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Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation project

Evaluation report for project GF/1030-01-01

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Acronyms and abbreviations

CGIAR	Consultative Group on International Agricultural Research
CLIP	Climate Land Interaction Project
COMPACT	Community Management of Protected Areas Conservation
FAO	Food and Agriculture Organization of the United Nations
FITCA	Farming in Tsetse Controlled Areas (project)
GEF	Global Environment Facility
GIS	geographic information systems
GPS	global positioning system
ICRAF	World Agroforestry Centre (formerly International Centre for Research in Agroforestry)
ILRI	International Livestock Research Institute
KARI	Kenya Agricultural Research Institute
LUCID	Land Use Change Impacts and Dynamics
NORAD	Norwegian Agency for Development Cooperation
PDFA	project development facility, Block A
PLEC	People, Land and Environment Change
PRIME	Productive Resource Investments for Managing the Environment
ROSELT-OSS	Long-Term Ecological Monitoring Observatories Network, Sahara and Sahel Observatory
START-PACOM	System for Analysis, Research and Training, Pan-African Committee
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

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Executive summary

A. Project details

Project title:	Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation
Project number:	GF/1030-01-01
Project duration:	36 months extended by 6 months: January 2001 to June 2004
Project location:	Three East African countries: Kenya, Uganda and United Republic of Tanzania
Implementing agency:	United Nations Environment Programme (UNEP)
Total budget:	$1,441,700

B . Introduction

1. The Land Use Change Impacts and Dynamics (LUCID) project of the United Nations Environment Programme-Global Environment Facility (UNEP-GEF), entitled Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation, was implemented in East Africa from January 2001 to June 2004. The four LUCID project sites were in Embu and Mbeere districts, south-east of Mt Kenya in Kenya; Loitokitok, north of Mt Kilimanjaro in Kenya; the southern slopes of Mt Kilimanjaro in Tanzania; and along a Ugandan transect from western Kabale Forest through Lake Mburo National Park and Sango Bay on the shores of Lake Victoria. The overall objective of the LUCID project was to "analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation".

C. Evaluation findings and conclusion

1. Findings

(a) Assessment of realization of project objectives

2. The LUCID-targeted research project had three intermediate objectives. The first objective was to "analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation". The objective 1 project indicators were realistic and were to a very large degree achieved. LUCID has produced information products in the form of working papers. Specifically, LUCID has developed and tested a research framework, but the findings have not been shared widely with potential end-users since the project ended in June 2004. More time is required for sharing the lessons learnt with stakeholders at local, national and international levels. The project has therefore to a large extent realized the first objective (rating score 2) as it is well documented in working papers 8, 9, 15, 16, 17, 19, 20, 30, 31, 33, 43, 47 and 50 (see comments in annex IV). Working papers 14 and 16 provide procedures for conducting land use and land cover analysis, while working paper 15 formed the methodological cookbook for site studies. Working paper 43 constitutes a synthesis of all methodological approaches for establishing the linkages between land use change, biodiversity and land degradation trends.

3. The second LUCID objective was to "integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation". The evaluation noted that this objective has also been realized to a reasonable extent (rating 2) as shown by working papers 11, 14, 21, 24, 39, 42, 48 and 51 (see assessment in annex IV). In particular working papers 42 and 48 capture the achievement of the second objective. The LUCID research framework as a tool for analysing the root causes of land use dynamics is effective in integrating ecological and socio-economic factors, land use change and existing theories on the dynamics of these processes.

4. The third objective was to "provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more

effective local, national and regional programmes". The LUCID project has also realized a large part of the objective (rating 3). This achievement is captured in working papers 10, 12, 26, 27, 35, 36, 37, 42, 43, 44 and 46 (annex IV). Although useful information for more effective programme design, planning and implementation has been identified, the information requires more processing into products that can inform policy and development partners and stakeholders. The data and information have not been formatted for long-term ecological and socio-economic monitoring, as was envisaged at project proposal stage. It is however significant that LUCID has posted most of the project research findings on a web site (www.lucideastafrica.com). The information is also compiled on a CD-ROM that includes most of the working papers, maps and some data. This information will not, however, be used unless training of end-users on the LUCID research approach and project findings is carried out.

(b) Assessment of the achievement of project outcomes

(i) Methodological guide

5. The quality and usefulness of the analytical and methodological guide on land use change analysis and its wider applicability was assessed as very good (rating 2). The guide provides a synthesis of experiences in the four project sites and further poses generic questions that lead to better identification of the linkages between land use, biodiversity and land degradation and their consequences for biophysical indicators such as soil parameters, plants and animal species and changes along landscape gradients. Although the results point towards identification of reliable biophysical indicators, further testing of the identified indicators is required for wider applicability within and outside East Africa.

(ii) Assessment of analytical framework

6. The LUCID research framework documented in working paper 48 is an effective approach in identifying socio-economic and ecological root causes of land use and land management change leading to change in biodiversity and land degradation. The approach has produced and identified aspects of similarities and differences driving socio-economic variables such as land tenure and national development policies rooted in the historical context of each country. This is well illustrated by the case of the root causes of land use change in the eastern (Tanzanian) and northern (Kenyan) slopes of Mt Kilimanjaro.

(iii) Quality and usefulness of generated information

7. The LUCID project produced over 40 working papers of varied quality ranging from satisfactory to excellent (annex IV). These papers were synthesized into a regional paper of excellent quality that integrated ecological and socio-economic data on land use and land degradation. This regional synthesis paper (42) provides very good linkages between land use change, land degradation and biodiversity across the East African region. The paper further provides some cross-cutting findings, which show expansion of farming, grazing and settlements over the last 20 years at the expense of native vegetation. More interesting results are contained in several other reports containing broad themes on wildlife ecology (numbers, distribution and migration), impacts of land tenure changes on land use, and the effect of policy on land use, biodiversity, land degradation and land distribution, among other themes.

(iv) Ecological information and monitoring system

8. The LUCID project outcome with respect to designing a long-term ecological monitoring system was not realized because the regional and technical advisory committees recommended that the activity be dropped from the work plan. The various forms of data collected can, however, be put forward to form an ecological baseline that would facilitate surveillance of land use change, biodiversity and land degradation patterns and trends.

(v) Capacity-building

9. The project enhanced the capacity of graduate students and scientists of multidisciplinary backgrounds. In Uganda, 10 researchers were exposed to the LUCID framework while the training of 1 postdoctoral student and 4 MSc students was co-financed by LUCID. LUCID co-financed the training of 1 PhD and 2 MSc students in Tanzania and 3 MSc and 2 PhD students in Kenya. Internationally, LUCID trained 3 students from the University of Bordeaux and 2 PhD students from Michigan State University.

(c) Cost-effectiveness

10. The project was cost effective. More than 40 working papers were produced with a lean budget at site and country levels. Only two employees were salaried for 50 per cent of their time by the project and personnel costs as a percentage of programme costs were within the accepted limit of 25 per cent. This cost-effectiveness was due to the generous free time contributed by a number of country scientists.

(d) Project immediate impact

11. The project immediate impact include the promotion of cooperation between East African countries on issues of cross-border biodiversity and land use changes, and application of the LUCID analytical and methodological guide in new projects, such as the Norwegian Agency for Development Cooperation (NORAD) project in the Pangani basin in Tanzania, the Productive Resource Investments for Managing the Environment (PRIME) project of the United States Agency for International Development (USAID) in Uganda and the Food and Agriculture Organization of the United Nations (FAO) project on conservation agriculture in Kenya.

(e) Project sustainability

12. Project outcomes are likely to be sustainable as a result of high-level project achievements in human and institutional capacity-building; adoption of an effective participatory approach; and the early indicators of a demand for LUCID project services. In addition, the several follow-up actions that are being planned by implementing institutions such as the International Livestock Research Institute (ILRI) should ensure project sustainability.

(f) Country ownership

13. The devolution of project implementation and financial support to national focal points in Tanzania and Uganda has greatly enhanced country ownership. The LUCID outcomes are being institutionalized by the national institutional focal points in these countries though not in Kenya, where the proposed national LUCID focal institution never participated in project implementation. The co-financing requirement of the UNEP-GEF project has also added value to the country ownership process.

(g) Project implementation and management

14. Project implementation and management was both effective and efficient at regional level and in operational project site offices. There was initial delay in the disbursement of funds to country offices due to a delay in the signing of the memorandum of understanding. The regional project advisory committee and the technical advisory site committees played an important role in ensuring that project implementation was on track. The participation of the UNEP-GEF programme office in project identification, formulation and implementation had a very significant positive impact on the success of the project.

(h) Project financial feasibility

15. The LUCID project was able to leverage additional financial resources to complement the GEF incremental costs. This is exemplified by the case of ILRI, where the potential donor (the Rockefeller Foundation) has shown interest in follow-up action for policy development for land use change. In Uganda, the Makerere University Institute of Environment and Natural Resources has received substantial support to facilitate application of the LUCID research framework in other national projects.

(i) Project potential for replicability

16. The project has a high replication potential as it was set up to develop research tools that can be used within and outside East Africa. Replication of the LUCID research framework is already taking place in other projects in the East African region but it is yet to be tested or replicated outside the region.

(j) Monitoring and evaluation system

17. Although LUCID was conceived as a targeted research project to develop new and innovative tools to address the issues of land use change, land degradation and biodiversity loss, the

project design did not formulate a logical framework as a tool for project monitoring, evaluation and management. The project goal, objectives, outcomes and activities were, however, framed with the logframe approach in mind. A monitoring and evaluation system has been applied even without explicit reference to the logframe as a tool for management.

(k) Project risks

18. The most important project risks were associated with the management of human resources in terms of stability of employment positions and prioritization of the LUCID activities, given the very tight budget under which the project activities were being implemented.

2. Conclusion

19. The overall assessment of the evaluation findings is that the LUCID project has to a great extent realized its objectives and expected outcomes. The overall rating of the project is shown in table 1.

Table 1. Overall rating of project activities by UNEP achievement categories

Criteria	Score (1–5)[a]	Comments
1. Attainment of objectives and planned results	2	Long-term monitoring objective was dropped and no-cost extension requested to complete planned results (annex I).
2. Attainment of outputs and activities	2	The working papers require more editing to improve their quality and there is a need to synthesize policy implications to assist decision-making. Dissemination not done, community participation was done towards the end in the feedback seminars (annexes II, III and IV).
3. Cost-effectiveness	1	There was significant co-financing by participating institutions. No-cost extension and project outputs had good value for money.
4. Impact	2	The impact is significant and increasing. LUCID follow-up actions will enhance long-term sustainability of project impact.
5. Sustainability	2	Capacity-building was very good, institutionalization, absorption and potential for wide adoption of LUCID research framework exists.
6. Stakeholders participation	4	Feedback workshop was done towards the end and a top-down approach was applied.
7. Country ownership	3	Kenya LUCID country office did not operate but in Tanzania and Uganda the level of country ownership based on the focal institutions was fairly good.
8. Implementation approach	2	LUCID project targeted institutions with human expertise and potential to deliver project outputs. Procurement of technical services was cost effective.
9. Financial planning and management	1	Proper internal financial control policies were effectively implemented and this guaranteed and facilitated good value for money, timely disbursement and effective leveraging of resources for co-financing by institutions.
10. Replicability	2	Institutionalization and adoption by participating institutions ongoing, while there are indications that other end-users are also keen to apply the LUCID research framework.
11. Monitoring and evaluation	3	Logical framework did not declare the targets and measurable outputs as it was a targeted research project. The project was, however, implemented according to the proposal objectives and project outcomes.
Overall rating	2	Clear project proposal, easy to implement, clear implementation approach, deliverables achieved beyond expectation, impact of LUCID outcome significant and increasing, very successful co-financing, but the project lacked a logframe and generation of research issues was top down.

[a] The UNEP rating system used is as follows:

1 = Excellent (90–100% achievement)
2 = Very good (75–89%)
3 = Good (60–74%)
4 = Satisfactory (50–59%)
5 = Unsatisfactory (49% and below)

D. Lessons learnt

20. Project flexibility during implementation was a critical strategy in the realization of project objectives, activities and outcomes, since key synthesis papers were completed within the no-cost extension period. The accompaniment of LUCID networking institutions and scientists by UNEP-GEF from project conceptualization to project implementation significantly contributed to project success. This process took place in a series of planning meetings, technical workshops and field visits. This evaluation notes, however, that the project objective to develop and test the LUCID research framework and then disseminate it in three years was not a realistic target. Generation and testing of tools was sufficiently done in the first phase, but dissemination and replication are considered to be follow-up actions by the LUCID network in partnership with UNEP-GEF.

21. The complexity of the impact of land use changes on biodiversity and land degradation calls for the multidisciplinary analytical research framework that is well illustrated by the newly developed LUCID approach. The historical context of LUCID conceptualization involved the cooperation of geographers, biologists, ecologists, soil scientists and socio-economists who were previously working on some aspects of land use change, biodiversity and land degradation with little collaboration. It would not have been possible for the LUCID research framework to have been well developed by any single discipline.

22. Strategic partnership between UNEP-GEF and national and international research and training institutions has greatly enhanced institutional and human resource capacity development in the context of developing a new research analytical framework on the dynamics of land use change, biodiversity and land degradation. In particular the South-South (Makerere and Dar es Salaam universities), North-South (Dar es Salaam, Makerere, Bordeaux 3 and Michigan State universities) and North-North (Bordeaux 3 and Michigan State universities) research collaboration has greatly enhanced global benefits in sharing lessons and experiences.

E. Recommendations

23. UNEP-GEF, in collaboration with ILRI, needs to follow up and facilitate proper dissemination of LUCID research products through a series of training workshops, seminars and conferences, inviting relevant stakeholders at national, regional and international levels.

24. The publication of the LUCID research findings in a book, and specifically the documentation of the results of tested LUCID research methodologies through case studies, will be an effective strategy for impacting positively on the dynamics of land use change, land degradation and biodiversity trends.

25. The baseline information on the LUCID project sites can contribute to a network of similar long-term ecological observatory systems in East, West and North Africa in collaboration with other initiatives such as the Long-Term Ecological Monitoring Observatories Network, Sahara and Sahel Observatory (ROSELT-OSS), the man and biosphere reserves of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Global Terrestrial Observing System and the Global Climate Observing System. ILRI and other members of the LUCID network, in collaboration with UNEP-GEF, need to consolidate databases and to support other research initiatives wishing to use or test the tools that have been developed.

26. The LUCID research analytical framework is built on existing theories related to ecology, political ecology, intensification and economics. It is recommended that other existing generic problem analysis frameworks, such as the sustainable livelihood framework and the pressure-state-response model, be refined by the application of the LUCID research findings to facilitate accurate identification of the root causes of land degradation, land use change and biodiversity losses. ILRI as a coordinating institution, in partnership with UNEP-GEF, in the LUCID follow-up actions will need to liaise with the relevant stakeholders concerned with the application of generic tools such as the sustainable livelihood framework and the pressure-state-response model.

Introduction and background

27. Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation was a medium-size targeted research project proposed by Land Use Change, Impacts and Dynamics (LUCID), a partnership of scientists at leading national and international institutions who have been studying land use change in East Africa and its implications for land degradation, biodiversity and climate change for over 20 years. The project was developed to respond to the three

East African (Kenya, Tanzania and Uganda) countries' national environmental priorities on the management of land resources and conservation of biodiversity, including the importance of protecting national parks. It also addresses the priority of promoting rural livelihoods and ecological integrity. The national institutions participating in the project, the African Conservation Centre, the University of Dar es Salaam and Makerere University, were joined by the University of Bordeaux, Michigan State University and a member of the Consultative Group on International Agricultural Research (CGIAR), the International Livestock Research Institute (ILRI) in Nairobi, who executed the project.

28. The project was designed to provide critical tools derived from land use change analysis for use by UNEP-GEF, subsequent UNEP-GEF projects, decision makers and NGOs in meeting UNEP-GEF operational goals in biodiversity conservation and prevention and mitigation of land degradation. Development of these tools emanates from the need to identify the linkages between land degradation and the UNEP-GEF focal area. The information developed by the project on the linkages between biodiversity and land degradation will assist in the design of UNEP-GEF projects on land degradation with multifocal area benefits. The complexity of interactions between ecological and societal processes over time and space has challenged attempts to understand the linkages between change in biodiversity and land degradation. Land use change analysis provides an entry into understanding these linkages and associated processes.

29. As a targeted research project, the primary project outcomes were geared towards its goal of providing generic materials of use to UNEP-GEF programmes: a replicable guide and framework to help in the development of multifocal area projects. Other outputs were derived from the supporting activities necessary in the development of the generic materials, such as site-level results, cross-site syntheses and regional analyses. Other goals of the project, such as capacity-building and sustainability, have themselves resulted in the production of certain outputs.

Scope, objectives and methodology of evaluation

A. Scope

30. In accordance with UNEP-GEF policy, an independent evaluator was contracted to conduct this evaluation under the guidance of the Chief of the Evaluation and Oversight Unit and in close cooperation with the Programme Officer, Land Degradation in the Division of GEF Coordination (DGEF) and in collaboration with the Programme Officer for Medium-Sized Projects in DGEF. The performance indicators were provided in the project matrix (annex I) and were used together with the evaluation parameters of appropriateness, effectiveness and efficiency, impact and sustainability. The scope of the evaluation is defined by the terms of reference in annex I.

B. Objectives

31. The overall objective of the evaluation was to establish project impact and review and evaluate the implementation of planned project activities, outputs and outcomes against actual results. The evaluation also assessed efficiency and cost-effectiveness of the overall implementation approach of the project, efficient and effective management of project funds, participation of all stakeholders, lessons learnt and good practices, management of risks, sustainability of project impacts and replicability of good practices.

C. Methodology

32. The LUCID evaluation was done between 24 September and 25 October 2004. The following methodological approaches were used to arrive at the evaluation findings:

(a) Desk reviews of project documents, outputs and monitoring reports to UNEP, including the GEF annual project implementation review reports, were used to form the opinion of the evaluator on project performance. In addition relevant correspondence was also used, particularly the no-cost extension request from ILRI and the letter of endorsement from the International Human Dimensions Programme on Global Environmental Change on land-use and cover changes of May 2002.

