

CURRICULUM VITAE

Martyn Greer MURRAY

40 Green Apron Park, North Berwick, East Lothian, EH39 4RE, United Kingdom.
Institute of Evolutionary Biology, University of Edinburgh, EH9 3JT, United Kingdom
Tel: +44 (0)1620 892568; e-mail: m.murray@ed.ac.uk
Web site: www.mgmsolutions.com University web page: <http://tinyurl.com/martyn-uni>

- 1. NAME:** MURRAY, Martyn Greer,
BSc Zoology (University of Edinburgh) 1973
PhD Zoology (University of Zimbabwe) 1980.
- 2. PROFESSION:** **Consultancy:** Biodiversity, Ecosystem Responses to Climate Change, Natural Resources Management, Protected Area Management, Rangelands, Project Review and Evaluation, Scientific Research and Policy (pages 2 - 8 & 10-11).
Research: Application of resource competition theory to natural resources management; community ecology of herbivores; animal migration (see pages 8 - 10).
- 3. PRESENT POSITION** (a) Director, MGM Environmental Solutions Ltd
(b) Honorary Fellow, University of Edinburgh
- 4. YEARS WITH FIRM** (a) 19 years
(b) 17 years
- 5. DATE OF BIRTH:** 19 July 1949, Prestwick, Scotland
- 6. NATIONALITY:** British
- 7. KEY EXPERIENCE:**
General:
Martyn Murray has 30 years of experience in management, monitoring and evaluation of natural resources, ecosystem and rangeland management, biodiversity and climate change, and protected area conservation on over 100 technical and development projects, many in critically vulnerable ecosystems, in 37 countries. The main emphasis of this work is in natural resources management in response to environmental degradation from overuse and climate change in Africa (all regions), Central Asia, South and South-east Asia, Europe and North America. He is an Honorary Fellow at the Institute of Evolutionary Biology, University of Edinburgh <<http://tinyurl.com/martyn-uni>> with an active research programme in natural resource management, herbivory, animal migration and competition theory. From October 1978 until 1991, he was Nuffield Research Fellow in Mammalian Ecology at the Physiological Laboratory, University of Cambridge; in 1991 he established **MGM Environmental Solutions Ltd**, <<http://www.mgmsolutions.com>> a company specialising in biodiversity conservation and natural resources management. He has extensive experience in assessing and developing national and regional plans for environmental protection, natural resource management and biodiversity conservation on behalf of the European Commission, World Bank/GEF, FAO, UNDP, WCMC-UNEP), also various international and national NGOs (GWS, IUCN-Belgium, IUCN-International, IUCN-UK, WCS, UK Wildlife Trusts) and the Dutch and UK government (DEFRA); in environmental monitoring (Afghanistan, Albania, Kyrgyzstan, Macedonia, Mongolia, Tajikistan, Tanzania, Turkey, Uganda, Zimbabwe); in leading multidisciplinary teams in project identification, design, technical and institutional appraisal, review and evaluation in the natural resources, protected area, ecotourism and biodiversity sectors (Botswana, Ethiopia, Ghana, Kazakhstan, Kenya, Kyrgyzstan, Mongolia, South Africa); in appraising and reviewing participatory, biodiversity, forestry and rangeland projects (Afghanistan, Armenia, Jordan, Malaysia, Mongolia, Nigeria, Tanzania, Pakistan, Zimbabwe); and in facilitating and organising ecosystem modelling workshops (Mongolia, Tanzania, Sumatra, UK).
- 8. TRAINING AND EDUCATION:**
 - Visiting lecturer - honours and postgraduate courses in zoology and ecology, University of Edinburgh, 1999-2010.
 - ARC/INFO analysis for GIS and FoxPro, WCMC, Cambridge, 1995.

- Biomathematics and computer modelling at Cambridge University, 1982-1983.
- Evolutionary biology (advanced) with W.D. Hamilton and R.L. Trivers at Harvard University, 1980.
- PhD Zoology, University of Zimbabwe, 1980.
 - ❖ Thesis on the behaviour and ecology of impala antelope in the Zambezi Valley, Zimbabwe;
 - ❖ Field studies on conservation biology of elephant, rhino, warthog, vultures and miombo woodlands;
 - ❖ Training in molecular techniques to study genetic polymorphism at the Blaire Medical Laboratories.
- BSc (Hons) Zoology, University of Edinburgh, 1973.
 - ❖ Thesis on population regulation of shelduck in the Forth Estuary, Scotland;
 - ❖ Field surveys of intertidal invertebrates.

9. COUNTRIES – PROJECT EXPERIENCE (37):

Afghanistan, Albania, Armenia, Belgium, Botswana, Central African Republic, China, P.R. Congo, Equatorial Guinea, Ethiopia, France, Gabon, Ghana, Indonesia (Sumatra), Italy, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lesotho, Malaysia (including Sabah and Sarawak), Macedonia, Mongolia, Namibia, Netherlands, Nigeria, Pakistan, Sao Tome & Principe, South Africa, Tajikistan, Tanzania, Turkey, Uganda, United Kingdom, Zambia, Zimbabwe.

