UNIVERSITY OF DAR ES SALAAM

INSTITUTE OF RESOURCE ASSESSMENT

Annual Report

July 2003 – June 2004

The Vision of IRA is

"to become a high performance and reputable institution that excels in research, teaching and service provision to the community in natural resources management at national, regional and international levels".

Our Mission is

"to enhance sustainable capacity in human, financial and physical resources in order to excel in quality research, teaching and service provision to the community in natural resources management; and further IRA's image as a centre of excellence in knowledge creation and skills development at a postgraduate level".

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SECTION ONE: BOARD OF DIRECTORS

This year we witnessed the end of the three-year tenure of the IRA Board and the appointment of the new Board to guide the Institute for the coming tenure 2002/03 – 2003.07. The new Board members of the IRA are listed below.

List of IRA Board Members (2002/03 – 2003/07)

1. **Prof. Raphael B.B. Mwalyosi**, Director/Chairman, Institute of Resource Assessment, University of Dar es salaam.
2. **Mr. Richard Muyungi,** Assistant Director, Division of Environment, VPO
3. **Mrs. Ester C.J. Kerario**, Director EIA/SEA, NEMC
4. **Mrs. A. Kaduma**, Director of National Food Security, Ministry of Agriculture and Food Security
5. **Mr. J.M. Mihayo**, Assistant Director, Water Resources Development, Ministry of Water and Livestock Development
6. **Dr. S.H. Sinda**, Institute of Development Studies (IDS) University of Dar es Salaam
7. **Prof. S. Misana**, Head, Geography Department, University of Dar es Salaam
8. **Dr. C.Z Kaaya**, Geology Department, University of Dar es Salaam
9. **Dr. J.L.M. Shitundu,** Economic Research Bureau, University of Dar es Salaam
10. **Prof. J. Nawe**, University Library Services, University of Dar es Salaam
11. **Mr. R. Musingi,** Regional Administration and Local Government, Dodoma
12. **Prof. IS. Iddi,** Director, Forest and Beekeeping, Ministry of Natural Resources and Tourism, Dar es Salaam
13. **Prof. J.O. Ngana,** Coordinator, Natural Resources and Environment, Institute of Resource Assessment, University of Dar es Salaam
14. **Dr. H. Sosovele,** Associate Director, Institute of Resource Assessment, University of Dar es Salaam
15. **Prof. I. Kikula**, UCLAS/IRA,
16. **Prof. N.F. Madulu,** Coordinator, Population and Human Settlement, Institute of Resource Assessment, University of Dar es Salaam
17. **Prof. P.Z. Yanda,**Coordinator, Information Technology and Remote Sensing, Institute of Resource Assessment, University of Dar es Salaam
18. **Dr. A. Majule**, Coordinator, Agriculture, Food Security and poverty Alleviation, Institute of Resource Assessment, University of Dar es Salaam
19. **Dr. F. Shechambo**, Coordinator, Social Policy Analysis, Institute of Resource Assessment, University of Dar es Salaam.
20. **Mrs. A. Hollella,** Representing the Supporting Staff, Institute of Resource Assessment, University of Dar es Salaam
21. **Mrs. E.G. Mosha,** Administrative Officer/Secretary, Institute of Resource Assessment, University of Dar es Salaam

DIRECTOR'S FOREWORD

IRA Director Prof. Raphael B. B. Mwalyosi

As stated in the 2002/03 Annual Report, IRA believes that research must be guided, demand driven, and should be relevant to the existing socio-economic and political environment nationally and regionally. During the reporting period (July 2003 – June 2004), and following the launching of the new Research Agenda and Strategic Rolling plan, the Institute of Resource Assessment (IRA) has been engaged in preparing a number of programmes as a way of implementing the Research Agenda and Strategic Rolling Plan. The IRA concentrated on the following activities:

- Preparation of a Research Programme;
- Preparation of a Master's Programme;
- Conducting Applied Research;
- Providing Community Services
- Teaching and Supervision of Postgraduates

Accordingly, IRA continued with the pioneering new project planning process whereby concept proposals are invited from IRA staff members based on the five thematic areas presented in the IRA Research Agenda namely:

- Natural Resources Management;
- Environment;
- Agriculture, Poverty Alleviation and Food Security;
- Population and Human Settlement;
- Social and Policy Analysis.

A total of 17 concept notes (CN) were submitted. These were then presented and discussed by all academic staff members at a Workshop Retreat at Bagamoyo. Each of the CN was discussed using 10 identified criteria, namely:

- Significance and relevance;
- Scientific contribution (e.g. replicability of methodology;
- Contribution to national socio-economic development;
- Relevant to IRA Research Agenda and UDSM Institutional Transformation;
- Long term duration (at least 1 year);
- Ability to attract stakeholder (donor) funding;
- Demand driven;
- Implementability;
- Topicality of research issues and;
- Scope – geographical, zone, etc.

Each one of the CN was then scored using an Evaluation Matrix. The Matrix indicated

- Priority 1 Projects, which could proceed to next step of identifying stakeholders to consult;
- Priority 2 projects which needed further polishing taking into account comments made and;
- Priority 3 projects were those found to be inadequate in more than half of the six criteria above. Such projects needed re-thinking re-focusing and extensive re-writing.

A Technical Committee of 6 staff members was established to edit the revised CN and draw up the final Programme. As a way forward, authors of Priority 2 and 3 projects were to re-design their concepts.

Substantial progress was made on the development of the new Natural Resources Assessment and Management Masters Programme initiated during the previous year. At the time of this reporting, the draft courses and modules

have been prepared including course outlines, course content, expected outputs, means of conducting courses and scheduled literature. The next stage will be to organize a stakeholder workshop to discuss the curriculum and draft the final programme proposal to be submitted to the UDSM Authorities for consideration and approval.

In the area of Research and provision of service to communities, the year 2003/04 was relatively productive. The Institute undertook and completed more 11 applied research and service projects. Also, 17 applied research and service projects are on-going and spilled over into 2004/05. During the same time, staff members published 13 papers in international journals, 3 books, 13 chapters in books and 40 research reports, service reports and workshop proceedings,. It was during this period that the IRA finalized the publication of the long-awaited Man-Land Inter-relations (MALISATA) Monograph and its summary in Kiswahili. There was also increased demand for our GIS laboratory and EIA database services.

We wish our stakeholders fruitful readership and hope that in this small way we disseminate our research findings and expect constructive feedback for further improvement of our work. As we look forward to another fruitful 2004/05, we dedicate ourselves to putting more effort into research, community service and training.

SECTION ONE: OVERVIEW OF THE INSTITUTE (IRA)

1.2 Institutional Set-Up

The Institute's mandate remains as presented in the 2002/03 Annual Report as per its interim constitution that stipulates its establishment, administrative structure and staffing. The Director manages the Institute. He is an appointee of the University Council and reports to the Chief Academic Officer (CACO).

Through the office of the Director, IRA has two participatory organs to facilitate decision-making i.e. IRA Board and a Management Committee. The former is a statutory organ of the University whereas the latter is an informal but useful arrangement to assist the Director to exploit the fertile treasure of ideas from members of the Institute.

The Office of the Director is also equipped with "generic tools" i.e., the Associate Director, Administrative Officer, and Accountant to help the Director with routine duties so that he focuses more sharply on strategic planning and management of the Institute instead of "administering" it.

Finally, the Director supervises 5 research team leaders or co-ordinators that also form the Management Committee. These are principal advisors to the Director and are responsible for planning and reviewing the institute's research activities. The Management Committee may also co-opt other staff when necessary and include a representative from the non-academic staff.

1.3 Management and Administration

1.3.1 Management committee

Name	Position
Prof. R.B.B. Mwalyosi	Director
Dr. H. Sosovele	Associate Director
Prof. N.F. Madulu	Co-coordinator, Population and Human Settlements
Prof. J.O. Ngana	Coordinator, Natural Resources and Environment.
Dr. A. Majule	Coordinator, Agriculture, Food Security & Poverty Alleviation
Prof. P. Z. Yanda	Co-coordinator, Remote Sensing and Information Systems
Dr. F. Shechambo	Coordinator, Social & Policy Analysis
Ms. E. Mosha	Administrative Officer/Recorder

1.3.2 Staff matters

During the academic year 2003/2004 the number of staff members stood at 34 (17 academic, 7 technicians and 10 administrative staff). During the period a new technician (Mrs. Olipa Ngereja) was recruited to the post of GIS Laboratory Scientist, replacing Mr. Simon Mwansasu who had been upgraded to Assistant Research fellow.

As stated above, one technical staff, Mr. Simon Mwansasu was re-categorized to academic staff position of Assistant Research Fellow. Ms. Kiwasila visited and worked for 3 months with her supervisor at the University College, London where they agreed on the quality and content of her PhD Dissertation. Ms. Kiwasila is now expected to graduate in December 2004. On the other hand, Mr. James Lyimo continued to finalize his PhD Dissertation and expects to officially submit the same to the University of Copenhagen in October 2004.

During the reporting period, one of our technicians, Mr. Francis Msuya, retired from University service while Dr. Faustin Maganga took a 1- year sabbatical leave to work with ECAPAPA in Entebe, Uganda. Meanwhile Prof. Idris Kikula continued to work at UCLAS in his capacity as Principal of the College. Dr. Shechambo completed his sabbatical leave, and was reinstated at the Institute in November 2003.