(b) The evaluator also scanned through several project products, including publications, regional and site synthesis papers, reports from workshops, national case studies and any technical information, research results, strategies and recommendations related to the development of the LUCID research approach. The reports were also part of the overall ranking of the project

performance, as shown in annex II. The assessment of the quality of the products and the listing of project-generated publications are shown in annexes IV and V.

(c) In addition to the evaluation of written reports, the evaluator visited project offices in Kenya, Tanzania and Uganda, where interviews were carried out with project management staff at ILRI, the University of Dar es Salaam and Makerere University. The evaluator also interviewed the project participants at the project site in Embu-Mbeere in Kenya, where a focused discussion was held with farmers, government extension agents and local provincial administration (annex IX).

(d) Sixteen key stakeholders were also interviewed on their views concerning the overall realization of project objectives, activities and outcomes. The interviews also provided useful information on the project implementation challenges and successes. Those stakeholders who were interviewed included the project management team at ILRI in Nairobi, UNEP staff and LUCID scientists at Makerere University in Uganda and the University of Dar es Salaam in Tanzania. A complete list of stakeholders who were interviewed is shown in annex XI.

(e) An email questionnaire was sent to those stakeholders who could not be interviewed by phone. Those who received questionnaires by email included some members of the LUCID regional project advisory committee and collaborating scientists from outside East Africa. A total of 30 questionnaires was sent out and the evaluator received responses from 16 questionnaires. The views of the respondents are summarized by activity in annex III, together with a rating for each activity on a scale of 1 to 5 (with 1 indicating the top rating). The mean score of the sample of 16 respondents was used to form an overall opinion of stakeholders' views on the LUCID project performance. These comments and the mean score of the questionnaire respondents were used by the evaluator to strengthen the final evaluation rating.

(f) The overall success of the activities to implement the project was rated on a scale of 1–5, as summarized in table 1.

(g) Within the main body of the report, the evaluator has taken the stakeholders' views to support the overall assessment of project objectives, activities, outcomes and other aspects of the project performance criteria set by the terms of reference, as shown in annex I, section 3.

Findings and conclusions

A. Assessment of the achievement of project objectives

33. The detailed assessment of the project performance in terms of objectives, outcomes, activities and outputs is given in annex II. In addition, annex IV contains the assessment and rating of reviewed working papers. The views of questionnaire respondents on their assessment of project performance and reasons for the ratings are provided in annex III. The list of theses, articles, conferences and other publications is shown in annex V. These referenced annexes contain information on LUCID targeted research project outputs.

34. The first LUCID objective was to "analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to utilize land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation". The project has to a large extent realized this objective, as documented in working papers 8, 9, 15, 16, 17, 19, 20, 30, 31, 33, 43, 47 and 50 (see comments in annex IV). Working papers 14 and 16 provide procedures for conducting land use and cover analysis while working paper 15 formed the inter-site comparative methodological cookbook. Working paper 43 synthesizes all regional methodological approaches necessary for establishing the linkages between land use change, biodiversity and land degradation trends. The project successfully tested its research framework at all the four sites and there are emerging indications that the framework is being replicated in other ecological sites and projects within East Africa. The impact of the approach has not, however, become widely known beyond the East Africa boundaries. The evaluation recommends that follow-up actions for dissemination of the framework be supported by UNEP-GEF in collaboration with other potential funding partners.

35. The second LUCID objective was to "integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation". The evaluation noted that this objective has been realized to a reasonable extent with evidence documented in working papers 11, 14, 21, 24, 39, 42, 48 and 51 (see assessment in annex IV). In particular working papers 42 and 48 captured the achievement of the second objective in a unique way by innovatively integrating

ecological and socio-economic factors, land use change and existing theories on the dynamics of the causal processes.

36. The third objective was to "provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes". The LUCID project attained this objective to acceptable levels as recorded in working papers 10, 12, 26, 27, 35, 36, 37, 42, 43, 44 and 46. Though useful information has been generated for effective design, planning and implementation of programmes, the information requires more processing into products that can inform policy and development partners and stakeholders. The data have also not been formatted for long-term ecological and socio-economic monitoring, as was envisaged at the project proposal stage.

1. Development of a new and innovative research methodology

37. The description of the new and innovative research methodology framework, which combines the ecological and socio-economic data, is contained in a regional methodological synthesis guide detailing how to identify trends and linkages between changes in land use, biodiversity and land degradation (working paper 43) and a research framework to identify root causes of land use change with consequences on land degradation and biodiversity (working paper 48). The two papers discuss in detail the nature of the LUCID research methodology and framework, which has been applied in the four project sites. Working paper 15 was developed early in June 2001 to assist the LUCID scientists to apply the same ecological research methodologies and analytical framework for identifying the root causes of land use change and how this is related to biodiversity loss and land degradation.

38. The LUCID research framework is replicable as it addresses generic issues on land use and how these issues interact with socio-economic and ecological spatial information. Broader ecological and socio-economic contexts are reviewed while impact on policy limitations is improved through a multi-scale approach. The application of such a research framework to land use, land degradation and biodiversity changes is the first in East Africa.

(a) Dissemination of research findings

39. Although the research framework is fairly new there are early indicators of its usefulness as reflected by an increasing demand for the methodological cookbook (working paper 15). So far over 20 end-users from Kenya, Uganda and Tanzania have requested the cookbook and applied its use in several projects and programmes. The LUCID research findings have not, however, been widely disseminated, especially to decision makers, as it is still too early after project termination in June 2004. ILRI is in the process of summarizing the findings for sharing with policy makers and other development partners, such as the Rockefeller Foundation.

(b) Integration of new LUCID data with existing old data

40. The degree of integration of new LUCID data and existing data from past studies and records was very good. To a great extent, LUCID data were collected using a uniform methodology and analytical framework for root causes of changes through the interaction of society and the environment. The interdisciplinary nature of the LUCID research framework was crucial in identifying root causes of land use change. This provided an important link for the new data on land use changes to the old existing data, particularly within the same space in different time periods. For example the regional coordinator in charge of socio-economic and land tenure studies has already used data from several sources (spatial and temporal) in the Embu project site for modelling land use and cover change and trends over three decades using multi-scale analysis.

41. Although the cookbook was inadequate in capturing some temporal changes in socio-economics, many of the changes over time were captured by analysis of satellite image records over a period of 25 to 30 years. It was also possible to derive trends from old maps of land use change between 1952 and 2002. In some cases, however, it was not possible to link new data with old data, as some old data were collected for a particular purpose and did not fit within the LUCID research framework. In some cases application of multi-method approaches of triangulation employed in LUCID helped resolve some issues that could not be satisfactorily addressed using a single-method approach.

(c) Effectiveness of LUCID research framework (analytical and methodological approaches) in relating land use change, land degradation and biodiversity

42. The LUCID framework was very effective in establishing the relationship between land use change and other changes in biodiversity and land degradation (see annex III on the views of interviewees). The use of the same research framework in the four sites allowed cross-site comparison of land use change impacts on land degradation and biodiversity and vice versa. The application of the LUCID research approach is the first attempt in East Africa by a multidisciplinary team to employ a common methodology and analytical framework to the relationships among the three variables (land use, land degradation and biodiversity changes).

(d) Indicators that LUCID research framework is filling a gap among potential users

43. Though the dissemination of the LUCID research framework has not been adequately done there are indications that the framework is gaining acceptance in East Africa. Such indicators include the application of the LUCID research framework in the Pangani basin project (2001–2003) in Tanzania, while other projects in Uganda have already asked the LUCID regional coordinator for copies of the methodology cookbook (working paper 15) for use. The University of Dar es Salaam's Department of Geography has finalized plans to apply LUCID tools in studying biodiversity loss in the southern highlands of Tanzania. The framework is already being used by ILRI and the World Agroforestry Centre (ICRAF) to study land use impacts in other projects in East Africa. The feedback workshops in the Embu and Mt Kilimanjaro sites strongly indicate the endorsement by farmers and local stakeholders of the usefulness of the LUCID research findings in contributing valuable information for the formulation of local and national policy.

2. Integrating ecological, socio-economic and land use data and theory

44. The LUCID framework integrates ecological, socio-economic and land use data and theory as explained in the regional synthesis paper, working paper 42. This paper summarizes over 40 individual site reports on the linkages between land use changes, biodiversity loss and land degradation in a variety of land use systems in the four project sites. The principal findings in the synthesis paper include the expansion of farming, grazing and settlements at the expense of native vegetation over the last 20 years, and the resultant loss of biodiversity and plant cover accompanying the loss of native vegetation due to cultivation and overgrazing, leading to the destruction of habitats, with particular consequences for large mammals, and local extinction. The paper identifies several other key findings on linkages of land use change, biodiversity loss and land degradation that could have direct impact and influence on national and regional policies targeting natural resources management, conservation, poverty reduction and economic development programmes.

45. The interdisciplinary nature of the generation and testing of the LUCID research framework was crucial for identification of the root causes of land use change. Joint research teams from the three countries were able to draw on a common understanding of root causes and similarities and differences between different sites. The resultant framework integrates information from several sources and then puts the results in a wider context.

46. A detailed description of the LUCID analytical framework is found in working paper 48, which is comprehensive in terms of addressing the key issues related to the root causes of land use change. The paper rationalizes the need to analyse land use change while considering information on different scales of root causes. It then applies an analytical framework for identifying the root causes or drivers of land use change using various theoretical approaches, such as the political ecology framework, intensification theory and land use change analytical approaches. The paper then applies political ecology to root cause analysis. The critical processes affecting land use and land management include globalization, national policies concerning land tenure, civil strife and insecurity, income diversification and urbanization, gender roles and labour allocation, and poverty and wealth in relation to land use and management.

47. The UNEP-GEF project development facility, Block A (PDFA) supported the development of this framework with the objective of promoting its wider application outside East Africa and there has therefore been deliberate refinement of the framework to ensure wider applicability.

48. The analytical and methodological guide is a useful replicable tool for identifying land use change, biodiversity loss, land degradation and the root causes of land use change. This has influenced some scientists, who have already started replicating its use in other comparable research

sites such as the Pangani basin in Tanzania, while many others are planning to use it at ILRI, the University of Nairobi and in Uganda, where a number of projects are planned using a platform based on the framework.

3. Contribution of LUCID information to better programming

(a) Integration of newly collected data with existing data and information

49. Key existing data for use in the LUCID project were clearly identified in the project proposal, and newly collected data built on existing data and information on the patterns and trends in land use, biodiversity and land degradation. The new LUCID information has been used to enrich existing databases. For example, the regional coordinator in charge of socio-economic and land tenure studies has already used data from several sources (spatial and temporal) in the Embu project site for modelling land use and cover change and trends over three decades using multi-scale analysis. In Kenya, Tanzania and Uganda the data were used to upgrade the databases at the Kenya Agricultural Research Institute (KARI), the Institute of Resource Assessment at the University of Dar es Salaam and the Institute of Environment and Natural Resources at Makerere University. The data are now stored in various databases in the three countries. The LUCID project has also produced a CD-ROM with information in the form of maps and working papers on the four project sites that will be disseminated to key institutions.

50. The LUCID project produced several working papers (annex IV) already listed on the web site that document excellent analysis of new and old data with better trends and patterns. It is desirable that LUCID data be consolidated into a common database. Institutions with valuable LUCID information include the Institute of Resource Assessment and the University College of Lands and Architectural Studies (University of Dar es Salaam, Tanzania), ILRI (Kenya), the geographic information systems (GIS) remote sensing unit of the Institute of Environment and Natural Resources and the National Biodiversity Data Bank (Makerere University, Uganda), the Tanzania Natural Resources Information Centre, the University of Nairobi (Kenya), KARI (Kenya), Michigan State University (United States of America) and the University of Bordeaux 3 (France).

(b) Quality of the baseline data and information for ecological monitoring (patterns and trends in land use, land degradation and biodiversity)

51. Some of the LUCID scientists have excellent long-term data and information (over 25 years) collected from the LUCID project sites. The use of satellite images provides objective quantification of changes in land use and land cover since the launch of Landsat in the early 1970s. The application of the analytical framework on the possible root causes or the driving variables permits integrated analysis of land use, land degradation and biodiversity loss.

52. LUCID baseline data are able to contribute significantly to the identification and development of indicators relevant for long-term ecological monitoring. Indicators from the biophysical and socio-economic processes of change can be monitored on multi-scale and temporal levels. Once the major trends are identified as part of the baseline information, regular monitoring can provide linkages to global public goods and provide linkages to global observatory systems, for example the Global Terrestrial Observing System. There is a need to follow up at data analysis level to identify relevant, accurate and robust indicators of land use changes that are linked to biodiversity loss and land degradation.

53. Important ecological, socio-economic, land use, land degradation and biodiversity data have been collected through the LUCID project from the Mt Kenya region (Mbeere and Embu), Mt Kilimanjaro slopes (Kenya and Tanzania) and in Uganda (Sango Bay, Lake Mburo National Park and Kabale Forest Reserve). These data sets have been analysed to produce individual site-level working papers and regional synthesis papers. The data sets at any level (local, national and regional) form important reference data for future studies. For example, case studies at site level have contributed valuable information on the linkages between land use and biodiversity loss and land degradation that future studies could build upon or use for trend purposes. It is therefore imperative that LUCID data be stored in a collective database to which all interested scientists would have unconditional access at all times. According to the views gathered from the questionnaire, respondents confirmed that LUCID project information has not been brought to a common base but it is under the custody of individual scientists and institutions. There is therefore a need to collate it in one database to facilitate its future access by other scientists, if the data exchange and sharing protocols can be worked out. When this is done the LUCID database will form an important baseline for future studies on land use change, biodiversity loss and land degradation.

At the moment individual researchers, research teams and institutions such as Makerere University, ILRI and the University of Dar es Salaam hold much baseline data.

(c) Usefulness of information generated by LUCID for future project and programme formulations

54. The quality of information generated was very good in terms of its usefulness at local, national and regional levels. This information has potential use in planning and could form a base for the monitoring of ecological and policy impacts on land use changes, biodiversity loss and land degradation at local to regional levels. The LUCID information products further justify conservation of biodiversity and habitats on the slopes of Mt Kilimanjaro and Mt Kenya and along the shores of Lake Victoria. The information can provide a firm foundation for land use planning and the development of environmental management plans at different scales (local, national and regional). The information generated is useful for assisting the preparation of national action programmes related to the Convention on Biological Diversity, the Framework Convention on Climate Change and the Convention to Combat Desertification.

55. The information generated by the LUCID project has the potential to inform international stakeholders on the challenges and opportunities affecting realization of sustainable development at different levels of land use. The LUCID project is currently limited in its global impact because of its small geographical scope. UNEP-GEF is interested in promoting the LUCID approach in other parts of the world and this will very much depend on capacity-building and dissemination of results to more scientists and institutions outside East Africa.

(d) Potential for use of LUCID information in development planning process or in programme formulation

56. LUCID information has the potential for use in planning longer-term monitoring of the interface between society and the biophysical environment. LUCID reports detailing relationships between land use, land degradation and biodiversity should inform development programmes and projects at all levels. In particular, the national biodiversity and desertification action programmes should draw lessons from the identified patterns and trends of land use, land degradation and biodiversity changes.

57. LUCID information has the potential for use in planning and longer-term monitoring of the interface between society and the biophysical environment. A number of stakeholders indicated that LUCID information can be used in a number of areas to assist in the development-planning process. For instance, socio-economic, soil and vegetation data can be used for planning and identifying areas that are under pressure from human activities. These data can also be used for mountain research partnerships at international network level or in research for planning development in the nucleated settlement around the slopes of Mt Kilimanjaro and Mt Kenya. These data provide the best available source of information that links biophysical and societal processes and thus provides an excellent basis for discussion of policy options related to land and resource management on issues such as water use and wildlife.

B. Assessment of achievement of project outcomes

1. Quality and usefulness of the analytical and methodological guide

58. The analytical framework and methodological guide is fairly comprehensive in identifying and analysing the relevant issues in land use change, land degradation and biodiversity loss. The quality of the framework was rated as very good (rating 2). The LUCID analytical framework (working paper 48), methodological guide (working paper 15) and regional methodological synthesis (working paper 43) describe the LUCID research framework in detail. The research framework provides a series of analytical and methodological approaches on how to collect sociological, ecological, land use, biodiversity and land degradation data and how to derive linkages amongst them. For example, working paper 48 provides a comprehensive analytical framework for addressing key issues on the root causes of land use change that result in land degradation and affect biodiversity. The paper analytically underscores the critical human-related processes affecting land use and land management, such as globalization, national land tenure policies, civil strife, insecurity, activities to diversify income, expanding urban towns and related infrastructure, changing gender roles, labour allocation, poverty and wealth issues. The paper further identifies replicable generic research questions and provides information on the design of the problem-specific framework. Working papers 15 and 43 provide ecological methodologies that could be widely used to collect

data in geographical sites similar to those of LUCID and beyond. In particular, the LUCID research framework uses a variety of approaches to assess the interactions of socio-economic and political systems and the biophysical environment.

2. Usefulness of the analytical and methodological guide

59. The analytical framework and methodological guide are very useful in analysing trends in soil fertility, diversity of agroecosystems, species richness and land degradation. They are also useful in collecting and analysing spatial and temporal changes. The generic nature of these tools makes them even more realistic and useful in integrating the historical sociocultural, economic and political driving forces within different time frames and in relation to other intervening variables. The usefulness of the new LUCID research analytical framework for assessing the interactions of land use changes, biodiversity and land degradation is further based on the combination of conceptual and methodological approaches and the research findings indicating linkages between changes in land use, biodiversity and land degradation. The LUCID research framework has added value to our understanding of the interactions of land use, land degradation and biodiversity by promoting a multidisciplinary approach to problem analysis and by identifying relevant indicators of land use, land degradation and biodiversity loss. Some indicators include new land use, emerging vegetation cover and changes in biodiversity status, especially for sensitive taxa such as plant and animal indicators, butterflies and birds and key species in various ecosystems.