10. COUNTRIES – GEOGRAPHICAL AND TECHNICAL EXPERIENCE (17):

Algeria, Cameroon, Canada, D.R. Congo (Zaire), Germany, Guinea-Bissau, India, Ireland, Malawi, Morocco, Nepal, Niger, Rwanda, Spain, Switzerland, United Arab Emirates, USA.

11. MEMBERSHIPS:

British Ecological Society, The Ecological Society of America, Society for Conservation Biology, IUCN Antelope Specialist Group, IUCN European Sustainable Use Specialist Group, Darwin College Cambridge.

12. LANGUAGES:

	Reading	Speaking	Writing
English (native tongue)	Excellent	Excellent	Excellent
French	Fair	Fair (bit rusty)	Fair
Kiswahili	Slight	Some	Slight

13. EXPERIENCE RECORD (CONSULTANCY):

DEFRA UK 2000/10

contracted to review annual and final reports of the UK Government's Darwin projects which comprise UK's national contribution to global biodiversity conservation. I also provide the Secretariat with an assessment of progress, advice on project management and recommendations for project improvements. A wide range of projects (total of 80 to date) are reviewed, some on site. Regions covered: Africa, Caribbean, Central America, Central and South Asia, Indian Ocean Islands, Pacific Islands, South America, South Atlantic Islands and Southeast Asia. Examples are: a biodiversity assessment of limestone karst dependent bats in Myanmar (Burma); sustainable management of large mammals in the Khan Khenti of Mongolia; river dolphin conservation in Amazonia; conservation training in Pacific Island States; land snails of Sri Lanka; herpetofauna of SE Asia; butterflies of Sabah; fruitbats of Madagascar; Mikumi NP elephant conservation in Tanzania; black rhino conservation in Namibia; conflict and conservation in the Maasai Mara, Kenya. 7 m.

Biodiversity specialist

University of Edinburgh 2010

developing a framework for sustainable management and equitable use of global natural resources based on the application of ecological competition theory. This work has resulted in a new approach to managing the global exploitation of fisheries, rangelands, fresh water, timber, NTFPs, game and other natural resources. 7 m

Principal Investigator

European Union – Ghana 2009/10

Evaluation of the Protected Area Development Programme (phase II) which aims to conserve tropical rain forest in the Ankasa and Bia Conservation Areas through strengthened law enforcement, community conservation and ecotourism. 1.5m

Team Leader

European Union – Turkey 2009/10

i/c of establishing a framework for monitoring the implementation of a UNESCO Biosphere Reserve in the Yildiz Mountains of northern Turkey; planning and partial implementation of a monitoring programme for fauna & flora, natural resources and socio-economics of villagers. 2.5m

Biodiversity Specialist

AGRER – UK 2009

Preparation of technical proposal supporting major EU Integrated Environmental Assessments. 1m

Biodiversity specialist:

LBST - UK 2009**Biodiversity specialist:**

Preparation of the company project tender document for Support Activities for the Development of Practical Measures to Facilitate the Implementation of the Biofuels Sustainability Scheme. 1m

UNDP/GEF/Dutch Government – Mongolia 2008/09**Team Leader**

i/c of Midterm Evaluation of the Altai Sayan Project which included formulation of a fully revised programme to empower herder communities to resolve problems with overgrazing and overuse of natural resources and to strengthen conservation of biodiversity in the Altai and Sayan Mountains by mainstreaming the environment into government policy at central and local levels and supporting transboundary conservation with Russia and China. 3 m

European Commission – Tanzania 2008**Team Leader**

i/c of evaluating the EC's STGR project to develop management of 7 Game Reserves and to conserve the black rhinoceros in situ within Selous Game Reserve. Analysis of options for institutional reforms in the wildlife sector of Tanzania. 1.5 m

Belgian Technical Cooperation – Uganda 2008**Team leader**

preparing a project document and non-spatial database for implementing an Environmental Sensitivity Atlas for the Albertine Rift Area of Endemism. The atlas is an integrated GIS that will guide physical planning of oil industry developments in one of the world's greatest hotspots of biodiversity. It will also support the Oil Spill Response Contingency Plan so as to minimise damage from accidental oil spills. 2.5 m

European Union – Kyrgyz Republic and Tajikistan 2006/08**Protected Areas and natural resources**

specialist implementing the Pamir-Alai Transboundary Conservation Area project in eastern Pamir and Pamir-Alai Mountain Ranges of Kyrgyz Republic and Tajikistan with special responsibility for biodiversity surveys, monitoring programme and management plan development. 8 m.

European Union – Croatia 2007**Biodiversity specialist**

preparing a PHARE technical proposal for developing the national biodiversity information system for Croatia which is to comprise a webGIS database and national monitoring system to meet requirements of the EU Birds and Habitats Directives. 0.5m.