1.4 Links and Collaboration

During the 2003/2004 period the Institute continued to establish links with local, regional and international Institutions. Continuing links include those with the

School of Geography, University of Stockholm until the conclusion of the MALISATA research programme in June 2004; the Center for Environment and Development of the Norwegian University of Science and Technology (NTNU) through the Pangani Basin Programme; the Institute of Geography, University of Copenhagen, under the Sustainable Agriculture in Semi-Arid Areas – SASA programme.

Other collaborative research continued with the Center for Development Research (CDR), Denmark; Population Reference Bureau (USA) and; the Norwegian Agricultural University (NORAGRIC), Norway.

Collaboration was either initiated or continued with several regional institutions including: the Institute of Water and Sanitation Development (IWSD); the Water Research Fund for Southern Africa (WARFSA); World Wildlife Fund for Nature (WWF); International Union for Conservation of Nature and Natural Resources (IUCN), Southern Africa Institute for Environmental Assessment; International Association for Impact Assessment and; Eastern Africa Association for Impact Assessment (EAAIA).

Within Tanzania, collaborative research also continued with the Institute of Development Studies, Economic Research Bureau, Constituent College of Engineering, and Faculty of Science of the University of Dar Es Salaam. Public service contacts were undertaken on a routine basis with government ministries such as Vice President's Office, Ministry of Natural Resources and Tourism, Ministry of Agriculture and Food Security, Ministry of Water and Livestock Development, and Ministry of Regional Administration and Local Government. Other partners in public service included Tanzania National Parks (TANAPA), National Environment Management Council (NEMC) and the National Bureau of Statistics (NBS). Also IRA continued to provide public services to international NGOs and development partners such as WWF, UNDP and USAID.

1.5 Development of Physical Infrastructure at the Institute

1.5.1 Library Services and Documentation Unit

In the year 2003/2004, the IRA Documentation Unit continued to provide reading materials to Institute staff, other university staff, graduate and undergraduate students. In collaboration with staff of the Main UDSM Library, the programme of computerization of our documentation has been completed and is running efficiently. 110 paper/books were catalogued and linked to the Main Library Computerized Open Public Access Catalogue (OPAC). That means a reader can access documents successfully from the Main Library web site.

Some individuals and Organizations continued to donate publications, books and journals to IRA Documentation Unit. Some of these Institutions include CIFOR; IIED; Demographic Unit – UDSM; Zed Books; FAO; UNDP; ILRI (International Livestock Research Institute); Faculty of Science – UDSM; RELMA (Regional Land Management Unit, Nairobi); Chr. Milchelsen Institute; and SUA

1.5.2 Computer and Related Facilities

The Institute continued to make efforts in procuring new computers to keep pace with advances in Information Technology. During the reporting period, the Institute purchased 7 computers, 2 printers and 1 digital copier. Thus, currently, the Institute has a total of 29 working computers (including 24 desktops and 5 laptops). There are more computers compared to the previous year. Two computers and a printer have been recently acquired through the EIA Expertise Database for Eastern Africa project. An office close to TANRIC has been furnished to house this database.

The Institute has a total of 15 Printers ranging from *HP LaseJet 1100 series* to *Large Format Printer like HP DesignJet 5000 PS*. There are more printers compared to the previous year. Out of fifteen printers, three are color printers and the printing range is from A4 to A0 including *HP 5500 LaserJet* Printer that produces high quality printouts in A3 size.

The Institute has two HP DesignJet plotters, mainly used for plotting maps in Geographic Information System (GIS). The Institute has five digitizing tables each connected to a computer for GIS activities. Development of a website for the Institute has reached advanced stages.

1.5.3 Information and Communication Technology Infrastructure

The computer facilities owned by the Institute offer several services including running a computerized information system in Natural Resources and the Environment; data processing and analysis of GIS activities; image processing; word processing; and database management including EIA. A computer has been installed in the documentation unit and links Internet services with the main University library. Computerization of IRA Accounts office continued.

SECTION TWO: TRAINING AND TECHNICAL SERVICES

2.1 Short-Term Training

2.1.1 Communicating Environmental Research to Policy Makers

In collaboration with the Population Reference Bureau (USA), the IRA conducted a third international, two-week policy communication workshop for participants from all-over Africa and beyond. The objective of the workshop was to train participants how to maximize policy makers' and planners' use of research results that illustrate the interaction of population, health and environment variables. Specifically, participants were trained how to:

- Address problems that policy makers face with integrated research;
- Understand how research findings enter an influence the policy process;
- Develop a policy-level communication strategy and action plan;
- Prepare and present short policy documents such as policy memoranda and fact sheets;
- Create and deliver oral policy presentations using a computer-based power point and graphics programme styles.

Trainers from IRA: Dr. H. Sosovele; Prof. N. Madulu, Dr. A. Majule and Ms. H. Kiwasila.

2.1.2 Integrating Environment into the Poverty Reduction strategy process potential of SEA

A workshop was organized as part of a study on Strategic Environment Assessment (SEA) and its potential for use in Tanzania and linkages to the Poverty Reduction Strategy process. The study was the initiative of the Vice President's Office and was supported by the UNDP.

The objectives of the workshop were:

- To increase awareness on SEA as a planning tool and a means of integrating environment issues into the planning and policy process;
- For the consultants undertaking the study to present on their initial work and plans; and,
- To explore with stakeholders on the potential application of SEA, or its principles, in Tanzania.

Participants from 41 key sectors and government institutions attended the workshop.

Four presentations were made in the workshop:

- Strategic Assessment and Environmental Impact Assessment: Linkages in Tanzania for Development and Environmental Conservation;
- Strategic Environmental Assessment in Distric Planning for Sustainable Development;
- What is SEA?; Overview of the Principles and Examples;
- Overview of the relationship between poverty and environment

Trainer: Prof. R.B.B. Mwalyosi; Prof. I. Kikula; Dr. H. Sosovele and Dr. A. Amkenda

2.2 Teaching and Supervision

During the year under review, members of academic staff participated in the following activities that are related to teaching and supervision.

1. Prof. I. Kikula: supervised Mr. Ndangarasi of Botany Department in his PhD studies; supervised desertations of undergraduate students in URP at UCLAS; and; was external examiner at NTNU, Norway
2. Prof. R. Mwalyosi supervised Mr. Mcharo of NEMC in his PhD studies and taught EV619 (Environmental Impact Assessment) to MSc. Students of the faculty of Science.
3. Dr. C. Mung'ong'o participated in the teaching and supervision of M.A. Course (GE618), Management and Conservation of Environmental Resources at the Department of Geography, UDSM
4. Dr. A. Mwakaje taught GE 211 (Agricultural Planning and policies).
5. Prof. R. Mwalyosi Prof. R. Mwalyosi taught EIA course to MSc. Students of the Dryland Biodiversity Programme at the University of Addis Ababa, Ethiopia.
6. Dr. R. Kangalawe was external examiner for two M.Sc. students from the Department of Forest Economics, Sokoine University of Agriculture.
7. Prof. Madulu: supervised Karin Lindsten , a Masters student form the University Lund, Sweden; supervised Haule, Michael J., PhD student, University of Kwazulu Natal, South Africa and; supervised Mwakajonga, Tuntufye A., a Masters student, Demographic Training Unit, University of Dar es Salaam.
8. Prof. P. Yanda: supervised Mr. A. Lyimo of IRA who has just completed his MSc. Studies and; supervised Mr. C. S. Sokile who has already submitted his PhD Thesis.

2.3 Preparation of Teaching Programmes and Curricular

During the year under review, members of staff continued working on modalities of establishing a Masters Degree Programme named "***Resource***

Assessment and Management". At the time of this reporting, the draft courses and modules had been prepared including course outlines, course content, expected outputs, means of conducting courses and scheduled literature.

The next stage is to call a stakeholder workshop to discuss the curriculum and draft a final programme proposal to be submitted to the UDSM Authorities for consideration and approval.

SECTION THREE: RESEARCH AND COMMUNITY SERVICES

3.1 Completed Research and Community Services

3.1.1 Integrated Water Resource Management in Lake Manyara Sub-Basin

The results of the study were presented in the 2002/03 Annual Report. In October 2003 the results were presented at the 4th Annual WARFSA Symposium in Gaborone Botswana. The final report was submitted to WARFSA. A paper was prepared and has been accepted for publication by the Physics and Chemistry of the Earth Journal to appear in the November 2004 series. A Kiswahili version of the report was prepared and disseminated to the local stakeholders in Manyara Region.

Researchers: Prof. J. Ngana, Prof. R.B.B. Mwalyosi, Prof. P. Yanda and Prof. N.F. Madulu

3.1.2 Enhancing Agricultural production through Sustainable Irrigation: A case of vinyungu farming system in selected zones in Iringa

The results of the study were presented in the 2002/2003 Annual Report. The results were fed back to the stakeholders in a workshop in Iringa. A Kiswahili manual on traditional agricultural inputs was prepared and distributed to farmers and agricultural extension staff in Iringa. Apart from a report on the study, a chapter was prepared for publication in a book.

Researchers: Dr. A. Majule and Prof. R. Mwalyosi

3.1.3 Man-Land Interrelationships in Semi-Arid Areas of Tanzania

The MALISATA Programme was initiated in 1991 with the support of the Swedish Agency for Research Co-operation (SAREC) to develop an understanding of land degradation in the Kondoa Eroded Area (KEA) in the Kondoa District and other semi arid areas of Tanzania. The programme was meant to provide scientific basis for the operation of the Government supervised Land Conservation Project in Dodoma (HADO).