3. Quality, usefulness and replicability of the analytical framework

60. The LUCID research framework documented in working paper 48 is an effective approach in identifying socio-economic and ecological root causes of land use and land management change leading to change in biodiversity and land degradation. The approach has produced and identified aspects of similarities and differences in variables driving socio-economic elements such as land tenure and national development policies rooted in the historical context of each country. This is well illustrated by the case of the root causes of land use change in the eastern part of Mt Kilimanjaro on the Tanzania side and the northern part on the Kenya side.

4. Quality and usefulness of the information generated for East Africa

61. The LUCID project produced over 40 working papers of varied quality ranging from satisfactory to excellent (annex IV). These papers were synthesized into a regional paper of excellent quality that integrated ecological and socio-economic data on land use and land degradation. This regional synthesis paper (working paper 42) provides perfect linkages between land use change, land degradation and biodiversity across the East African region. The paper provides some cross-cutting findings, which include the expansion of farming, grazing and settlements over the last 20 years at the expense of native vegetation. The paper also documents a positive relationship between losses of native vegetation and animals and biodiversity loss. The same relationship applies to the loss of large mammals. The paper further confirms pastoralism as a more compatible land use to conservation of biodiversity in the four sites in the East African region. It documents that land fragmentation is decreasing the viability of agricultural livelihoods depending on land under cultivation.

62. More interesting results are contained in several other reports, for example the broad themes of wildlife numbers and distribution and wildlife migration corridors are contained in working papers 8, 12, 18, 27, 29, 31, 36, 37, 39 and 42; land tenure changes and impacts on land use in working papers 7, 11, 14, 19, 20, 24, 25, 30, 31, 39 and 47; the effect of policy on land use and on biodiversity, land degradation and land distribution in working papers 7, 11, 17, 18, 19, 20, 21, 25, 30, 31, 38, 39, 44 and 47; water quality in working papers 35 and 42; plant species and ecosystem type distribution in working papers 12, 26, 30, 32, 33, 36, 38, 39, 40 and 42; changing land distribution between groups of land users, such as between farmers and herders, and the impact on wildlife conservation in working papers 17, 19, 20, 23, 25, 39, 44 and 47; evolving farming systems, including crop type and method of livestock rearing, in working papers 14, 19, 20, 21, 23, 25, 34, 36, 44 and 47; and the magnitude of the effect of agricultural intensification and expanding crop production in semi-arid ecosystems on soils in working papers 9, 10, 12, 21, 26, 38, 41 and 42.

63. ILRI has attached great importance to the information generated by the LUCID research framework and has therefore ranked land use issues within ILRI and the whole CGIAR system at fourth position in its strategic plan. The LUCID research framework has also contributed to the formulation of other GEF programmes, such as the Desert Margins Programme. LUCID has also had a positive input into the design and implementation of the Farming in Tsetse Controlled Areas

(FITCA) project funded by the European Union. The lessons learnt in the implementation of the LUCID research framework informed the FITCA project, as the project coordinator was half time with LUCID and half time with the environmental monitoring and management component of FITCA.

64. The creation of national and regional databases of the major LUCID findings will have an important positive impact on the national environment management authorities of the three East African countries once the results (as outlined in the working papers) are disseminated. These authorities will be in a position to use baseline information established through LUCID to make accurate state-of-the-environment reports to UNEP every two years recording trends in land use, biodiversity and land degradation based on biophysical and socio-economic changes. As LUCID information has already been digitized it can be easily repackaged into various information products for informed decision-making at local, national and international levels.

5. Quality and usefulness of the ecological information and monitoring system

65. The LUCID regional and technical advisory committees recommended that this activity be dropped from the work plan since it was deemed that the LUCID team would not have adequate time to implement it. Consequently, although the LUCID data are in various forms that can be put forward to establish an ecological information and monitoring system that would facilitate surveillance of land use change, biodiversity and land degradation patterns and trends, some follow-up action is required to finalize this initiative, which would be of strategic importance for the UNEP-GEF contribution to the Global Terrestrial Observing System and the Global Climate Observing System by providing solid linkages and baseline data. So far the LUCID project data can easily be formatted to provide such support to the above global ecological monitoring systems. The LUCID data have been incorporated into the national databases and therefore data exchange is feasible, given the cordial working relations among the institutions and scientists. The data exchange protocols will greatly enhance the utility of the common database as a model for other regions of the world.

6. LUCID capacity-building for researchers and national institutions

66. The extent to which the LUCID project enhanced the capacity-building of researchers at site, national, regional and international levels was rated as very good (annex III). This is because graduate students and scientists of multidisciplinary backgrounds participated in studies and in the production of regional and national synthesis papers. The project has made excellent contribution in enhancing the capacity of researchers at national institutions. In Uganda, 10 researchers were exposed to the LUCID framework and 1 postdoctoral student and 4 MSc students trained. In Tanzania 1 PhD and 2 MSc students were trained, and in Kenya 3 MSc and 2 PhD students. Internationally LUCID trained 3 students from the University of Bordeaux 3 and 2 PhD students from Michigan State University.

67. The LUCID project held several feedback workshops, including one at the Kilimanjaro site in Tanzania, five at the Kilimanjaro site in Kenya, and another at the Embu site in Kenya. These feedback workshops were mainly for creating awareness of the LUCID research findings and also for crosschecking the accuracy of the information obtained. LUCID research findings are expected to have a positive impact on decision makers. There is a need to process relevant LUCID information into products that are easily understood by policy makers and appropriate to development planning. Capacity-building for other stakeholders, including NGOs, was rated as satisfactory (average rating 3.8) as the respondents felt that they were not sufficiently exposed and not many know about the findings yet.

C. Cost-effectiveness of LUCID project

68. Project duration was initially for 36 months starting in January 2001 and scheduled for completion in December 2003. Although there was a six-month delay in project commencement and termination, overall implementation was conducted in a most efficient manner. Disbursement of funds has been efficient and there has been no delay due to the disbursement system. UNEP-GEF released the first allocation of $80,000 (15 per cent of the budget) 10 days after signing of the contract between ILRI and UNEP-GEF in February 2001. There was, however, a six-month delay in signing the memorandum of understanding with Makerere University and the University of Dar es Salaam.

69. The personnel cost in comparison with the programme costs was well within the accepted limit of 25 per cent. Only two persons were salaried in the project. Country scientists freely contributed a lot of their time and institutions also met extra costs and allowed access to their national information free of charge. Access to databases was free in all the countries and at ILRI.

70. The identification of scientists to undertake case studies took some time. This was one of the reasons behind the request for LUCID project extension at no extra cost for a period of six months ending in June 2004. Although the project has now finalized most activities more time is needed to disseminate the results to decision makers and other stakeholders.

71. Although the project was not sufficiently funded at country level, the country site coordinators were satisfied that the financial allocation was well used to meet the project objectives, activities and outcomes. With an allocation of less than $70,000 the Uganda LUCID project managed to provide excellent information on the project sites, though with an extra $10,000 per site the scientists would have been able to buy higher-resolution images, which would have greatly improved the quality of the baseline information. The LUCID database information is based on 30x30 metres resolution, but for an additional $10,000 the level of data resolution could have been 10x10 metres or even less. The cost-effectiveness of the project was also seen in the added value to institutional strengthening despite the small budget allocation. For example, Uganda acknowledges that UNEP-GEF support has improved the GIS facilities at Makerere University Institute of Environment and Natural Resources and the institute is now in a better position to contribute useful information for the implementation of the national biodiversity conservation strategies, which require objective data in order to influence policy.

D. Project impacts

1. Immediate project impact on scientific research and policy development

72. Immediate impact on scientific research at site, national and regional levels was very good. At site level, tools were developed, quality data collected from most sites where no such data had been collected before and very useful products generated. For instance NORAD in Tanzania is already using the LUCID methodology for its Pangani basin project. At national level, the LUCID project allowed interactions among many national research institutions and encouraged productive research discussions. Within the region, the project has promoted cooperation among East African countries on cross-border issues and has influenced ICRAF in adopting the Embu LUCID research design and applying it in Tanzania on the slopes of Mt Kilimanjaro. The ILRI Mara project is also using the LUCID research framework. The immediate impact on international scientific research has not been properly established though there are signs that the impact will be great, as the project generated reliable information and identified historical trends that link well with current information.

73. The synthesis of research findings into policy briefs is a follow-up action that ILRI is willing to finance through its own resources. A final workshop is being prepared targeting policy and decision makers. The impact of the LUCID project on policy development and decision-making potentially remains very good at national and regional levels, due to the following:

(a) The use of the LUCID research framework in projects such as the USAID PRIME project in south-western Uganda, for which the LUCID project has leveraged funding of $17 million from May 2004. The project uses a methodological approach to land use change and land cover analysis. The prime mover is the Uganda LUCID national leader, who intends to apply the LUCID approach in four new districts in addition to using baseline information in two districts in which the LUCID project was implemented;

(b) Application of LUCID ecological methods for data collection on plants in a cross-border project in Uganda to update a database;

(c) LUCID leveraged funds from the European Union for a Ugandan NGO, Partnership for African Environmental Sustainability, for the implementation of a project entitled Land Degradation and Armed Conflict, a regional programme in East Africa covering Burundi, Ethiopia, Kenya, Rwanda and Uganda. The project was implemented between 2002 and 2003 and used the LUCID analytical approach, and the results in Uganda show a strong association between land degradation and armed conflict;

(d) LUCID leveraged funds for a new project at the LUCID focal point in Uganda (Makerere University). This two-year project, running from 2004 to 2006, has been funded by the International Development Research Centre for $250,000 and seeks to apply ecosystem approaches

to human health to understand the human dimensions of malaria in west Uganda. The project plans to train 10 MSc students on the use of LUCID tools;

(e) In Kenya, the Rockefeller Foundation and World Bank are willing to provide funding for a follow-up on LUCID findings for policy design and programming interventions. Alongside, the Rockefeller Foundation would like ILRI to address issues of analytical work on linkages between policy impacts on poverty and provide a monitoring and evaluation system that would serve as a basis for informed decision-making.

74. The impact of the project at international level is perceived to be unsatisfactory by a number of stakeholders, and this evaluation noted that the findings have not been adequately shared with policy makers. There are, however, signs that the impact will be great; for example, the University of Dar es Salaam recently shared the LUCID findings in the Global Biodiversity Conference for Africa. In addition, LUCID has had an impact on ILRI in the CGIAR, and on global forums. Other areas that LUCID has contributed to globally include:

(a) LUCID activities have been institutionalized as a global project (TGO1, Evolution of Productive Systems);

(b) The LUCID project has influenced the recognition by CGIAR of land use changes as a priority research area;

(c) The International Panel on Climate Change 4th assessment report intends to include LUCID and the Climate Land Interaction Project (CLIP) as case studies;

(d) The LUCID project featured in the 2002 meeting proceedings of the Pan-African Committee of the global change System for Analysis, Research and Training (START-PACOM);

(e) CLIP, a side project of LUCID, was very highly ranked in a National Science Foundation biocomplexity competition in 2003.

2. Longer-term impacts

75. As regards the potential longer-term impact in the next three to five years, most respondents rated it as very good (rating 1.6) at both national and regional levels. Many scientists and researchers are likely to adopt the use of the methodology and other tools because the research is of high quality with high potential to have an impact on scientific thinking.

76. Additionally, the following projects have received inspiration from the LUCID project:

(a) Changing agricultural land use in the Karamoja region (Italian Cooperation, 2004);

(b) Socio-economic impacts of malaria due to fish farming (International Development Research Centre, 2004–2006);

(c) Impacts of controlling tsetse flies on land use in eastern Uganda (ILRI, 2004–2005);

(d) Impacts of tobacco growing in Uganda on distribution of woody biomass (British American Tobacco, 2003–2005);

(e) Impacts of controlling East Coast fever (Uganda) on land use change (ILRI, 2003);

(f) CLIP (Michigan State University, 2003–2008).

E. Sustainability of project outcomes

77. LUCID as a targeted research project had a catalytic role and therefore the financial sustainability of project activities by GEF was not expected. The LUCID project, however, exhibited some aspects that the evaluation considers to be important in creating an enabling environment for the sustainability of LUCID outcomes and products. Some of these include:

1. Capacity-building

78. The LUCID project was rated good at local level (rating 3), excellent at national level (rating 1) and very good at both regional and international levels (rating 2). Some of the trained graduate students were recruited by university teaching departments, as was the case for the University of Dar es Salaam.

2. Participatory approach

79. LUCID adopted a feedback workshop strategy to share the generated information with stakeholders for sustainability of the project findings. The approach was very good at local level (rating 2), satisfactory at national level (rating 4) and good at community level (rating 3). The feedback workshops stimulated very rewarding discussions on project findings and their relevance to policy development and improved programme planning and implementation.

3. Follow-up actions on LUCID project outcomes

80. Some of the early indicators showing that other collaborating partners are willing to follow up on LUCID outcomes include:

(a) Active participation by the French Institute of Research in Africa;

(b) Interest shown by the stakeholders of the Community Management of Protected Areas Conservation (COMPACT) project (Tanzania) in accessing the findings;

(c) The willingness by the Department of Geography, University of Dar es Salaam, to use the tools and framework on a new site. Focal points at Makerere University and the University of Dar es Salaam are in the process of accommodating the LUCID approach in teaching departmental courses;

(d) Commitment by the Rockefeller Foundation and ILRI to transform the findings into policy briefs for policy makers.

81. The above trends are indicators of the sustainability of project findings. LUCID project outcomes and impacts have not yet influenced policy and regulatory frameworks on land use, land degradation and changes in biodiversity at any level, as effective dissemination of products and frameworks has not yet been done. But plans are at an advanced stage to hold a workshop with policy makers to share the policy implications of LUCID findings.

4. Institutional sustainability

82. The LUCID project was very good (rating 2) in facilitating institutional sustainability. The reason was the close collaboration created among researchers and institutions from different disciplines. This collaboration is likely to continue at all levels (local, national, regional and international). Also, LUCID data and information products will inform broad national strategies for the implementation of national environmental management programmes, such as national action programmes under the Convention to Combat Desertification, national biodiversity conservation strategies under the Convention on Biological Diversity, national strategies for sustainable development and national environment management authority actions. The approach is also being institutionalized at ILRI, which is well placed to facilitate regional cooperation and also to provide leadership.

83. The LUCID findings are being used for teaching by the Makerere University Institute of Environment and Natural Resources, and the Department of Range Management at the University of Nairobi has indicated interest in using the methodological guide and selected working papers to update teaching material on ecological courses. The project also purchased equipment such as computers, printers and global positioning system (GPS) technology, which became the property of the participating national institutions after the end of the project.

84. These aspects of sustainability prompted most stakeholders to believe that the project findings will be self-sustaining because they are already in use and have great potential for further use by a wider community of scientists, policy makers, planners and decision makers. Though the project was not designed to have a follow-up phase, this need has arisen and was discussed in the last LUCID annual seminar held in February 2004. In the light of this, it was felt that there is a great need for institutional coordination of LUCID follow-up activities at national and regional levels. These coordination activities should best be taken up by national LUCID focal points such as the Department of Geography at the University of Dar es Salaam, while at regional level ILRI remains better placed to provide linkages and networking with a consortium of policy makers such as ministers, NGOs, international institutions and donors.

F. Identification, engagement and consultation of stakeholders

85. The process of identifying and engaging the stakeholders was successful but very much dependent on the existing network known to the project coordinators and members of the regional and technical committees. At national level, the process of identifying graduate students or sourcing specific expertise for site-level case studies was the responsibility of participating institutions (Makerere University and University of Dar es Salaam). For Kenya, identification of scientists and institutions was as effective as in the other countries, but the familiarity of the regional coordinators with the Kenyan issues provided backstopping services at the Embu and Mt Kilimanjaro sites.

86. Although the identification of the participating scientists, which targeted key individuals with the comparative advantage to add value to LUCID, was linked to institutional affiliation, LUCID institutional linkage was very weak, as LUCID had no legal identity to enter into any memorandums of understanding or contracts with some of the participating institutions. The failure of the LUCID project to establish formal collaboration with Kenyan institutions is a reflection of some of the weaknesses of project stakeholder involvement and engagement. However, this process of stakeholder identification and engagement was one of the strengths behind the excellent performance of LUCID in Uganda and Tanzania.

87. The LUCID project envisaged a high level of partnership building among the working groups and with other institutions, for example Makerere University, Michigan State University, KARI and National Museums of Kenya, who are also involved in other projects. The dissemination strategy largely adopted by LUCID was through feedback workshops involving many stakeholders (including farmers, scientists, local leaders and government officers), although the effectiveness of the feedback workshops in gaining support for positive policy development was weak.

G. Country ownership of LUCID outcomes

88. The historical background of the origin of the LUCID project has some relevance to the country ownership process. The LUCID idea began in 1997 following a meeting held at Naro Moru, Kenya, between groups of scientists with considerable experience working on the impacts of land use in East Africa. This group came together and agreed to cooperate and use existing data in their personal custody and in reports and archives. ILRI, through a grant from USAID, financed this initiative, which was followed by other exploratory meetings. Following a PDFA workshop held between 13 and 16 April 2000 in Dar es Salaam, the LUCID project proposal was endorsed by Kenya, Uganda and Tanzania and submitted to UNEP-GEF for approval. This was finally passed in September 2000 as a medium-sized project for targeted research with a budget of $750,000.

89. It was during the above consultative and participatory process that the LUCID project objectives were contextualized within the policies of the three East African governments. LUCID project objectives addressed priority and current environmental agenda in East Africa. Kenya, Tanzania and Uganda are faced with the responsibility of implementing international conventions on environment and sustainable development. Issues of land use changes and how such changes are related to biodiversity loss and land degradation must be addressed if compliance with international conventions is to be achieved. This is also consistent with the recommendation of the Scientific and Technical Advisory Panel submitted to the GEF Council on10 December 1999 in Bologna, Italy. The meeting reviewed and clarified linkages between land degradation and the GEF focal areas and encouraged the GEF secretariat and implementing agencies to help countries prepare proposals for GEF support for land degradation activities as they relate to the GEF focal areas. The LUCID project has relevance to national and regional strategies for the implementation of the Framework Convention on Climate Change, the Convention to Combat Desertification, and the Convention on Biological Diversity, and to the principles of sustainable development. In particular the project received the endorsement of national governments through their respective national environment management authorities.