European Union – Republic of Macedonia 2006/07**Biodiversity specialist**

developed Directive Specific Implementation Plans (Birds, Habitats, Zoos Directives), Endangered Species Regulation, Monitoring of Forests Regulation and Sector Approximation Strategy (Nature) in Macedonia to enable full approximation of EU legislation in the Nature and Forestry Sectors, 2.5 m.

European Union – Kenya 2006**Team Leader and biodiversity specialist**

in charge of the final evaluation of the EC's Biodiversity Conservation Programme (BCP) in Kenya comprising 37 community-focused projects that are designed to enhance the capacity of local communities (pastoralists and farmers) to conserve biodiversity in priority conservation areas. Recommendations provided to guide the EU's Community Environment Facility (CEF) towards an integrated response to climate change. (See entry in 2003 below on the mid-term review of BCP). 1.5 m.

World Bank/GEF – Mongolia 2006**Team Leader and facilitator**

in charge of coordinating the development of an ecosystem management model of the 6-valleys on the eastern shore of Lake Hövsgöl as a response to climate change. This is the second of two modelling workshops involving some 40 scientists and managers (further details below). 1m.

World Bank/Netherlands - Mongolia, 2006**Team Leader and environmental specialist**

undertaking a programme review of 23 environmental projects (including forestry policy; use of toxic chemicals; urban pollution; artisanal mining; illegal wildlife trade; threatened species of Gobi desert; and a conference on Buddhism and the environment). 2m

World Bank/GEF – Armenia 2006**Team Leader and biodiversity specialist**

in charge of revising the biodiversity monitoring programme and associated training programme for Sevan and Dilijan National Parks, following an on site review. 1m

EC (Takis) Republics of Tajikistan, Kyrgyzstan and Kazakhstan, 2006.**Environmental specialist**

with responsibility for revising the Terms of Reference for the EU's forthcoming project: "Development of National Environmental Strategies for Sustainable Development". Detailed background information on unsustainable use of natural resources and pollution of atmosphere, water and soils provided together with guidelines on strategy development. .75m

World Bank/GEF, Lesotho and South Africa, 2005/06**Team Leader and biodiversity specialist**

conducting a midterm review of the Maloti Drakensberg Transfrontier Project which seeks to protect 2,520 flowering plants, 600 recorded rock art sites with 35,000 images, and the catchments and watersheds that provide 25% of South Africa's water. Advised on the establishment of transfrontier PAs, ecotourism development, institutional strengthening and project management. 2.5m.

EuropeAid Unit E6, EC, Brussels 2005

Environmental specialist with responsibility for preparing chapters of the *Environmental Integration Handbook for EC Development Co-operation* on behalf of EuropeAid Unit E6. This publication introduces new environmental tools and approaches into all aspects of European Commission development cooperation. Download handbook at: <http://www.environment-integration.eu/content/section/4/146/lang/en/3m>.

Gobi Conservation Project, Mongolia 2005

Ecosystem conservation expert reviewing progress on-site in developing herding community groups to improve conservation of rangelands and biodiversity including argali sheep, ibex, snow leopard, black-tailed gazelle and saxaul forests within protected areas and buffer zones in the southern Gobi desert. A conservation strategy for the next 4 years was formulated with the project leader. 0.5 m.

World Bank/GEF – Mongolia 2005

Team Leader and facilitator in charge of coordinating the development of an ecosystem management model of the 6-valley ecosystem on the eastern shore of Lake Hövsgöl. The model will assess the impact of climate change and herding pressure on permafrost melt, forest loss, primary productivity and biodiversity loss. This is the first of two modelling workshops. 1m.

BTC, Uganda 2005

Ecologist and natural resources specialist with responsibility for preparing AGRER's technical proposals for developing a wetland monitoring system for Uganda on behalf of The Ministry of Water, Lands and Environment. The system proposed covers (a) the systematic collection of ecological and socio-economic data on the status of wetlands and (b) the development of a centralised database with public access via the Ministries web site. 0.5 m.

EC, Pakistan 2004/05

Natural resources specialist evaluating the EC's Palas Conservation and Development Project in North West Frontier Province, Pakistan. The 5-year project aimed to address rural poverty and to conserve pine, cedar and evergreen oak forests of the Western Himalayas with high levels of endemism, including the endangered Western Tragopan pheasant. Implementation: forest and rangeland conservation, formation of 48 community-based organisations, and a wide range of rural development programmes (mini-hydro power units, medical clinics, veterinary assistance and agricultural improvement. Formulation of plans for Phase 2 support programme including stakeholder participation in natural resources management. 2 m.

EC, Zambia 2004

Institutional expert evaluating the European Commission's Forest Support Programme which is facilitating change from the Forest Department to an autonomous Forestry Commission in an attempt to reverse a rapid decline in the nation's *Brachystegia* forests. 1.5 m.

