

Introducing Environmental Sustainability into the Ugandan System of National Accounts

Draft Final Report to the ENR Sector Working Group

By

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Any errors and omissions contained in this report are the responsibility of the author and do not necessarily reflect those of the other organisations consulted.

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List of Acronyms

ANS	Adjusted Net Saving
CEEPA	Centre for Environment and Economic Policy for Africa
DFR	Directorate of Fisheries Resources
EA	Environmental accounts
ENR	Environment and Natural Resources
ENR	–
SWG	Environment and Natural Resources Sector Working Group
FIRRI	Fisheries Resources and Research Institute
GDP	Gross Domestic Product
GNI	Gross National Income
GS	Genuine Saving
Ha	Hectare
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IUCN	International Union for the Conservation of Nature
KARI	Kawanda Agricultural Research Institute
LSU	Large stock unit
MAAIF	Ministry of Agriculture, Animal Industries and Fisheries
MFPED	Ministry of Finance, Planning and Economic Development
MTTI	Ministry of Tourism, Trade and Industry
MWLE	Ministry of Water, Land and Environment
NA	National Accounts
NEMA	National Environment Management Authority
NFA	National Forest Authority
NR	Natural resources
	Natural Resource Accounting Programme for East and Southern
NRAESA	Africa
NTFP	Non-timber forest products
OECD	Organisation for Economic Cooperation and Development
PEAP	Poverty Eradication Action Plan
PMA	Plan for the Modernisation of Agriculture
SAM	Social Accounting Matrix
SEEA	System of Integrated Environmental and Economic Accounting
SNA	System of National Accounts
SUT	Supply and Use Table
UBOS	Uganda Bureau of Statistics
UIA	Uganda Investment Authority
UN	United Nations
Ush	Uganda shillings
UWA	Uganda Wildlife Authority
Y & M	Yaron and Moyini report

Executive Summary and Main Recommendations

This study was undertaken for the ENR SWG (Environment and Natural Resources Sector Working Group) to assess the feasibility of introducing environmental sustainability into the national accounts (NA) through environmental accounting, popularly known as “green accounting.” This study is a follow-on to a broader study by Yaron and Moyini (2003) “The role of environment in increasing growth and reducing poverty in Uganda,” which was commissioned by the ENR SWG. Since this is a feasibility study only, it was thought prudent to focus on three priority natural resources—forests, fisheries and soil—with the understanding that other resources would be included in future work.

Environmental accounts (EA) are an extension of NA, using concepts, classifications and methods from the NA to construct accounts for the environment and natural resources in both physical and monetary units, consistent with the NA. EA have been codified by the UN in the Handbook for the System of Integrated Environmental and Economic Accounting (SEEA; UN et al., 2003).

The feasibility assessment considers

- policy usefulness of environmental accounting in terms of its contribution to the PEAP
- technical feasibility in terms of data availability and institutional capacity

EA are important because the NA are the most widely used source of information about the economy, but NA fail to account for depletion of much natural capital and often underestimate the economic contribution of ENR sectors. Addressing these failures is especially important in countries that are heavily dependent on their natural resources. Most of Uganda’s current and projected national income is derived from agriculture and exploitation of the natural resource base (forestry, fishing, tourism, etc.). Uganda’s economic growth and poverty reduction strategy, in the PEAP and more specifically in the PMA, is based on improving exploitation of natural resources. Hence, it is essential to construct NA, extended for the environment and natural resources, that properly assess the sustainability of economic growth.

Comprehensive environmental accounting is a very large undertaking and no country has implemented the entire framework, as described in the UN’s SEEA (UN et al., 2003). Rather, each country has implemented, incrementally, those parts of the SEEA that are most critical to its ENR policy concerns and the available data. In Uganda, several overarching policy concerns drive the need for EA, as they do in many other countries:

- Is GDP growth sustainable or is Uganda depleting ENR wealth in order to fund current consumption, in other words, ‘living off its natural capital?’ If not sustainable, what is the cost of environmental degradation?
- What is the true economic importance of ENR sectors to GDP and how significant are they for household livelihoods, especially the poor?

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- What is the potential for ENR sectors to fund the sustainable management of these sectors?

Corresponding to each policy concern, EA provide an indicator or set of statistics to help monitor that concern.

Policy Issue	Indicators & statistics proposed
1. Sustainability of GDP growth	Adjusted Net Savings (ANS)
2. True economic importance of ENR sectors	Revisions to the NA and GDP for some values. Satellite accounts for other values
3. Potential of ENR sectors to fund sustainable NR management	Measurement of 'resource rent' generated by ENR sectors

A large part of what is called environmental accounting is simply better, more thorough implementation of the current System of National Accounts (SNA, UN et al. 1993), the handbook used by all countries to compile national accounts. In this respect, EA focuses attention (and hopefully resources) on the neglected ENR sectors, on what the NA should be doing anyway, and improves the NA. Other ENR values are recorded in 'satellite' accounts to the NA, which do not affect the core NA.

1. Adjusted Net Saving (ANS):

The PEAP calls for sustainable economic growth, recognizing that short-term GDP growth can be obtained from depletion of resources, but that maintaining economic growth over the long term is not possible unless the environment and natural resources are managed sustainably. The PEAP recognises that soil erosion and deforestation are serious problems and are linked to poverty. In plans for long-term growth, the PEAP makes a commitment to restore sustainable growth and improve incomes of the poor, specifically by protecting the natural resources on which the poor depend. Government's medium term strategy to increase annual economic growth from 6.5% to 7% relies, in part, on actions to improve environmental sustainability.

GDP (Gross Domestic Product) or GNI (Gross National Income) is the indicator most commonly used to assess economic growth, but it does not account for depletion or degradation of natural resources. Consequently, GDP represents, for example, the logging income from cutting down forests, but not the cost of any corresponding deforestation. In such cases, GDP would appear to increase in the short run, but the economy would not be able to sustain that level of GDP in the future because of loss of the underlying assets.

Sustainable development requires that total wealth—manufactured capital, natural capital, and human capital—is increasing over time. ANS measures this change in total wealth in the economy. Based on the concept of Genuine Saving developed by the World Bank, ANS takes National Saving, subtracts depreciation of manufactured capital, adds investment in human capital (education expenditures), and subtracts depletion or degradation of natural capital.

Recommendation: Compile Adjusted Net Saving and add this to the indicators for Pillar 1 of the PEAP Results and Monitoring Matrix

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Contribution of ANS to the PEAP: For Pillar 1 of the PEAP, Strong Economic Management, GDP growth and other commonly cited macroeconomic variables are the only indicators included in the Results and Monitoring Matrix; there is no indicator of the *sustainability* of macroeconomic growth and poverty reduction. Adding ANS would complement the objective for stable economic growth with sustainable economic growth.

2. Measuring the true contribution of ENR sectors to the economy

Natural resources often provide goods and services that are not fully represented in the NA, even though the SNA calls for including them. Some values of forestry and fisheries, such as non-timber forest products and subsistence fishing, should be included in the NA, but are underestimated or missing because of difficulties in measuring them. Forests often provide valuable services to other sectors such as tourism (providing habitat for wildlife tourists come to see). These values are included in the NA, but because the using sector, such as tourism, doesn't pay for the service, it is not attributed to the Forestry sector. Additional services like soil and water protection are also not attributed to Forestry, although they are quite valuable to other sectors like agriculture and municipal water supply.

Recommendation: Compile environmental accounts for the ENR sectors' contribution to NA and add to the indicators for Pillar 2 of the PEAP Results and Monitoring Matrix

Contribution to the PEAP: Despite the recognition of ENR sectors under the PEAP Pillar 2, Enhancing Production, Competitiveness and Incomes, there are no indicators in the PEAP results and monitoring matrix that assess *both* sustainability and economic contribution. For Pillar 2, indicators cover either

- economic contribution of a sector without assessing sustainability of resource use (Fisheries: value of output and exports), or
- environmental sustainability of a sector without assessing economic contribution (Forestry: proportion of land under forest cover, average distance to firewood source)

Environmental accounting would provide indicators for both aspects of ENR utilisation, which will help support ENR sectors in seeking appropriate levels of budgetary support and investment for sustainable development of the ENR sectors. It will further enhance the cooperation among line ministries because, in the case of forestry for example, the value of forestry to non-forestry sectors (tourism, agriculture, water, etc.) can be demonstrated and quantified. This will also help promote the Sector Wide Approach to the ENR sectors and provide motivation for individual ENR sectors to support each other

3. ENR sectors' potential contribution to government revenues

There are three components to this aspect of EA:

- Amount of tax and non-tax revenues collected by government from ENR sectors.
- Current levels of government expenditure on ENR sectors
- Resource rent generated by ENR sectors: this represents the potential revenue that can be obtained from ENR sectors

Recommendation: Calculate resource rent for ENR sectors and compare to actual revenues collected and ENR budgetary needs

Contribution to the PEAP: This component of environmental accounting contributes primarily to Pillar 2 of the PEAP: Enhancing production, competitiveness and incomes

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because it identifies the degree to which ENR sectors can be taxed to provide revenues for ENR management. But this component also contributes to PEAP Pillar 1, Strong Economic Management. ENR sectors are a major source of revenue, so sound fiscal management requires environmentally sustainable management of ENR sectors. Quantifying this dependence of government on revenues from ENR sectors—as well as the potential contribution ENR sectors could make—will motivate appropriate levels of budgetary support and investment for sustainable development of the ENR sectors.

Beneficiaries from environmental accounting

Any government agency with analysis and planning responsibilities related to the environment and natural resources can benefit from the introduction of environmental accounting. The major ones include:

- MFPED, which will have indicators for the sustainability of economic growth and statistics for planning that include the environmental costs and benefits of strategies for economic growth
- UBOS, which will have more accurate and comprehensive national accounts
- ENR SWG and all its members including the line ministries and agencies with responsibility for resource management and planning. They will have indicators and statistics, both physical and monetary, for monitoring the environment and natural resource base, and for policy analysis and planning.

In addition, the private sector and civil society can also benefit from having more information available about the environment, especially from an economic perspective and consistent with NA. It would be especially useful to provide an annual Fact Sheet for parliamentarians and others that summarise the main indicators from the environmental accounts, and how they contribute to monitoring the progress and impact of the PEAP.

Implementation

For each recommendation there are specific actions which are listed in Tables ES1-3, along with the agencies primarily responsible for their implementation. Overall, the ENR SWG will be responsible for EA, but particular tasks may require the expertise and cooperation of specific agencies.

These recommendations were developed by the Project Team for this consultancy, which consists of an international consultant (Dr. Lange) and a four-person Country Team with staff persons from NEMA, MWLE, UBOS, and MFPED, after extensive discussions with relevant agencies (see list of persons consulted in Appendix A).

Recommendations are provided for only three ENR concerns—forestry, fisheries and soil erosion—even though the ENR sector also includes wetlands and wildlife. This focus was chosen in order to demonstrate the feasibility of environmental accounting, but should eventually be extended to other ENR sectors as well as relevant sectors not under the ENR SWG such as water, minerals and energy.