90. Other indications of country ownership of the LUCID project include:

(a) The use of LUCID outcomes to improve the capacity of national institutions dealing with research and environmental information systems, including the National Biodiversity Data Bank at Makerere University (Uganda), the soil database at KARI (Kenya) and the database at the Institute of Resource Assessment, University of Dar es Salaam (Tanzania);

(b) Participation of relevant key national institutions in the development and testing of the LUCID research framework. Relevant government ministries also approved the existence of

LUCID project activities in their own countries; for example, in Tanzania LUCID received approval from the Office of the Vice-President and the Ministry of Environment and Natural Resources;

(c) The national participating institutions and ILRI, plus international scientists and institutions, have contributed to the success of the LUCID project by providing scientific expertise to LUCID at no cost as well as by preparing 15 graduate students at no cost to the LUCID project except for financing student field research data collection at a very reasonable cost. The co-financing budgets for LUCID by recipient governments show that Kenya committed $140,250, Tanzania $92,000 and Uganda $73,125.

H. LUCID institutional arrangements, management and financial systems

1. LUCID institutional arrangements and implementation approach

91. The lead institutions that played excellent roles in the LUCID project were ILRI, the Institute of Environment and Natural Resources at Makerere University, the University of Dar es Salaam, Michigan State University, the University of Bordeaux 3, UNEP and KARI.

92. UNEP-GEF signed three separate contracts with the key institutions implementing the project, namely ILRI, the University of Dar es Salaam and Makerere University, as shown in the organization structure appended in annex VI. The African Conservation Centre, which was supposed to be the focal point for Kenya, did not participate in the project implementation as the contact person moved to a different institution, the African Wildlife Foundation. The Kenya component of LUCID did not therefore find proper institutional housing and this remains a weak point in the institutionalization of LUCID in Kenya.

93. The LUCID country focal points are supporting the regional institutionalization of LUCID at ILRI, as this will facilitate regional coordination. Additionally, they are willing to actively play their country roles in the output follow-up initiatives; for example, the Makerere University Institute of Environment and Natural Resources is proposing the creation of a centre for land use and policy research to continue with the LUCID approach in land use and cover analysis and also in identifying the linkages with biodiversity and land degradation. The centre will be used as a research and monitoring platform for long-term ecological and policy monitoring. ILRI has also adopted LUCID outcomes, which now form part of its Medium-Term Plan 2005–2007. One of the milestone or performance indicators for 2005 is holding a policy workshop with policy makers and other stakeholders in Kenya to present policy briefs on LUCID findings and thus stimulate discussion on policy implications and programme interventions.

94. In 2006, an ex post impact assessment on different land use interventions for smallholders farming in tsetse controlled areas is planned; also under this theme ILRI intends to carry out a spatial household model for hot spots and cold spots of land use change in Kenya and the consequences for poverty reduction and systems sustainability. Lessons learnt will be disseminated as widely as possible. A report on the linkages between changing land use, biodiversity, and land degradation in East Africa will be completed by 2006. By 2007, ILRI expects to develop or propose scenarios of farming futures under climate change in East Africa, using LUCID information under a new LUCID-inspired CLIP.

2. Regional advisory committee

95. The regional advisory committee was expected to meet every six months. The committee played a critical role in guiding the project to realize its objects and outcomes as defined in the project proposal. The committee monitored the technical quality of research activities and reports. It also provided guidance in situations where the project implementation needed adaptation to changed circumstances. The steering and advisory committee, for example, advised that the establishment of an ecological monitoring system would not be feasible due to the short-term nature of the project.

96. The members of the regional advisory committee, listed in annex VII, are prominent scientists with long experience of the ecological and socio-economic dynamics of land use change, biodiversity and land degradation issues. The annual meetings were held regularly and thoroughly reviewed the status and direction of project implementation. The committee also assessed the technical soundness of the project outputs in the form of case studies and working papers and fulfilled the role of the technical steering committees. As LUCID was conceived as a network of scientists working on a targeted research agenda that was clearly defined during the PDFA process, the role of the technical steering committee became more or less redundant.

3. Technical steering committee

97. Site leaders, scientists representing international institutions, constituted the meetings. A list of the scientists is shown in annex VIII. The project site coordinators facilitated the implementation of the project objectives and activities effectively. The national site coordinator worked closely with the regional coordinators and international scientists to ensure that the project objectives were realized. However, from the interviews, the consultation on the project was not intensive enough to assist new scientists understand the project objectives and expected outcomes. In terms of research design, supervision of field data collection and analysis the project lacked adequate time supervision from site scientist coordinators, as their participation was only on a voluntary basis and the supervision budget was limited.

4. Assessment of the project proposal

98. The project was well conceived at PDFA phase and the medium-sized project proposal was well written, with all the necessary information for a clear plan of implementation. The project was very well described in the proposal and at the terminal evaluation stage; all the funds were used according to budget. The scope of work defined was realistic and the performance indicators were relevant and useful for project monitoring and evaluation. The proposal was of very high standard in addressing key issues on land use change and how this relates to biodiversity loss and land degradation.

99. The proposal was developed with the participation of all key stakeholders, who were then involved in proposal implementation. The proposal was a joint effort between the UNEP Land Degradation Unit and the executing and implementing partners. This participatory approach guided the researchers to address relevant and complex issues on the relationship between land degradation, land use and biodiversity. These issues address the concerns of implementation of major international environmental conventions, especially the Convention to Combat Desertification and the Convention on Biological Diversity.

100. The project proposal was focused on the development of a replicable research framework that can assist research to compile new and old data for making informed decisions on ways to mitigate land use changes that lead to biodiversity loss and to land degradation.

101. The assessment of project scientists, and indeed of this evaluation, is that lack of time for data collection in the field was a constraint. The proposal underestimated the logistics of the time frame for project implementation and it did not allow sufficient time for data analysis and dissemination of the results. Hence the project had to request a no-cost extension of six months. The proposal also underestimated the participation of several relevant disciplines, such as agriculture and wildlife management.

102. Identification of indicators for land use change, land degradation and biodiversity loss were discussed in the proposal. The proposal did not identify clearly the collaboration strategies with other similar projects operating in the area in order to exchange data and information on socio-economic and agrobiodiversity issues. A case in point is the People, Land and Environment Change (PLEC) GEF project operating in East Africa, which the LUCID project had limited interaction with.

103. The PLEC teams have conducted agrobiodiversity assessments in agricultural areas and have gathered a large amount of socio-economic data, including data on land use patterns and land use changes. Although the proposal indicated that LUCID was to concentrate on natural ecosystems while PLEC was focused on artificialized agriculture production systems, LUCID transects and land use analysis overlapped with the PLEC mandate. It is therefore recommended that in the follow-up actions the findings of both LUCID and PLEC enrich the information products for improved decision-making and policy formulation at all levels.

5. Adjustment during LUCID implementation

104. The LUCID project was the first with UNEP-GEF for the lead executing agent, ILRI, who therefore had to adjust to GEF reporting guidelines, which are slightly different from the ILRI reporting system. The adjustment includes changing from broad categories to subcategories of expenditure items, and making quarterly instead of biannual financial reporting.

I. Project financial management and feasibility

105. UNEP-GEF strategy was to work with institutions that had internal capacity for financial management. This made it possible for country institutional focal points to receive their budget allocation directly from UNEP for project site operations. An exception to this was the honorarium money, which was allocated to ILRI and paid directly to the consultants and scientists on completion of LUCID working reports. ILRI received the bulk of the funds as the main executing agent of LUCID and channelled the funds through subcontract arrangements to Michigan State University and the University of Bordeaux in France.

106. The project finances were well managed by all the institutions that received project funding. It is estimated that the results registered by the LUCID project could have been achieved in other similar projects with five times as much funding. The budget was well planned as there were no additional funds requested and few reallocations were undertaken within budget items. Using value for money as the criterion for project efficiency and cost-effectiveness, the LUCID project has performed far above average. For example, all the site reports in Uganda and Tanzania cost less than $70,000 and only $10,000 was required to pay all the scientists their honoraria of about $1,000 for each report. However, while appreciating the commendably high level of cost-effectiveness in achieving LUCID outcomes, the evaluation calls for better funding of field activities to improve the quality of future research and to attract and retain scientists in the face of other competing responsibilities.

107. As far as co-financing is concerned, it is apparent that all the participating institutions spent more than was originally indicated in the proposal budget if the total time commitments of scientists and supporting institutional services are taken into account. ILRI, for example, waived 26 per cent of the overhead budget as part of the co-financing of LUCID and contributed a great deal of free consultation time with staff scientists.

108. The financial disbursement by GEF is rated as excellent by LUCID project accountants within implementing institutions since there were no delays in release of funds and the financial reporting occurred every three months. ILRI suggested that the reporting time be made more flexible to fit within the existing financial reporting of every six months for most donor projects. ILRI found quarterly reporting out of phase with their reporting schedule. The reporting also required a new budget line according to GEF requirements but this did not require significant adjustment to the ILRI financial management system. The project was audited annually by external auditors as validated by the audited annual reports for the years 2001, 2002 and 2003.

109. Overall, the project finances were well spent and disbursements were efficiently done at all levels. The acquisition and procurement of goods and services was regulated by the internal rules and procedures of the executing institutions, which are of internationally accepted standard.

J. Project replicability potential

110. Replication of the LUCID project in other countries will come at a later stage, since the results and impacts of LUCID findings have not been disseminated beyond the LUCID primary network. The LUCID findings can be used to inform the design of future projects on studies of land use and management of natural resources. Although sending project documents to potential end-users at national level is likely to have impact, the evaluation proposes that follow-up actions, undertaken jointly by ILRI and other institutions, in organizing training workshops for key end-users in research and policy development will robustly increase the chances of replicability of the project findings. This is because the challenge of achieving replication of LUCID findings includes the task of resynthesizing information into products that can inform decision makers.

111. The replication of the research framework in different geographical areas is taking place already, although more will take place later when the LUCID findings are widely shared with potential end-users. Currently, the tools are being used in other sites outside the LUCID project sites, namely in the Maasai Mara by ILRI and in the Mt Kilimanjaro area by ICRAF. If we consider Uganda as replication in the same geographical area, several donors are supporting the application of the LUCID approach in several other projects as already described in section IVD of the present report.

112. The use of project-trained individuals and institutions to replicate the project's outcomes in other regions will take place as the 15 trained graduate students find placement in strategic positions where the LUCID research framework will be useful. Some of the graduate students are finding

employment in universities in the North and South, thus enhancing the potential for continued collaboration among such institutions even after termination of the LUCID project.

113. The role of the project in building the capacity of individual scientists, universities and international institutions better placed to replicate the project vision and outcomes earned it excellent ratings among stakeholders (annex III). The project also applied very good methods of information transfer that will help disseminate its findings and ensure that its vision and outcomes are replicable elsewhere. The evaluation notes that the topical issues that LUCID tackled are of relevance to a wide community of scientists, laymen and professionals.

K. Project monitoring and evaluation system

1. Effectiveness of monitoring and evaluation as a project management tool

114. Although the LUCID project was designed using a partial logical framework as a tool for monitoring and evaluating baseline information and performance indicators, project objectives, outcomes and activities, as outlined in annex I (terms of reference), have been realized as shown in annex II (project performance).

115. Delays in the implementation of project activities at country project site offices were due to lateness in the signing of the memorandum of understanding between UNEP-GEF and respective lead institutions in each country. This cannot be blamed on inefficient fund disbursement. The delay of six months in signing the contracts with national LUCID focal points was compensated by the six months no-cost extension from December 2003 to June 2004.

116. Apart from dropping some aspects of outcome 4 (the design of an ecological information and monitoring system to identify linkages, provide baseline data and permit scientists and governments to evaluate the environmental impact of land use change caused by policy or other interventions) the project was well managed without any unnecessary requests for corrective measures such as budget reallocations and work plan revision.

2. Assessment of baseline information and performance indicators

117. Identification of baseline information and benchmarks for assessing the project achievement of objectives, outcomes and activities was the product of a consultative process between key scientists and institutions that would be participating in project implementation. This participative process in workshops and meetings created awareness among the implementing partners concerning the need for regular self-assessment and the need for timely financial and technical reporting.

118. In regard to the suitability of identified baseline information and selection of long-term ecological monitoring indicators, the LUCID project did not take up this issue, following the advice of the regional advisory committee. However, the assessment by this end-of-project evaluation is that it is possible to revisit the issue of establishing a long-term ecological and socio-economic monitoring system for the LUCID project site with a view to providing guidance on how such an environmental information management system can be used in analysing trends and patterns in the dynamics of land use change, biodiversity and land degradation.

3. Backstopping services and quality control of deliverables

119. The quality of the technical reports by individuals who provided backstopping services is generally good (annex IV) in terms of relevance to project objectives and technical soundness. However, there were a few cases in Uganda where the individuals were not able to deliver due to change of job or status, in which case other scientists completed their reports. The quality of backstopping services was also shown by other products such as maps and data analyses and by the timeliness of production. Some expertise gaps were, however, detected that could have improved the quality in addition to providing even wider scope for replicability and professional applicability of the LUCID information.

L. Lessons learnt during project implementation

120. Project flexibility during implementation was a critical strategy in the realization of project objectives, activities and outcomes, since key synthesis papers were completed within the no-cost extension period. This evaluation notes, however, that the project objective to develop and test the LUCID research framework and then disseminate it in three years was not a realistic target.

Generation and testing of tools was sufficiently done in the first phase, but dissemination and replication are considered follow-up actions by the LUCID network in partnership with UNEP-GEF.

121. The complexity of the impact of land use changes on biodiversity and land degradation calls for a multidisciplinary analytical research framework that is well illustrated by the newly developed LUCID approach. The historical context of LUCID conceptualization involved geographers, biologists, ecologists, soil scientists, socio-economists and others who were previously working on some aspects of land use change, biodiversity and land degradation with little collaboration. It would not have been possible for the LUCID research framework to have been developed by any single discipline.

122. Strategic partnership between UNEP-GEF and national and international research and training institutions has greatly enhanced institutional and human resource capacity development in the context of developing a new research analytical framework on the dynamics of land use change, biodiversity and land degradation. In particular the South-South (Makerere and Dar es Salaam universities), North-South (Dar es Salaam, Makerere, Bordeaux 3 and Michigan State universities) and North-North (Bordeaux 3 and Michigan State universities) research collaboration has greatly enhanced global benefits in sharing lessons and experiences.

M. Major project risks and adaptive management

123. Use of part-time staff was a risky element of the LUCID project since once a member of staff is assigned to another responsibility or changes employment there is no institutional memory of the project status. For example, the Kenya country office faced a problem when the LUCID link person, a senior scientist from the African Conservation Centre, left the centre for a position with the African Wildlife Foundation. To counter the problem, ILRI stepped in through the project coordinators, who were well versed with Kenyan national issues from previous experiences and research activities at other project sites. Consequently there was no Kenya focal institution to take leadership.

124. Another related risk is the position of project scientists in the organizational hierarchy. Even when LUCID scientists attempted to forge partnership with the African Wildlife Foundation, the promotion of the scientist to a higher position within the foundation made it impossible for the person to continue participating in LUCID activities and meetings. In selecting scientists to champion UNEP-GEF activities, competition for the limited time of senior scientists within partner institutions can have an adverse impact on project implementation.

125. In Uganda problems arose from involving scientists who were busy with other assignments and reliance on graduate students or academic staff who were looking for further studies outside the country, thus causing the delay of deliverables. One senior member opted for holiday in Britain; another took sabbatical leave while the other got a better placement with the United Nations Children's Fund (UNICEF) in South Africa. Two graduate students left for the United States and Norway for their PhDs.

126. Risks related to the management of project finances were minimized by UNEP-GEF by selecting implementing institutions with well-established internal financial control systems. Financial risks were easy to track as far as the UNEP-GEF financial component was concerned but the co-financing aspects carried out by executing and implementing partners were difficult to monitor and evaluate. The implementing partners provided commitment letters indicating willingness to contribute assistance in kind or in cash towards the realization of the LUCID project objectives. The risks involved in this arrangement can be reduced if the executing agency can provide audit certificates that the contribution has been provided.

N. Recommendations

127. UNEP-GEF, in collaboration and partnership with ILRI, needs to follow up on and facilitate proper dissemination of LUCID research products through a series of training workshops, seminars and conferences, inviting relevant stakeholders at national, regional and international levels.

128. The publication of the LUCID research findings in a book, and specifically the documentation of the results of tested LUCID research methodologies through case studies, will be an effective strategy for impacting positively on the dynamics of land use change, land degradation and biodiversity trends. Such a book will be useful for curriculum development and training. It is therefore recommended that UNEP-GEF, in collaboration with ILRI, take up the challenge of

ensuring that this is carried out. This exercise could benefit greatly from the experiences of the original technical committee of scientists.

129. The baseline information on the LUCID project sites can contribute to a network of similar observatory systems in East, West and North Africa, in collaboration with similar long-term ecological monitoring initiatives such as ROSELT-OSS, the man and biosphere reserves of UNESCO, the Global Terrestrial Observing System and the Global Climate Observing System. It is recommended that the baseline information and established transects be properly georeferenced for long-term ecological monitoring. More planning and consultation is required to agree on the harmonization of data collection and the minimum data set to be collected and for what purpose. It is also important that data exchange protocols be agreed. If proper data collection methods are agreed then the information, which will be regularly monitored every three to five years, will contribute to the Global Terrestrial Observing System and the Global Land Cover Network.

130. ILRI, in collaboration with UNEP-GEF, needs to consolidate databases and facilitate networking of research scientists who may wish to use or test the LUCID research framework and tools in other regions of the world.

131. UNEP-GEF funded the LUCID project to develop a research methodology that leads to the improvement of project design on a global scale. So far the framework has been developed and successfully tested at pilot scale in East Africa. It is recommended that LUCID research findings be used to improve the efficacy of existing approaches to project design, such as the sustainable livelihoods framework and the pressure-state-response model. The evaluation recommends that collaboration and closer consultation among key stakeholders in the application of the sustainable livelihoods framework and the pressure-state-response model is forged in future LUCID follow-up actions. ILRI is best placed to catalyse this process of ensuring that the LUCID research framework is issued to improve these approaches in future project design.