World Bank/GEF, Mongolia 2004

Team Leader undertaking an independent Mid-term Review of the Lake Hovsgol - GEF project in Mongolia - Dynamics of Biodiversity Loss and Permafrost Melt in Lake Hovsgol National Park. Mission to Lake Hovsgol in July and August 2004 to review the multidisciplinary research programme investigating the impact of global warming on the forest, steppe and riparian zones along the lakeshore and in 6 surrounding tributary valleys. The review covers some 25 studies concerned with ecosystem dynamics and biodiversity. A major objective of the project is the introduction of sustainable practises for use of natural resources (pastureland, forests and fish stocks) amongst herding families. Training was provided to researchers. A revised research programme for the project, with individual plans for each of the 25 studies, was formulated. 2 m.

EC, Tanzania 2004

Team Leader and Natural Resources expert leading a four-person team to evaluate the Special Programme for Refugee Affected Areas in western Tanzania in the Great Lakes region that borders with Uganda, Rwanda, Burundi and the DR Congo. Inputs in: project management, reserve management (Burigi, Ibanda, Moyowosi & Rumanyika), afforestation, and community development. 1.5 m.

IUCN, Kazakhstan 2004

Antelope conservation specialist requested to represent IUCN at the Saiga Conservation and Management meeting and workshop in Almaty, Kazakhstan and to provide recommendations on upgrading conservation plans for the critically endangered Saiga antelope. 0.5 m.

EC, Czech Republic 2004

Protected Area specialist with responsibility for preparing AGRER's technical proposals for managing 15 Natura 2000 sites, including analysis of four Member State Natura 2000 management programmes, drafting of management guidelines for the Czech Republic sites, training in PA management and community negotiation, and information and interpretation. 0.75 m.

GEF, Albania 2003/04

Protected Area specialist with responsibility for preparing SOFRECO's technical proposals for preparing a management plan for Datji National Park, Albania. Whilst on mission in Albania, a national team of specialists were selected, meetings were held with the Director of the General Directorate of Protected Areas and the Director of Datji National Park, and a field visit was made to look at several proposed tourism development sites in the park. 1 m.

EC, Kenya 2003

Ecologist and Biodiversity specialist with responsibility for evaluating the EC's Biodiversity Conservation Programme in Kenya comprising 19 community-focused projects that are designed to enhance the capacity of local communities (pastoralists and farmers) to conserve biodiversity in priority conservation areas. The evaluation included visits to the following project sites: Koiyaki Guiding School and

Wilderness Camp (Maasai pastoralists and conservation); Shompole Group Ranch Ecotourism Development Project (Maasai pastoralists and conservation); Mount Elgon Wildlife Fence Project (human-wildlife conflict resolution); the Saiwa Swamp Chain Link Fence Project (conservation of the endangered Sitatunga antelope); ; Ngong Road Forest Sanctuary Development Project; and Ol Donyo Sabuk Biodiversity Rehabilitation & Eco-tourism Development Project (including restoration of the 14 Waterfalls site). Formulated proposals for EC's future investment in community conservation. 2 m.

IUCN, UK 2002/03

Natural Resources specialist with responsibility for undertaking an audit of natural resources in the United Kingdom on behalf of the IUCN. The audit aimed to determine the degree to which wild, living resources are used by society either on a consumptive or non-consumptive basis, and to measure the contributions that such uses make to the economy, health and nutrition of the UK. The report is being used as the basis of a detailed agenda item to be presented at the SBSTTA (Subsidiary Body on Scientific, Technical and Technological Advice) meeting of the CBD in November 2003. 15 m (part-time).

WCS, Mongolia 2002/03

Biodiversity and rangeland specialist with responsibility for evaluating the first five years performance of the UNDP project: Biodiversity Conservation and Sustainable Livelihood Options in the Grasslands of Eastern Mongolia, reviewing project design and progress, and staff performance, and making detailed recommendations that include new priorities for project activities and new institutional arrangements, to enable the project to meet its overall objective over the next three years. 1.5 m.

UNEP, Afghanistan 2002/03

Natural resource management specialist with responsibility for assessing the post-conflict state of the natural environment in northern, western and eastern Afghanistan, including deforestation, land degradation and use of natural resources. Visited Cedar and Pine forests in the east, Arid Rangelands, Pistachio and Juniper forests in the central and west and willow thickets along the Amu Darya (Oxus) River in the north to assess the extent of forests, the damage to old growth, the state of regeneration, the health of rangelands, the presence of wildlife populations and the harvesting of timber and NTFPs. Prepared recommendations for institutional strengthening of central and provincial government offices in the environmental sector and for establishing a system of participatory management with local communities that addresses problems of overgrazing and loss of natural resources. 2 m. Report available at: <<http://www.unep.org/Evaluation/PDF/afghanistanpcajanuary2003.pdf>>.

Darwin Initiative, Kenya 2002

Biodiversity Specialist with responsibility for reviewing two innovative Darwin projects on site in the Masai Mara National Reserve and adjacent Transmara and Narok Districts areas to the east and west of the reserve. The Transmara project aimed to alleviate human wildlife conflict involving elephants, carnivores and rhinoceros. The Narok project, 'Community-driven conservation and ecotourism in the Mara ecosystem, Kenya' aimed to establish a community nature reserve, develop ecotourism, and facilitate local institutions that can manage tourism and conservation. 0.5 m.