The Programme came to an end in 2000. During its lifetime the Programme produced 11 PhDs, 3 MSc and over 100 publications have been produced. During the reporting period, a three-day Workshop was held in Dodoma to feedback and solicit stakeholder inputs and reflect on the research output of the Programme. Workshop participants included senior representatives from Kondoa District and the Dodoma Regional Secretariat. Subsequently, the research works have been

synthesized into a Monograph/Book. In addition, a summary of the monograph has been produced in Kiswahili for dissemination to all key stakeholders including those in Kondoa District.

Research Coordinator Dr. C. Mung'ong'o

3.1.4 Mainstreaming Environment into Poverty Reduction Strategy Process: The Role of Strategic Environmental Assessment

The objective of this consultancy was to determine experience to-date of Strategic Environmental Assessment (SEA) in Tanzania and outline the potential of SEA as a tool in poverty reduction and planning process at the sectoral and local government levels in Tanzania.

The project was commissioned by VPO/UNDP and is funded by DFID

Researcher: Prof. R. B. Mwalyosi and Adolf Mkenda

3.1.5 Natural Resources and Socio-Economic Baseline Survey for the Songwe River Transboundary Catchment Management Project

The objective of this study was to undertake scoping of the proposed project to determine natural resource use patterns, identify associated environmental and socio-economic threats to the catchment and propose intervention measures within the Songwe catchment.

Key findings from this study are;

- Soil erosion is well pronounced in some areas due to deforestation and cultivation on steep slopes.
- The area along Songwe in Mwaulambia, Tanzania, is overstocked, thus leading to soil erosion along cattle routes.
- Mono-cropping cultivation of seasonal crops such as maize, tobacco and beans is predominant. This is less effective in terms of soil and water conservation.
- The upper reaches of Songwe River are typified by presence of adverse slope conditions.
- Most forest reserves are under inadequate management because of inadequate financial and human resources.
- Shifting cultivation (e.g. Chitemene system) contributes to deforestation in the middle and upper catchment, thus subjecting soil to water erosion.
- Bush fires associated with charcoal burning and hunting of game meat, reduce protective vegetation cover and biodiversity.

- Charcoal burning, brick burning and fuel wood collection contribute to deforestation.
- Inappropriate fishing methods, such as complete blocking of the river with traps and nets at the mouth of the river and also the use of seine nets, lead to the destruction of breeding grounds and consequently diminished fish stock.
- The ongoing degradation of water sources in the middle catchment will change the hydrological regime of the river.
- There is lack of information on the current status of these resources

Researchers: Prof. R.B.B. Mwalyosi, Prof. P.Z. Yanda, Prof. E.K. Shishira, Dr. C.G. Mung'ong'o, Dr. A. Majule

3.1.6 Sustainable Development and Management of Wetlands – Kilombero case study

This was a consultancy work funded by FAO-Netherlands Partnership Program - FNPP Project. The study was conducted in two villages namely Idete and Signali located in Kilombero District, Morogoro Region. The findings from this study show that the wetlands are highly beneficial in supporting the livelihoods of communities inhabiting these areas. The landscapes in the wetlands are diverse and provide a number of livelihood options such as agriculture, fishing and livestock keeping. The findings however, show that almost all the people in the case study villages in Kilombero Valley utilize wetlands to grow a range of crops including rice, maize and cassava, either during the rainy season or in the dry season. Over the last two decades the use of wetlands for agriculture has increased because of increasing population and the resultant need to produce more food. However, there are environmental concerns associated with increasing use of wetlands for agriculture and other livelihood activities. Among such concerns is deforestation and trampling of soils by increasing livestock numbers. The former is due to land clearing for expansion of farmland and the latter is due to influx of pastoral and agro-pastoral communities in the area. Project has been completed and report submitted to FNPP.

Researchers: Dr. R.Y.M. Kangalawe and Dr. E.T. Liwenga

3.1.7 Resource Poor Environment and Poverty Alleviation in Mbinga District

This research project was financed by REPOA. The main objective of this project was to assess performance and effectiveness of *Ngoro* and *Malonga* farming systems in Matengo highlands in the conservation soil fertility and enhancement of crop productivity.

The results show that ngoro farming practice has more positive impacts on poverty alleviation, environmental management and sustainable agriculture compared to *malonga* system. Ngoro system is more effective on prevention of soil erosion. On the other hand, cultivation along the hills using *malonga* practice leads to soil erosion reduces soil fertility and productivity. Non-farm income generating activities are associated with *malongo* farming systems and thus appear to be adopted as a strategy of reducing poverty. This farming system is associated with marginal environments where agriculture is not favourable.

Researchers: Prof. P. Yanda Dr. A. Majule, and Dr. A. Mwakaje

3.1.8 Natural Resources Use Patterns and Poverty Alleviation Strategies in the Highlands

This research project was financed by REPOA. The objectives of this project were two-fold:

- To document the existing resources use patterns and establish the interactions between human activities and resource use patterns in the highland and lowland areas

- To examine and assess the relationships between population growth

Findings from this study illustrate that there is significant population growth especially in the highland areas that has led to out-migration and increase of poverty level, i.e. lack of employment to the young generation due to land scarcity. There is also change of life style among the people in both the highland and lowland areas. For example, pastoralists in the lowland areas are turning into agro-pastoralists, and farmers from the highland highland areas are opening farms in the lowlands. This is an adaptive mechanism to cope with challenging and changing biophysical and socio-economic environments such as decrease of livestock and grazing areas. In addition, many people are involved in trade. Coping mechanisms among the agriculturists in the highland areas include trade, cultivation of cash crops, hiring of land, out-migration, and employment in the informal sectors (short-term employment, especially in the lowland areas). Out migration is dominant in the highland areas. However, prevailing conflict between the communities in the highland and lowland areas has limited in-migration into the nearby sparsely populated lowland areas.

Researchers: Prof. P.Z. Yanda and Prof. N.F. Madulu

3.1.9 Participatory Approach for District Development Planning Within the Tanzakesho (Capacity 21) Programme in Tanzania

This is work that has been conducted between 2000 – 2004 in Mbozi and Sengerema Districts. The work has been done on advisory capacity within the global programme of Capacity 21. The programme which was under PO-RALG and UNDP has ended this year.

The objective of the programme was to build capacity of the district staff, ward staff and communities to plan. This was done in eight wards and about forty villages. The village leaders were first trained on roles and responsibilities, visioning, environmental awareness and PRA. The PRA was used as a tool for communities to come up with their own village plans based on priorities of the felt needs. The communities had also to come up with implementation modalities. The results have been incred8ibly fascinating. Contrary to the popular views, district staff are able to facilitate planning once they are empowered. Similarly, community members are able to articulate development issues with some facilitation. Implementation of the plans are possible with minimum financial support. Such an approach enhances commitment, ownership and sustainability.

Researcher: Prof. I. Kikula

3.1.10 When Bottom-Up Meets Top-Down: The Limits of Local Participation in Local Government Planning in Tanzania

This initiative was a follow-up on a tracer study conducted to establish the effectiveness of training district staff by REPOA. The service produced interesting results that prompted the REPOA Management to encourage an indepth analysis. The results showed that participatory planning has a huge potential for fostering sustainable development in the district. However, in order to realize this potential a number of issues need to be addressed. Among these issues is the relationship between PRA-based participatory planning and budgeting at village/community level and the overall district planning and budgeting Also, there is need to train district staff to fully articulate the principles of a true participatory planning approach.

Researchers: Brian Cooksey and Prof. I. Kikula

3.1.11 The Development of Guidelines for Regional Impact Assessment of Shared Ecosystems of East Africa

ACT together with the East African Community (EAC) are collaborating to develop regional guidelines for Environmental Impact Assessment (EIA) of

shared natural resources such as the Taita Hills- Eastern Arc Mountain forests of the Southern end of Kenya and the northern Tanzanian border; Minziro-Sango Bay swamp forest, located in south-western Uganda and northern Tanzania along the Lake Victoria; Mt. Elgon shared by Kenya and Uganda, Lake Victoria shared by the three East African countries and Maasai-Serengeti ecosystems (shared by Kenya and Tanzania).

The need for common EIA guidelines arises at a time when the causes of environmental degradation and the destruction of the ecosystems in the region are many, varied, complex and interrelated. These include rapidly growing population densities in and around fragile systems, national environmental policies and programmes that have not explicitly provided for regional management of shared ecosystems and limited knowledge on structures and productive potentials of many of the shared ecosystems.

With the establishment of the EAC, measures need to be instituted such as harmonized policies, guidelines, laws, standards and programmes that will promote cooperation in the conservation and sustainable use of the shared ecosystems. This means that the partner states need to develop and adopt long-term guidelines and policies to assess the impact of economic development activities on shared ecosystems. Since the three partner states have signed and ratified the Convention on Biological Diversity (CBD), they are expected to promote activities on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly adversely affect the biological diversity of other states or in areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate. EAC Partner states will be fulfilling their obligation under the Convention if they establish a regime of guidelines for EIA. Such guidelines are crucial for the proper conduct impact assessment studies on shared ecosystems.

Thus, the specific objectives of the study were:

- Preparing EIA guidelines on the basis of Strategic Environmental Assessment;
- Identifying and categorizing types of projects that can cause trans-boundary impacts in the shared ecosystems of East Africa;
- Establishing procedures for the guidelines for regional EIA of shared ecosystems of East Africa;
- Proposing forward-looking strategies on: (i) the specific training needs to enhance the integration of regional EIA in the EAC Partner states and; (ii) the role of environmental agencies and other stakeholders in the implementation of regional EIA Guidelines for shared ecosystem of East Africa.