Annex I

Terms of reference

For the final evaluation of Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation

GF/1030-01-01

1. Background and legislative mandate

"Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation" is a medium-sized, targeted research project proposed by LUCID, Land Use Change, Impacts and Dynamics; a partnership of scientists at leading national and international institutions that have been studying land use change in East Africa and its implications for land degradation, biodiversity, and climate change for over 20 years. The project was developed to respond to the three East African (Kenya, Tanzania, and Uganda) countries' national environmental priorities on the management of land resources and conservation of biodiversity, including the importance of protecting national parks. It also addresses the priority of promoting rural livelihoods and ecological integrity. The national institutions participating in the project are the African Conservation Centre, University of Dar es Salaam and Makerere University, who were joined by the University of Bordeaux, Michigan State University and a member of the CGIAR, the International Livestock Research Institute (ILRI) in Nairobi, who executed the project.

The project was designed to provide critical tools derived from land use change analysis for use by GEF, subsequent GEF projects, decision makers and NGOs in meeting GEF operational goals in biodiversity conservation and prevention and mitigation of land degradation. Development of these tools emanates from the need to identify the linkages between land degradation and the GEF focal area. The information developed by the project on the linkages between biodiversity and land degradation will assist in the design of GEF projects on land degradation with multifocal area benefits. The complexity of interactions between ecological and societal processes over time and space has challenged attempts to understand the linkages between change in biodiversity and land degradation. Land use change analyses provide an entry into understanding these linkages and associated processes.

The project falls under the GEF Operational Programme no. 1: Arid and Semi-Arid Ecosystems. The tool will be developed and tested in the semi-arid region of East Africa, a region with rich biodiversity and of high risk to biodiversity loss and land degradation. This is an area rich with existing research that the project can draw upon. It is also an area with a history of varied environmental management regimes and programmes that provide many lessons.

As a targeted research project, the primary project outcomes were geared towards its goal of providing generic materials of use to GEF programmatic: a replicable guide, framework and monitoring system to help in the development of multifocal area projects. Other outputs were derived from the supporting activities necessary in the development of the generic materials, such as site-level results, cross-site syntheses and regional analyses. Other goals of the project, such as capacity-building and sustainability, have themselves resulted in the production of certain outputs.

Project duration was initially 36 months (January 2001 to December 2003), which was extended for another 6 months for completion in June 2004. The budget was US$ 1,441,700 funded by the GEF Trust Fund (US$ 771,000) and the International Livestock Research Institute (ILRI), Michigan State University (MSU) and the participating countries (US$ 645,000).

The project refers to the UNEP programme of work 2000–2001, and its subprogramme on Environmental Assessment and Early Warning. At the time of internalization of the project more detailed information on the subprogramme was not available. The project also supports the GEF Operational Strategy in which "GEF activities will be designed to support capacity-building, human resource development and skills that are necessary to achieve global environmental objectives" and the GEF Operational Programme Number 1 on Arid and Semi-Arid Zone Ecosystems and its emphasis on conservation and sustainable use of biodiversity.

2. Objective and scope of the evaluation

The overall objective of the evaluation is to establish project impact, and review and evaluate the implementation of planned project activities, outputs and outcomes against actual results. The evaluation will also assess efficiency and cost-effectiveness of the overall implementation approach of the project, efficient and effective management of project funds, participation of all stakeholders, lessons learnt and good practices and management of risks, sustainability of project impacts and issues of replicating good practices.

In accordance with the UNEP/DGEF policy, the evaluation will be conducted as an in-depth evaluation that will involve desk review of project documents, outputs, monitoring reports, review of specific products including publications, interview with project management at ILRI, Technical Advisory and Regional Advisory Committees, Stakeholders and relevant staff at UNEP/DGEF.

The performance indicators provided in the logframe/project matrix (see table) should be used together with the evaluation parameters of appropriateness, effectiveness and efficiency, impact and sustainability. Guidelines on performance indicators are provided in the UNEP project manual pp. 13/89–13/99 and are also available on http://www.unep.org/Project_Manual/.

Project logical framework

Project rationale and objectives	**Indicators**
Ultimate goal The project goal is to contribute to the conservation of biodiversity and prevention of land degradation by providing useful instruments to identify and monitor changes in the landscape associated with biodiversity loss and land degradation, and identify the root causes of those changes. These tools will assist GEF in the design of multifocal area projects. With information obtained from such tools, stakeholders and decision makers will be better able to implement effective remedial and preventive policy. Intermediate objective 1 Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation. Intermediate objective 2 Integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation. Intermediate objective 3 Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes.	1. Reports and other informational products produced. Guide for land use change analysis developed and tested. Guide disseminated and eventually adopted by decision makers from the local to regional level, GEF and other users such as universities. 2. Reports and other informational products produced. Root causes framework developed and tested. Framework disseminated and adopted by GEF, decision makers and other end-users. 3. Database and related analyses generated including information on the patterns and trends in land use affecting biodiversity and land degradation. Informational products, such as a "decision-making tool" on a CD-ROM, reports, articles and a web site produced and disseminated among decision makers and others. Training of decision makers conducted. Data products used in internal meetings, public meetings, and published reports.
Project outcomes	**Indicators**
1. An analytical and methodological guide on how to use land use change analysis to obtain information on changes in biodiversity and on land degradation, and their linkages. 2. A replicable analytical framework to identify the socioeconomic and ecological root causes of land use/land management change leading to change in biodiversity and land degradation. 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship. 4. The design of an ecological information and monitoring system to identify the linkages, provide baseline data, and permit scientists and governments to evaluate the environmental impacts of land use change caused by policy or other interventions. 5. Capacity-building of researchers at national institutions and at NGOs, and graduate students conducting their thesis research under the aegis of the project. Trained decision makers and other stakeholders on the use of the data and information system.	1. Generation and testing of the guide. Demonstrated improved understanding of how to use land use change analysis, and the linkages between biodiversity and land degradation, by GEF projects, international and national institutions as indicated by their participation in meetings, communications, and inclusion of the guide in their activities such as the design of their projects. 2. Generation and testing of the framework. Demonstrated improved understanding of how to identify the root causes of land use/land management change as shown by participation in meetings, communications, inclusion in their activities such as the use of the framework in the design of projects and programmes. 3. Completed data collection at the site level to fill gaps in existing knowledge. Analysis of new and existing data conducted (statistical, GIS, modelling, qualitative) and research findings completed. Cross-site comparisons and regional synthetic analyses completed. Graphs, tables, maps and written analyses generated. Reports and other informational products completed and disseminated. 4. Identification of key ecological and

	socio-economic indicators from site-level research, the literature and consultations. Design and write-up of the monitoring system. 5. Graduate student research designed and implemented with supervision by project scientists, and their research written up as reports and theses. Products and results of the project adopted in university curricula. Active participation of stakeholders (local community members, local and national decision makers, other scientists, etc.) in meetings and workshops. Decision makers trained in the use of the data and information system. Project findings disseminated in reports, CD-ROMs, the project web site, scientific articles and in meetings and conferences.
Project activities to achieve outcomes (including cost in US$ or local currency of each activity) 1. Consolidate existing research. Collect additional primary data to fill gaps and permit site comparability. Analyse site level results. ($220,000) 2. Hold feedback seminars, policy workshops, and meetings in the sites and at the national level. ($25,000) 3. Scientific coordination of the site and regional research. Travel to sites, hold meetings at the sites and regional level, and communicate with project scientists, advisory committee and steering committee to ensure scientific and programmatic direction. ($55,000) 4. Regional analyses and development of generic frameworks. Hold meetings and writing retreats of project scientists to discuss generalizable patterns and processes across sites, and regional patterns. Conduct GIS, modelling and other cross-site and regional analyses. Develop and test land use guide and root causes framework. Write site- and regional-level research reports, guide and framework. Generate CD-ROM and other information products. ($431,000) 5. Design the ecological information and monitoring system. ($40,000)	**Indicators** 1. Socio-economic and ecological data collected (remote sensing and other spatial data, wildlife surveys, plant and animal diversity and abundance surveys, farmer and herder surveys and focus group interviews, census statistics, etc). Data entered into database. Analyses completed. 2. The meetings are held and stakeholders attended and participated. Research findings disseminated and discussed. 3. Determination of necessary common data and methodology. Determination of available data and data gaps. Travel to and communication with sites by scientific coordinators to ensure comparable analysis and timeliness of completion. Meetings held to discuss research and direction of project. 4. Meetings and writing retreats of project scientists held. Regional database developed. Cross-site and regional analyses completed. The guide and framework developed and tested. Reports written (approximately 25) and other informational products completed and disseminated. 5. Key ecological and socio-economic indicators determined from site-level research, the literature and consultations. The monitoring system is designed and written up.

Specifically, the evaluator shall take the following actions in order to achieve the objective of the evaluation. The evaluator shall:

(a) Establish to what extent the project's objectives were met and planned results obtained, taking into account the indicators listed in the project logical framework:

(i) To what extent the project has managed to develop a new and innovative research methodology for land use change analysis and widely disseminate research findings;

(ii) To what extent the project has managed to integrate ecological, socio-economic and land use data and theory;

(iii) To what extent the information generated for East Africa has contributed to more effective local, national and regional programmes;

(b) Establish how well the outcomes were achieved by:

(i) Determining the quality and usefulness of the analytical and methodological guide on land use change analysis and its wider applicability;

(ii) Determining the quality, usefulness and replicability of the analytical framework developed by the project;

(iii) Determining the quality and usefulness of the information generated for East Africa;

(iv) Determining the quality and usefulness of the ecological information and monitoring system designed by the project;

(v) Assessing to what extent the project has assisted in building capacity of researchers and national institutions, NGOs and graduate students in East Africa that have participated in the project;

(vi) Establishing how the decision makers and other stakeholders have been trained in the use of data and information systems;

(c) Assess the cost-effectiveness of the project, i.e. whether the project achieved its goals and objectives within planned and/or reasonable time and budget;

(d) Evaluate the immediate impact of the project on scientific research and on policy development and decision-making in the region and possible other impacts. As far as possible, also assess the potential longer-term impact, considering that the evaluation is taking place right after the completion of the project and that actual longer-term impact is expected to be seen in a few years time;

(e) Assess sustainability of the project in terms of enabling environmental, institutional and financial sustainability;

(f) Review the mechanisms put in place by the project for identification and engagement of stakeholders and establish, in consultation with the stakeholders, whether this mechanism was successful, and its strengths and weaknesses. Particular attention should be paid to the level of participation by scientists and students from third world countries (i.e. Kenya, Tanzania, Uganda), and civil society NGOs;

(g) Assess the level of country ownership. Specifically, the evaluator should assess whether the project was relevant for national development and environmental agendas and to the regional and international agreements;

(h) Review the institutional arrangements, management and financial systems, which played an important role in the implementation of the project and determine whether the project was managed efficiently and effectively (implementation approach). This comprises e.g. assessment of the roles of the technical steering committee and advisory committee and whether the project document/plan was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project. The evaluator should also establish how well the project had identified and managed its risks;

(i) Assess the financial feasibility of the project, e.g. whether it was successful in identifying and engaging funding sources, realistic budgeting and in following good financial management practices;

(j) Assess whether the project has potential to be replicated, either in terms of expansion, extension or replication, in other countries and/or regions. The evaluator shall also establish whether any steps towards replication have been taken by the project and the relevance and feasibility of these steps;

(k) Determine effectiveness of the monitoring and evaluation system as an effective management tool of the project. Attention should be paid to the identification of baselines and indicators, quality of backstopping, quality assurance, and control of deliverables;

(l) Identify problems encountered and lessons learned during project implementation;

(m) Identify any major risks that the project faced during implementation and how well the risks were managed through adaptive management;

(n) Provide recommendations to UNEP and its executing partners regarding future actions to follow up on this project.

3. Methodology

The evaluation will be conducted by using a participatory approach whereby the task manager and other relevant staff are kept informed and regularly consulted throughout the evaluation. The following are the main approaches for collecting and analysing data:

(a) Desk review of the project documents, outputs, monitoring reports (such as the quarterly reports to UNEP and the GEF annual Project Implementation Review reports), and relevant correspondence;

(b) Review of specific products including publications in international journals, peer-reviewed books, regional synthesis papers, reports from regional workshops as well as national case studies, highlighting case studies, technical information, research results, strategies and recommendations related to wider application of the methodological approach developed by the project;

(c) Interviews with the project management at ILRI, Nairobi, Kenya; and telephone interviews with members of the Technical Advisory Committee and the Regional Advisory Committee;

(d) Interviews and telephone interviews with stakeholders from the three participating countries which were involved with this project, particularly from African Conservation Centre, University of Dar es Salaam in Tanzania and Makerere University in Kampala. As appropriate, these interviews could be combined with an email questionnaire;

(e) Interviews with the UNEP/GEF project task manager and relevant staff in UNEP/DGEF as necessary.

The success of project implementation will be rated on a scale of 1 to 5 with 1 being the highest rating and 5 being the lowest and covering the following aspects:

1. Attainment of objectives and planned results;
2. Achievement of outputs and activities;
3. Cost-effectiveness;
4. Impact;
5. Sustainability;
6. Stakeholders participation;
7. Country ownership;
8. Implementation approach;
9. Financial planning;
10. Replicability;
11. Monitoring and evaluation;
12. Risk management.

Each of the items should be rated separately and then an overall rating given. The following rating system is to be applied:

1 = Excellent	(90–100% achievement)
2 = Very Good	(75–89%)
3 = Good	(60–74%)
4 = Satisfactory	(50–59%)
5 = Unsatisfactory	(49% and below)

The ratings will be converted in a separate annex to the GEF rating system of: Highly Satisfactory (80–100%), Satisfactory (65–79%), Marginally Satisfactory (50–64%), Unsatisfactory (49% and below), and N/A.

4. Evaluation report format and procedures

The evaluation report shall be a detailed report, written in English, of no more than 20 pages exclusive of the executive summary, the lessons learned, and the findings and recommendations and include:

1. Executive summary (no more than 3 pages);
2. Introduction and background;
3. Scope, objective and methodology of evaluation;
4. Findings and conclusions;

5. Lessons learnt;

6. Recommendations;

7. All annexes should be typed.

The final report shall be written in English and submitted in electronic form in MS Word format by 8 October 2003, and should be addressed as follows:

Mr. Segbedzi Norgbey, Chief, Evaluation and Oversight Unit
UNEP, P.O. Box 30552
Nairobi, Kenya
Tel: (254-2) 623387
Email: segbedzi.norgbey@unep.org

With copies to:

Mr. Ahmed Djoghlaf, Director
UNEP/Division of GEF Coordination
P.O. Box 30552
Nairobi, Kenya
Tel: (254-2) 624166
Fax: (254-2) 624041/2
Email: ahmed.djoghlaf@unep.org

Ms. Anna Tengberg
Programme Officer, Land Degradation
UNEP/Division of GEF Coordination
Tel: (254-2) 624147
Fax: (254-2) 624041
Email: anna.tengberg@unep.org

The evaluation report will be printed in hard copy and published on the Evaluation and Oversight Unit's web site www.unep.org/eou. Subsequently the report will be sent to the GEF Secretariat for their review and inclusion in the GEF web site.

5. Timing and resources

A consultant will be hired to conduct this evaluation under the guidance of the Chief of Evaluation and Oversight Unit (EOU) and in close cooperation with the Programme Officer, Land Degradation in the Division GEF Coordination (DGEF) and collaboration with the Programme Officer for Medium-Sized Projects (MSP) in DGEF.

In accordance with UNEP/GEF policy, all GEF projects are evaluated by an independent evaluator contracted by the EOU, and not associated with the implementation of the project. The evaluator should have the following qualifications: (i) basic expertise on the subject matter, (ii) experience with projects in developing countries, and (iii) project evaluation.

The contract will begin on 20 September and end on 15 November 2004 (3 weeks spread over 8 weeks). The consultant will travel to ILRI, the executing agency, and Nairobi, Kenya, to interview relevant staff and visit one of the national institutions participating in the project. The consultant will submit a first draft to EOU on 25 October 2004. Comments to the final draft report will be sent to the consultant after a maximum of 2 weeks. After incorporating the comments, the consultant will submit the final report by 15 November 2004.

6. Schedule of payment

The evaluator will receive an interim payment of 40% of the total amount due upon submission of first draft. A final payment (60% of total amount) will be made upon satisfactory completion of work. The fee is payable under the individual SSAs of the evaluator and is inclusive of all expenses such as travel, accommodation and incidental expenses.

In case the evaluator cannot provide the products in accordance with the TORs, the timeframe agreed, or his products are substandard, the payment to the evaluator could be withheld, until such a time as the products are modified to meet UNEP's standard. In case the evaluator fails to submit a satisfactory final product to UNEP, the product prepared by the evaluator may not constitute the evaluation report.