Ghana Wildlife Society, Accra 2001/02

Team leader for the GWS/Royal Netherlands Embassy programme. Reviewed progress made by the society in developing a Community Nature Reserve in the rain forests of the Agumatsa Range. Formulated a management strategy for conservation, an ecotourism development plan and business plan for the area. Special topics included a review of baseline surveys, an assessment of biological threats, a study of the current utilisation of natural resources, and an analysis of policy, planning and administrative frameworks. The strategy includes detailed guidelines for developing a Management Plan for the reserve. 1.5 m.

FAO, Rome 2001

Biodiversity specialist for the FAO Biodiversity Conservation programme. Given sole responsibility for preparing an FAO publication of 30,000 words, entitled 'Current Issues in Biodiversity Conservation'. The publication provides an historical background and covers current thinking and practise in the following topics: principal threats to biodiversity; protected area management; participatory natural resources management; community conservation; ecotourism; sustainable harvesting; ecosystem management; landscape conservation; habitat restoration; biodiversity conservation outside of protected areas; and funding for conservation. The publications will be widely distributed to authorities responsible for implementing conservation in FAO's member countries and to middle-level management 4 m.

EC, United Kingdom 1997/00.

Coordinator of the Forth Estuary management system, under the EU Partnership Programme. Responsible for preparing a Biodiversity Management Plan of the Forth Estuary and for advising the Scottish Executive on its implementation. The work involved extensive collaboration with the main stakeholders in the estuary. As part of this 4-year process, I organised and facilitated development of an interactive, interdisciplinary ecosystem model, working with 25 scientists and natural resources managers from all over Scotland. The model enables one to look at management actions, such as agricultural inputs of fertiliser, or fishing quotas, to examine how they impact all the way through the food chain to the populations of top predators - the sea birds and marine mammals. 3 m.

EC/DFID/IUCN Belgium 2000

Biodiversity specialist for the EC/DFID/IUCN Biodiversity in Development Project. Responsible for preparing biodiversity briefs on a) the EC focus on regional cooperation in development programmes and its application to biodiversity conservation throughout the world, and b) the volume and trends of international trade in wild animals and plants together with the regulations and procedures of CITES. Also responsible for editing and quality control of the complete set of 20 Biodiversity Briefs (2000 words each),

covering all aspects of biodiversity conservation and development of natural resources, and a 10,000 word synthesis report of guiding principles for integrating biodiversity into development co-operation. All these materials are for dissemination within the EC and its delegations around the world for use as senior level training materials. 3 m.

Royal Netherlands Embassy, Ghana 2000.

Programme co-ordinator for the Wildlife Division Support Project in Ghana. Responsible for preparation of successful tender, fielding a consultancy team, organising the mission to Mole National Park, and the Wildlife Division HQ in Accra, and for supervising all aspects of MGM's findings and recommendations. These included the identification and formulation of a US\$4.2 million Institutional Strengthening Programme and US\$4.8 million Project to Develop Mole National Park. 0.75 m.

WCMC-UNEP. 1993-1999.

Senior Advisor to the World Conservation Monitoring Centre, Cambridge. My duties involved advising the Director and senior staff on policy and strategy with regard to biodiversity, protected areas and species programmes. 1 m.

UNDP/GEF Mongolia 1999.

Grassland ecologist and rangeland specialist for UNDP's Eastern Steppe Biodiversity Project. Responsible to the UNDP for a) formulating a Biodiversity Management Plan for wildlife conservation and sustainable utilisation with strong community involvement, b) implementing a rangeland monitoring programme, and c) establishing an integrated ecosystem research programme in the Eastern Steppe of Mongolia. Special topics included livestock grazing, nomadic pastoralism, fire management, the ecological effects of Brandt's vole and the migration of Mongolian gazelle. Recommendations addressed the financial sustainability of UNDP's conservation programme in Mongolia and the need for institutional strengthening of the Protected Areas Authority. 4 m.

DFID/CIFOR. Sumatra. 1999.

Facilitator for a DFID funded modelling workshop of 50 land-use specialists and scientists held in Bukittingi and Jambi in Sumatra so as to develop a model of rain forest habitat and the interaction between human, ecological and economic factors affecting land-use at the margin of rain forests. This "FLORES" model investigates the causes of deforestation by examining how policy changes filter through the decision-making processes of households and villages, and impact on forest conservation at the landscape level. Micro-economics at the village level and the role of the market in NTFPs were incorporated. Further models are anticipated for other tropical regions. 1.25m.

EC. Kenya. 1998/99.