Environmental accounting can be introduced incrementally in three phases, divided into

- Immediate actions to construct EA that can be taken over the next few months, based on data that are presently available or can be used with minor adjustments
- Medium term actions that can be taken over the next year, based on data that will become available later, or will require more extensive revision

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- Longer term actions that will require more extensive research or collection of additional data

There is also a crosscutting need for technical training, sensitisation of policy-makers and planners, and capacity building.

It is expected that the ENR SWG will be responsible for implementing these actions. The cooperation of several specific agencies, most of whom are members of the ENR SWG, will be required to implement specific tasks, and these are identified in the tables of recommendations.

The next important step is to review these recommendations with the relevant institutions so that they can be adopted (after appropriate revision) as statements of commitment. This process began with a stakeholders' workshop to review the Draft final Report in February. The ENR SWG agreed to establish an ENR subcommittee on environmental accounting, which is a critical institution for carrying forward the recommendations. Indeed, experience in other countries have shown that such a committee with high-level policymakers is necessary for success. Other countries have benefited from establishing, in addition, working groups for each ENR sector. Close involvement of environmental economists, often from the university or research institutions has also been helpful because of the need for expertise in this field of economics.

Resources required for implementation and sources of support

The primary resource requirement for introducing environmental accounting is the time of government staff, and the level required depends on the specific recommendations that are adopted and the extent of the effort. The immediate actions can largely be handled though a few weeks' of an international consultant's time plus a slightly longer period of time for a Country Team of local consultants, like the Team for this consultancy.

Determination of the resources needed for Medium-term actions will require additional consultation. Much can be accomplished with a 3-4 months of an international consultant's time, supported by local consultants. But others—notably, carrying out new surveys—will require substantial funding.

Sustainability of environmental accounting requires a great deal of technical training because economists and national accountants do not generally receive training in this specialised tool in their normal education. Including support for technical training is very important. Much of this can be provided through specialised workshops, but it might also be useful in the longer term to support advanced degree training in environmental economics.

The consultancy was able to begin consultation with some agencies about the resources required for implementation, but this process was not completed. This consultation should be completed by the ENR SWG environmental accounting sub-committee.

The ENR SWG may consider providing some support for development of environmental accounting, or looking for support from other sources.

An immediate source of support, although relatively limited, is the NRAESA Programme, which has been operating since 1995 to provided technical assistance to countries for environmental accounting. It is currently in its third phase, with support from SIDA running

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from 2003-2007. The NRAESA Programme is committed to assisting in the establishment of environmental accounts in Uganda and can provide a small amount of technical assistance from local and international experts, as well as technical training through workshops and degree programmes at the University of Pretoria.

The NRAESA Programme has agreed to fund technical assistance for these activities from Dr. Lange and her colleague, Dr. Mungatana. It has also developed a collaborative relationship with Makerere University, which may be able to assist in some of the activities, but is also prepared to work directly with the appropriate government agencies.

A longer-term potential source of support is the Global Initiative in Environmental Accounting which is being established by the Earth Institute of Columbia University in collaboration with the World Bank.

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**Table ES1. Recommended actions to construct Adjusted Net Saving
Contributes to the PEAP Pillar 1**

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Actions		Agencies responsible:
Now, possible with existing data: Construct ANS based on revision of World Bank's Genuine Saving to include:		
1. Deforestation	Use preliminary estimate of area deforested from NFA. Use Bush et al. (2004) to estimate cost of deforestation	NEMA, NFA, UBOS, Makerere University
2. Soil erosion	Include figure soil erosion, but valued as the cost of reduced land productivity rather than the method in Y&M	NEMA, IFPRI, KARI, MAAIF, PMA Secretariat
Medium-term (2005): Improve ANS		
3. All components	Hold seminars to sensitise MFPED and heads of key ministries planning units to ANS and its contribution to the PEAP. Hold stakeholders workshops to discuss results.	NEMA, MFPED, PMA Secretariat and others
4. Deforestation	Obtain more accurate data on area deforested from NFA's satellite imagery analysis. Recommend changes to Household Survey and other relevant surveys for the collection of data about forest goods and services Agree upon valuation methods acceptable to UBOS, MFPED, NFA for forest goods and services Estimate the stumpage value of forest goods and services.	NEMA, NFA, UBOS, MFPED, Makerere University
5. Soil erosion	Improve figure as more data are available from IFPRI/KARI, and better data about declining yields are available.	NEMA, KARI, IFPRI, MAAIF, PMA Secretariat, Makerere University
6. Other resources	Assess possibility of including other resources such as fisheries	NEMA and others to be determined
Longer-term: Improve and expand ANS to include all resources		
7. All components	Hold seminars to sensitise MFPED to ANS and its contribution to the PEAP Hold stakeholders workshops to discuss results	NEMA, MFPED, and others
8. Deforestation	Improve valuation based on new data obtained from Household Survey and other sources that may become available	NFA, UBOS, NEMA, MFPED, Makerere University
9. Fisheries	Include in ANS if/when stock data are available	DFR, UBOS, NEMA
10. Other natural resources	Wetlands, wildlife, etc. as data are available	NEMA and others to be determined
10. Conduct surveys to improve the figures for cost of		NEMA and others to be

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depletion and degradation	determined
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**Table ES2. Recommended actions to improve ENR values in the national accounts
Contributes to the PEAP Pillar 2**

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Now, possible with existing data: Improve measure of ENR values that should be in NA but are presently missing		Agencies responsible
Forestry	Initiate discussions with UBOS to expand Household Survey questionnaire to cover missing forest product data	NFA, UBOS, NEMA
Forestry and Fisheries	Review forestry and fisheries values reported in case studies—identify which are consistent with NA and which require adjustments	NFA, DFR, UBOS, NEMA, Makerere University
Medium term improvements (2005): ENR values that should be in NA but are presently missing		
Forestry	Include questions about NTFP in Household Survey	NFA, UBOS, MFPED, NEMA
Fisheries	Include in Household Survey sample frame submodule for fishing households/villages	DFR, UBOS, NEMA, MFPED
Forestry & Fisheries	Agree upon valuation methods and make the needed adjustments to values from case studies identified earlier, including estimates of value-added. Discuss methods for dealing with unreported and illegal harvesting of timber and fisheries. Discuss reconciling trade statistics with production and use statistics in the NA.	NFA, DFR, UBOS, NEMA, MFPED, Makerere University
Other resources	Identify data gaps and studies/surveys needed to fill them For example, wetland resources that are harvested could be added to Household Survey	DFR, UBOS, NEMA Makerere University
ENR values included in NA but attributed to other sectors		
Forestry & Tourism	Estimate the value of tourism expenditure attributable to forested land (forested National Parks) by simple procedure, such as proportion of tourists visiting park multiplied by foreign tourism expenditures	MTTI, UWA, NFA, NEMA, UBOS, Makerere University
Forestry & Agriculture	Review methodology in Bush et al. for forage values of forest	MAAIF, UBOS, NEMA, Makerere University
Longer-term improvements		
Forestry and Fisheries	Measure multiplier impacts on incomes, especially of poor households, from ENR activities in forestry and fishing using the SUT and SAM	NEMA, UBOS, Makerere University
Forestry &	Conduct surveys to improve the estimate	MTTI, UWA, NFA, NEMA,

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Tourism	the value of tourism expenditure attributable to forested land (forested National Parks). Estimate the value-added generated by industries providing goods and services that tourists purchase	UBOS, Makerere University
Other resources	Surveys for missing ENR data	NEMA, UBOS and others to be determined
Ecosystem services (forestry & wetlands)	Identify contributions to water and soil protection and who benefits: agriculture, fisheries, municipal water supply, water bottling company, human health, etc. Review valuation methodologies for consistency with NA	NEMA and others to be determined

Table ES3. Recommended actions to estimate the potential for ENR sectors to fund sustainable NR management

Contributes to the PEAP Pillars 1 and 2

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Now, using existing data:		Agency responsible
Assess current levels of revenue generated by ENR sectors		
Fisheries and forestry	Collect data on tax & non-tax revenues collected by government Compare revenue to ENR Ministry budgets	NEMA, NFA, DFR, MFPED, Makerere University, EPRC
Medium term (2005): resource rent and its contribution to ENR management		
Forestry and fisheries	Review existing studies for estimates of resource rent: Fisheries: Norconsult and others Forestry: Falkenberg and Sepp, others Compare estimates of rent to revenues collected by government and ENR Ministry budgets. Identify data required to improve measurements of resource rent.	NEMA, NFA, DFR, MFPED, Makerere University, EPRC
Allocation of rents	Review mechanisms used in other countries to ensure that some portion of NR revenues are dedicated to managing the resource.	NEMA, NFA, DFR, MFPED, Makerere University
Longer Term: potential for ENR sectors to become self-funding		
Missing data on resource rent	Conduct surveys--questions can be included in other surveys	NEMA, NFA, DFR, UBOS, Makerere University
Potential rent	Analysis of potential rent that ENR sectors could generate under optimal management	NEMA, NFA, DFR, EPRC, Makerere University
Other resources	Estimate rent for other natural resources such as minerals	NEMA, UBOS, Dept of Mines

1. Background

This consultancy examines the feasibility of revising the national accounts (NA) to better represent the environment and natural resource (ENR) sectors, following on from a major study by Yaron and Moyini (2003) to assess the role of the ENR sectors in promoting economic growth and reducing poverty. The Yaron and Moyini (Y&M) report, drawing on many other studies, demonstrated that the role of ENR sectors in the economy is underestimated in GDP and the national accounts, and attempted to suggest what a more accurate representation of ENR sectors might be. They further raised the issue that Uganda's economy, which is heavily dependent on natural resources, runs the risk of unsustainable growth—growth in current income (GDP) generated by depleting or degrading the natural resource base. Underestimation of the economic contribution of ENR sectors and the lack of a macroeconomic measure to monitor sustainability of GDP growth may mislead government into choosing policies that undermine the long term sustainability of the economy and its poverty reduction efforts. To counteract the misleading signals from the current national accounts, Y&M recommended a number of actions, among them, a feasibility assessment of “green accounting” for Uganda.

Environmental accounting is a popular term for environmental accounting. Environmental accounting is important because the NA are the most widely used source of information about the economy. There have been many case studies of individual ENR sectors, comparing their true economic value to the value included in the NA. Taking the case studies approach to the next step, environmental accounting provides the basis for institutionalising the collection of improved ENR sector data and including them in the NA. By using the NA framework, it brings together *all* ENR sectors so that the ENR SWG can better advocate collectively for all ENR sectors together, rather than on a sector-by-sector basis. Environmental accounting ensures that the contribution of ENR sectors is valued in a manner consistent with the definitions and methodologies of the NA, in contrast to one-off case studies, which often estimate values that cannot be directly compared with those in the NA. Environmental accounting increases the visibility and credibility of the ENR values.

It should be noted from the beginning that a large part of what is called environmental accounting is simply better, more thorough implementation of the current System of National Accounts (UN et al. 1993), the handbook used by all countries to compile national accounts. In this respect, environmental accounting focuses attention (and hopefully resources) on the neglected ENR sectors, on what the NA should be doing anyway, but that statistical offices have not had sufficient resources to do thoroughly. The distinction between where environmental accounting is simply NA done better and where it goes beyond the NA will be discussed in the following sections.