The project was commissioned to a team of four consultants from the East African states. The study was concluded and three documents were produced and submitted to the East African Community thus:

- Executive Summary of EIA Guidelines
- Report of a Study to Propose EA Guidelines for Shared Ecosystems of East Africa and;
- Environmental Assessment Guidelines for Shared Ecosystems in East Africa.

Researchers: Prof. John Okedi (Uganda); Prof. Raphael Mwalyosi (Tanzania); Dr. Albert Mumma (Kenya) and Mrs. Asheline Appleton (Kenya)

3.2 Ongoing Research and Consultancy

3.2.1 Pangani River Basin Research Programme

This is a multidisciplinary research contributing towards integrated water resources management in the Pangani River Basin. The project is undertaken by research staff from the University of Dar es Salaam (IRA, Geography Dept. Dept of Water Resources Engineering). A workshop was organised and 16 papers were presented and are available as published proceedings. Arrangements are in the pipeline to publishe some of these in refereed journals. The project is winding up in December 2004.

IRA Researchers involved; Prof. Ngana, J. O; Prof. Shishira, E.K and Prof. Yanda, P.

3.2.2 Systems Research on Small Groundwater Retaining Structures under Local Management in Arid Areas of East Africa (REAL)

This research project is being undertaken by a consortium of research institutes with funding from the European Union (EU). The main focus of the research is to explore ways and options of community participation in land and water management, taking small water retaining structures (dams) as a case in point. The main emphasis is placed on the role of community participation in East Africa in planning, construction and management and evaluation of the performance of the dams for wildlife and livestock. It should be noted that this research project comes at a time when most Sub-Saharan Africa is experiencing recurrent drought or sometimes too much rain, which simply percolates underground, or flows all the way to the sea and disappears there, leaving behind people who face and have to cope with the after-effects of too much rain and later drought or shortage of water.

The project is undertaken jointly with the Faculty of Engineering and Delft University of the Netherlands, Catholic University of Leuven, and University of Nairobi. The project involves local communities (livestock keepers and wildlife managers) in Kitendeni, Arusha (Tanzania), and Amboseli National Park (Kenya).

Researchers: Dr. Sosovele, Prof. Shishira, Dr. Kangalawe and Prof. D.Mashauri of Engineering Dept.

3.2.3 Capacity Building to Evaluate and Adapt to Climate Change-Induced Vulnerability to Malaria and Cholera in the Lake Victoria Region

This research project is funded by Assessment of Impact and Adaptation to Climate Change (AIACC) Programme, and is jointly undertaken by the Institute of Resource Assessment, University of Dar es Salaam, University of Nairobi (Kenya) and University of Makerere (Uganda). This research project has five objectives:

- To analyse climate variability in temperature and rainfall extremes in relation to reported and documented malaria and cholera outbreaks in order to establish the coupling sensitivities and critical climate thresholds;
- To determine patterns of water supply, use and management in relation to malaria and cholera outbreaks of targeted groups
- To determine socio-economic profiles and activities of the target groups as factors that influence their vulnerability and adaptation strategies
- To carry out climate sensitivity tests for prediction of possible and future vulnerabilities and coping ranges
- To build capacity of institutions and scientists in the region to conduct climate variability and changes, vulnerability and adaptation research.

The project activities undertaken during the reporting period included: analyses of socio-economic data from the two fieldworks to generate the relationships between household characteristics and incidences of malaria and cholera. Progress reports were produced and presented at the Stakeholders Workshop in July 2003 held in Muleba town, Kagera Region. One in the research team participated in the GIS training workshop held in Nairobi in August 2003. The training based on the use of ArcView software in the analysis of spatial data.

In Tanzania the study is being undertaken in Bugarama village (Muleba District) for analysis of climate induced malaria, and in Chato Village (Biharamulo District) for cholera. Among the lessons learned is that it has been noted that villagers in the study area are quite familiar with malaria as a serious disease particularly in Bugarama village. As a result, they have developed a number of locally adapted control measures such as use of traditional herbs. Such adaptation does not exist for cholera for the reason that it is considered to be a new disease and herbalists

have not been able to identify appropriate medication. Findings from this study will provide an understanding on the vulnerability, magnitude of impacts, locally derived adaptation strategies, and identify areas for external intervention measures. Findings of the study will therefore provide an input for planning adaptation mechanisms. Further analysis of data is in progress to identify adaptation scenarios. During the period also the graduate student attached to the project accomplished the dissertation (MA) work and graduated in November 2003.

Researchers: Prof. P. Yanda, Dr. R. Kangalawe

3.2.4 Establishment of Tarangire Information Centre (TIC)

This is an ongoing consultancy project originally funded by WWF for 2 years and is now funded by TANAPA for one more year. During the reporting period, staff from IRA conducted two major training programs at the Tarangire Information Centre. The first involved Park Ecologists from all national parks in Tanzania. The two weeks introductory training focused on the application of GIS and Remote Sensing in the management of natural resources. The second training was specifically done to TANAPA staff based at the Tarangire Information Centre. In-house training has been going on continuously.

The TIC is progressively developing it's own GIS database. There are now datasets with basic information on the Tarangire/Manyara ecosystem. This includes, but not limited to road network, settlements, administrative boundaries, ranger posts, tourist facilities, etc. The datasets have been obtained from various sources including TAWIRI that has provided animal count census data.

IRA Researchers: Prof. P. Yanda, Mr. S. Mwansasu and Ms. A. Mushi.

3.2.5 Coordination for the Policy Implementation Programme

This is an ongoing consultancy programme whereby WWF Tanzania Programme Office has commissioned IRA to provide technical input in the form of coordination for the implementation of USAID's US$ 2.4 Million funded programme to support the Government of Tanzania implement the Wildlife Policy and the National Environmental Policy. IRA is providing coordination services in overseeing the implementation of the work plan.

This assignment is critical for IRA as it provides opportunity not only to contribute to the practical implementation of the policies but also, as another opportunity to IRA to foster linkages between the Institute and the key

Government departments, the donors and international NGOs. The programme is continuing through to August 2004.

Researcher: Dr. H. Sosovele

3.2.6 Indigenous Soil Fertility Restoration in Cashew Nut Producing Area of Southern Tanzania

The research study examines various farming practices and their implications to livelihoods of people in terms of production, the current status of soil fertility, adoption rate of organic fungicides in cashew growing areas and investigated how farmers are responding to declining soil fertility through organic residue management. The study further explored other development problems facing the people through PRA and households survey supplemented by field visits. Through laboratory incubation, the potential of various organic residues in ameliorating soil acidity associated with sulphur dusting and effects on growth of maize were also investigated.

Findings from this study show that sulphur is still a major fungicide used in both zones and this poses a threat to the soil fertility. The adoption of alternative organic fungicides is still slow due to various reasons including poor institutional frameworks and dissemination. The application of organic residues on soils seems to be the best option for managing soil fertility and this need to be promoted. There is an urgent need to review the agricultural land ownership systems since currently elders tend to own large proportion of land under cashews and this encourages out-migration of the youth into urban areas to look for non-farm activities.

Three research papers have been produced out of this work namely:

1. A Research paper “Declining Soil Fertility”. A Challenge for Sustainable Productivity of land under cashew Farms, Southern areas of Tanzania has been re-submitted for publication in the Geographical Journal of Tanzania

2. MSc Dissertations by Jacob Omollo (SUA) “Effects of Organic Residues on Ameliorating Sulphur induced acidity in Cashewnut growing soil of Mtwara, Tanzania by been completed: Two papers are being developed.

3. On farm/on station evaluation of the interaction between sulphur/soils and organic residue types in progress specifically the collection of crop data and soil samples analysis in progress.

Researchers: Majule, A.E.; Shishira, E.K. and Yanda, P.Z.

3.2.7 Mapping of Malagarasi RAMSAR Site Using recent Landsat images

The project was funded by SIMMORS. Major objective of the study was to establish temporal changes cover/use types in the Ramsar Site. Draft maps have been submitted to the client.

Researchers: Prof. P.Z. Yanda and S. Mwansasu

3.2.8 Mapping of Selected Catchment Forests in Tanzania

This is a consultancy project to carry out digital aerial photography and ortho-photo map creation for selected catchment forests in Tanga, Morogoro and Kilimanjaro Regions, covering a total area of approximately 94,122 Hectares. The service has been requested by the Ministry of Natural Resources and Tourism. The Contract is for US$ 124,000. The project has been delayed because of some technical difficulties in acquiring cloud-free aerial photographs. IRA terminated contract with Geospace International as service provider for digital aerial photographs because they demanded an increase of the budget by 25%. A new service provider (Geosystems) has been contracted. The firm has so far made some attempts without success because of cloud cover.

Researchers: Prof. Yanda, S. Mwansasu

3.2.9 Climate Human Environment Interactions in Africa

The IRA and the Change de Recherches (CNRS) though Centre European de Recherches at d'Enseignement des Geosciences de I'Environment (CEREGE) of France have developed a joint research project called "Climate – Environment and Human Dynamics in Africa (CLEHA). The project operates in the Southern Highlands of Tanzania and seeks to address the following questions:

- What are the contributions of climate change and human impacts on tropical environments as reconstructed for Holocene (vegetation, water resources, soils, etc.) and;
- What are the consequences of environmental change on the livelihood of human societies?