Team Leader on two evaluation and design missions for the EDF funded project: "Elephant Conservation and Community Wildlife Programme". This programme, which was implemented by the Kenya Wildlife Service, aimed to reduce human-elephant conflict in tall forest, plantation and savanna habitats through electric fencing, elephant translocations, and community outreach: it also aimed to reduce elephant poaching, monitor elephant populations, nationally and conduct applied research into elephant-forest interactions. Detailed recommendations covered policy change, preparation of a National Wildlife Strategy, protection of the indigenous tall forests of Mt. Kenya, fence construction and maintenance, community conservation, improvements in project administration, research and monitoring including aerial and ground surveys, and water management. 4 m.

EC. Ethiopia. 1998/99.

Team Leader for EC evaluation mission to assess the organisational and administrative structure of the National Parks Rehabilitation in Southern Ethiopia Project. Responsible for reviewing protected area management plans for Nechisar, Mago and Omo NPs and evaluating the community revenue-sharing programme, law enforcement, effectiveness and sustainability of income generation from tourism, safari hunting, crocodile ranching and other wildlife products by the Ethiopian Wildlife Conservation Organisation. Responsible for preparing detailed recommendations to address the illegal offtake of elephants, giraffe, rhino and other large mammals, encroachment of farming in parks, and illegal grazing of livestock. Detailed recommendations covered policy and institutional reform for the national network of protected areas, park administration, rangeland management, sustainable utilisation of natural resources, community conservation and the further support required from federal and regional governments and the international donor. Three National Parks and the Arba Minch Crocodile Ranch were assessed on site. Evaluation made extensive use of logframes. 2 m.

EC/SADC. Zimbabwe. 1997/99.

Link Coordinator representing Edinburgh University's training support for the MTRE Course, at the University of Zimbabwe (EU programme: "SADC Wildlife Management Training Project"). Initiated the joint teaching and research programme in Harare, giving lectures on Protected Area Planning and Biodiversity Conservation; study visit to Omay District to demonstrate community use of natural resources in deciduous woodlands, the role of the private sector, and problems encountered by the CAMPFIRE programme. Formulated MSc and PhD research projects and monitoring protocols in tropical resource ecology. 3 m.

EC. Tanzania. 1997.

Protected area specialist for mid-term review of the EDF "Serengeti Conservation and Development Project, Tanzania". Responsible for reviewing the Serengeti Management Plan and Zoning Plan, and for evaluating technical assistance and support for law enforcement, education and community extension in the Serengeti and its support zone, for assessing the new Government policy on community conservation, for advising on rangeland management and future threats to woodland and forest habitats, for outlining regional wildlife conservation requirements, and for producing new logical frameworks for the project. In the course of the evaluation, workshops were held in neighbouring communities to assess levels of damage from elephant, bush-

pig and other wildlife species and to assess the effectiveness of community conservation, micro-enterprises and community clubs. 1.5 m. (Report available at: http://europa.eu.int/comm/europeaid/evaluation/evinfo/acp/951351_ev.html)

EC. Botswana. 1996/97.

Team Leader for mid-term review of EDF project: "Wildlife Conservation in Northern Botswana". This aims to strengthen the Department of Wildlife and National Parks in order to protect northern parks and reserves, including the Okavango Delta and the Chobe National Park. Responsible for reviewing protected area management plans for Chobe National Park, Nxai Pan National Park, Makgadikgadi Pan Game Reserve and Moremi Wildlife Reserve in the Okavango Delta. Major evaluation inputs in eco-tourism, aerial surveys and park management. Formulation of Terms of Reference for Phase II which includes a project design for the whole country which will provide for an effective programme to tackle the major biodiversity conservation issues, including the woodland-elephant dynamic, conflicts over land-use and conflicts over Okavango Delta water, and an assessment of relevant policy in the wildlife, tourism, agricultural and social sectors. The logframe approach was applied to both the review and design phases. 3 m. (Report available at: <http://europa.eu.int/comm/europeaid/evaluation/reports/acp/951285.pdf>).

EC. Ghana. 1996.

Team leader for EDF funded project: "Protected Areas Development Programme, Ghana". Responsible for formulation of a project design (on site) and Terms of Reference for donor project to support conservation and sustainable-use of intact, tall rain forest in Bia, Ankasa and Nini Suhien Protected Areas. Major formulation input into management plans for the three protected areas. Subsequently evaluated technical bids at pre-qualification and restricted invitation stages. 1.5 m.

World Bank (GEF) and UNDP. Jordan. 1996.

Conservation and rangeland specialist for evaluation mission of the GEF / UNDP programme "Conservation of the Dana and Azraq Protected Areas, Jordan". Responsible for an evaluation of: a) the institutional strength of the Royal Society for the Conservation of Nature (RSCN); b) the rangeland and biodiversity management in and around Wadi Dana degraded by sheep and goats; and c) the habitat restoration and management of the Asraq oasis. 1.5 m.

Department for International Development (DFID)/WCMC, UK. 1995.

Protected Area specialist for DFID Project "Investments in Conservation Areas in the Tropics" based at WCMC. Responsible for the GIS gap-analysis of protection and investment in moist forest types and ecofloristic zones in 99 countries in Africa, tropical and insular Asia, Central America and South America, and for prioritising forest types requiring additional conservation inputs. 6 m.