1.1 Environmental accounting and its relevance to Uganda

Environmental accounting has a rather long history, dating back at least to 1973 (see Lange and Duchin, 1993 for a brief history of these efforts). Over the past few decades, there has been a great deal of experience with various forms of environmental accounting. Norway has the longest running experience, with accounts for minerals, forestry, fisheries, and energy

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dating back to the mid-1970s, and more recent accounts for air pollution. In the mid-1980s, environmental accounting gained international recognition through the work of Repetto and his colleagues (1989) in Indonesia and Cost Rica. This work raised the issue of economic growth fuelled by depletion of natural capital, and the inconsistent treatment in the NA of produced capital and natural capital. During that same period, the Brundtland Commission Report popularised the concept of sustainable development (WCED, 1984)

Since the late 1980's, economists and statisticians have worked continuously to develop and test methodologies for environmental accounts (EA). Even the 1993 SNA, the handbook on national accounts, has revised its definition of assets and the resulting effects on GDP to take into accounts some natural resources. However, much of environmental accounting is handled in 'satellite' accounts—accounts that are linked to the NA through a common set of definitions and classifications, but which do not affect the core values of the NA. Satellite accounts are developed when information in the conventional NA is not presented in the manner required for policy analysis. There are, for example, satellite accounts for tourism and for transportation.

The first, interim handbook on environmental accounting was published in 1993 (UN, 1993). Following this, the UN Statistical Commission established the London Group on Environmental Accounting, a working group of statisticians and economists from international organizations (UN, IMF, World Bank, OECD, Eurostat) and country statistical offices, to develop a more detailed handbook on concepts and methods. After 10 years' work, a revised and greatly expanded handbook was finished in 2003 (UN et al., 2003), known as the SEEA (System of Integrated Environmental and Economic Accounting).

Comprehensive environmental accounting is a very large undertaking and no country has implemented the entire SEEA. Rather, each country has implemented, incrementally, those parts of the SEEA that are most critical to its ENR policy concerns and the available data. Many countries, both developed and developing, have implemented at least some component of the SEEA.

In Uganda, as in many other countries, several overarching policy concerns drive the need for environmental accounting:

- Is GDP growth sustainable or is Uganda depleting ENR wealth in order to fund current consumption, in other words, 'living off its natural capital?' If not sustainable, then what is the cost of environmental degradation?
- What is the true economic importance of ENR sectors to GDP and how significant are they for household livelihoods, especially the poor?
- What is the potential for ENR sectors to fund the sustainable management of these sectors?

Corresponding to each policy concern, environmental accounting provides an indicator or set of statistics to help address that concern. These figures are based partly on concepts and methods that are already part of the NA and partly on the SEEA. In some instances, environmental accounting may change the NA, while in others the core values of the NA (such as GDP) will remain the same, but additional indicators and statistics are compiled, as shown in the table below.

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In the sections below, each policy issue and the recommended environmental accounting measure(s) is discussed in terms of methodology, data availability and actions to be taken. The ENR sectors under the SWG include forestry, fisheries, land and soil, wetlands, and wildlife. A strong argument could be made that several other sectors should also be included, notably, water, minerals and energy. This consultancy focuses on just three ENR concerns: forestry, fisheries and soil erosion, in order to demonstrate the feasibility of EA, but should eventually be extended to other ENR sectors as well as relevant sectors not under the ENR SWG.

Table 1. Policy issues and corresponding environmental accounting measures

Policy Issue	Indicators & statistics proposed	Concepts & methods for measures	Impact on NA core accounts
1. Sustainability of GDP growth	Adjusted Net Savings (ANS)	SEEA	No effect on core accounts
2. True economic importance of ENR sectors	Revisions to the NA and GDP for some values. Satellite accounts for other values	Partly NA, Partly SEEA	Partly affects core accounts (better measure of fisheries and forestry output) Part of contribution represented in satellite accounts, not affecting core accounts
3. Potential of ENR sectors to fund sustainable NR management	Measurement of 'resource rent' generated by ENR sectors	SEEA, derived from data in the NA	No effect on core accounts

1.2 Scope of this report

As mentioned in the Acknowledgements and the beginning of this section, this report is a follow-up to a broader study commissioned by the ENR SWG, which was carried out by Yaron and Moyini in 2003, "The Role of Environment in Increasing Growth and Reducing Poverty in Uganda." This report addresses the feasibility of one important component of their recommendations: how to introduce concepts of sustainability into the national accounts, that is, how to introduce environmental accounting to Uganda.

In commissioning this feasibility report, the ENR SWG decided to focus on a sample of ENR sectors rather than trying to cover them all. Forestry, fisheries, and soil erosion were chosen for the feasibility study because the information needed for environmental accounts (both physical data and their economic value) is most readily available for these sectors. The ENR SWG recognizes that future work will include the other resources, such as wetlands, wildlife, and climate. Indeed, in the longer term it would be most useful to include other natural resources which are not under the ENR SWG, notably water and energy.

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Furthermore, with decentralization of government, the role of Local Government in generating and using data is critical. In the feasibility study, which is necessarily constrained by limited resources, it was not possible to work at the local level. Rather, the study made use of data readily available at the national level. As environmental accounting is implemented, Local Government can become a key player in all activities from data collection to technical training and capacity building.

2. Monitoring the Sustainability of Macroeconomic Growth: Adjusted Net Savings

The PEAP calls for sustainable economic growth, recognizing that short-term GDP growth can be obtained from depletion of resources, but that maintaining economic growth over the long term is not possible unless the environment and natural resources are managed sustainably. The PEAP recognises that soil erosion and deforestation are serious problems and are linked to poverty. In plans for long-term growth, the PEAP makes a commitment to restore sustainable growth and improve incomes of the poor, specifically by protecting the natural resources on which the poor depend. Government's medium term strategy to increase annual economic growth from 6.5% to 7% relies, in part, on actions to improve environmental sustainability.

GDP (Gross Domestic Product) or GNI (Gross National Income) is the indicator most commonly used to assess economic growth, but it has two major limitations regarding ENR: GDP does not account for depletion or degradation of natural resources and GDP measures goods produced, but not the 'bads' such as soil erosion and pollution. Consequently, GDP represents the logging income from cutting down forests, but not the cost of any corresponding deforestation. It reports increased agricultural output from mining the soil, but not the cost of soil erosion and fertility losses. In such cases, GDP would appear to increase in the short run, but the economy would not be able to sustain that higher level of GDP in the future because of loss of the underlying assets.

While GDP is needed to assess economic growth, a complementary macroeconomic indicator is needed to evaluate whether GDP growth is sustainable. Adjusted Net Saving (ANS) is a macroeconomic indicator designed to complement GDP by assessing the sustainability of economic growth.

ANS is based in the concept of Genuine Savings, developed in the late 1990's by the World Bank (Hamilton and Clemmens, 1999; Kunte et al., 1998; World Bank, 1997). So in order to determine whether ANS is feasible for Uganda, we start with a review of Genuine Saving, the data required to calculate ANS

2.1 What is Genuine Saving?

In order to determine if GDP growth is sustainable, an indicator that keeps track of the economy's wealth is required (See World Bank (2002) for a discussion of the relationship between national income and national wealth.). The ideal method, if complete data were available, would be to measure the value of all stocks (produced, natural and human) and monitor how they change over time. When total wealth is increasing, growth is sustainable;

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when total wealth is declining, then the economy is liquidating its capital to support current consumption and this cannot last.

Measuring total wealth is a problem for many developing countries: they do not compile figures for produced capital (manufactured capital like buildings and equipment) even though it is recommended by the 1993 SNA, let alone natural capital or human capital. So the World Bank developed a 'shortcut' indicator called Genuine Saving that measures the change in total capital over time. This is useful because it is the *change* in wealth that indicates whether or not GDP growth is sustainable. Genuine Saving can be implemented relatively easily because it is built on data already compiled for the NA, using the following simple accounting identities:

1. Change in wealth or capital stocks = Net investment
2. Net investment = Net Savings

The World Bank's contribution was to recognize that concepts of Net saving and Net investment in the national accounts, which include only produced capital, could be extended for natural capital and human capital, and thus provide a measure of economic sustainability that takes into account changes in all forms of capital, including ENR capital and human capital.

As an example of this method, the World Bank's Genuine Saving for Uganda in 2001/02 is given below:

<i>Genuine Saving, Uganda 2002</i>	World Bank estimated value in 2002 (US\$ million)
National Saving	\$971
- Consumption of fixed capital (i.e., depreciation of manufactured capital)	- \$431
+ Investment in human capital	+ \$110
- Deforestation	- \$318
- Depletion of mineral resources	Na
- Cost of environmental damage from carbon dioxide emissions	- \$10
= Genuine Saving	= \$322
Gross National Saving as % of Gross National Income	17%
Genuine Saving as % of Gross National Income	6%

Source: unpublished data from World Bank

This compares to Genuine Saving as a percent of GNI of 8% in Kenya and 3% in Tanzania.

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National Saving and consumption of fixed capital (CFC) are usually obtained from the national accounts of each country. In some countries CFC is not measured and the World Bank estimates it as a fixed share of Gross National Income.

Investment in human capital is measured as the expenditure on education, which is part of the national economic data collected from each country by the IMF annually.

Deforestation is measured as the area deforested x estimated ‘stumpage value’ per hectare for timber. The area deforested is obtained from FAO estimates; an average stumpage fee is estimated for different regions of the world based on case studies. In principle, the cost of deforestation should be based on the net value of land use change—this is calculated as the loss in asset value from forest products plus the gain in value from alternative land use, such as agriculture. In practice, the value of alternative land use is highly site-specific and cannot be estimated at the regional level.

Depletion of mineral resources is measured as the volume of minerals extracted x estimated resource rent per unit. Mineral extraction is obtained from a variety of international sources; an average resource rent for each mineral is estimated on the basis of case studies.

Damage from carbon emissions is measured as the tons of carbon emitted, which can be obtained from a number of international sources, x US\$10/ton. The unit cost, US\$10/ton, is a ‘placeholder’ widely used in studies of carbon emissions.

From the brief description of the variables included in Genuine Saving and the data sources, two major points should be noted:

- Not all the ENR variables of importance to a country are included. For example, soil erosion and depletion of fisheries are not estimated
- Some data are supplied by each country, but other data are derived from international estimates. Figures supplied by each country for its National saving, CFC, and education expenditure are quite accurate (as accurate as the national accounts). International estimates for carbon emissions and mineral production are also fairly accurate for each country. But estimates for deforestation can be much less accurate. Furthermore, the values used to price deforestation and mineral depletion are derived from average values calculated from limited data for a few countries applied to similar countries, which may not be very accurate.

These are issues we will return to when discussing what steps to take. But the purpose of the World Bank’s compilation of Genuine Saving is to show that it can be done and to encourage countries to compile their own Genuine Saving based on more accurate data that can be found within each country.