In order to address these key issues, routine data collection is needed for reconstructing the past history of climate change so that we can predict the future. In light of this requirement, a monitoring station has been established at Masoko, Rungwe District. Currently, there is an ongoing data collection on temperature, rainfall, soil erosion and other socio-economic data on the surrounding environment.

IRA Researchers: Dr. A. Majule, Prof. R. Mwalyosi

3.2.10 The dynamics of farming systems, food security and poverty alleviation strategies in the semiarid areas of Sukumaland, Tanzania

The research is ongoing, started in June 2004, and is funded by REPOA. The main objective of this study is to investigate the dynamics of the farming systems in Sukumaland. Specifically the study aims at examining the food security situation and poverty alleviation strategies that are carried out by local communities under changing environments, with specific reference to the impact of small-scale mining activities on land degradation and the environment in general. One fieldwork has been undertaken and first progress report prepared and submitted to REPOA.

The districts included in the study are Geita and Misungwi in Mwanza Region and Kahama and Kishapu in Shinyanga Region. Geita and Kahama represent areas with small-scale gold mining whereas Misungwi and Kishapu represent areas involved with small-scale diamond mining. In each of the two districts, two villages were selected in consultation with the respective districts authorities. Villages selected were Nyarugusu in Geita District, Mabuki in Misungwi District, Ilogi in Kahama District and Songwa in Kishapu District. At the villages detailed data collection was undertaken through discussions with key informants, participatory rural appraisals (PRAs) and field observations.

Preliminary findings indicate that the village communities are differentiated in various socio-economic groups namely the wealthy, the moderately wealthy and the poor. It has been found out however that majority of the people belong to the "poor" group. The village community as whole have different economic capacities, different food security situation and poverty alleviation strategies. Majority of the people depend on agriculture (both crop production and livestock keeping) for their livelihoods, though other activities such as small-scale mining and business contribute to the food security situation and to alleviate poverty. Small-scale mining has been reported to have mushroomed only since the early 1990s, which is ascribed to have resulted in many people from other places migrating into the study areas. The study has established also that there are intergenerational differences in terms of activities undertaken by various age groups, including the strategies used to achieve food security and alleviate poverty. While the youths are more involved in business and small-scale mining activities the middle age and the elderly are more involved in agriculture as the main means of ensuring food security and alleviating poverty. It has been found however that land for agriculture is becoming scarcer, attributed to the increasing population and the mining activities which have converted much of the arable land into badlands.

Researchers: Dr. Kangalawe, Dr Liwenga, Dr Majule and Prof. N. Madulu;

3.2.11 The Role of Non-Wood Food Forest Products on Poverty Alleviation in the Southern Coastal Areas of Tanzania

The overall focus of the study is on the role of edible non-wood forest products and how they contribute to poverty alleviation. In undertaking the study, field work was conducted in Mtwara Region in two districts – Mtwara Rural and Tandahimba. In each district participatory studies and field observations were undertaken. Preliminary findings indicate existence of different socio-economic groups in each village whereby the majority of the people are poor and live below the poverty line. A fairly large proportion of the population depend for their livelihoods on non-wood food forest products. Thus, for example, the use of *ming'oko* has increased and overexploitation has changed the availability and size of the product. Poverty alleviation in theses areas is constrained variably by several factors including lack of or poor water services, schools and other related infrastructure. Further, ecological characterization of different non-wood forest products needs to be undertaken in order to understand the impact of exploitation on the environment.

Researchers: Dr. A. Majule, Dr. E. Liwenga and Mr. H. Ndangalasi

3.2.12 Preparation of General Management Plans for Gombe National Parks.

This is a consultancy project involving preparation of a General Management Plan (GMP) for Gombe National Park (GNP). The project started in October 2003. To-date, there has been no clear statement of the park's purpose and significance in any previous partial plans. No one has looked at the long range "big picture" for this park other than consideration for expansion and more development within this small park with little regard for the sustainability of park resources. The current effort is an attempt to put into effect this long felt need for a GMP for the GONAPA. Thus, an interdisciplinary team approach used participatory workshops and group consensus building techniques to:

- Identify problems and issues;
- Determine the park's significance and purpose;
- Identify management objectives (the park's desired future);
- Determine management zoning and limits of acceptable use and;
- Recommend specific management and development actions and programs for each zone.

The process of preparing a GMP for GONAPA was undertaken in phases. The first phase was a reconnaissance field visit to identify relevant stakeholders. This was followed by involvement of stakeholders, particularly communities in villages surrounding GONAPA and the management of the park. The third phase was a Stakeholders' Workshop organized and held at Kigoma and was attended by

representatives and participants from all the stakeholder institutions visited during the two previous consultative visits/meetings. The Workshop participants gathered to deliberate on the issues and concerns raised by the stakeholders during phase two and agreed on the major issues for which objectives and strategies were formulated as a basis for the GONAPA GMP. Subsequently a technical committee of 15 people was constituted from among the key stakeholders to undertake park zonation and putting in place a plan of action for the GMP.

Researchers: Prof. R. Mwalyosi, Prof. P. Yanda and Dr. C. Mung'ong'o

3.2.13 Wayleave Village Electrification Scheme (WVES) Project

This is a consultancy project commissioned by TANESCO. The Government of Tanzania acting through Tanzania National Electric Supply Company Limited (TANESCO) is implementing the *"Songo Songo Gas Development and Power Generation Project".* The project involves village land up-take for the pipeline way leave. It also includes compensation and socio-economic impact mitigation packages for the affected villages along the gas pipeline and Songo Songo Island.

TANESCO and the Government of Tanzania expect these development activities to boost socio-economic development of the concerned villages and contribute to poverty reduction. TANESCO commissioned the Institute of Resource Assessment (IRA) of the University of Dar es Salaam to undertake socio-economic and environmental assessment of the above-mentioned activities. The focus of the assignment is to address three main issues: (a) inventory of socio-economic baseline information; (b) limited environmental and socio-economic impact assessment and; (c) resettlement action plan for the affected population. This report addresses the limited environmental and socio-economic impact analysis of the planned development activities.

Researchers: Dr. H. Sosovele, Prof. R. Mwalyosi, Prof. A. Mashauri, Dr. A. Mwakaje and Dr. C. Mung'ong'o.

3.2.14 Addressing farmer-pastoral- wildlife conflicts in the Kitendeni Wildlife Corridor, Monduli/Hai Districts, Tanzania.

This is a collaborative research between Centre for Development and Environment, University of Berne, Switzerland and Department of Geography, University of Dar es Salaam. My involvement as a researcher is through the Department of Geography. The Eastern and Southern Africa Partnership Programme (ESAPP) funds this research. The main objective is to undertake a

participatory analysis of resource use conflicts and to develop an agreeable mechanism and institutional arrangement of addressing the problems. The research is now starting and will run for one year.

IRA Researcher: Dr. H. Sosovele

3.2.15 The Changing Livelihoods in the Maasai Plains – Implications on Poverty Levels and Sustainability of Natural Resource Base

This study is funded by REPOA. Two fieldworks have been conducted and progress reports ware submitted and presented to the Annual REPOA Workshop
Objectives of this study are the following;

- Identify responsive mechanisms as a strategy to alleviate poverty and improve the standard of living in the study area,
- Examine whether such livelihood strategies have helped alleviate poverty in the study area,
- Examine the evolution of the poverty alleviation strategies in relation to dwindling natural capital in the study area,
- Propose tenable poverty alleviation strategies as the basis for achieving improved standard of living and sustainable use of the natural capital.

Researchers: Prof. P. Yanda and C.M.P. William

3.2.16 Wetland Utilisation, Poverty Alleviation and Environmental Conservation in Semi Arid Areas of Tanzania – The Case of Dodoma

The study is funded by REPOA. Major objectives are;

- To assess the current wetland utilization pattern and how that promotes food security and reduces poverty levels
- To ascertaining utilization practices that may lead to the degradation of wetlands and how these effects could be minimized.
- To establishing ways in which benefits accrued from the wetlands could be optimized without compromising the ecological and hydrological integrity of the wetlands.
- To study existing land tenure system and its implication on land use pattern and environmental management.

First fieldwork has been conducted and progress report was submitted and presented to the Annual REPOA Workshop

Researchers: Prof. P. Z. Yanda, A. Majule and A.G. Mwakaje

3.2.17 An Analysis of Land Use Dynamics and Land Degradation Processes in the Great Rift Valley, Central Tanzania: A Case of Iramba District

Ongoing project started in June 2003, funded by OSSREA. This study investigates land-use dynamics and land degradation processes in the Great Rift Valley areas of Iramba District, Tanzania. The main objective of the study was to investigate land-use dynamics, agricultural development and constraints and their socio-economic and environmental effects in the Kinampanda-Kinyangiri landscape in Iramba District. Four villages were included in the study, including two in the rift valley and two in the plateau. The study employed two methodological approaches, including participatory assessments and quantitative (household interviews and soil analysis) to obtain qualitative and quantitative information pertaining to biophysical, agronomic and socio-economic facts that influence community access to, and utilisation of the various resources, and on the dynamics of land-use and land degradation.

Preliminary results indicate that over the last few decades the land-use intensity has increased for agriculture, including crop cultivation and livestock keeping and other livelihood activities. The increase has been due to increasing population of both people and livestock, and hence the resultant needs to produce more food. However, there are environmental concerns associated with increasing land-use intensity, including deforestation, soil erosion, declining soil fertility and trampling of soils by increasing livestock numbers. The main conclusion is that to sustain livelihoods under the ongoing dynamics in the study area there is need for an integrated approach in managing different resources available. Various measures need to be undertaken to ensure environmental sound agricultural practices including raising farmers' awareness of the need to incorporate appropriate land and water conservation measures in managing their farms, as well as in addressing constraints in the various sectors such as agriculture, natural vegetation use and water resources.