Annex II

Project performance on objectives, activities, expected outcomes and outputs realized

Intermediate objective(s)	Objectively verifiable indicators	Achievement status	Rating
Intermediate objective 1. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation.	Reports and other informational products produced. Guide for land use change analysis developed and tested. Guide disseminated and eventually adopted by decision makers from the local to regional level, GEF and other users such as universities.	Reports written. Guide for land use change produced and tested. Dissemination partly done, but to the policy makers it is planned before the end of 2004.	2
Intermediate objective 2. Integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation.	Reports and other informational products produced. Root causes framework developed and tested. Framework disseminated and adopted by GEF, decision makers and other end-users.	The framework has been developed and tested in the four project sites. The analytical framework is described in detail in working paper 48 of June 2004. However, it is too early to expect the analytical framework to have been disseminated and adopted by GEF, decision makers and other end-users.	2
Intermediate objective 3. Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes.	Database and related analyses generated including information on the patterns and trends in land use affecting biodiversity and land degradation. Informational products, such as a decision-making tool on a CD-ROM, reports, articles and a web site produced and disseminated among decision makers and others. Training of decision makers conducted. Data products used in internal meetings, public meetings, and published reports.	Regional database developed. CD-ROM on project information reports and articles. Web site developed and updated regularly. Training of decision makers not conducted but planned for 2004. Data on products used in internal meetings and public reports.	2
Outcome 1. An analytical and methodological guide on how to use land use change analysis to obtain information on changes in biodiversity and on land degradation, and their linkages.	Generation and testing of the guide. Demonstrated improved understanding of how to use land use change analysis, and the linkages between biodiversity and land degradation, by GEF projects, international and national institutions as indicated by their participation in meetings, communications, and inclusion of the guide in their activities such as the design of their projects.	LUCID working paper 43 of June 2004 describes the LUCID methodological guide in detail. Guide has been generated and tested. Report on how to use change analysis to identify linkages between biodiversity and land degradation written. Presentation to meetings made. Guide used in the design of national and international projects.	2
Outcome 2. A replicable analytical framework to identify the socio-economic and ecological root causes of land use/land management change leading to change in biodiversity and land degradation.	Generation and testing of the framework. Demonstrated improved understanding of how to identify the root causes of land use/land management change as shown by participation in meetings, communications, inclusion in their activities such as the use of the framework in the design of projects and programmes.	Report on how to identify the root causes of land use/land management changes written.	2
Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land	Completed data collection at the site level to fill gaps in existing knowledge. Analysis of new and existing data conducted (statistical, GIS, modelling, qualitative) and	Completed data collection at site level. Analysis of new and existing data completed.	3

degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship.	research findings completed. Cross-site comparisons and regional synthetic analyses completed. Graphs, tables, maps and written analyses generated. Reports and other informational products completed and disseminated.	Cross-site comparisons and regional synthesis made. Reports written.	
Outcome 4. The design of ecological information and monitoring system to identify the linkages provides baseline data, and permits scientists and governments to evaluate the environmental impacts of land use change caused by policy or other interventions.	Identification of key ecological and socio-economic indicators from site-level research, the literature and consultations. Design and write-up of the monitoring system.	Identification of key ecological and socio-economic indicators of land use change and land degradation done. Ecological monitoring system NOT done. Steering Committee considered it untenable due to time and lack of sufficient data.	4
Outcome 5. Capacity-building of researchers at national institutions and at NGOs, and graduate students conducting their thesis research under the aegis of the project. Trained decision makers and other stakeholders on the use of the data and information system.	Graduate student research designed and implemented with supervision by project scientists, and their research written up as reports and theses. Products and results of the project adopted in university curricula. Active participation of stakeholders (local community members, local and national decision makers, other scientists, etc.) in meetings and workshops. Decision makers trained in the use of the data and information system. Project findings disseminated in reports, CD-ROMs, the project web site, scientific articles and in meetings and conferences.	Graduate research designed, implemented and theses and reports written. Results of projects used in university curricula in the participating universities e.g. University of Dar es Salaam and Makerere University. Results discussed in workshops nationally and internationally. Project findings disseminated in reports. CD-ROM developed on project design, implementation and results, web developed http://www.geo.msu.edu/lucid/ and all the reports put there. Meetings with local communities held in all sites. Meeting with decision makers planned for 2004. Annual meeting held. Presentations of LUCID at various venues; research findings included in UNEP Atlas of Global Environmental Change. Prototype LUCID web site with interactive GIS component created. Application of LUCID experiences in other projects (FITCA – Farming in Tsetse Controlled Areas).	2
Activity 1. Consolidate existing research. Collect additional primary data to fill gaps and permit site comparability. Analyse site-level results.	Socio-economic and ecological data collected (remote sensing and other spatial data, wildlife surveys, plant and animal diversity and abundance surveys, farmer and herder surveys and focus group interviews, census statistics, etc). Data entered into database. Analyses completed.	Data collection on socio-economics and ecological surveys done, entered into computer and analysed.	2
Activity 2. Hold feedback seminars, policy workshops, and meetings in the sites and at the national level.	The meetings are held and stakeholders attended and participated. Research findings disseminated and discussed.	Meetings with stakeholders (local communities) held and research findings shared with participants.	4
Activity 3. Scientific coordination of the site and regional research. Travel to sites, hold meetings at the sites and regional level, and communicate with project scientists, advisory committee and steering committee to ensure scientific and programmatic direction.	Determination of necessary common data and methodology. Determination of available data and data gaps. Travel to and communication with sites by scientific coordinators to ensure comparable analysis and timeliness of completion. Meetings held to discuss research and direction of project.	Common methodologies developed. Available data determined and gaps identified. Travel by coordinators between sites made.	3

Activity 4. Regional analyses and development of generic frameworks. Hold meetings and writing retreats of project scientists to discuss generalizable patterns and processes across sites, and regional patterns. Conduct GIS, modelling and other cross-site and regional analyses. Develop and test land use guide and root causes framework. Write site- and regional-level research reports, guide and framework. Generate CD-ROM and other information products.	Meetings and writing retreats of project scientists held. Regional database developed. Cross-site and regional analyses completed. The guide and framework developed and tested. Reports written (approximately 25) and other informational products completed and disseminated.	Annual general meetings and writing retreats held. Regional database developed. Cross-site and regional analysis completed. Guide and framework developed and tested. Reports written (currently 51).	2
Activity 5. Design the ecological information and monitoring system.	Key ecological and socio-economic indicators determined from site-level research, the literature and consultations. The monitoring system is designed and written up.	Design of ecological monitoring system considered untenable due to project time and lack of sufficient data.	5

Annex III

Questionnaire responses

Activity	Average rating	Reason
a. Assess extent to which LUCID project has achieved its planned results		
i) The new tools developed by LUCID project	1.55	Very good because of usefulness of methodology cookbook, satellite images, transect and other approaches for analysing land use change, land degradation, biodiversity loss, analytical framework linking land use change, land degradation and biodiversity loss, interdisciplinary analytical framework for identifying the root causes of land use change.
ii) Linkage between new LUCID project data and old data on land use, biodiversity loss and land degradation	1.6	Very good because new data were collected on a uniform platform (save for a few justified deviations). This provided an important link for the new data on land use changes to the old existing data particularly within same space in different time periods. Though the cookbook has some inadequacies in capturing some temporal changes on socio-economics, many of the changes over time were captured by analysis of land use change using satellite images. It was also possible to derive trends in land use change from 1952 to 2002 using old maps.
iii) Application of new tools in capturing the analysis of the relationships between land use, biodiversity loss and land degradation	1.8	Very good because new tools provided better relationships between land use change, biodiversity loss and land degradation. Use of quadrants as employed by the LUCID project harmonized the results of different sites. Use of LUCID tools provides the first attempt in the region whereby an interdisciplinary team is employing common tools to analyse these relationships.
iv) Signs showing that LUCID tools are filling a gap for potential end-users	1.8	Very good. New projects such as Pangani basin project (2001–2003) in Tanzania are already using the LUCID methodology. Projects in Uganda have already requested LUCID regional coordinator for their copies of the methodology cookbook for use. Department of Geography in University of Dar es Salaam has finalized plans to use similar tools to study loss of biodiversity in southern highlands of Tanzania. Universities of Nairobi and Makerere will use findings for academic teaching. There is great potential that the products of LUCID research will be widely used not only in the region but also elsewhere. Also farmers have affirmatively accepted the findings.
v) Integration of ecological, socio-economic, land use data and theory and sustainable livelihood by LUCID framework	1.2	Excellent because the multidisciplinary design of the LUCID project studies captured both primary and secondary, e.g. maps done by other projects informed LUCID scientific data. LUCID has many working papers which are discipline specific, but which reveal multidisciplinary context in the regional synthesis papers.
vi) The integration between ecological, land use change and existing data with sustainable livelihood framework	1.9	Very good because the tools allowed for integration of socio-economic and ecological data.
vii) Assessment of quality and usefulness of the analytical framework as a replicable tool in identifying the root causes of land use change, biodiversity loss and land degradation	1.1	Excellent because biodiversity strongly correlated with identified root causes and some scientists are replicating its use in other research sites. Joint research teams from the three countries were able to draw common understanding of root causes and identify similarities and differences between different sites. Use in some other sites may need intelligent adjustments since it is the only tool in East Africa region.
viii) Assessment of quality of the baseline data and information in existing databases for monitoring and evaluating the patterns and trends in land use change, biodiversity loss and land degradation	3.0	Good because there is a need for a follow-up in the identification of specific changes in land use. Since the primary has not been brought to a common base it remains scattered and there is need to put it together to allow establishment of patterns and trends. When this is done then LUCID database will form an important baseline for future studies on land use change, biodiversity loss and land degradation. At the moment individual researchers, research teams and institutions such as Makerere University, ILRI ecological database and University of Dar es Salaam database hold much baseline data.
ix) Assessment of the usefulness of information generated by LUCID for future	1.8	Very good quality and useful information was generated at local, national and regional levels because it will enable planning and monitoring

Activity	Average rating	Reason
project/programme formulation		changes in land use, biodiversity and land degradation. Will also help in justifying conservation along the slopes of Mt Kilimanjaro and Mt Kenya and of lakeshore biodiversity and habitats. At international level, the information is useful but limited geographically to the region.
x) Potential for the practical use of LUCID information in developmental planning process or in project/programme formulation		Can be used for planning and identifying areas that are under pressure from human activities. Baseline for mountain research at international network level. For planning development in the nucleated settlements around Mt Kilimanjaro and Mt Kenya. For policy discussions on land and water use and wildlife issues.
b. Assessment of the quality and usefulness of the project outcomes		
i) Documentation of land use change by LUCID analytical and methodological guide at the project pilot sites	1.6	Very good because it helped in collecting data that produced very good maps, quality reports, guidelines and very reliable findings. Links biophysical and societal processes.
ii) Quality and usefulness of the analytical and methodological guide on land use change analysis and its wider applicability	1.6	Very good. Both have potential for wider applicability by end-users such as graduate students, NGOs, projects, scientists, researchers, planners, UNEP, ILRI, universities and research institutions in different sites. The methodological guide can be widely applied because it is useful for multiple disciplines, different cadres of researchers, government policy makers, environmental authorities, and various ministries concerned with planning and management of natural resources and land use.
iii) Quality and usefulness of the information generated for East Africa	1.8	Very good quality and useful information was generated for East Africa which forms a basis for future research changes in land use, biodiversity loss and land degradation. The only hiccup is that no permanent field plots were established but GPS coordinates can help. Data are good but it requires consolidation and rebuilding into an accessible database, not just scientific papers. Need to set specific baseline and predict the outcome over a specific period of time.
iv) Capacity-building for researchers and national institutions, NGOs and graduate students in East Africa by LUCID project	2.2	Very good capacity-building at local level for multidisciplinary researchers, whose presentations if made in a final workshop can influence local ownership by communities enormously.
	2.2	Very good capacity-building at national level because national institutions such as universities benefited greatly. Some engaged LUCID graduate students as members of their permanent staff.
	3.2	Good capacity-building for NGOs because small number have been reached but potential is there.
	2.1	Very good capacity-building of graduate students because within the LUCID resources the project trained 2 PhD, 1 postdoctoral and 11 masters students. These students acquired special skills and used new tools in addition to being very marketable.
v) Training of decision makers and other stakeholders trained in the use of data and information systems	3.8	Satisfactory, because has only been done to the extent of reaching the decision makers in primary LUCID network institutions but not beyond. There is need therefore to disseminate findings of the project far and wide targeting especially community stakeholders, government officials, NGOs and other end-users at site, national, regional and international levels.
c. Immediate LUCID project impacts on scientific research and policy development		
i) Immediate LUCID project impacts	1.3	Excellent on scientific research at site level because a number of tools were developed, quality scientific data were collected from some localities where no such data had been collected before, also the products are very useful, for instance NORAD is already using the LUCID methodology for Pangani basin project and the feedback workshops were effective.
	2.2	Very good on scientific research at national level because LUCID allowed interaction between many national institutions which have opened up the use of findings and tools. These institutions have had productive discussions, which explored funding options to address interaction with national and regional policy makers.
	2.3	Very good on scientific research at regional level because of gaps filled by

Activity	Average rating	Reason
		data. The project has promoted cooperation among research institutions of the East African countries on cross-border issues.
		Immediate impact on international scientific research has not been well established according to a number of respondents except two who thought it has been excellent due to accurate and reliable methodology and for the first time root causes of land use change, and linkages of land use change, biodiversity loss and land degradation are being addressed. These are all signs that the impact will be great since the project generated reliable and historical information which links well with current information. The methodology guide and synthesis papers will go a long way towards inspiring international scientists even in the distant future. The value lies not only in scientists replicating aspects of the LUCID work, but also in responding to it as LUCID stimulates ideas and adopting approaches that reflect their particular needs.
ii) LUCID project impact on policy development and decision-making	2.0	Very good on policy development and decision-making at local level because of its future influence on policy makers as the project findings become more widely known and as they get discussed at different levels.
	2.0	Very good on policy development and decision-making at regional level because the results have great potential to influence policy makers and policy formulation since it is of reasonable regional scale.
		The impact at international level is limited as the results are not yet with the policy makers. There is a need for dissemination through workshops, seminars and conferences in addition to distributing the LUCID products to the various institutions and government departments.
	1.6	Very good potential longer-term impact in the next 3 to 5 years at both national and regional levels because many scientists and researchers are likely to adopt the use of the methodology and other tools and because research is of high quality and has high potential to impact on scientific thinking.
d. Institutional arrangement and financial systems		
i) Assessment of the efficiency and effectiveness of project implementation approach	1.0	Excellent at site level because of the participatory research method adopted.
	1.5	Very good at national level after signing memorandums of understanding because of team spirit displayed by country teams despite meagre budget allocation, otherwise regional coordination would have been very difficult. Kenya country office displayed weakness.
	1.0	Excellent at regional level because of teamwork. The project started well except for the delayed signing of memorandum of understanding.
ii) Role of project regional advisory/technical committee in the project implementation approach	1.3	Excellent because the committee guided the research and strongly and effectively advised the project throughout the implementation process.
iii) Adaptation of the project management to changes	2.0	Very good because these changes enabled the project to be implemented to successful completion. This is because of the flexibility accomplished through regular meetings, which circumvented time delays. These changes included change in staff, choice of study sites and data harmonization during preparation of synthesis papers.
e. Cost-effectiveness of the project		
		The incremental cost to GEF amounting to $682,375 enabled the scientists to study land use and land cover in a more scientific way and provided funds to support building research capacity of students.
		Other sources of funds to the LUCID project were Pangani complementing 5,000,000 Tanzanian shillings, the Macaulay Land Use Research Institute (UK) $30,000, scientific study of Mt Kilimanjaro by French $1,000.
	1.5	Very good because of the high quality of reports, tested and working analytical framework and methodological guide, save for late production

Activity	Average rating	Reason
		of CD-ROM, and delayed terminal workshop.
f. Project sustainability		
		LUCID project co-financed training of 2 PhD and 3 MSc students in Kenya, 1 postdoctoral and 4 MSc students in Uganda and 1 PhD and 2 MSc students in Tanzania plus 3 Bordeaux students.
i) Role in training of students		Effectiveness of LUCID project in training students at local level was good (2.7), at national level was excellent (1.3), and very good (1.5) at regional and international levels. This is because a number of students received good training and degrees and some got employment as assistant lecturers. Good indicator of sustainability.
ii) Role of participatory approach		Participatory approach adopted by LUCID project in feeding back generated information to the stakeholders for sustainability of the project findings was very good (1.6) at local level, satisfactory (3.5) at national level and good at community level (2.5) because project had very successful discussions of the reports except that the representative from the President's Office did not attend in Tanzania.
iii) Early indicators of sustainability		Some of the early indicators showing that other collaborating partners are willing to follow up on the LUCID outcomes include active participation by IFRA (French Institute of Research in Africa), interest shown by COMPACT stakeholders in accessing the findings in Tanzania. Others include willingness by Department of Geography to use the tools and framework in a different site, commitment by Rockefeller Foundation and ILRI to transforming the findings into policy briefs for policy makers.
iv) LUCID facilitation of institutional sustainability	1.5	Very good because it allowed for close collaboration among researchers from different disciplines, different institutions and different departments. This collaboration is bound to continue at site and regional level even long after the project has ended.
		LUCID project outcomes/impacts have not yet influenced policy and regulatory frameworks on land use, land degradation and changes in biodiversity at any level since dissemination of products and frameworks has not yet been undertaken. This is a matter to be followed up in the near future. There is need to consolidate findings into one book and disseminate at national, regional and international forums.
		LUCID project contributed to the development of institutional capacity by training staff who were readily absorbed into some of these institutions e.g. Department of Geography, University of Dar es Salaam. The findings have also been used in teaching in Makerere University and University of Nairobi is in the process of using them. The project also purchased equipment such as computers, printers and GPS which participating national institutions owned after the end of the project.
		The lead institutions that played excellent roles in the LUCID project were ILRI, Makerere University Institute of Environment and Natural Resources, University of Dar es Salaam, Michigan State University, University of Bordeaux 3, UNEP, Makerere University, Nairobi University.
		The project was not designed to have a follow-up but the need has arisen and was discussed in the last LUCID annual seminar held in February 2004.
		The project findings will be self-sustaining because they are already in use and there is great potential of use by wider community of scientists, policy makers, planners and decision makers. The LUCID team has also forged great synergy and there is international interest in the approach.
		There is great need for institutional coordination of LUCID follow-up activities at national and regional level because the long-term impact could be significant, and UNEP-GEF might consider putting in place a mechanism to assess this. These coordination activities should best be taken up by national leaders such as Department of Geography at University of Dar es Salaam, while at regional level ILRI should team up with a consortium of policy makers at ministerial level, NGOs, international institutions and donors.