2.2 Who measures Genuine Saving?

Genuine Saving is included in the SEEA as one of the environmentally adjusted macroeconomic indicators that can be constructed. Since the late 1990’s, the World Bank has calculated Genuine Saving for almost all countries, and has a time series going back to 1970, when data are available for a country. Many of the leading economists support Genuine Saving (sometimes called Comprehensive Saving or Genuine Investment) as a reasonable shortcut to measuring total wealth directly (most recently in Arrow et al., 2004)

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A version of Genuine Saving—termed Net Saving Adjusted for Depletion—was constructed for Australia (Ryan, 2000). This measure included changes in produced capital plus mineral reserves, but not human capital. A few countries are now including natural capital in their national balance sheet: Australia, Canada, and UK (for oil). Accounts for total wealth including natural capital have been constructed for Botswana and Namibia. For these countries, Genuine Saving is measured directly from the annual change in total wealth.

2.3 Criticisms of Genuine Saving and implications for ANS

All indicators have some limitations, either in concept or the way they are implemented. This section reviews several major aspects of Genuine Saving that have been criticized and recommends how to address them in an ANS for Uganda.

Method for valuing depletion and degradation

The SEEA presents several different methods for measuring the value of depletion of natural resources; there is no consensus yet in the international community over which method is best. Some critics claim that the method used by the World Bank overestimates the cost of depletion (Dietz and Neumayer, 2004). However, the World Bank approach is the easiest to implement; until there are clear recommendations from the international community, the World Bank approach is probably the best to use. As mentioned above, deforestation should be valued at the net value of the change in land use, not just the loss in forest asset value.

In principle, all forms of ENR degradation should be included in Genuine Saving, but the lack of data has so far limited the measure of degradation to a charge for carbon emissions. A charge for carbon emissions can be included because data are available for all countries and there is a reasonable consensus on a global price. Soil erosion, fertility loss, and other forms of resource degradation (wetlands, air pollution, etc.) are not included in the World Bank's measure of Genuine Saving, but should be added in Uganda's ANS where possible. For these forms of environmental degradation, there is no global price; all costs are locally determined and vary enormously among countries.

New discoveries, technological changes and other factors

Perhaps a serious criticism of Genuine Saving is that it does not include additions to the volume and/or value of natural capital. Additions may come about through new discoveries (minerals), improvements in the management of natural capital that might increase its value (fisheries, forestry, wildlife, etc.), or changes in technology or commodity prices that make previously un(der)-utilised resources economically exploitable. There is no easy solution to this problem yet.

Human capital

Sustainable development requires building wealth of all kinds including human capital. In many countries, it makes sense to deplete some natural capital in order to finance investment in human capital. A great deal of work has been done on the measurement of produced capital and natural capital, but there is no consensus about how to measure human capital. Rather than omit investment in this critical type of capital—and the possibility of sending misleading signals about sustainability—the World Bank measures investment in human capital as expenditure on education. This approach is less than ideal because the investment is valued at the cost of production rather than a price that reflects its contribution to

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production and national income; but such a price is not currently available, although the subject is receiving new attention by economists. Indeed, other components of the NA for which market prices are not available are also measured in this way, for example, most of the output of government and social services.

Despite problems in measurement, it is advisable to include human capital in ANS. Omitting human capital may send misleading signals about sustainability in cases where other capital (produced or natural) is depleted in order to fund human capital.

Population growth.

It can be reasonably argued that sustainable development requires not just non-declining wealth, but non-declining *percapita* wealth—that means that every year total wealth must increase at the same rate as the population increases just to maintain the same material standard of living for the population over time. A negative figure for Genuine Saving indicates unsustainable economic growth. However, a positive figure for Genuine Saving does not necessarily indicate a sustainable economy—it shows an increase in capital, but it cannot indicate whether the increase is sufficient to maintain percapita capital stock. Only full accounts for wealth can be used to determine whether percapita wealth is increasing over time.

2.4 Recommendations

For Pillar 1 of the PEAP, Economic Management, commonly cited macroeconomic variables like GDP are the only indicators included in the Results and Monitoring Matrix; there is no indicator of the *sustainability* of macroeconomic growth and poverty reduction. Adding ANS would complement the objective for stable economic growth with sustainable economic growth

ANS is a good indicator of sustainability, which can be compiled without a great deal of extra data collection. ANS can build on the World Bank’s Genuine Saving for Uganda, but should be revised in two ways:

- Improve the indicator by using Ugandan data for items already in Genuine Saving, i.e., deforestation.
- Add other resources not included in Genuine Saving: soil erosion, fisheries, degradation of wetlands, wildlife and other important resources as data become available

ANS is measured as:

$$ANS = GNS - CFC + HC - D_{For} - D_{Fish} - D_{Other} - SE - CO_2$$

Where

ANS	Adjusted Net Saving
GNS	Gross National Saving
CFC	Consumption of fixed capital (depreciation of manufactured capital)
HC	Investment in human capital
D_{For}	Deforestation and forest degradation
D_{Fish}	Depletion of fisheries
D_{Other}	Depletion of other natural resources, as data become available
SE	Soil erosion
CO_2	Carbon emissions

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Recommendation: Compile Adjusted Net Saving and add it to the indicators for Pillar 1 of the PEAP Results and Monitoring Matrix

ANS should be compiled incrementally, building on data presently available, introducing improved data over time, and conducting capacity building and sensitisation to ensure ANS is institutionalised in the PEAP process. Broad objectives of the incremental approach are the following:

Now (by March 2005): Construct ANS based on method of Genuine Saving including preliminary values for deforestation obtained from Ugandan data and adding soil erosion

Improve ANS in the Medium Term (2005): revise preliminary values for deforestation and soil erosion and include new data where available

Institutionalise ANS in the Longer-Term (2006 +): Include additional ENR sectors and add ANS to PEAP Results and Monitoring Matrix

Specific actions needed for each stage of ANS development are discussed below and summarized in Table 3, which also shows the agencies that must be involved. The ENR-SWG will have primary responsibility for all actions; specific agencies whose cooperation is required for a task are identified in Table 4. Broadly speaking, the following data are required:

Improving the measure of deforestation in ANS requires data for

- Annual land area deforested by major categories of forest-type
- Value of forest goods and services lost from deforestation (Ush/hectare). Value is measured at stumpage values—the value attributable to the forest—rather than the total value-added or output of forest goods and services
- Value gained from alternative land use, such as crop farming or livestock (Ush/hectare). Value is measured as the land rent—the value of output attributable to the land—rather than the total value-added or total output from alternative land use

A first estimate of deforestation can be made over the next few months based on existing data for forestry. NFA will provide preliminary estimates of annual area deforested (which will be revised by mid-2005). A first estimate of the value of forest goods lost from deforestation can be based on Bush et al. (2004) with some adjustments to estimate stumpage value from output value (Table 2). These values are described in the next section. If possible, the value of value gained from alternative land use will also be estimated. Steps will also be taken to improve the data on forestry by initiating discussions to revise the Household Survey to include questions about use of forest goods and services. A preliminary discussion document for this revision was provided to UBOS by the consultant.

Table 2. Estimated annual production of timber and non-timber forest products from Uganda's forests

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	Total hectares of forest type in Uganda	Total livelihood value of forest type, million Ush per annum		
		Timber + NTFP	Timber value	NTFP value
Protected Tropical Highland Forest	427,210	7,721	3,630	4,092
Private Tropical Highland Forest	350,130	10,625	6,694	3,931
Savannah woodland & Bushland	1,372,708	69,222	48,453	20,770
Afromontane	264,200	64,049	23,699	40,351
Total	2,414,248	151,617	82,476	69,144

	Annual livelihood value, Ush per hectare		
	Timber + NTFP	Timber value	NTFP value
Protected Tropical Highland Forest	18,074	8,497	9,578
Private Tropical Highland Forest	30,346	19,119	11,227
Savannah woodland & Bushland	50,427	35,297	15,131
Afromontane	242,427	89,701	152,729
Average	62,801	34,162	28,640

NTFP: Non-timber forest products.

Notes: Protected Tropical Highland Forest adjusted for forest type found in Afromontane zone. Figures may not sum to totals due to rounding.

Source: Adapted from Bush et al. (2004) Table 15, p. 33

Over the medium term (2005), the measure of deforestation will be improved in several ways. Based on analysis of satellite imagery by NFA, more accurate information about land area deforested will become available in the middle of 2005. Recommended revisions of the Household Survey in order to provide better, annual information about the use of forest products, will be made. Further analysis of existing case study data will revise the values for forest products and alternative land use. In order to build support for ANS and to institutionalise compilation of ANS, NEMA, NFA, UBOS, MAAIF and MFPED should review the valuation methods jointly in cooperation with Makerere University, which can provide expertise in economic valuation. Valuation issues are discussed in more detail in the next section of this report.

In the longer term, data from the Household Survey about use of forest goods will improve the measure of the value of forests and the cost of deforestation. Research is required to assess the credibility of data about forest environmental services and how they are affected by deforestation.

Including the cost of land degradation/soil erosion in ANS requires data for:

- Annual volume of soil loss, or land area affected by soil erosion (and loss of soil fertility)
- Value of lost agricultural productivity due to soil erosion and loss of fertility

IFPRI and KARI have provided a first estimate of the volume of soil erosion. M&Y estimated a value for soil erosion based on the cost of fertilizers to replace lost nutrients. However, this is not an appropriate method for ANS; the appropriate measure is the loss of

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agricultural productivity. Furthermore, in the case of subsistence agriculture, the replacement cost method tends to overestimate the cost of soil erosion. In the short term, if a rough estimate of the value of productivity loss can be made, it will be included in ANS.

In the medium term, IFPRI and KARI are carrying out additional work, which will provide more accurate measures of the volume and value of soil erosion. The cost of land degradation should also include losses of soil fertility; it is likely that this additional component of land degradation will only be available in the longer run.

Including the cost for other ENR sectors in ANS requires data for:

- Stocks of other ENR variables, for example, stocks of fish
- Value of changes in these stocks

In the short term, these ENR sectors cannot be included in ANS. In the medium term, it may be possible to include a measure for fisheries, if information about stocks and changes in stocks becomes available in the coming year. An assessment of data available for other ENR sectors can be undertaken in the coming year. Otherwise, the inclusion of fisheries, wetlands, wildlife and other resources will only be possible in the longer term when specific surveys can be undertaken.

Institutionalisation

Institutionalisation of ANS requires development of credible data, valuation methodologies and the capacity in the relevant agencies to compile ANS, as well as understanding and acceptance of ANS in MFPED and other agencies.

A critical component of compiling ANS is choosing an appropriate valuation method. Environmental economics has developed a range of different valuation methodologies, but not all are consistent with national accounts. Workshops to review valuation methodologies for each ENR sector should be held jointly by NEMA, UBOS, MFPED, MAAIF and the relevant ENR agency (such as NFA or DFR) in cooperation with Makerere University, which can provide expertise in economic valuation.

At each stage, there should be stakeholders meetings to present and discuss the data used for ANS.