The fieldwork for this project has been completed and a draft final report has been prepared and submitted to OSSREA for comments.

Researchers: Dr. R.Y.M. Kangalawe, Dr. A.E. Majule and Prof. E.K. Shishira

3.3 Future Research and Consultancy

3.3.1 Integrated Assessment of Regional Land-Climate Interactions

The objective of this research is to develop an approach that brings the analysis of the climate, ecological and human systems to temporal and spatial scales that communicate. The project will be undertaken jointly by the IRA and Geography

Department (UDSM) and Michigan State University (USA). The project is worth US$ 800,000 and is approved for funding by the National Science Foundation of the USA.

3.3.2 Participatory Improvement of Soil Fertility and Water Management for Sustainable Small Scale Agriculture in Tanzania, Malawi and Zimbabwe

In mid-2004, funds were made available to IRA by FIRCOP-SADC to develop a concept proposal into a full proposal on the subject above. The project involves three SADC countries, Tanzania, Malawi and Zimbabwe. The project aims at increasing crop productivity and raising farmers' incomes through improved sustainable soil and water management in the context of changing livelihood systems. The main objectives are:

- To understand current farmers' perception and practices regarding soil and water management;
- To review current approaches by agricultural service providers in relation to changing farming pratices and environment;
- To build on and enhance farmers' capacity to manage soil fertility and water at farm level through development of innovative learning approaches and tools;
- To identify implications for private and public sector service provision relating to soil fertility management and;
- To investigate the impact of soil and water management on livelihoods and provide sustainable recommendations for action.

The project will use participatory approaches involving key stakeholders who will identify,prioritise problems and develop sustainable soil and water management practices/services. Activities will include field work, training, stakeholders' and dissemination workshops.

IRA Researchers: Dr. A. Majule, Prof. R. Mwalyosi, Dr. A. Mwakaje and Dr. E. Liwenga

3.3.3 Environmental Monitoring Assistance to Dar es salaam Water and Sewerage Authority (DAWASA)

This is a consultancy project commissioned by the Dar es Salaam City Water Services. This project is to last five years, although it will be implemented on yearly basis. The budget for the first year is a US $ 84.2 thousands.

The objectives of the project are:

- Assist DAWASA to develop and implement an environmental review and reporting plan, procedures, standard tests, and reporting formats
- Assist DAWASA to review the various environmental compliance reports submitted by the Operator, Contactor, etc to ensure that the requirements of various Acts, Regulations, Contracts, and Licences have been complied with and that the submitted reports are fair and reasonable statement of environmental performance / compliance by the Operator and Contractors.
- Assist DAWASA to report progress and performance against the agreed Environmental Management Plan, and
- Train DAWASA environmental staff so that they can effectively deliver and sustain an appropriate environmental review and reporting program.

To-date the following activities have been undertaken:

- Initial sampling and analysis
- Training needs assessment;
- Development of training programme for DAWASA Staff;
- Inventory survey of monitoring sites;
- Development of monitoring programme – selecting monitoring sites and defining parameters and sampling frequencies and;
- Initial structure of monitoring report for subsequent database formulation.

Immediate future activities include:

- Starting implementation of training programme for DAWASA staff;
- Starting implementing monitoring programme and;
- Database development.

Researchers: Prof. R.Mwalyosi, Dr. H. Sosovele, Prof. A. Mashauri, Dr. R. Mato and Mr. Pallangyo.

3.3.4 Development of Poverty-Environment Indicators in Tanzania

The overall aim of this work is to develop a set of indicators linking poverty and environment in Tanzania that can be used to understand poverty- environment interactions and to monitor poverty reduction that can result form environmental change. The specific objectives of the consultancy include (i) to assess and determine the different use of poverty-environment indicators from local to national levels, (ii) to identify existing data collection systems and surveys producing, or with the potential to provide poverty-environment indicators, (iii) to propose a core set of poverty-environment indicators for use by the poverty

monitoring systems and the local level; planning and (iv) to build national capacity on development and use of poverty-environment indicators.

The VPO/UNDP is funding this work as part of the process to revise the Poverty Reduction Strategy and Poverty Monitoring System. Data collection is has been completed. Data analysis is now in progress. The work is undertaken in collaboration with Environmental Resources Management (ERM) on United Kingdom.

IRA Researchers: Dr. H. Sosovele; Prof. R. Mwalyosi; Dr. R. Kangalawe; Dr. Emma Liwenga and Dr. F. Shechambo.

3.3.5 Common Mistake/Problems in Proposal and Report Writing Among Tanzanian Researchers

This desk study aims at identifying and documenting the common mistakes made by authors of proposals and reports. It is expected that the study will come up with results that will lead to the writing of a manual to be used in Universities and research institutions in East Africa. Data analysis based on proposals and reports submitted to REPOA between 2000 – 2004 has been completed. The common mistakes and probable factors have been identified. The steps that are to follow are interviews of a sample authors and report writing.

Researchers: Prof. I. Kikula and Dr. M. Qorro

3.3.6 Development and Bio-Diversity in East Africa and India

The specific task of this research project will be a systematic evaluation of the impact of the management of protected areas and of tourism on human development and biodiversity. How has the relationship between conservation and the economy of the surrounding villages developed over time? What impact have different institutional solutions and applications had on biodiversity and on human living conditions?. With this study we will gain much needed systematic empirical knowledge on how and if it is possible to have a symbiotic relation between development and conservation in poor rural areas in the third world.

Researchers: Dr. F. Shechambo and E. Uddhammer.

SECTION FOUR: PUBLICATIONS

The major publication achievement during the reporting was the production of the MALISATA Monograph and and a Kiswahili Summay Booklet. A total of 69 publications had been produced. They include 3 books, 13 chapters in books; 13 journal articles, and 40 research reports, consultancy reports and workshop proceedings, as indicated below.

4.1 Books

1. Mung'ong'o, C.; Kikula, I. and Mwalyosi, R. (eds.) (2004). Geophysical and Socio-Political Dynamics of Environmental Conservation in Kondoa District, DUP, ISBN: 9976-60-407-7

2. Mung'ong'o, C. and Kikula, I. (eds.) (2004). Hali ya Mazingira Katika Wilaya ya Kondoa na Hatua za Marekebisho, DUP, ISBN: 9976-60-411-4

3. Sikoyo, J.G.M.; Wakhungu, W.; Okedi, J. and Mwalyosi, R.B.B. (2004). Shared Ecosystems of East Africa: Sustainable management strategies. AfricanCentre for Technology Studies, Nairobi, Kenya and East African Community, Arusha, Tanzania. Transboundary Series No. 5.

4.2 Chapters in Books

4. Mung'ong'o, C.G. (2004). Methodological Approaches, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

5. Shishira, E.K. and Yanda P.Z., (2004). Landscape Evolution in the Kondoa Irangi Hills, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

6. Shishira, E.K. and Yanda P.Z., (2004). Landscape Vulnerability, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

7. Ngana, J.O. (2004). Climate and Water Resources, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

8. Rulangaranga, Z.K.; Lyaruu, H.V.M. and Eliapenda, S. (2004). Vegetation Dynamics, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

9. Madulu, N.F. (2004). Population Dynamics and Settlement Patterns, In: Mung'ong'o *et. Al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

10. Yanda, P.Z. and Kangalawe, R.Y.M. (2004). Land Tenure and Land Use Dynamics, In: Mung'ong'o *et.al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

11. Mung'ong'o, C.G. (2004). Power, Politics and Conservation in Kondoa Irangi, In: Mung'ong'o *et. Al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

12. Kikula, I.S.; Mwalyosi, R.B.B. and Liwenga, E.T. (2004). Lessons Learnt, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

13. Mwalyosi, R.B.B. and Kikula, I.S. (2004). Policy Issues and the Way Forward, In: Mung'ong'o *et. al.* (eds.): Geophysical and Socio-Political Dynamics of Environmental Conversation in Kondoa District. DUP, University of Dar es Salaam.

14. Sosovele, H. and Maganga, F. (2004). The Implications of Recent Institutional and Policy Changes for Irrigation Development in Tanzania (submitted for the ENRECA Book to be published by DUP).

15. Sosovele, H. (2004). Water Scarcity or poor water management? Root Cause Analsysis of Water Problems in the Usangu Basin and its Implications on Irrigation (submitted for ENRECA Book to be published by DUP).

16. Madulu, N.F. (2003). Population, Environment and Natural Resource Management, Un UNFPA & Demographic Training Unit (eds.) Integration of Population Variables in Development Planning: Part II (Trainees Manual) Chapter 8E, pp 135-154.

4.3 Journal Articles

17 Sosovele, H. Kulindwa, K (2003). Adaptation and Change: Lessons from the Barabaig Pastoralist. (Forthcoming) Tanzania Journal of Population Studies and Development.

18. Shechambo, Fanuel (2003) " The Contribution of Mining to Local and national Economies of Tanzania and Attendant Environmental and Social costs". PANGEA Vol. 34 (forthcoming).

19. Madulu, N.F., Mashauri, D.A., Ngana, J.O. and Mudege, N. (eds.), (2003), Integrated water supply and water demand for sustainable use of water resources, Physics and Chemistry of the Earth, Vol. 28, Issues 20-27 , Pages 759-760

20. Madulu, N.F. (2003), *Linking Poverty Levels to Water Resource Use and Conflicts in Rural Tanzania,* Physics and Chemistry of the Earth, Vol. 28, Issues 20-27 .