Activity	Average rating	Reason
v) Demand for project services by stakeholders		The demand for project services among stakeholders is very good (2.1) at national and local levels and good (2.7) at regional and global levels. Extensive dissemination of the information may create even greater demand for the project products as the potential is there.
g. Country ownership		
		LUCID project objectives were within the government policies of the three East African countries.
		LUCID was conceptualized in a concept development workshop held in Dar es Salaam and attended by scientists and institutional representatives from the regional and international spheres such as Michigan State University and ILRI, and GEF in partnership with the LUCID team.
		The LUCID outcomes are yet to be incorporated in national and sectoral development plans because it is still too early to assess this, as dissemination is incomplete.
		The project was relevant for national development and environmental agendas and regional and international agreements because it was developed to respond to national environmental issues and commitment to international conventions.
h. Identification and engagement of stakeholders		
		The mechanisms used to identify and engage project stakeholders included indigenous knowledge at local level, outstanding expertise at national level, previous contacts/networks, consultation and facilitation of PDFA and possession of separate projects at international level.
		These mechanisms were successful because they provided synergy that helped to produce good-quality products and in providing a team who were efficient in implementing a project to successful completion.
		The level of involvement/participation by students and scientists was excellent (1) and by civil society was good (2.5).
		Degree of consultation and stakeholder participation was very good (1.6) because they were involved in the planning and implementation stages of the project.
		Stakeholders' participation was high because of their involvement from project conceptualization through implementation but LUCID project did not involve NGOs and private sector who are also stakeholders.
		Institutional networking was very good (2) because the project succeeded in collecting useful regional data by networks of participating institutions.
		Partnership building was high among the working groups. LUCID has sustained partnership building with other institutions e.g. Makerere University and Michigan State University, who are also involved in another project being coordinated by Michigan State University.
		Extending information through feedback workshops was well done but few were held; one feedback workshop was held in August 2004 to disseminate the findings of the LUCID project.
i. Financial feasibility of the project		
		Resource mobilization, financial and budget planning of the LUCID project was very good (1.5) at regional level because of high level of co-funding and volunteer work.
		The activities of the project were satisfactorily carried out within the planned budget. Some members of the steering committee had been involved in some projects where five times the budget produced the same outputs as those of LUCID.
		The cost-effectiveness of resources was fairly good except that the site budget was insignificant compared to the regional budget. Budget items were well outlined and in many cases adequate at regional level but not at

Activity	Average rating	Reason
		site level.
j. Project replication		
		The level of knowledge transfer is very good (2.1) but will take some time, so far only a small group has been reached. However, good indications are there because of the reports. The level of methods transfer is very good (2.3).
		There was unanimous agreement among the respondents that LUCID project has high feasibility for expansion to other areas since proposals are already being developed by other projects along the same lines. Appropriate modifications will however be a necessity in some cases.
		The project was excellent (1.4) in building capacity of individual scientists and students who participated.
		The project had very good (1.6) contribution in building the capacity of institutions such as universities; such institutions are in good position to replicate the outcomes.
		These steps were very relevant and feasible because wide use of tools and frameworks depend on wide sharing and dissemination of research outcomes which in turn stimulate thinking. These steps were actually the expectations from LUCID.
k. Effectiveness of monitoring and evaluation		
		There was wide consensus among the respondents that monitoring and evaluation was an effective management tool which helped LUCID project to gauge its performance throughout the implementation period. Close follow-up on every activity and the commitment by the advisory committee formed main monitoring and evaluation component.
		The level of success with which LUCID project identified its baseline data and performance indicators was excellent (1) because good baseline data is a good representative of all processes of the project.
		The backstopping services were of excellent (1.3) quality because specialists provided such services and made the project produce good products as shown by quality maps, data analysis and in some cases observed strict timelines. Some expertise gaps were however lacking and could be filled e.g. LUCID lacked animal ecologists.
		The quality assurance and control of the deliverables in the LUCID project was excellent (1) because of vigorous supervision by regional office and site coordinators.

Annex IV

Reviewed documents

Working paper series rated for quality, usefulness and relevance in meeting LUCID intermediate objectives

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
8. Mbugua, S.M. 2002. Influence of land use pattern on diversity, distribution and abundance of small mammals in Gachoka Division, Mbeere District, Kenya.	Influence of land use pattern on diversity, distribution and abundance of small mammals	Objective 1. New data on plants, small mammals diversity and elements of land degradation	Outcome 3 (ii). Linkage between land degradation and biodiversity Outcome 5. Researchers capacity-building	Rating 2. This paper is very good for relevance, usefulness and for linking land use, degradation and biodiversity loss and for new data on plants, small mammals diversity and elements of land degradation
9. Gachimbi, L.N. 2002. Technical report soil survey and sampling in Embu-Mbeere District, Kenya.	Soil survey and sampling results	Objective 1. New data on land use along altitudinal gradient	Outcome 3 (ii). Information from East Africa on relationship between soil erosion, fertility and land use change	Rating 3. This paper is a good paper in terms of relevance, usefulness and for provision of information on relationship between soil erosion, fertility and land use change and for new data on land use along altitudinal gradient
10. Gachimbi, L.N. 2002. Technical report on soil survey and sampling: Loitokitok Division, Kajiado District, Kenya.	Report on soil survey and sampling	Objective 3. Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation	Outcome 3 (i). Solid information on the processes of land management/land use change and their consequences for land degradation and change in biodiversity	Rating 2. Very good paper for providing solid information on the processes of land management/land use change and their consequences for land degradation and change in biodiversity
11. Smucker, T. 2002. Land tenure reform and changes in land use and land management in semi-arid Tharaka, Kenya.	Land tenure reform and changes in land use and land management in semi-arid environment	Objective 2. Analytical theory to develop a replicable framework to identify the root causes of land use change	Outcome 2. Replicable analytical framework to identify socio-economic root causes of land use change	Rating 3. Good for relevance, usefulness and for providing analytical theory to develop a replicable framework to identify the root causes of land use change
12. Pomeroy et al. 2003. Linkages between changes in land use, land degradation and biodiversity in S.W. Uganda.	Linkages between changes in land use, land degradation and biodiversity	Intermediate objective 3. Integrated data and information on patterns and trends in land use, biodiversity and land degradation	Outcome 3 (i). Processes of land use change and the consequences of land degradation Outcome 3 (ii). The linkages between land degradation and change in biodiversity	Rating 2. Very good paper in terms of relevance, usefulness and for providing linkage between changes in land use, land degradation and biodiversity
13. Not available				
14. Mugisha, S. 2002. Root causes of land cover/use change in Uganda: An account of the past 100 years.	Root causes of land cover or land use change	Objective 2. Integrate ecological, socio-economic and land use data to identify root causes of land use change leading to change in biodiversity and land degradation	Outcome 3 (iii). Solid information on the root causes of land use change and land degradation	Rating 2. Very good paper for providing solid information on the root causes of land use change and land degradation and integrating ecological, socio-economic and land use data
15. Maitima, J. 2001.	Methodological guide	Objective 1. Analyse new	Outcome 1. An	Rating 2. Very good

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
Guide to field methods for comparative site analysis for the Land Use Change, Impact and Dynamics project.	for comparative site analysis for LUCID	and existing data concerning the linkages between the processes of changes in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages of change in biodiversity and land degradation	analytical and methodological guide on how to use land use change analysis to obtain information on changes in biodiversity and on land degradation, and their linkages	paper in terms of relevance, usefulness and for detailing methodology for data collection on land use change analysis to obtain information on changes in biodiversity and on land degradation
16. Butt, B. and J. Olson. 2002. An approach to dual land use and land cover interpretation of 2001 satellite imagery of eastern slopes of Mt Kenya.	Approach to dual land use and land cover interpretation of 2001 satellite imagery	Objective 1. Analysis of new and existing data to guide on how to use land use change analysis to identify spatial and temporal trends	Outcome 1 and outcome 2. Methodological and replicable analytical framework to guide on how to use land use change analysis	Rating 3. This paper is a good paper and received a rating of 3 for relevance, usefulness and for analysing new and existing data to guide on how to use land use change analysis to identify spatial and temporal trends and produce a replicable analytical framework to guide on how to use land use change analysis
17. Tukahirwa, J. 2002. Policies, people and land use change in Uganda: A case study in Ntungamo, Lake Mburo and Sango Bay sites.	Policies, people and land use change	Objective 1. Analysis of new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use change	Outcome 4. Designing ecological information and monitoring system to identify the linkages, provide baseline data and permit scientists and governments to evaluate the environmental impacts of land use change caused by policy or other interventions	Rating 2. The paper is very good in quality and usefulness for reviewing information on policies, people and land use changes
18. Not available				
19. Campbell et al. 2003. Root causes of land use change in the Loitokitok area, Kajiado District, Kenya.	Root causes of land use change	Objective 1. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. This paper received a very good rating for analysing old and existing data to provide information on the processes of land management/land use change and their consequences for land degradation and change in biodiversity. The paper also provided linkages between land degradation and change in biodiversity, and identified the root causes of land use change and land degradation, including the poverty/degradation relationship
20. Olson, J. 2004. Multi-scale analysis of land use and management change on the eastern slopes of Mt Kenya.	Analysis of land use and management change	Objective 1. Analyse new and existing data concerning the linkages between the processes of change in land use	Outcome 3. Solid information on the processes of land management/land use change and their consequences for land degradation and change	Rating 2. This paper is a very good paper for generating information on land use and in linking these land use changes to losses in biodiversity in the east of

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
			in biodiversity	Mt Kenya
21. Campbell et al. 2003. An overview of land use issues in the communities of Loitokitok Division, Kajiado District, Kenya.	Overview of land use issues	Objective 2. Integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	This paper is good for providing quality information on land use issues
22. Not available				
23. Wangui, E.E. 2003. Links between gendered division of labour and land uses in Kajiado District, Kenya.	Links between division of labour among gender and land use	Objective 2. Integrate ecological, socio-economic and land use data and theory to develop a replicable analytical framework to identify the root causes of land use change leading to changes in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 3. Good paper in terms of usefulness and relevance of information generated linking labour, gender, socio-economic issues and land use
24. Mbonile, M.J. 2003. Absentee farmers and change of land management on Mount Kilimanjaro in Tanzania.	Absentee farmers and change of land management	Objective 2. Integration of ecological, socio-economic and land use data to identify root causes of land use change leading to changes in biodiversity and land degradation	Outcome 3. Solid information on the process of land use change and their consequences on land degradation and change in biodiversity	Rating 3. Good paper for providing solid information on the process of land use change and their consequences on land degradation and change in biodiversity
25. Not available				
26. Majule, A.E. 2003. A study on land use types, soils and linkage between soils and biodiversity along the slopes of Mt Kilimanjaro, Tanzania.	Impacts of land use/land cover changes on soil degradation and biodiversity	Objective 3. Integrated data and information on the patterns and trends in land use, biodiversity and land degradation	Outcome 3. Solid information on the linkages between land degradation and change in biodiversity	Rating 2. This paper is very good for providing solid information on the linkages between land degradation and change in biodiversity and integrated data and information on the patterns and trends in land use, biodiversity and land degradation
27. Worden et al. 2003. Land use impacts on large wildlife and livestock in the swamps of the greater Amboseli ecosystem.	Land use impacts on large wildlife and livestock	Objective 3. Provide integrated data and information on the land use, biodiversity and land degradation	Outcome 3 (i). Solid information on the processes of land management/land use change and their consequences for land degradation and change in biodiversity	Rating 3. This paper is good for providing information on the impacts of land use on wildlife and livestock

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
28. Taulya, G. and L. Busingye. 2003. Results of feedback workshops In Sango Bay, Lake Mburo National Park and Ntungamo/Kabale, Uganda.	Results feedback workshop	Objective 3. Providing integrated date and information on the patterns and trends in land use, biodiversity and land degradation	Outcome 5. Capacity-building to community and dissemination	Very good paper for documenting dissemination of findings to the community and building their capacity
29. Nanyunja, R.K. 2003. Human perceptions of biodiversity loss in Uganda: Case studies of Sango Bay, Lake Mburo National Park and Rubaale grasslands.	Human perception of biodiversity loss	Objective 3. Integrated information on the patterns and trends in land use, biodiversity and land degradation	Outcome 3. Solid information on 1) The processes of land use change and their consequences for land degradation and change in biodiversity	Rating 3. Good paper in terms of usefulness and relevance in addressing objective 3 and providing integrated information on the patterns and trends in land use using human perceptions of loss of biodiversity
30. William, C.M. 2003. The Implications of land use change on forests and biodiversity: A case of the "Half Mile Strip" on Mount Kilimanjaro, Tanzania.	Implication of land use change on forests and biodiversity	Objective 1. Analysing new and existing data concerning the linkages between the process of change in biodiversity, land degradation and land use	Outcome 3 (ii). Solid information on the linkages between land degradation and change in biodiversity Outcome 3 (iii). Root causes of land use change and land degradation	Rating 2. Very good paper in terms of quality, usefulness and relevance on implications of land use change on forests and biodiversity and root causes of land use change and land degradation
31. Noe, C. 2003. The Dynamics of land use changes and their impacts on the wildlife corridor between Mt Kilimanjaro and Amboseli National Parks, Tanzania.	Dynamics of land use changes and their impacts on wildlife	Objective 1. Analysis of new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. Very good paper for quality and usefulness in providing information on the dynamics of land use changes and their impacts on wildlife populations
32. Not available				
33. Maitima et al. 2004. Impacts of land use on vegetation composition, distribution, structure and diversity: The case of Embu-Mbeere districts, Kenya.	Impacts of land use on vegetation composition, distribution, structure and diversity	Objective 1. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. The paper received a rating of 2 for analysing new and existing data on the linkages between the processes of change in biodiversity and land degradation. This analysis can be used to design a guide on how land use changes could be used to analyse and identify spatial trends, temporal trends, and linkages of change in biodiversity and land degradation
34. Not available				
35. Gichaga et al. 2004. Survey of water quality changes with land use	Water quality changes with land use type	Objective 3. Providing integrated data and information on the	Outcome 3. Solid information on the processes of land use	Rating 3. The paper is very good in terms of analysing changes in

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
type in the Loitokitok area, Kajiado District, Kenya.		patterns and trends in land use, biodiversity and land degradation	change and root causes of land use change and land degradation	water quality as land use changes
36. Kamau, P. 2004. Forage diversity and improvement of grazing management on rangeland ecosystem in Mbeere District, Kenya.	Forage diversity and improvement of grazing management on rangeland ecosystem	Objective 3. Data on patterns and trends in land use, biodiversity and land degradation	Outcome 3. Information on root causes of land use change and land degradation	Rating 4. This paper is satisfactory in terms of relevance, usefulness and for providing data on biodiversity patterns in land use and land degradation
37. Chira, R. 2004 Changes in wildlife habitat and numbers in Embu-Mbeere District, Kenya.	Changes in wildlife habitat and numbers	Objective 3. Integrated data on the patterns, trends in land use and biodiversity and land degradation	Outcome 3 (ii). Linkage between land degradation and change in biodiversity Outcome 3 (iii). Root causes of land use change and land degradation	Rating 2. This paper received a rating of 2 (very good) for relevance, usefulness and for providing integrated data on the patterns, trends and root causes of land use change and biodiversity
38. Misana, S.B., A.E. Majule and H.V. Lyaruu. 2003. Linkages between changes in land use, biodiversity and land degradation on the slopes of Mount Kilimanjaro, Tanzania.	Linkages between changes in land use, biodiversity and land degradation	Objective 2. Integrating ecological, socio-economic and land use data, identifying root causes of land use change leading to changes in biodiversity and land degradation	Outcome 3 (i). Solid information on the land use change Outcome 3 (ii). Linkages between land degradation and change in biodiversity	Rating 2. This paper received a rating of 2 (very good) for providing solid information on the land use change and for providing linkages between land degradation and change in biodiversity
39. Otuoma, J. 2004. The effects of wildlife-livestock-human interaction on habitat in the Meru conservation area.	Effects of wildlife-livestock-human interaction on habitat	Objective 2. Integration of ecological, socio-economic and land use change data	Outcome 2. A replicable analytical framework to identify socio-economic and ecological root causes of land use change	Rating 3. This paper is relevant and useful in providing information on integrated ecological, socio-economic and land use change. It provides a replicable analytical framework to identify socio-economic and ecological root causes of land use change
40. Lyaruu, H.V. 2002. Plant biodiversity component of the Land Use Change, Impacts and Dynamics project, Mt. Kilimanjaro, Tanzania.	Plant biodiversity as the component of LUCID	Objective 3. Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation	Outcome 3 (i). The processes of land use change and their consequences on land degradation and change in biodiversity	This is a good paper in quality and is a useful source of information on the processes of land use change and their consequences on land degradation and change in biodiversity
41. Not available				
42. Maitima et al. 2004. The linkages between land use change, land degradation and biodiversity across East Africa. Regional synthesis paper.	Linkage between land use change, land degradation and biodiversity	Objective 2. Integrate ecological and socio-economic land use and theory Objective 3. Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa	Outcome 2. A replicable framework Outcome 3 (i), (ii), (iii)	This is an excellent regional synthesis paper in terms of quality and usefulness and is relevant in providing linkage of information and analytical framework on land use change, land degradation and biodiversity status of the East African region
43. Maitima et al. 2004. A methodological guide on how to identify trends and linkages between	Methodological guide on how to identify trends and linkages between changes in land use,	Objective 3. Provide integrated data and information on the trends in land use, biodiversity	Outcome 1. An analytical and methodological guide on how to use land use	Rating 2. A very good paper in terms of synthesis of linkages of methodologies used in

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
changes in land use, biodiversity and land degradation. Regional synthesis paper.	biodiversity and land degradation	and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes	change analysis to obtain information on changes in biodiversity and on land degradation, and their linkages	data collection on land use change analysis to obtain information on changes in biodiversity and on land degradation
44. Campbell et al. 2004. Comparing the Kenyan and Tanzanian slopes of Mt Kilimanjaro: Why are the neighbouring land uses so different?	Comparing the Kenyan and Tanzanian slopes of Mt Kilimanjaro	Objective 3. Provide integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. Very good paper in clearly revealing the differences and similarities in land use changes in the two countries
45. Not available				
46. Tirindi, C. 2004. Results of feedback workshops in Manyatta Division, Embu District and Siakago Division, Mbeere District.	Dissemination of the findings and seeking consensus building on the generated results between the stakeholders	Objective 3. Providing integrated data and information on the patterns and trends in land use, biodiversity and land degradation in East Africa that will provide a basis for more effective local, national and regional programmes	Outcome 5. Capacity-building. Community as stakeholders on the use of the data and information system	Rating 2. Very good paper for documenting dissemination of the research findings on the effects of land use change on vegetation/biodiversity and land degradation. Most of the findings were appreciated by the attendants.
47. Olson et al. 2004. The spatial patterns and root causes of land use change in East Africa.	Spatial patterns and root causes of land use change	Objective 1. Analyse new and existing data concerning the linkages between the processes of changes in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages of change in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. This paper received a rating of 2 for revealing information on root causes of land use change and for linking the changes to loss of biodiversity and land degradation
48. Olson et al. 2004. A research framework to identify the root causes of land use change leading to land degradation and changing biodiversity.	A research framework to identify the root causes of land use change leading to land degradation and changing biodiversity	Objective 2. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation	Outcome 2. A replicable analytical framework to identify the socio-economic and ecological root causes of land use/land management change leading to change in biodiversity and land degradation	Rating 2. This is a very good paper. It articulates issues related to replicable analytical framework to identify the socio-economic and ecological root causes of land use/land management change leading to change in biodiversity and land degradation
49. Not available				

Working paper number, author, title	Outstanding theme	Responding to intermediate objective number	Responding to project outcome number	Rating for relevance, usefulness and quality
50. Robin et al. 2004. Linkages between changes in land use, biodiversity and land degradation in the Loitokitok area of Kenya.	Linkages between changes in land use, biodiversity and land degradation in the Loitokitok area of Kenya	Objective 1. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. This paper is very good for usefulness, relevance and quality. It analysed both new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to apply land use change analysis in identifying spatial and temporal trends, and linkages of change in biodiversity and land degradation
51. Maitima et al. 2004. The linkages between land use change, land degradation and biodiversity in Embu-Mbeere.	Linkages between land use change, land degradation and biodiversity	Objective 2. Analyse new and existing data concerning the linkages between the processes of change in biodiversity, land degradation and land use in order to design a guide on how to use land use change analysis to identify spatial and temporal trends, and linkages, of change in biodiversity and land degradation	Outcome 3. Solid information from East Africa on 1) the processes of land management/land use change and their consequences for land degradation and change in biodiversity, 2) the linkages between land degradation and change in biodiversity, and 3) the root causes of land use change and land degradation, including the poverty/degradation relationship	Rating 2. This paper warranted a rating of 2 for analysing new and existing data and for revealing the linkages between the processes of land use change and biodiversity and land degradation

Annex V

Theses, conference presentations and articles for refereed journals

1. Completed theses

Atieno, F., MSc, University of Nairobi; Muriuki, G., MSc, University of Nairobi; Mugatha, S., MSc, University of Nairobi; Otuoma, J., MSc, University of Nairobi.