EC. Central African Republic. 1994.

Project Manager for EDF project: "Northern Region Development Project, Central Africa Republic". Responsible for evaluation of problems in conservation of the unique northern wildlife and wildlife habitats, arising from large-scale poaching and break-down in law enforcement; advising the European Commission (DGVIII, Brussels) on Phase 2 of the programme. 0.75 m.

EC. Zimbabwe. 1994.

Representative of DGVIII at the EU/IUCN Victoria Falls workshop. Responsible for assisting DGVIII in the formulation of regional strategies for development of protected areas, conservation of forest and wetland habitats, and conservation of biodiversity in Africa, the Caribbean and the Pacific, using a Logical Framework structure. 0.5 m.

EC. Nigeria. 1993.

Team leader for EDF funded project: "Oban Hills Programme, Nigeria". Responsible for formulating the project design, and preparation of terms of reference for donor support to conserve an area of intact rain forest, situated in an ancient refuge with exceptionally high biodiversity, through community extension programmes and strengthened law enforcement and wildlife institutions; subsequently evaluated technical bids at pre-qualification and restricted invitation stages. 1.5 m.

DFID (ODA)/WCMC. UK. 1992.

Forest conservation specialist for DFID (ODA) funded project: "Strategy Programme for Research on Forestry and Agroforestry: Taxonomic Inventories Project". Responsible for surveying plant and animal inventories for 8,715 protected areas within 131 tropical countries in the following taxonomic groups: higher plants (including the overlapping groups: higher plants, trees, angiosperms, dicotyledons, monocotyledons, ferns and fern allies), mammals, birds, reptiles, amphibians, freshwater and brackish water fish and butterflies. Responsible for directing development of the first pilot database linking plant inventories with a plant species database where individual species records are maintained. Responsible for recommending direction of development of WCMC's conservation databases. 4 m.

Global Security Programme. 1992.

Biodiversity specialist with responsibility for authoring a chapter on 'The Value of Biodiversity' for publication in a book prepared by the Global Security Programme (Cambridge, UK) to highlight growing concerns over environmental security. 'Threats Without Enemies' is published by Earthscan. 1 m.

EC. Equatorial Guinea. 1992.

Project Manager for EDF funded project: "Conservation et Utilisation Rationnelle des Ecosystemes Forestiers, Equatorial Guinea". Responsible for project formulation in consultation with DG VIII (EC, Brussels) and evaluation of consultancy bids in a programme designed to conserve the remaining areas of lowland rain forest. 0.75 m.

TANAPA, Tanzania, 1992

Grassland ecologist for the development of a management model of the Serengeti ecosystem in conjunction with 20 senior staff of Tanzanian National Parks and international scientists. Model development and testing took place at a workshop held at the Serengeti Research Institute within the national park. 0.75 m.

EC. Six Central African States, 1991.

Project Manager for EDF funded project: "Conservation and Rational Utilisation of Forest Ecosystems in Central Africa (ECOFAC)". Responsible for evaluation of the Prequalification and Restricted Invitations of this six country programme, which has become of critical importance to the conservation of central African rain forest. Advised on a strategy for long-term monitoring of the programme in consultation with DG VIII (EC, Brussels). 3 m.

University of Edinburgh, (Visiting Fellow) 1993-present:

- Current research is focussed on competition theory and its use in predicting human use of natural resources, including sustainability, conflict and overexploitation (see references below).
- Co-founded the Biodiversity Unit spanning all departments and institutes in the Division of Biology at Edinburgh University. The unit provided a forum for meetings and research in the area of biodiversity. It also provided a platform for the University and SNH to organise a book on the biodiversity of Scotland.
- Directed an NERC-funded research programme that has developed a GIS model to predict herbivore species richness in Africa (\forall - and \exists - diversity) relation to climate change incorporating satellite NDVI sensor imagery, soils, vegetation class, and topographical databases. This research has been undertaken in collaboration with a graduate student, David Baird, firstly as an M.Res candidate and laterally as a doctoral candidate, at the University of Edinburgh. 1st results published in Ecology (see below).
- Supervised studies of the migration of Mongolian gazelle in the Eastern Steppes of Mongolia. Appointed to the research committee for Kirk Olson's PhD project on a WCS-funded programme that utilises mineral and chemical analysis of forage, satellite radio-tracking and vehicle surveys to document movements between calving and rutting grounds of an estimated 1.2 million animals. Supervised Steve Blake's PhD project on elephant movements in Nouabalé-Ndoki National Park in northern PR Congo and various Masters and Honours projects.
- Supervised studies of Buffon's kob behaviour and conservation in Guinea-Bissau and Senegal. Research undertaken by J. Dyson in the Parc Transfrontalier du Niokola Badiar.
- Principal Investigator for studies of the distribution and dispersal of specialised British insects (oak leaf arthropods and dead-wood beetles in Scots Pine) that formed a basis for monitoring future population trends.
- In collaboration with Stuart West, undertook new studies of conflict in fig wasps in order to test further the theory of kin selection. Results confirmed that Hamilton's theory does not apply in most natural systems due to the conflicting influence of increased competition between relatives. Results published in Nature (see below).
- Guest lecturer at the University of Edinburgh (ongoing). Lectures have been delivered in the following courses: behavioural ecology (Zoology III); Ecology III - sustainable utilisation of natural resources; Ecology IV (honours year) – wildlife and protected areas management; Zoology IV - plant-animal interactions. Centre for Tropical Veterinary Medicine, MSc module - sustainable utilisation of wildlife.
- Guest lecturer in biodiversity studies at the Open University MSc Course in Human Ecology held at the Centre for Human Ecology, Edinburgh.

