Mungure, Warden of the MGR, will be actively involved with the project team on a day-to-day basis. Other participating organizations in Tanzania will include TPRI, Arusha, Mweka Wildlife College, and the University of Dar es Salaam. In addition to workshops held in Tanzania to discuss the progress of the Programme, there will be a final review conference at the RGS at which the main conclusions of the studies undertaken will be presented to representatives of funding agencies, the Tanzanian government and other interested parties.

4. INCOME

4.1 What financial support from public sources (Government Department or Agency) does the organisation as a whole receive at present, and from which organisations?

The RGS receives an annual grant of £84,000 from the Department of National Heritage to ensure the Map Room with its unique collection of maps and charts is open to the public. From time to time grants-in-aid are made to specific research initiatives. Currently ODA have funded (£300,000) the land use/erosion study 92/94 in the middle-hills of Nepal (a joint project with the Institute of Hydrology). A further £100,000 is anticipated from ODA to fund the joint research project the Badia with the Higher Council for Science, being coordinated on behalf of the RGS by Dr R Dutton of the Centre for Overseas Research and Development, Durham University. The British Council have helped with flights and conference expenses (and in many educational ways) on most of the past RGS projects.

4.2 Please give details of grant you have sought from other public sources for this project.

ODA. Initial discussions have been held with Dr Ian Haines (Senior Environment and Research Adviser). A revised bid will be made soon by the RGS, in the light of the reconnaissance visit in August 1993. This is likely to relate to study of the possibilities for sustainable community use of the natural resources of the MGR by local people and will not cover biodiversity studies.

Global Environment Facility. The RGS is in touch with Dr Alan Rodgers, GEF coordinator for East Africa in Dar Es Salaam, but no formal proposal has yet been submitted.

4.3 Please state other sources of income and amounts to be put towards the costs of the project (including any income from private sponsorship, trusts, fees or trading activity). Include donations in kind e.g. accommodation. Indicate any income or donations which are confirmed.

(Note: the income planned below relates to the overall infrastructure of the Mkomazi Ecological Research Programme and the support of individual research projects. The figure given under (c), below, is inclusive of this grant application.)

	Planned	***Confirmed***
(a) Corporate Sector (6 Corporate Patrons x £40,000)		
(b) Other private sponsors		
(c) Trusts/grants		
(d) Film and book rights		
(e) Personal donations/well wishers		
**Friends of Conservation*		

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(f) Support in kind (offered but value to be agreed):
Land Rover: help with vehicles
BP: donated fuel
Abercrombie & Kent: ground support
British Airways: help with flights
G. Adamson Wildlife Preservation Trust: use of light aircraft for aerial survey
University Museum, Oxford: paid leave for member of research team
(see Annex 2)

4.4 Briefly describe the arrangements envisaged for meeting the costs of continuing your project beyond any period of Darwin Initiative funding, if appropriate. A clear exit strategy must be provided.

The overall Mkomazi Ecological Programme has a finite duration in the field and is planned to involve a limit of 25 Tanzanian and 25 visiting scientists and students. The size and duration of other field inputs will be reduced as necessary to ensure the viability of Darwin-funded work if other funds are not forthcoming. The objectives of this project are achievable in full during the period of funding requested from the Darwin Initiative. The results presented in individual publications, at the final Review Conference, and in the resulting published Proceedings will be taken up by Tanzanian scientists and resource managers within the Division of Wildlife, research institutes and higher education establishments. Any further investigations of biodiversity will be carried out by Tanzianian personnel from these institutions, some of whom will have been trained during this project.

5. EXPENDITURE

5.1 Please state expenditure on the programme of work (see 2.7). Please work by financial year (defined as April to March), using 1994/95 prices throughout - do not include any allowance for assumed future inflation. Indicate salary costs on Table A, and total costs on Table B. For programmes of less than 3 years' duration, enter 'nil' as appropriate for future years.