More general training in environmental economics would also greatly facilitate institutionalisation of ANS. Training could be provided at a variety of levels, such as half-day workshops for high-level policymakers, with longer workshops for economists in line ministries and government agencies.

Finally, there are international opportunities for training in environmental accounting methods, which staff of UBOS, NEMA, MWLE and other agencies should attend when possible. The first is the Regional Training Workshop in Natural Resource Accounting organized by the CEEPA (Centre for Environmental Economics and Policy in Africa), University of Pretoria. Other workshops are being planned.

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Table 3. Recommended actions to construct Adjusted Net Saving

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Actions		Agencies responsible
Now, possible with existing data: ANS based on revision of World Bank's Genuine Saving to include:		
1. Deforestation	Use preliminary estimate of area deforested from NFA. Use Bush et al. (2004) to estimate cost of deforestation	NEMA, NFA, UBOS, Makerere University
2. Soil erosion	Include figure soil erosion, but valued as the cost of reduced land productivity rather than the method in Y&M	NEMA, IFPRI, KARI, MAAIF, PMA Secretariat
Medium-term (2005): Improve ANS		
3. All components	Hold seminars to sensitise MFPED and others to ANS and its contribution to the PEAP. Hold stakeholders workshops to discuss results.	NEMA, MFPED, PMA Secretariat and others
4. Deforestation	Obtain more accurate data on area deforested from NFA's satellite imagery analysis. Recommend changes to Household Survey and other relevant surveys for the collection of data about forest goods and services Agree upon valuation methods acceptable to UBOS, MFPED, NFA for forest goods and services Estimate the stumpage value of forest goods and services.	NEMA, NFA, UBOS, MFPED, Makerere University
5. Soil erosion	Improve figure as more data are available from IFPRI/KARI, and better data about declining yields are available.	NEMA, KARI, IFPRI, MAAIF, PMA Secretariat, Makerere University
6. Other resources	Assess possibility of including other resources such as fisheries	NEMA and others to be determined
Longer-term: Improve and expand ANS to include all resources		
7. All components	Hold seminars to sensitise MFPED to ANS and its contribution to the PEAP Hold stakeholders workshops to discuss results	NEMA, MFPED, and others
8. Deforestation	Improve valuation based on new data obtained from Household Survey and other sources that may become available	NFA, UBOS, NEMA, MFPED, Makerere University
9. Fisheries	Include in ANS if/when stock data are available	DFR, UBOS, NEMA
10. Other natural resources	Wetlands, wildlife, etc. as data are available	NEMA and others to be determined
10. Conduct surveys to improve the figures for cost of depletion and degradation		NEMA and others to be determined

3. Economic Contribution of the Forestry and Fisheries Sectors

Natural resources often provide goods and services that are not fully represented in the NA, mainly because they are not exchanged in markets, so it is not easy to measure the volume and value produced and used. The 1993 SNA recognizes this and recommends that some non-monetary goods be included in the NA, where they are equivalent to similar monetary goods. But other goods and services may not be included, or not explicitly identified. In constructing a more accurate measure of the economic value of forests and fisheries, we first identify the reason for the omission of the value from the NA because this will tell us where the core NA should be revised and where the values should be included in ‘satellite accounts’ for forestry and fisheries.

1. The first case includes goods that in principle should be included in the NA, but are underestimated because of poor data. Examples include non-monetary collection of wood as well as a large range of non-timber forest products. But even the monetary sector can be improved by estimates of unreported activity, mainly logging and fishing. Where under-reporting is significant, it is common for countries to include some estimate of the missing values. In Uganda, for example, an estimate for under-reporting of coffee production is included in the NA. Total GDP will increase by including more accurate and comprehensive figures for ENR sectors.
2. The second case includes values for ENR services that are already included in the NA, but are not explicitly identified as being provided by the ENR sector. A good example is the services provided by forests. Forests may provide forage for livestock, but farmers don't pay grazing fees, so the entire value of this ‘input’ to livestock production is simply attributed to livestock. Forests also provide habitat for wildlife that tourists come to see—the value is attributed to tourism (and distributed across the industries supplying products tourists buy) but not to forests. The entrance fee to forested national parks reflects, in part, this value, but fees are often set without regard for the actual value of the service provided.

In EA for such ENR services, there is no change to the NA or GDP as such; rather, the purpose is to make more explicit the use of, for example, forests by non-forestry sectors. In this case, EA are satellite accounts which show the services forests are providing for free—these services should be valued even if the beneficiaries never pay for them because it shows the economic value that will be lost if forests are not managed sustainably. In some countries, notably in Central America, markets have been developed for these services under a programme called Payment for Environmental Services.

3. The third case includes values that are presently not included in the NA at all, such as carbon storage and biodiversity protection are services which benefit all people of the world, not just Ugandans. These values are only included in satellite accounts and do not affect core NA.

Table 4. ENR values and the representation in national accounts

Type of omission	Example	Action
1. ENR goods that should be included in the NA, but are not fully represented because of the difficulty of obtaining reliable data.	Non-timber forest products collected by households	Revise NA for ENR sector output and value-added
2. ENR goods and services that are included in the NA, but in a manner that attributes their value to a different sector.	Forests provide services to tourism	Include in satellite accounts. Satellite accounts will reallocate the value-added in NA from beneficiary sector using the service to ENR sector providing services.
	Forests provide forage for livestock	
	Forests provide ecosystem services such as watershed protection for soil and water that benefit agriculture, fisheries, municipal water supply, industry, etc.	
3. Forest services that are not represented at all in the NA	Carbon storage and biodiversity protection in forests	Include in satellite accounts. There is no NA counterpart.

3.1 Valuation of ENR goods and services

A number of studies have attempted to provide a more accurate figure for the economic value of forestry and fisheries; some were reported in Y&M and a new forestry study was completed this year (Bush et al. 2004). The objective of ENR valuation is to provide a measure of the contribution of ENR sectors to GDP; to do so, one must use the same definitions and valuation methodology as the NA uses. Several issues must be dealt with when going from case studies of ENR values to including such values in the national accounts.

One set of issues concerns the suitability of case study data for scaling up to the national level. Issues include the design of the sample frame, the coverage of ENR variables, etc. These issues cannot be fully assessed at this time, but should be addressed in the medium term.

Another set of issues concerns the methods of valuation. Case studies are undertaken for many reasons—few have as their primary objective the revision of the NA. Valuation methods for one purpose, such as cost-benefit analysis, are not necessarily appropriate for revising the NA. Consequently, when drawing on case study values for the NA, some adjustment might be needed. These are the most common circumstances where values from case studies might require adjustment before inclusion in the NA:

- Distinction between *output* and *value-added*. Sectoral contribution to GDP is measured by its value-added, or the income generated (labour income + operating surplus + net taxes on production). This is calculated by subtracting from output the intermediate consumption of goods and services used in production. Some case

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studies measure the value of output but do not report the value-added portion of output.

- Value in *basic prices* and in *purchasers' prices*. Sectoral output in the NA is measured in farm-gate or factory-gate prices, that is, the price at the point of production. But there are additional costs incurred between the farm-gate and the point where the consumer purchases the product—these costs include trade & transport margins plus net taxes on products. Where products are consumed directly by the producer, such as a household, there are no margins, but when goods are sold, margins must be taken into account
- *Consumer surplus* and *market price*. Market price is the concept used in the NA; typically it is the single (or average) price that all consumers pay for a good, regardless of how much they might be willing to pay for it. Economic studies sometimes use a concept called 'consumer surplus' which attempts to measure the total amount that consumers would have been willing to pay for a good—in addition to the market price that they actually pay. Consumer surplus gives a more accurate picture of the economic value, but is not consistent with the NA.

Data for estimating the true economic value of forestry and fisheries are reviewed below to determine

- which values can be used to improve the NA and which belong only in satellite accounts
- if adjustments to data are needed for consistency with the NA

The review considers M&Y, the Bush et al. study for NFA as well as many of the reports and studies that underlie both of these reports. (See list of documents reviewed in the Appendix).

3.2 Forestry

Uganda's forests provide 5 categories of goods and services:

1. Wood and wood products, monetary and non-monetary (logs, poles, firewood, and the principle input to charcoal manufacture)
2. Non-timber forest products
3. Services to non-forest economic activities: forage for livestock, tourism
4. Environmental protection services for soil and water that benefit Uganda's economy
5. Global environmental services: carbon storage and biodiversity protection

The forest industry in the NA includes only the first, wood and wood products. Non-timber forest products, such as wild foods, craft and building materials, medicines, etc. are not included, although in principle they should be treated as part of the forest industry. Measurement and valuation use standard NA methods, but data collection poses serious challenges for these missing values.

Services to non-forest economic activities such as livestock forage and tourism, are included in the NA, but attributed to those sectors, not forestry. Valuation is relatively straightforward, although additional data will be required.

Environmental protection services for soil and water benefit a number of industries, notably, agriculture, drinking water companies (public suppliers and private bottlers), water-intensive

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manufacturing industries, and perhaps fisheries. These values are implicitly included in the NA, and estimating the forest service contribution to these sectors is difficult. Additional environmental protection services for carbon and biodiversity are outside the range of conventional NA, but it is useful to attempt to value these services.

The main, immediate focus of environmental accounting for forestry should focus on improving the data that should already be included in the NA (wood & non-wood forest products) and estimating the value of forest services provided to tourism and livestock. Valuation of additional ecosystem services is a longer-term research project. Each component is now discussed in greater detail.

Wood and non-wood forest products

Commercial sector

There is a monitoring system in place for commercial logging, which, in principle, should provide NFA and UBOS with reasonably good data about economic activity in this sector. However, the ability to monitor and enforce this system is weak, and the incentives for under-reporting (taxes and fees must be paid on the volume of logged) are strong. So NFA and UBOS believe that commercial logging is under-reported, and under-estimated in the NA. For the monetary sector, NFA is putting in place a new system of monitoring which may improve the data they collect and provide to UBOS.

Export statistics may include some unreported timber as well as timber trans-shipped from neighbouring countries, but trade statistics are not reconciled with production and use statistics. Getting a better picture of timber requires reconciling trade and production accounts for timber—not an easy task! This might allow UBOS to develop an estimate of under-reported logging.

Non-monetary sector

UBOS obtains data about wood use from NFA, but these data are largely based on earlier benchmarks for percapita energy requirements, which may not be accurate parameters for predicting wood harvest any longer. UBOS conducts a Household Survey which asks households about use of wood products (logs, poles, fuelwood, charcoal), but these figures do not correspond with the estimates provided by NFA and are not used for compiling production accounts for forestry.

The Household Survey does not ask explicitly about non-timber forest products (NTFP). The questionnaire includes items that could be interpreted as including NTFP, but these items take the form of residuals rather than specific items, hence, they are unlikely to elicit a reliable response. The items are: “other meat,” “other fruit,” “other vegetables,” “other food,” and “traditional doctors fees/medicines” (this last item could include gathering of wild plants for medicine). There is no item that would include thatching grass and other NTFP used for crafts and construction. It would be quite useful to expand the Household Survey to include some questions about forest products.