21. Dungumaro, E.W. and Madulu, N.F. (2003), *Public Participation in Integrated Water Resources Management: The Case of Tanzania,* Physics and Chemistry of the Earth, Vol. 28, Issues 20-27 .

22 Ngana, J.O., Mwalyosi, R.B.B.; Madulu, N.F.; Yanda, P.Z. (2003). *Development of an Integrated Water Resources Management Plan for the Lake Manyara Sub-basin, Northern Tanzania*, Physics and Chemistry of the Earth, Vol. 28, Issues 20-27, pp. 1033-1038

23. Madulu, N.F. (2004). *Asessment of Linkages Between Population Dynamics and Environmental Change in Tanzania*. African Journal of Environmental Assessment and Management, Vol. 9 (Accepted for publication)

24. Kangalawe, R.Y.M. 2003. *Sustaining water resource use in the degraded environment of the Irangi Hills, central Tanzania*. Physics and Chemistry of the Earth 28: 879-892

25. Sosovele, H. and Nelson, F. (2003). *Livelihoods and Poverty Reduction Initiatives: Lessons from Semi-arid and Arid Areas of Tanzania*, Paper submitted and accepted for publications by the Journal of Geographical Association of Tanzania. Vol. 31 of 2003.

26. Mung'ong'o, C. (2003*). Social transformation and political empowerment in the age of globalization: Looking beyond women's empowerment in Tanzania*. Nordic Journal of African Studies, 12 (2): 119-133; 2003.
27. Majule, A., Shishira, E.K. and Yanda, P.Z. (2004): *Declining Soil Fertility: A Challenge For Sustainable Productivity of Land Under Cashew Farms, Southern Areas Of Tanzania.* Journal of Tanzania Geographical Association. (Accepted for publication)
28. Yanda, P.Z. (2004): *Implications of Population Increase and Land Tenure on Land Resources Integrity in the Kondoa Lower Irangi, Central Tanzania - The Case of Mrijo Village*. Journal of Population Studies and Development (Accepted for publication).

29. Shechambo, F. (2003). *The Contribution of Mining to Local and National Economies of Tanzania and Attendant Environmental and Social Costs.* PANGEA: Journal of Geosciences and Development. Vol. 9/40 pp. 3-21

4.4 Other Publications (Research Reports, Service Reports, and Conference Proceedings)

30. Ngana, J.O. (2004). Variation and its relation with rainfall in the Upper Pangani Basin.

31. Basin. In J.O. Ngana and F.C. Shechambo (ed.). *Workshop Proceedings* on Water Resources Management in Pangani Basin. Uhuru Hostel Moshi 5-6 August 2004.

32. Kangalawe, R.Y.M. (2003). Threats and Opportunities to Sustainable Management of Dryland Biodiversity in the Degraded Environments of central Tanzania: A case of Irangi Hills. Paper presented at the Regional Workshop on Sustainable Biodiversity Management for Reduced Community Vulnerability to Drought at Lake Bogoria Hotel, Baringo – Kenya, 1-4 October 2003.

33. Yanda, P.Z., Kangalawe, R.Y.M. and Sigalla, R.J (2004). Vulnerability and Adaptation to Climate Change-Induced Malaria and Cholera in the Lake Victoria Region. Paper to be presented at the "*Second AIACC Africa and Indian Ocean Island Regional Workshop*" held in Dakar, Senegal, from 24th - 27th March 2004.

34. Liwenga, E.T. and Kangalawe RY.M. (2004). Livelihood Dynamics and Food Security in the Semiarid Areas of Central Tanzania: The Case of Destocking in HADO Areas. Paper presented at MAFS- SUA Collaborative Research

Workshop for Food Security, HELD AT TANESCO Training Centre Morogoro, 24-26th May 2004.

35. Mung'ong'o, C. & Mwamfupe, D. (2003). Poverty and changing livelihoods of migrant Maasai pastoralists in Morogoro and Kilosa Districts, Tanzania. REPOA Research Report No. 03.5, 2003. ISBN 9987-686-67-2.

36. Kikula, I.S.; Mung'ong'o, C. and Mnzava, E.Z. (2003) Shortcomings of linkages between environmental conservation and poverty alleviation in Tanzania. REPOA Research Report No. 03.2, 2003. ISBN 9987-686-60-5.

37. Sosovele, H. (2003). Action Plan for Initiating a Strategic Environmental Assessment (SEA) in Kilwa District. A Report submitted to the World Bank, Dar es Salaam. December 2003.

38. Sosovele, H. (2003). Introduction to SEA in the planning process. Paper presented to a workshop for Kilwa District stakeholders held in October 2003 at Kilwa.

39. Sosovele, H. & With Mwinjaka, S. (2003). EIA and SEA Linkages in Tanzania for Development and Environmental Conservation. Paper presented to a workshop for Kilwa District stakeholders held in October 2003 at Kilwa.

40. Sosovele, H (2003). Tourism Development Poverty Reduction and Community Cohesion in Tanzania. Paper presented to 2nd African Conference on Peace through Tourism. Meeting organized by the International Institute of Peace through Tourism and the Ministry of Natural Resources and Tourism and held 7-12 December 2003, Golden Tulip Hotel, Dar es Salaam.

41. Sosovele, H (2003). Review of Existing Mechanisms for Harmonization of Risk Assessment, Risk Management, Mutual Acceptance of Data and Validation: The Case of Tanzania. Report submitted to Vice President's Office as part of the programme to harmonize Risk Assessment and Risk Management in accordance with the Cartegena Protocol on Biosafety.

42. Sosovele, H. (2004). Community participation and poverty reduction from conservation: Lessons from wildlife and forest initiatives in Tanzania. Paper presented to the SEASCAPE workshop at White Sands Hotel June 2004.

43. Madulu,N.F. and Yanda, P.Z. (2003). Highland-Lowland interactions in Natural Resources Use and Effects on Poverty Levels: The case of Karatu and Monduli Districts

44. Madulu, N.F. (2003). Socio-Economic Assessment of Water Needs Use in the Upper Kihansi River, in WARFA/WATERNET (2003), Proceedings of the 4th WaterNet/Warfsa Symposium on "Water, Science, Technology & Policy Convergence and Action by All", Gaborone, 15-17 October 2003 (pp. 175-183).

45. Madulu, N.F. (2003), Population Pressure, Poverty Alleviation Strategies, and Policy Changes: An Assessment of Impacts on Common Property Resource Availability in Rural Tanzania, Paper Presented at the 1st Conference on *"Promoting Common Property in Africa: Networks for Influencing Policy and Governance of Natural Resources, Cape Town (6th-9th October 2003).*

46. Madulu, N.F. (2003), Gender Roles and Culture in Natural Resource Management in the Lake Victoria Basin: Experiences From Northern Tanzania, Proceedings of *the 4th African Population Conference: Facing up the Challenges of the 21st Century, Tunis, 8th – 12th December 2003.*

47. Madulu, N.F., and E. Liwenga (2004). Economics of Pastoralism In East Africa: Tanzania Component, paper Presented at the Second Partners Meeting, Egerton University, Nairobi, 25-28 April, 2004.

48. Madulu, N.F. and P.Z. Yanda (2003). Highland – Lowland Interactions in Natural Resource Use and Effects on Poverty Levels: The Case of Karatu and Monduli Districts, Nothern Tanzania, REPOA Research Report, No. 03.3.

49. Madulu, N.F. (2003). Formative Assessment for the Design of Maternal Health Campaign in Tanzania, Paper Presented to the Reproductive and Child Health Section, Ministry of Health, Dar es Salaam.

50. Ngana, J.O., R.B.B. Mwalyosi, N.F. Madulu, P.Z. Yanda (2004) Development of an Integrated Water Resources Management Plan for the Lake Manyara Sub-Basin, Northern Tanzania, Final Report to WARFSA.

51. Yanda, P.Z. (2004): Land Use Research in The Lake Victoria Basin, Tanzania Part Analysis and Synthesis Report. Final Report Submitted to the Inter-University Council for East Africa.

52. Yanda, P.Z. (2004): Challenges Facing Forest Management in Tanzania. Paper Presented on Earth Day, American Embassy, 22nd April, 2004, Dar Es Salaam.

53. Yanda, P.Z. (2004): Impact of Catchment Degradation on Downstream Wetland Ecosystem Integrity – The Case of Lake Jipe Wetland, Northern Tanzania. Paper Presented at the Headstream Workshop held in Maun, Botswana, 24rd – 26th May 2004.

53. Yanda, P.Z. (2004): Application of GIS for Developing Environmental Indicators. Paper presented at the National TSED Seminar on Environmental Module. 28th – 30th June 2004. Livingston Club – Bagamoyo.

54. Yanda, P.Z. (2004): Need for Using Indicators for Planning and Decision Making. Paper presented at the National TSED Seminar on Environmental Module. 28th – 30th June 2004. Livingston Club – Bagamoyo.

55. Yanda, P.Z., Mung'ong'o, C.G., Mwalyosi, R.B.B. & Shishira, E.K. (2004): Socio economic baseline studies for Lake Malawi/Niassa/Nyasa Ecoregion Programme. Final Report Submitted to WWF SARPO

56. Yanda, P.Z., Mung'ong'o, C.G., Mwalyosi, R.B.B. & Shishira, E.K. (2004): Natural resources baseline studies for Lake Malawi/Niassa/Nyasa Ecoregion Programme. Final Report Submitted to WWF SARPO

57. Liwenga, E.T. (2003). Local Resource Utilisation in Drylands: A Challenge to Sustainable Biodiversity Management in Mvumi in Central Tanzania. A Paper Presented at the 4th Regional RPSUD Workshop on "Sustainable Biodiversity Management for Reduced Community Vulnerability to Drought" Held at Lake Bogoria Hotel in Kenya, October 1st – 4th 2003.