Nuffield Research Fellow, University of Cambridge; Project Leader, Serengeti National Park, Tanzania, 1985-1993:

Field studies were conducted over a five-year period from 1985 to 1990 into the ecology of grazing ungulates in the savanna woodland and grassland habitats of the Serengeti National Park, with particular emphasis on migration, use of wild pastures, herbivory, niche separation, resource competition and ecosystem processes. The following research projects are representative of the studies undertaken:

- Migration of wildebeest in the Serengeti-Mara ecosystem: an investigation of mineral deficiencies, energy requirements and predation of wildebeest in relation to annual patterns of movement.
- Community ecology of grazing ungulates: an investigation of habitat selection, foraging behaviour, locomotion, daily activity, reproduction and body condition in free ranging wildebeest, hartebeest, topi, waterbuck and zebra.
- Comparative nutrition of grazing ungulates: an investigation of energy metabolism, diet selection, food intake and digestion in wildebeest, hartebeest and topi, with data collected from wild-caught animals kept in stables at the Serengeti Research Institute.
- Theoretical investigation of optimal foraging strategies by ungulates feeding on sparse, dry-season pastures, which for the first time took account of energy expended in locomotion during extensive foraging movements.
- Comparative investigation of skeletal muscle physiology in two classes of antelope, one with migratory and nomadic foraging habits and the other with residential habits.

SERC Research Fellow, University of Cambridge; Research Associate, University of Malaya, 1980-1985:

Field studies over 24 months from 1980 to 1982 in primary and secondary rain forest on the Malay peninsula and in the Bornean states of Sabah and Sarawak included a study of pollination and seed dispersal in *Ficus* (wild figs) and informal supervision of graduate projects on birds and mammals. As an active member of the Malayan Nature Society, investigated the utilisation of timber and NTFPs by indigenous peoples, state institutions and the private sector. Questionnaire survey of reasons for conserving tropical rainforests (published in 1990). Various popular articles about the ecology of SE Asian rain forests. Throughout this period, studies undertaken of the biology of the specialised fig fauna.

Yvonne Parfitt Fellow, University of Zimbabwe and Department of National Parks and Wildlife, 1974-1980:

Field studies were conducted over a 4-year period from 1974 to 1978 into the behaviour and ecology of impala within the wooded savannas of the Zambezi Valley in northern Zimbabwe. The main focus of the impala research was a study of 450 individually marked animals from which data were collected on movements, habitat preference, foraging associations, social behaviour, age, morphology and genetic markers. This enabled investigations of sociality, kinship, mating strategy, reproductive skew, costs of male conflict, dispersal and age-specific mortality. Assisted with data collection in other projects at the park's research station, including the monitoring of large mammal populations from fixed foot-transects, studies of elephant movement, warthog mortality, vulture breeding success and woodland dynamics.

Undergraduate, University of Edinburgh: Research Assistant, Nature Conservancy, Edinburgh 1973-74:

Studied the population dynamics of shelduck in the Firth Estuary, Scotland over a one and a half year period with detailed investigations of nesting success, duckling survival and breeding territories using colour-ringed birds. Surveys of the invertebrate fauna available as food in tidal mud flats at Aberlady and Gosford Bays were undertaken to assess the quality of breeding territories.

14. M.G. MURRAY – PUBLICATIONS:

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- Murray, M.G. (submitted MS). Sharing scarcity on a crowded planet: a framework for natural resource management. **Science**.
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- Olson, K.A., **Murray, M.G.** & Fuller, T.K. (2010). Vegetation composition and nutritional quality as forage for gazelles in eastern Mongolia **Rangeland Ecology and Management** 63: 593-598 (Available at: http://www.mgmsolutions.com/martyns_publications.html).
- Murray, M.G. (2010). Bushmen and the Environment: A Story of Our Time. **The Bulletin of the British Ecological Society** Vol. 41 (2): 40-43.
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- Murray, M.G. & Simcox, H. 2003. Use of Wild Living Resources in the United Kingdom – A Review. UK Committee for IUCN (<http://www.iucn-uk.org/Projects/WildLivingResources/tabid/63/Default.aspx>).
- UNEP 2003. Afghanistan: Post-Conflict Environment Assessment. UNEP, Switzerland. (Details of availability from: http://www.unep.org/publications/search/pub_details_s.asp?ID=109)

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