Bush et al. (2004) carried out a major survey of the goods and services provided by forests for NFA. The study provides a good basis for non-timber forest products to be included in the Household Survey because it has identified products that are 1) significant for livelihoods and hence worth the effort of collecting information and 2) feasible to include in a survey.

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The questionnaire used by Bush et al. asks about use of the forest products shown in the following list (question 34):

Vegetables and Fruits	Animals, large	Other products
Yams	Big antelope	Building poles
Bamboo shoots	Hippo	Timber
Mushrooms	Buffalo	Grass for thatching
Wild honey	Animals, small	Rattan
Afromamum	Rats	Bamboo
Passion fruit	Rabbits	Sand
Guava	Duiker	Clay
Mango	Primates	Stones
Jackfruit	Snakes	Other products
Paw paw	Porcupine	Large carpentry items
Palm nut (for oil)	Guinea fowl	Small carpentry items
Wild coffee	Francolin	Medicinal plants
Tamarind	Other	Mats/woven goods
		Handicrafts
		Firewood
		Charcoal

The questionnaire surveyed a large number of items, and it is probably not possible to include them at such a level of detail in the Household Survey. However, collecting data for a more aggregate product classification increases the difficulty of obtaining a good estimate of product values. The Household Budget Survey of Tanzania collects information about forest goods aggregated into the following major groups:

Forest products included in the Tanzanian Household Budget Survey

Logs (timber)
Poles
Firewood
Charcoal
Wattle bark
Sandalwood
Baobao (Ukwaju)
Ubuyu
Natural honey
Bees wax
Wild fruits
Wild vegetables (including medicinal plants)
Insects
Bushmeat
Gum Arabica

The data obtained from Bush et al. as well as from the Household Survey, when it is revised, will provide measures of output value, but additional data and analysis is required to estimate value-added, which is the forestry sector's contribution to GDP. It is likely that, with the

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exception of charcoal manufacturing, the intermediate inputs to these activities are few and value-added as a share of output is high, as much as 90%. Further work needs to be done to determine the value-added portion of output. Falkenberg and Sepp (2000) seem to have done some work in this area, but the consultant was not provided with a copy of that report and cannot assess its usefulness.

Environmental services

Tourism

Foreign tourism expenditure has been estimated at US\$183 million in 2002/03, just under 3% of GDP (Y&M report tourism as 7.5% of GDP, but they seem to have used erroneous figures for GDP). Foreign tourists are broadly defined to include all non-residents visiting for less than a year, including business visitors and people visiting family and friends, not just those coming for recreational purposes to see the National Parks and other sites. Nonetheless, ecotourism is thought to dominate the industry, and forested areas provide most of the ecotourism sites. Six out of the ten National Parks are forests. There are no estimates of the value of domestic tourism, although Ugandans account for the largest group of visitors to Wildlife Protected Areas (Y&M). It is clear that forest ecosystems are critical for the tourism industry.

An indicator of their importance is the entry fee paid by visitors to these parks, but this accounts for only a small part of the total expenditures by tourists to visit forest-based sites. The value of tourism expenditure in these six, forested National Parks would provide a lower bound estimate of the contribution of forests to tourism. While estimation of forest-based tourism will not change the core NA, it will make the economic contribution of this ENR sector more explicit.

Tourism value is estimated in two ways:

- Expenditure or Use:* a Visitors' Exit Survey provides data about tourist expenditures
- Production or Supply:* an industry survey provides data about the output of the tourist industries supplying the goods and services tourists buy

Visitors' Exit Surveys have been carried out and are used to estimate foreign tourism for the balance of payments. No further use of the data appears to have been made that might indicate how much of the expenditure is attributable to forested areas.

Livestock forage

Livestock forage was a significant value in the Bush et al. (2004) study. Their method was to estimate the area of degraded woodlands, bush or grassland that could be grazed (10.6 million ha), estimate the number of cattle the land could support (1 LSU/Ha), and assign a value of Ush 3,640 per hectare to this forage. The value is based on Falkenberg and Sepp (2000) and other studies; no new work was done for this study. Consequently, the figure is very rough and warrants further investigation in the future.

Environmental protection services, local and global

There is no doubt that forests play a valuable role in protecting soils and water, as well as maintaining climate and biodiversity. But it is not easy to quantify these services, and to value them is even more difficult. Carbon storage is the one service for which reasonably accurate volume data can be obtained; valuation can use internationally accepted prices, which are reviewed in (Eurostat, 2002; Lange, 2004b; UN et al., 2003). For other services,

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Falkenberg and Sepp did some work, which Bush et al. (2004) draw on. Because of the uncertain nature of the data, these values will remain more experimental until new work can be done.

Downstream economic impact of forests

Falkenberg and Sepp (2000), quoted in Y&M, provide some measures of the downstream contributions of forestry to wood processing industries. The supply-and-use table and the SAM, which UBOS will start constructing in 2005, will provide good, comprehensive estimates of the economy-wide economic contribution of forestry.

Cost of deforestation

Deforestation and forest degradation are serious problems. The FAO estimates a loss of 50,000 hectares annually. As described in the previous section, the cost of deforestation should be included in ANS, where the lost forest products are valued at the land area deforested multiplied by the unit stumpage value, or resource rent (Ush per hectare). There is no estimate of stumpage fee in any of the documents reviewed; there are some indications that Falkenberg and Sepp (2000) estimated stumpage values, but they would, in any case, need to be updated.

At this time, losses from deforestation are restricted to timber and non-timber forest products. The impact of deforestation on livestock grazing is likely to be very small since grazing occurs on already degraded woodlands. Tourism sites are, in principle, protected and not subject to deforestation, but this needs further review. The effect of deforestation on the ability of forest to provide other services is uncertain.

Summary of recommendations for forestry

Based on the discussion above, the following recommendations are made for each component of forest accounts:

Logging, Monetary sector:

- Check new NFA monitoring system for improvements in logging data (volume and value)
- Address the issue of unreported logging, perhaps including an estimate
- Reconcile trade and production statistics for timber

Harvesting of wood products, Non-monetary sector:

- The estimate of the use of non-monetary wood products and their prices needs revision, and figures from NFA should be reconciled with those from the Household Survey
- For non-timber forest products, the Household Survey should add questions about the use and sale of forest products. The number of products used for the Bush et al. study is probably too large for the Household Survey so UBOS should design jointly with NFA, Natural Forest Management and Forest Management and Planning, an appropriate number and classification of products to include in the Household Survey. Product classification would be based on the relative importance of items and the reliability of responses and NFA can provide this. NFA can also advise regarding units of measurement and value.
- The values for timber and NTFP collected by Bush et al. represent output and should be adjusted to estimate the value-added component. These values can be used for

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comparison with the next Household Survey and the residual values currently in the Household Survey.

With the next Household Survey scheduled for February, there may be little time for an extensive, proper review of the products to be added to the HS. Nonetheless, it would still be useful to include a section with some questions on forest products, even if highly aggregated, in order to test the questionnaire and compare with the NFA study.

- It would also be useful to include additional products that are harvested from wetlands such as reeds, but it may not be possible to do so at this time.

Environmental services to tourism and livestock

- A preliminary estimate of forest-based tourism expenditures can be made using the existing survey data, based on average tourist expenditures and the number of tourists visited forest sites. For more accurate estimates, additional surveys by UWA will be needed.
- Assumptions used for valuation of forage value should be reviewed

Other environmental services

- Values for carbon storage can be calculated from existing data about forest biomass and international 'prices' for carbon
- Values for other environmental services: soil and water protection, biodiversity protection, will require more extensive research

Downstream economic impacts of forestry

- Downstream impacts should be measured using the SUT and SAM under development by UBOS

Deforestation (also discussed in section 2 of this report)

- Preliminary estimate of the cost of deforestation can be based on hectares lost each year and the forest values per hectare from Bush et al. However, the values in Bush are for output, and the stumpage value must be estimated. Initial values should include only timber and NTFP values; other forest values can be added later after further research to establish credible values.

3.3 Fisheries

In contrast to forestry, fisheries provide only one product: fish (including fresh, frozen, smoked, dried, and other fish products), so the issue for EA with respect to fisheries is relatively simple: how good is the measure of output of this sector and how can it be improved?

Fisheries include monetary and non-monetary fishing and fish processing. Most of the data problems were discussed at length in M&Y and elsewhere; they are summarized here in terms of what can be done for the NA.

Monetary sector

For the relatively large-scale, industrial sector, since most is exported there are potentially two checks on production: the production volume reported by companies and the exported volume reported by Customs. For fish exported to Europe, the data are probably fairly sound since the EU has stringent regulations requiring traceability of fish. For fish exports to other countries there are no such regulations and it is not clear how accurate the data are. Incentives for under-reporting are high—taxes are paid on the volume of fish caught, and their marketing. Government and industry experts agree that there is a problem with illegal, unregulated, and unreported fishing, which is probably significant. To the extent that unreported fishing is exported and is captured in Customs statistics, the magnitude of the problem may be partly revealed by comparing trade statistics and production statistics. For some industries, an estimate of unreported activity is included in the NA, often as a fixed percent of the reported output. Much of the fish exported to the DRC and Rwanda is unrecorded.

Non-monetary sector

While local governments should, in principle, provide data to DFR and UBOS about fish catch and fish prices, this system has not worked very well, and experts agree that fish production and consumption is underestimated. Fish catch from smaller lakes and rivers is not accounted for. DFR is putting into place a number of measures aimed at improving reporting of non-monetary fishing activity in the future, such as the Beach Monitoring Units.

Another major data source for fish production and consumption is the Household Survey. The Fisheries Commissioner pointed out that the Household Survey systematically underestimates non-monetary fish catch because the sample frame is not appropriate for fishing villages and households. Fishing villages occur in clusters and would require a submodule of the HS in which these households would be over-sampled. This submodule of the HS would also improve an understanding of the relationship between fisheries and livelihoods. Keizire (2003) points out that there are no accurate figures for the number of households that derive their livelihoods from fishing.

The construction of a suitable submodule will require cooperation of DFR and UBOS, as well as other agencies. It can build on survey work for specific areas, such as the Survey of Lake Victoria Environmental Management Project mentioned in Keizire (2003).

Summary of recommendations for fisheries

Output and contribution to GDP

Data for the monetary and non-monetary sectors provided in Banks (2003) include estimates of values for fisheries from the point of production through its downstream impacts in fish processing and wholesale trade of fish products. Banks distinguishes output and value-added at all points. These values are consistent with NA and, in principle, can be used for the NA. However, these values cannot simply be inserted in the NA; rather, they should be used as a guide in collecting better information for inclusion in the NA. The following steps—already recommended by DFR and others—should be taken to construct EA for fisheries

- Monetary sector contribution to GDP: include estimate of illegal, unreported and unregulated fishing
- Non-monetary sector contribution to GDP: collect more accurate data by introducing a submodule into the Household Survey

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The Banks study can provide a guide for calculating the value-added portion of output.

Downstream economic impact of fisheries

Banks provides some estimates of the downstream impacts of fishing—fish processing and trading. The supply-and-use table (SUT) and the SAM, which UBOS will start constructing in 2005, will provide good, comprehensive estimates of the economy-wide economic contribution of fisheries. Hopefully, the team to construct the SUT and SAM will take into account the data collected by Banks in their work.