58. Liwenga, E.T. (2003). Livelihood Diversification in the Drylands of Central Tanzania: A Challenge to Sustainable Management. A Paper Presented at the Workshop held at the University of Dar es Salaam on "The Art Knowledge in Semiarid Areas in Tanzania" organized by the Department of Geography in Collaboration with the Swiss National Centre for Competence in Research (NCCR), December 18th – 19th 2003.

59. Sosovele, H. (2004). Sustainable Tourism in Tanzania: Challenges and Possibilities. Paper presented to Think Tank IV Conference on Sustainability and Mass Destinations: Challenges and Possibilities held at the University of Southern Denmark from June 30 – July 4, 2004. Paper published as Conference Proceedings by the University of Western Sydney. ISBN 1-74108-054-1

60. Kikula, I.S. (2004). Participatory Approach for District Development Planning Within the Tanzakesho (Capacity 21) Programme in Tanzania. PO-RALG and UNDP.

61. Kikula, I.S. ; Mato, R. and A. Mwakaje (2003). Environmental Impact Assessment for the Upgrading of the Ndutu Safari Lodge. Ndutu Safari Lodge.

62. Ndangarasi, H.J.; Kikula, I.S. and Friedrichs, J.B. (2003). Effects of Non-Timber Products Extraction on Species Diversity, Species Composition and Forest Structure in an African Biodiversity Hotspot. Proceedings of International Conference on Non-Timber Products Held in November 2003 in USA

63. Cooksey, B. and I. Kikula (in press). When Bottom-up meets top-down. The Limits of Local Participation in Local Government Planning in Tanzania.

64. Shechambo F.; Edmund, B. and Chege, F. (2003). Mainstreaming of the Environment in Kenya national Economic Development Planning and in Poverty Reduction Strategies. Nairobi: IUCN.

65. Shechambo, F. (2004). Coastal Livelihoods: The case of Tanga Integrated Coastal Zone Management Project. Presentation at the Workshop on PRS Review, Bagamoyo, 28 January 2004.

66. Shechambo, F. (2004) The Coastal Forests of Tanzania: An Assessment of the Resource. Report for WWF Coastal Forest Programme. April 2004.

67. Gamas, D.M.; Shechambo, F. and Majige, K.R. (2004). Training Needs Assessment for Willife Management Areas in Tanzania. Report for WWF and Wildlife Division.

68. Okedi, J.; Mwalyosi, R.B.B.; Mumma, A. and Appleton, A. (2004). Report of a Study to Propose Environmental Assessment Guidelines for Shared Ecosystems in East Africa. Report for EAC.

69. Okedi, J.; Mwalyosi, R.B.B.; Mumma, A. and Appleton, A. (2004). Environmental Assessment Guidelines for Shared Ecosystems in East Africa. Report for EAC.

SECTION FIVE: FINANCES

5.1 Sources of Funds

5.1.1 Government Sources

During the year 2003/2004, the Institute received a budgetary allocation of TShs 12,720,000 from the Government through the University of Dar es Salaam to cover other charges, over and above personal emoluments. TShs 4,000,000 were allocated for research.

5.1.2 Own Sources

The Institute continued to generate funds from internal sources. These came mainly from community services rendered. These services contributed approximately TShs. 25.5 Million and US$ 164,807. The figures are based on a 40% charge on professional fees from consultancies and public service work by its staff.

5.1.3 Donor Funds

Additional funds were provided by different donors in the form of grants for institute-wide research projects. These came through such projects as the Pangani Basin Water Management (NORAD), Man-Land Interrelationships (SIDA-Sarec), Sustainable Agriculture in Semi-rid Areas (DANIDA), Enhancing Research Capacity (DANIDA), Population Reference Bureau (USA), and Water Research Fund for Southern Africa (WARFSA), Rockfeller Foundation and Eastern Africa Association for Impact Assessment (EAAIA). For all these programmes/projects, a total of TShs 64.5 Million and US $ 356.5 Thousand was allocated.

SECTION SIX: APPENDICES

Box 1: List of Academic Members of Staff

1. **Raphael B. B. Mwalyosi, Professor**, **Director,** B.Sc. Hons, M.Sc. (Dar), Ph.D. (AUN). Ecology.

2. **Hussein Sosovele, Senior Research Fellow, Associate Director,** BA Hons; M.A. (Dar), Ph.D. (Bremen) Sociology.

3. **Elieho K. Shishira, Associate Professor,** B.Sc., Hons, (E.A), M.Sc., Ph.D. (Sheffield) Applied Geomorphology, Remote Sensing of Land Resources, Land Classification.

4. **Ndalahwa F. Madulu, Associate Professor,** B.Ed. Hons, M.A. (Dar) Demography, Ph.D. Dar). Demography.

5. **Idris S. Kikula, Professor,** B.Sc. Hons; M.Sc. (Dar) Ph.D. (Griffith) Land Resource Management, Environment and Remote Sensing. **

6. **James O. Ngana, Associate Professor**, B.Sc. Hon.; M.Sc. (Dar), M.Sc. (Galway), Ph.D. (KTH, Stockholm) Water Resources and Environment.

7. **Pius Z. Yanda, Associate Professor**, B.Sc., Hons; (Dar), Dip. MNRSA; M.Sc. (AUN) , Ph.D. (Stockholm) Environment, Water Resource Development.

8. **Fanuel C. Shechambo, Senior Research Fellow**, Dip. Lib. (Makerere), BA, Hons; M.A. (Econ.) (Dar), Dr.sc.agr. (TU Berlin) Agricultural and Resource Economics.

9. **Faustin P. Maganga, Senior Research Fellow**, BA Hons; M.A. (Dar), M.Sc. (Zimbabwe), Ph.D. (Roskilde) Institutional Aspects of Natural Resource Management***.

10. **Claude G.M. Mung'ong'o, Senior Research Fellow**, Dip. Lib. (Makerere), B.A. Hons (Dar), M.A. (Dar), Ph.D. (Stockholm). Environmental Sociology.

11. **Amos Enock Majule, Research Fellow**, B.Sc. Agric. Hons (SUA), Ph.D. (Reading) Environment, Soil Fertility and Conservation.

12. **Agnes Mwakaje, Research Fellow**, B.Sc. Agric. Hons (SUA); M.Sc. Agric. Economics (Reading) Ph.D. Agric. Economics (London)

13. **Hidergard L. Kiwasila, Research Fellow**, BA Hons (Dar) M.P.H. (North Carolina) PGWSST (Loughborough) Sociology, Public Health. *

14. **Richard Y.M. Kangalawe, Research Fellow,** Dip. Crop Prod. (Uyole), B.Sc. Agric. (SUA), M.Sc. (AUN), PhD (Stockholm).

15. **James G. Lyimo, Assistant Research Fellow,** B.Sc. Agric. (SUA), PGDIP. MNRSA, M.Sc., (AUN) Natural Resource Management. *

16. **Emma T. Liwenga, Research Fellow,** Dip.Crop Prod. (Uyole), B.Sc. Agric. (SUA), M.Sc. (AUN).*

17. **Simon Mwansasu, Assistant Research Fellow,** Visual C++ Programming (QA, UK), B.Sc. Hons; M.Sc. (Pinar Del Rio,Cuba). Forest Engineering

Key:
*** On study leave**
**** On secondment**
***** On sabbatical leave**
****** On leave without pay**

Box 2: <u>List of Technical Staff</u>

Stephen K. Kajula, Principal Technician, Cert. in Agro-meteorology-WMO (Nairobi Kenya); Cert. Photo Interpretation Land Use/Land Cover (ITC Netherlands); Cert. Laboratory Photographic Technician (PCL UK); Cert. In Image Data Processing (Copenhagen); Cert. Land Resource Management & Image Data Processing (Zimbabwe); Cert. Wildlife Management (Mweka).

Anna Mushi, Cartographic Technician, GIS (Trondheim, Norway), Diploma in Cartography (Horsens Polytechnic, Denmark).

Chrisant Msonganzila, Senior Field Officer, Dip. Crop. Production (Uyole).

Augustine J. Yonah, Senior Field Officer, Certificate in Social Work, ISW (Dar).

Evod B. Ulaya, Field Officer I, Certificate in Rural Development Planning (IRDP Dodoma).

Alexander Mnyenyelwa, Artisan, FTC (Arusha Tech. College).

Box 3: List of Administrative Staff

1. **Eva-Grace Mosha, Administrative Officer**, Dip.Ed. (Morogoro), B.A (Ed.) (UDSM), M.A. (UDSM).
2. **Peter E.K. Damson, Accountant,** ADA (IFM).
3. **Victor Makero, Assistant Supplies Officer,** NCC, NBMM, ATEC 1.
4. **Mary Mwavalla, Office Management Secretary**.
5. **Anita Kidinilo, Office Management Secretary**.
6. **Sophia M. Mwakibete, Office Management Secretary**.
7. **Agnes Holela, Secretary Grade I**
8. **Bruno Mwano, Driver.**
9. **Hamisi Abdulrahman, Security Guard**.
10. **Salama Sia, Security Guard**