Smucker, T. 2003. In search of the sustainability miracle: Land reform, agricultural intensification, and changing livelihoods in semi-arid Tharaka, Kenya. Doctoral dissertation. Michigan State University, Department of Geography.

Wangui, E.E. 2004. Links between gendered division of labor and land use in Oloitokitok Division, SE Kajiado District, Kenya. Doctoral dissertation. Michigan State University, Department of Geography.

2. Support for student research outside LUCID activities

A Japanese look at changes in land management in Mbeere. Postdoctorate, 2004.

Working on historical changes in swamps in Loitokitok. PhD support for Stephen Mathai.

Vegetation changes in Mbeere hills. MSc research, Grace Ngugi.

Satellite images, Mbeere. MSc assistance for Michael Njoroge.

3. Conference papers

Norton-Griffiths, M. and B. Butt. 2003. The economics of land use change in Loitokitok Division, Kajiado District, Kenya. Poster presented at the Fourth Annual Tanzania Wildlife Research Institute (TAWIRI) Research Conference, Arusha, Tanzania, 4–6 December 2004.

Olson, J.M. 2003. Understanding land use change on Mt Kenya by melding politics, prose and soil pH. Paper presented at the Association of American Geographers Annual Meeting, New Orleans, LA, 4–8 March 2003.

Olson, J.M. 2004. Coupling land and climate systems: Linkages to completing the critical loop in East Africa. Panel presentation at the Association of American Geographers Annual Meeting, Philadelphia, PA, 14–19 March 2004.

Smucker, T.A. 2002. Changing land rights and responses to drought in Tharaka, Kenya. Paper presented at the African Studies Association Annual Meeting, Washington, D.C., 5–8 December 2002.

Smucker, T.A. 2003. The social dimensions of environmental management in semi-arid Tharaka, Kenya. Paper presented at the Association of American Geographers Annual Meeting, New Orleans, LA, 4–8 March 2003.

Smucker, T.A. 2004. Land reform, tenure security, and livelihood change: Reassessing land policy in Kenya's semi-arid lands. Paper presented at the Association of American Geographers Annual Meeting, Philadelphia, PA, 14–19 March 2004.

Wangui, E.E. 2002. Gender and agricultural change along the Mt Kilimanjaro ecological gradient, SE Kajiado, Kenya. Paper presented at the African Studies Association Annual Meeting, Washington, D.C., 5–8 December 2002.

Wangui, E.E. 2002. Links between gendered division of labor and land use change in SE Kajiado District, Kenya. Poster presented at the Association of American Geographers Annual Meeting, Los Angeles, California, 19–23 March 2002.

Wangui, E.E. 2003. Gender and livelihood change among the Maasai of south-east Kajiado District, Kenya: Methodological challenges. Paper presented at the Association of American Geographers Annual Meeting, New Orleans, LA, 4–8 March 2003.

Wangui, E.E. 2004. The changing meaning of livestock and implications for gender roles in Oloitokitok Division, Kenya. Paper presented at the Association of American Geographers Annual Meeting, Philadelphia, PA, 14–19 March 2004.

4. LUCID presentations

LUCID presentation to African palynology database in Morocco, 2002.

LUCID panel in American Association of Geographers meeting, 2003.

LUCID presentation in an international conference on small mammals in Morogoro, Tanzania, 2003.

LUCID presentation in an international conference on soils, Eldoret, 2003.

LUCID presentation to a biodiversity conservation meeting in Arusha, Tanzania, 2003.

LUCID presentation in global biodiversity forum, Dar es Salaam, 2004.

5. Articles in preparation (to be submitted to journals)

Maitima et al. A book chapter on the role of small-scale livestock production in the environment.

Maitima et al. A co-authored article in a review journal publication.

Olson, J.M. When intensification leads to land degradation or sustainable land management: Comparing agricultural systems in East Africa.

Smucker, T. Land reform and patterns of sustainable intensification: Rethinking livelihood security in East Africa's semi-arid areas.

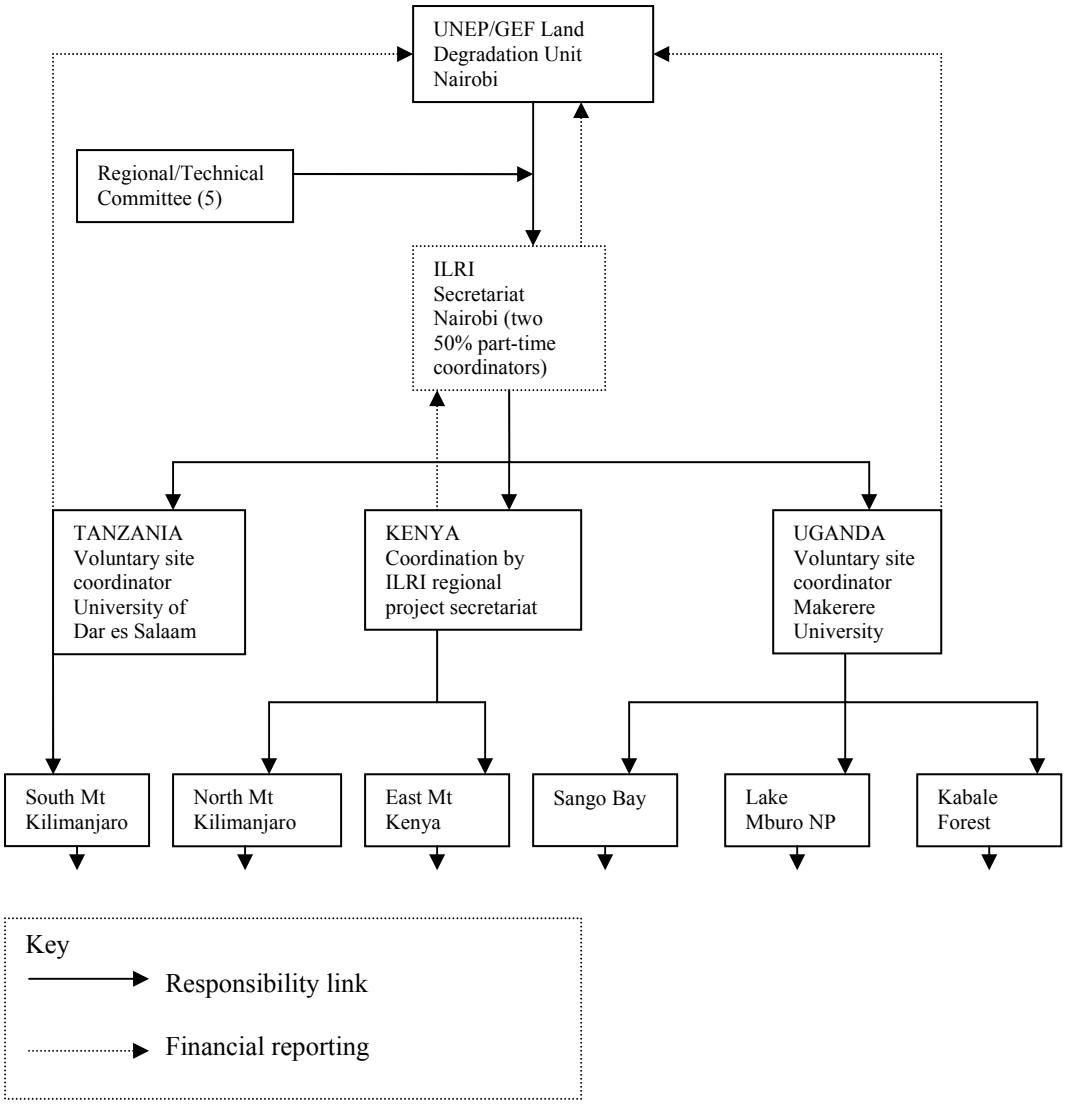
Smucker, T., D.J. Campbell, J. Olson and E. Wangui. 2003. Community workshops as a participatory component of field research: Examples from Kenya. To be submitted to *Human Ecology*.

Smucker, T. and Wisner, B. Changing household responses to drought in Tharaka, Kenya: Persistence, change, and challenge.

Wangui, E.E. Female pastoralists in a patriarchal society: The case of Ilkisongo Maasai of southern Kenya.

Annex VI

Organization chart of LUCID project implementation



Annex VII

Regional advisory/technical committee

Name	Contact
David Campbell	Michigan State University, Geography Department, East Lansing, MI 48824 USA
Anna Tengberg	UNEP, P.O. Box 30552, Nairobi, Kenya
Shem Migot Adhola	Uganda World Bank Country Office, Kampala, Uganda
Leonard Berry	University of Florida, Florida Center for Environmental Studies, Physical Sciences Bldg, 777 Glades Rd, Boca Raton, FL 33431 USA
Dr. Robin Reid	ILRI coordinating programmes touching on people, livestock and environment
Dr. Joseph Maitima	Administrated and coordinated ecological research activities of LUCID project
Dr. Jennifer Olson	Coordinated land use and socio-economic studies in LUCID project

Annex VIII

Regional and country offices

Office/person	Responsibility	Contact information
East Africa region and Kenya		
Dr. Joseph Maitima	Project Coordinator, Ecological	ILRI, P.O. Box 30709, Nairobi, Kenya Email: j.maitima@cgiar.org
Dr. Jennifer Olson	Project Coordinator, Land Use and Socio-economics	ILRI, P.O. Box 30709, Nairobi, Kenya Or: Michigan State University, East Lansing, MI 48824-1115, USA Email: j.olson@cgiar.org
Dr. Robin Reid	ILRI coordinating programmes touching on people, livestock and environment	ILRI, P.O Box 30709, Nairobi, Kenya Tel: 254-20-630743 Fax: 254-20-631481/631499 Email: r.reid@cgiar.org
Prof. David Campbell		Michigan State University, East Lansing, MI 48824 USA Tel: 1-517-432-3436
Dr. Helen Gichohi		African Wildlife Foundation, P.O. Box 48177, Nairobi, Kenya Tel: 254-20-710367 Email: hgichohi@awfke.org
Mr. Simon Mbugua Mugatha		ILRI, P.O. Box 30709, Nairobi, Kenya Tel: 254-20-630743 Fax: 254-20-631481/631499 Email: s.mugatha@cgiar.org
Dr. John Githiaga		Zoology Department, University of Nairobi, P.O. Box 30197, Nairobi, Kenya Email: jmgithaiga@uonbi.ac.ke
Mr. Stephen Mathai		National Museums of Kenya, P.O. Box 40658, Nairobi
Tanzania		
Prof. M. Mbonile	Contact person for LUCID network	Geography Dept, University of Dar es Salaam, P.O. Box 35049, Dar es Salaam, Tanzania Tel: 255-022-2410500-8 ext. 2337 Fax: 255-022-2410393/2410395 Email: mmbonile@hotmail.com
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Prof. Francois Bart		Institut de Geographie, Universite de Bordeaux 3, Domaine Universitaire, 33607 PESSAC Cedex, France Email: fbart@ades.cnrs.fr
Uganda		
Mr. Sam Mugisha	Contact person for LUCID network	Institute of Environment and Natural Resources, Makerere University, P.O. Box 7298, Kampala, Uganda Tel: 256-41-530135 Fax: 256-41-530134 Email: sammugisha@yahoo.com or smugisha@muienr.mak.ac.ug
Prof. Derek Pomeroy		National Biodiversity Databank, Makerere University Institute of Environment and Natural Resources, P.O. Box 7298, Kampala, Uganda Tel: 077-512358 Email: derek@imul.com
Dr. Joy Tukahirwa		ECOTRUST, P.O. Box 8986, Kampala, Uganda Email: jtukahirwa@ecotrust.or.ug

Annex IX

Focused group discussion held on 13 October 2004 at Embu project site in Kenya

Name	Institution and position held	Contact
Simon Mbugua Mugatha	Postgraduate student, University of Nairobi	Working for ILRI
Joseph Maitima	LUCID project coordinator	ILRI
Jennifer M. Olson	LUCID project coordinator	Michigan State University, ILRI
Felista W. Mwaniki	Extension officer, Ministry of Agriculture	P.O. Box 80, Siakago
Alusa Muthanje	Farmer	Siakago
Matthews M. Njagi	Extension officer, Ministry of Agriculture	P.O. Box 80, Siakago
Paul K. Kiige	Extension officer, Ministry of Agriculture	P.O. Box 80. Siakago
Justa M Kithaka	Farmer	Siakago
John M. Makenge	Chief	Nthawa Location
John Magu	District agricultural extension officer	Siakago
Mary Wambui	Farmer	Siakago

Annex X

Work plan and logistics for LUCID evaluation plan

Date	Activity	Institution/contact	Logistics/comments
22–24 September 2004	Signing of contract, medical exams and orientations to evaluation TOR Project document reviews	UNEP and ILRI	Documents, and holding of brief with project management and UNEP team
27–28 September 2004	Formulation of questionnaire and consultations on work plan Project documents reviews	ILRI and UNEP	Need to book for meetings and to make travel arrangements
29–30 September 2004	Interviews at UNEP Specific product reviews	UNEP	
1 October 2004	Interviews at ILRI	ILRI	
4–5 October 2004	Interviews with Uganda stakeholders and Makerere University	Uganda LUCID country office	Logistics: Invitations of the relevant stakeholders and scientists for in-depth focused group discussions Hotel accommodation and DSAs, identification of the focal persons to coordinate the evaluation exercise
6–7 October 2004	Interviews with Tanzania stakeholders and Dar es Salaam University	Tanzania LUCID country office	Logistics: Invitations of the relevant stakeholders and scientists for in-depth focused group discussions Hotel accommodation and DSAs, identification of the focal persons to coordinate the evaluation exercise
12–13 October 2004	Interviews with Kenya stakeholders at project site, Embu	KARI scientists to facilitate?	Transport and arrangement of interview meetings
14–15 October 2004	Pending interviews, consultations and review of documents, questionnaire analysis Telephone interviews	UNEP and ILRI	Telephone facilities
18–25 October 2004	Questionnaire analysis and review of project documents, correspondences etc.		Office space
26 October to 5 November 2004	Final report writing and submission of first draft		Office space and report production facilities

Annex XI

Itinerary

Name	Activity	Date
1. UNEP team (Evaluation and Project Oversight Unit and Land Degradation Unit): Segbedzi Norgbey, Susan Bech and Anna Tengberg	Consultation on TOR	22 September 2004
2. Joseph Maitima, Coordinator, LUCID	Interview	29 September 2004
3. Anna Tengberg, UNEP	Interview	30 September 2004
4. Joseph Maitima	Interview	30 September 2004
5. Ade Freedman, Theme Director, ILRI	Interview	1 October 2004
6. Robin Reid, ILRI	Interview	1 October 2004
7. Sam Mugisha, Makerere University, Uganda	Interview	4 October 2004
8. James Kalewa, Makerere University, Uganda	Interview	4 October 2004
9. Professor M. Mbonile	Interview	6 October 2004
10. Professor Salome Misana	Interview	7 October 2004
11. Christine Noe	Interview	7 October 2004
12. Joseph Maitima, Coordinator, LUCID	Interview	8 October 2004
13. Jennifer Olson, Coordinator, LUCID	Interview	12 October 2004
14. Key informers at Embu site: Engineer Muthini Kituu, Machanga Agricultural Machinery Services, Mbeere	Interview	12 October 2004
15. Group of stakeholders in Embu: farmers, location chief, and four agricultural extension staff, and three participants from LUCID team	Focused group discussion	13 October 2004
16. John Mukoza- Kifuse, Fund Programme Management Officer, Division of GEF Coordination	Interview	15 October 2004
17. Tumuluru Kumar, ILRI Finance Department	Interview	15 October 2004