Depletion of fisheries

There are clear indications—a declining catch per unit effort—that critical stocks have been overfished (M&Y, pers.comm. from Fisheries Commissioner and staff of FRRI). The cost of fisheries depletion should be included in the ANS, valued at the volume of lost stock (usually defined as tons of fishable adult biomass) times the unit rent (Ush per ton). However, there is no agreement yet on the level of fish stocks and how they may have changed over time. Until there is some agreement on stocks, it is not possible to estimate the cost of depletion.

If and when stock levels, or changes in stock levels, can be provided, the cost of depletion can be calculated using unit rent estimated from Banks (2003). The data from Banks will need to be updated to current prices and reviewed for accuracy. It would be best to involve the private sector in this assessment, possibly through the Uganda Fish Processors and Exporters Association.

3.4 Recommendations for improving the measure of economic contribution of ENR Sectors

Despite the recognition of ENR sectors under the PEAP Pillar 2, Enhancing Production, Competitiveness and Incomes, there are no indicators in the PEAP results and monitoring matrix that assess *both* sustainability and economic contribution. For Pillar 2, indicators cover either

- economic contribution without assessing sustainability of resource use (Fisheries: value of output and exports), or
- environmental sustainability without assessing economic contribution (Forestry: proportion of land under forest cover, average distance to firewood source)

Environmental accounting would provide indicators for both aspects of ENR utilisation. EA will provide better indicators of the contribution of the ENR sectors to the national economy and household livelihoods, which may in turn help support ENR sectors in seeking appropriate levels of budgetary support and investment for sustainable development of the ENR sectors. It may further enhance the cooperation among line ministries because, in the case of forestry for example, the value of forestry to non-forestry sectors (tourism, agriculture, water, etc.) can be demonstrated and quantified. This may also help promote the Sector Wide Approach to the ENR sectors and provide motivation for individual ENR sectors to support each other

Recommendation: Compile accounts for the ENR sectors' contribution to NA and amend the indicators for Pillar 2 of the PEAP Results and Monitoring Matrix

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Environmental accounting for individual ENR sectors should be carried out incrementally, building on data presently available, introducing improved data over time, and conducting capacity-building and sensitisation to ensure ANS is institutionalised in the PEAP process. Broad objectives of the incremental approach are the following:

Now (by March 2005): Initiate actions that will lead to better data for forestry and fisheries in the NA in the Medium-term

Medium term actions to improve forestry and fisheries in NA (2005): estimate preliminary values for forestry and fisheries that should be included in the NA but are presently missing or under-reported; begin estimate of additional forestry values

Longer term actions to improve NA and measures of ENR Sector values (2006 +): estimate broader concepts of ENR sector values especially ecosystem services such as the contribution of forests to tourism, downstream contributions of ENR sectors to GDP (using the SAM); include additional ENR sectors; include indicators for the PEAP Pillar 2 Results and Monitoring Matrix.

Detailed recommendations for forestry and fisheries were described in sections 3.2 and 3.3 above. Those actions are summarised here.

Actions that can be taken over the next few months include initiating discussions between NFA and UBOS about expanding the Household Survey to cover missing forest products and reviewing the valuation methods used in forestry and fisheries case studies to determine which, if any, can be used directly in the NA. While DFR has a fisheries economist, NFA does not yet have a forestry economist, so it would be very helpful to include economists from Makerere University in the discussions.

Over the next year, priority should be given to measuring those values that should be included in the NA but are not fully represented. This includes revisions to the Household Survey to improve the data for Forestry and Fisheries, and agreement upon revisions to values that might be adopted from case studies and other surveys. Plans for addressing other ENR sectors, such as water, minerals, wildlife, energy, should also be developed.

An important component of forestry values are the 'free' services provided to other sectors, especially tourism and agriculture. Presently, there is no estimate of forest-based tourism values, but it is likely that a rough estimate of the value could be provided from existing data. The values for livestock forage provided by forests and woodlands reported in (Bush et al. 2004) should be reviewed and improvements planned that are consistent with NA methods.

In the longer term, the economy-wide contribution of ENR sectors including downstream processing can be estimated using the supply-and-use table (SUT) and the Social Accounting Matrix (SAM). Estimates of the value of forest-based tourism should be improved through additional surveys, or a set of additional questions for planned surveys. Longer-term research is needed to improve measures of ecosystem services of forests and wetlands.

Institutionalisation

As with ANS, institutionalisation of EA for the ENR sectors requires development of credible data and methodologies for generating these data, the capacity in the relevant agencies to compile the accounts, and an understanding and acceptance of EA in MFPED and other

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agencies. Workshops involving relevant agencies are needed to come to an agreement about the valuation method consistent with NA, and the participation of MFPED is critical. Stakeholders' workshops are also necessary to sensitise stakeholders on the methods for compiling data and to build support. Most likely, workshops on ANS and on ENR sectors should be combined.

While some aspects of EA for ENR sectors can be handled by staff with current levels of training, valuation of environmental services of forests is likely to require a relatively high degree of proficiency in specialised areas of environmental economics, which staff may not have at present. Additional training and hiring of consultants with specialised expertise will be necessary for some aspects of ENR sector valuation. Makerere University has some capacity in environmental economics and may be able to assist.

Table 5. Recommended actions to improve ENR values in the national accounts

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Now, possible with existing data: Improve measure of ENR values that should be in NA but are presently missing		Agencies responsible
Forestry	Initiate discussions with UBOS to expand Household Survey questionnaire to cover missing forest product data	NFA, UBOS, NEMA
Forestry and Fisheries	Review forestry and fisheries values reported in case studies—identify which are consistent with NA and which require adjustments	NFA, DFR, UBOS, NEMA, MAAIF, Makerere University
Medium term improvements (2005): ENR values that should be in NA but are presently missing		
Forestry	Include questions about NTFP in Household Survey	NFA, UBOS, MFPED, NEMA
Fisheries	Include in Household Survey sample frame submodule for fishing households/villages	DFR-MAAIF, UBOS, NEMA, MFPED
Forestry & Fisheries	Agree upon valuation methods and make the needed adjustments to values from case studies identified earlier, including estimates of value-added. Discuss methods for dealing with unreported and illegal harvesting of timber and fisheries. Discuss reconciling trade statistics with production and use statistics in the NA.	NFA, DFR, UBOS, NEMA, MFPED, Makerere University
Other resources	Identify data gaps and studies/surveys needed to fill them For example, wetland resources that are harvested could be added to Household Survey	DFR, UBOS, NEMA Makerere University
ENR values included in NA but attributed to other sectors		
Forestry & Tourism	Estimate the value of tourism expenditure attributable to forested land (forested National Parks) by simple procedure, such as proportion of tourists visiting park x	MTTI, UWA, NFA, NEMA, Makerere University

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	foreign tourism expenditures	
Forestry & Agriculture	Review methodology in Bush et al. for forage values of forest	MAAIF, UBOS, NEMA, Makerere University
Longer term improvements		
Forestry and Fisheries	Measure multiplier impacts on incomes, especially of poor households, from ENR activities in forestry and fishing using the SUT and SAM	NEMA, UBOS, Makerere University
Forestry & Tourism	Conduct surveys to improve the estimate the value of tourism expenditure attributable to forested land (forested National Parks) Estimate the value-added generated by industries providing goods and services that tourists purchase	MTTI, UWA, NFA, NEMA, Makerere University
Other resources	Surveys for missing ENR data	NEMA and others to be determined
Ecosystem services (forestry & wetlands)	Identify contributions to water and soil protection and who benefits: agriculture, fisheries, municipal water supply, water bottling company, etc. Review valuation methodologies for consistency with NA	NEMA and others to be determined

4. Potential for ENR Sectors to Fund Sustainable Resource Management

There are three components to this assessment:

- Amount of tax and non-tax revenues collected by government from ENR sectors
- Current levels of government expenditure on ENR sectors
- Resource rent generated by ENR sectors: this represents the potential revenue that can be obtained from ENR sectors

It may not initially seem that these statistics are part of EA because these data can be collected outside the environmental accounting framework. However, the SEEA includes these items under the environmental accounting component, Accounts for Natural Resource Management, because it is so useful for policymakers to have this information along with the kind of information discussed in sections 2 and 3. The SEEA Handbook provides an extensive discussion of these data and guidelines for compilation.

For both Forestry and Fisheries, government expenditure for resource management can be obtained from government budget statistics. Similarly, revenues collected from forestry, fishing and related activities can also be collected from official statistics. There remains a question about the potential for Forestry and Fisheries to contribute to management expenditures of their respective sectors. This issue has two components:

- The efficiency of current revenue collection, given current levels of taxation and levies. Actual revenue collected may be less than potential revenue due to under-reporting of harvest/catch and under-collection of tax and non-tax revenues for reported harvest/catch

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- The potential ability to pay based on the resource rent generated by Forestry and Fisheries

There have been a number of studies of revenue collection efficiency and these will not be reviewed here. What is relevant to environmental accounting is the potential ability to pay based on the resource rent generated by Forestry and Fisheries. The issue of resource rent, or stumpage value for forestry, has already been raised in sections 2 and 3. Resource rent is the value of natural resources *in situ*, and is used to calculate the cost of depletion of natural capital.

4.1 Resource rent in Forestry and Fisheries

Forestry

In Forestry, there has been no review of stumpage values or an assessment of the present levels of tax and non-tax levies on logging. Some reports have alluded to work done by Falkenberg and Sepp on stumpage values, but it is unclear whether that study really did provide such values. There are two possible methods for estimating stumpage value. First, stumpage values for similar timber in East Africa may provide a useful first approximation for stumpage values in Uganda. Alternatively, the introduction of auctions as a method for allocating logging rights may shed some light on the stumpage value of timber. The auction price, under competitive bidding, will approach the stumpage value. The auction system is quite new so the prices may not yet reflect rent, but it will be useful to monitor the auction prices from an early stage.

Fisheries

Two studies have been done that provide information about the potential resource rent generated by fisheries, Norconsult (2002) and Banks (2003). The Norconsult study, part of the Fish Levy Trust Fund Study, was carried out to evaluate the potential contribution the Lake Victoria fisheries industry could make to a fund for management of fisheries. It did not collect detailed information about the costs of fishing. Banks (2003) collected detailed information about fishing activities on major water bodies in Uganda. Banks did not calculate the resource rent generated by fishing, but his data could be used to calculate rent. Banks' underlying database would have to be accessed to estimate resource rent, and all stakeholders, including the private sector, should also be consulted.

4.2 Recommendations

This component of EA contributes primarily to Pillar 2 of the PEAP: Enhancing production, competitiveness and incomes because it identifies the degree to which ENR sectors can be taxed to provide revenues for ENR management.

But this component also contributes to PEAP Pillar 1, Strong Economic Management. ENR sectors are a major source of revenue, so sound fiscal management requires environmentally sustainable management of ENR sectors. Quantifying this dependence of government on revenues from ENR sectors—as well as the potential contribution ENR sectors could make—will motivate appropriate levels of budgetary support and investment for sustainable development of the ENR sectors.

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The data will provide better information about

- Dependence of government on revenue from ENR sectors compared to current levels of support for these sectors from the government budget, and the levels needed for investment to make ENR sectors (and government’s revenue stream) sustainable.
- The potential resource rent from ENR sectors, which could be recovered to fund management of ENR sectors and contribute to government revenue

Recommendation: Using environmental accounts, estimate the potential for ENR Sectors to fund sustainable management of their respective sectors

The following data collection and analysis activities will make clear the ability of ENR sectors to fund sustainable resource management:

- Collect data on tax and non-tax revenues collected for forestry and Fisheries and their related activities
- Collect information from case studies about the efficiency of revenue collection and the potential for additional revenue based on current tax/levy rates
- Collect data on government ministry expenditures (including project expenditures) for Forestry and Fisheries management
- Estimate resource rent for Forestry and Fisheries

Additional information and institution building will be required to ensure that resource rent, if collected by government, is dedicated at least in part to the management of the ENR sector from which it originates. While recommendations in this area go beyond the scope of environmental accounting, it is reasonable to recommend the following

- Review mechanisms used in other countries to ensure that some portion of NR taxes, user fees, royalties are returned to the sector for managing the resource
- Assess compliance with national legislation of mechanisms for ENR institutions to retain (a proportion) of revenue and mechanisms for addressing any potential conflicts of interest
- Assess the incidence of benefits and burden from any changes in revenue and tax policy

These recommendations can be carried out incrementally, as described in the table below.

Table 6. Recommended actions to estimate the potential for ENR sectors to fund sustainable NR management

ENR SWG has overall responsibility for implementation of these actions. Specific ENR SWG members, as well as some non-members with primary roles to play are identified for each task.

Now, using existing data:		Agency responsible
Assess current levels of revenue generated by ENR sectors		
Fisheries and forestry	Collect data on tax & non-tax revenues collected by government	NEMA, NFA, DFR-MAAIF, MFPED, Makerere University
	Compare revenue to ENR Ministry budgets	

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Medium term (2005): resource rent and its contribution to ENR management		
Forestry and fisheries	Review existing studies for estimates of resource rent: Fisheries: Norconsult and others Forestry: Falkenberg and Sepp, others Compare estimates of rent to revenues collected by government and ENR Ministry budgets. Identify data required to improve measures of resource rent.	NEMA, NFA, DFR, MAAIF, MFPED, Makerere University
Allocation of rents	Review mechanisms used in other countries to ensure that some portion of NR revenues are dedicated to managing the resource.	NEMA, NFA, DFR, MFPED, Makerere University
Longer Term: potential for ENR sectors to become self-funding		
Missing data on resource rent	Conduct surveys--questions can be included in other surveys	NEMA, NFA, DFR, UBOS, Makerere University
Potential rent	Analysis of potential rent that ENR sectors could generate under optimal management	NEMA, NFA, DFR, Makerere University
Other resources	Estimate rent for other natural resources such as minerals	NEMA, UBOS, Dept of Mines

5. Beneficiaries and target audience for environmental accounts

The beneficiaries of environmental accounting are many. Examples of primary beneficiaries are listed here, but should not be considered an exhaustive list.

ENR Secretariat will be able to determine investment priorities for ENR sectors, and this will also benefit private sector investors also.

Both UBOS and all users of national accounts will benefit because they will have more accurate national accounts—this will help both in monitoring sustainable development at the macroeconomic level and sector level, as well as in the design of appropriate development policies, and in cost-benefit analyses of projects that affect ENR sectors.

The Macroeconomics Department of the Ministry of Finance will benefit by obtaining a more accurate assessment on an annual basis of the sustainability of economic growth.

All agencies responsible for the success of the PEAP will benefit from the more accurate and comprehensive data provided by environmental accounts, because environmental accounts will show at both macro and sectoral levels whether economic growth is sustainable or not.

Annual Fact Sheets can be provided to Parliamentarians and others that include indicators of sustainable economic development from the environmental accounts, and from the improved, more accurate national accounts that result.

Table 7. Example of indicators from the environmental accounts for an annual Fact Sheet

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Indicators at the Macroeconomic Level	
GDP (with more accurate estimates of ENR sectors)	Indicator of economic growth
Adjusted Net Saving: Deforestation Depletion of fish stocks Soil erosion/fertility loss Other environmental degradation	Indicator of the Sustainability of economic growth
Indicators at the Sectoral Level	
ENR sectors' contribution to GDP Exports Employment Household livelihoods (with more accurate values for missing, non-market goods and services from ENR sectors)	Indicators of direct and indirect contribution of ENR sectors to GDP— What the economy may lose if ENR sectors are not maintained in terms of economic growth, balance of payments, jobs and poverty reduction
ENR sectors' contribution to government revenue as share of total revenue	Indicators of dependence of local and national government on sustainable management of ENR sectors
ENR sectors' taxes paid compared to government ENR sector management costs	Indicators of the contribution compared to the cost of management of ENR sectors
ENR sectors' resource rent compared to taxes paid	Indicators of the share of <i>potential</i> compared to the <i>actual</i> contribution of ENR sectors

6. The Way Forward

Environmental accounting should be undertaken in response to clearly defined policy needs. Three such policy needs were identified:

- Is GDP growth sustainable or is Uganda depleting ENR wealth in order to fund current consumption, in other words, 'living off its natural capital?' If not sustainable, then what is the cost of environmental degradation?
- What is the true economic importance of ENR sectors to GDP and how significant are they for household livelihoods, especially the poor?
- What is the potential for ENR sectors to fund the sustainable management of these sectors?

For each of these policy concerns, indicators and statistics obtained from EA were identified. Specific recommendations were made for each component, which are listed together in the Executive Summary. Environmental accounting can be introduced incrementally in 3 phases. The detailed recommendations for EA are divided into

- Immediate actions that can be taken over the next few months, based on data that are presently available or can be used with minor adjustments
- Medium term actions that can be taken over the next year, based on data that will become available later, or will require more extensive revision
- Longer term actions that will require more extensive research or collection of additional data

There is also a crosscutting need for

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- training in specific tools of environmental economics necessary for environmental accounting,
- sensitisation of policymakers and planners about the usefulness of environmental accounting,
- building the institutions in each agency to maintain EA, which involves assigning responsibilities to specific agencies and ensuring that they have the staff and resources to carry out these responsibilities.

At a stakeholders' meeting in February 2005 to review a draft of this report, the following decisions were made:

- ENR SWG, including both line ministries and UBOS, will continue the collaborative relationship with the programme for Natural Resource Accounting in East and Southern Africa (NRAESA). NRAESA is based at CEEPA (Centre for Environmental and Economic Policy in Africa), University of Pretoria. NRAESA has been promoting environmental accounting in Southern and East Africa since 1995 and has a great deal of expertise in this area.
- An environmental accounting sub-group of the ENR SWG was established to facilitate follow-up and obtain firm commitments from each agency to the recommendations of the consultancy report.

6.1 Lessons from other countries

Over the past 10 years of the NRAESA programme, there have been many experiences with establishing environmental accounting. Most countries have found the following institutional arrangement the most successful:

1. A National Advisory Committee (or steering committee) consisting of high level policy-makers from key ENR sectors, as well as the users and other agencies key in compiling environmental accounts. Most important are the Ministry of Finance as a key user and the Statistical Office as a key collaborator in compiling the accounts.

In Uganda, the environmental accounting sub-group of the ENR SWG can play this role.

2. A Technical Committee consisting of technical staff in ENR ministries who will do the actual work. This committee should be relatively small to facilitate getting the work done. Often separate working groups are established to address each ENR sector, and consist only of those agencies directly involved in compiling the accounts for that sector. These working groups in most countries have also included staff from universities or research organizations with specialized expertise in environmental economics.

These working groups can be established in Uganda as the work proceeds. Following directly from the feasibility report, working groups can be established for forestry, fisheries and soils.

Because of the need for environmental economists, it would be useful to collaborate more closely with research institutions of Makerere University.

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3. A key agency that will coordinate and take leadership to drive the process within both committees. In many countries this is a Ministry of Environment.

In Uganda, the ENR Secretariat, NEMA or MLWE could play that role.

6.2 Resources required for implementation and sources of support

The primary resource requirement for introducing environmental accounting is the time of government staff, and the level required depends on the specific recommendations that are adopted and the extent of the effort. The immediate actions can largely be handled though a few weeks' of an international consultant's time plus a slightly longer period of time for a Country Team of local consultants, like the Team for this consultancy.

Determination of the resources needed for Medium-term actions will require additional consultation. Much can be accomplished with a 3-4 months of an international consultant's time, supported by local consultants. But others—notably, carrying out new surveys—will require substantial funding.

Sustainability of environmental accounting requires a great deal of technical training because economists and national accountants do not generally receive training in this specialised tool in their normal education. Including support for technical training is very important. Much of this can be provided through specialised workshops, but it might also be useful in the longer term to support advanced degree training in environmental economics.

The consultancy was able to begin consultation with some agencies about the resources required for implementation, but this process was not completed. This consultation should be completed by the ENR SWG environmental accounting sub-committee.

The ENR SWG may consider providing some support for development of environmental accounting, or looking for support from other sources.

An immediate source of support, although relatively limited, is the NRAESA Programme, which has been operating since 1995 to provide technical assistance to countries for environmental accounting. It is currently in its third phase, with support from SIDA running from 2003-2007. The NRAESA Programme is committed to assisting in the establishment of environmental accounts in Uganda and can provide a small amount of technical assistance from local and international experts, as well as training through technical workshops and degree programmes at the University of Pretoria.

The NRAESA Programme has agreed to fund technical assistance for these activities from Dr. Lange and her colleague, Dr. Mungatana. It has also developed a collaborative relationship with Makerere University, which may be able to assist in some of the activities, but is also prepared to work directly with the appropriate government agencies.

A longer-term potential source of support is the Global Initiative in Environmental Accounting which is being established by the Earth Institute of Columbia University in collaboration with the World Bank.

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Appendix A. People consulted during consultant's visit

Alex Muhweezi, Barbara Nakangu	IUCN
Eugene Muramira, Kaggwa Ronald Kiragga	NEMA
Bezalel Kabanda (Permanent Secretary), James Kawesi	MWLE
Steven Bahemuka Kim Bradford-Smith	UBOS
Dick Nyeko, Commissioner of Fisheries Boaz Keizire	DFR
James Acworth, John Begumana, Nsita Steve Amooti, Khaukha Stephen	NFA
Dr. Moyini	Consultant
Angela Rwabutomize	M of Finance
Damien Akankwasa	Uganda Wildlife Association
Dr. Kamanyi, Dr. Donkara	FRRI
Martin Fowler	MAAIF
Sam Benin	IFPRI
Crammer Kaizzi	Kawanda Agricultural Research Institute
Andrew Plumtre	Wildlife Conservation Society
Deborah Nyarunda	Uganda Fish Processors and Exporters Association
Kyosingira Wilson Fred	Directorate of Water Development

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