

ENVIRONMENT & NATURAL RESOURCE ACCOUNTING



ENVIRONMENT AND NATURAL RESOURCE ACCOUNTING MANUAL provides basic understanding of the application of ENRA in climate change adaptation and mitigation planning and orients the reader in developing municipal accounts.

TRAINING MANUAL

CLIMATE CHANGE COMMISSION



The Climate Change Commission, an independent and autonomous body that has the same status as that of a national government agency, is under the Office of the President of the Philippines. It is the lead policy-making body of the government which is tasked to coordinate, monitor, and evaluate programs and action plans of the government relating to climate change pursuant to the provisions of the Republic Act No. 9729 or the Climate Change Act as amended by Republic Act No. 10174 or the People's Survival Fund.

GLOBAL GREEN GROWTH INSTITUTE



The Global Green Growth Institute (GGGI) is a new international organization committed to strong, inclusive green growth. GGGI assists developing and emerging countries with integrating their ambitions for strong economic performance and environmental sustainability with the goal of bringing about poverty reduction, job creation, social inclusion, and climate change mitigation and adaptation. Headquartered in Seoul, GGGI was established by treaty in June 2012 at the United Nations Rio+20 Conference by an initial group of eighteen nations who share the organization's vision. To date, there are a total of 24 Member Countries who joined the organization. GGGI has a diverse portfolio of programs in developing countries around the world. These in-country programs, together with global products and services, focus on delivering results through an integrated approach of evidence based green growth planning and implementation aligned to countries' development priorities. The organization also focuses on knowledge development and management activities which build a strong theoretical and empirical basis for green growth, while providing concrete options and guidance for policymakers; as well as building the conditions for public and private green infrastructure investments.

PREFACE

The Philippines is highly vulnerable to the impacts of climate change. As witnessed through the devastation from typhoons Yolanda (2013), Glenda (2014), and Lando (2015), millions of Filipinos were affected and communities incurred costly damages and forced to rebuild. In anticipation of stronger typhoons hitting the country, climate change adaptation and mitigation is vital to the development and preparedness of Local Government Units (LGUs) and the people they serve.

The methodologies and tools offered in this publication are intended to raise national awareness and competence among national and local government institutions, civil society, private sector, and communities. This publication provides information outlining mechanisms on how to develop capacities of decision makers, local planners and trainers in integrating science-based assessments into policies, plans, and programs to make communities adaptive and resilient to climate risks.

This manual is one of the many references that the users may utilize in developing their respective development plans.

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Disclaimer

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I. Training Design

1.1. Course Overview

ENRA was initiated in the Philippines in the early 1990s with USAID support to DENR for eight years up to year 2000. At the same time, the UN Statistics Office provided support to the National Statistical Coordination Board (NSCB) to establish an environment and natural resources accounts intended as satellite account to the country's System of National Accounts (SNA). Because of these two parallel initiatives, an executive order was issued by then President Fidel V. Ramos establishing the Philippine Economic, Environmental and Natural Resources Accounts (PEENRA) led by NSCB. The DENR also established its PEENRA core group led by the Policy and Planning division.

Despite increased awareness on the need for ENRA, sustaining its institutionalization at the national level was not sustained. The results of ENRAP, however, found themselves in many of the policies implemented by DENR, particularly in the use of economic instruments for natural resource management and pollution management. Renewed interest in ENRA is, therefore, not surprising as the world grapples with the impacts of climate change and as governments are continuously looking for more efficient tools to incentivize behavioral changes toward adaptation and mitigation.

In the implementation of the National Climate Change Action Plan (NCCAP), the Climate Change Commission – Climate Change Office (CCC-CCO) has started demonstrating the Ecotown approach to integrate climate change adaptation and mitigation planning into local development planning. Two of Ecotown sites that are in more advanced in demonstrating the approach are Siargao Island and San Vicente, Palawan. The activities in these demonstration sites include natural resource assessments, mapping using GIS, environment and natural resource accounting, vulnerability assessment, and support for community based adaptation through enterprise development. This manual is intended to guide the Trainers in conducting the training for the local chief executives and local planners. The toolkits that are attached in this manual will help in using the submodules designed by the expert in the subject and in facilitating the training for the other stakeholders.

1.2. Learning Objectives

At the end of the training program, the participants will be able to:

- Acquire basic understanding of the application ENRA in climate change adaptation and local land use planning
- Acquire basic skills in applying selected tools for ENRA development
- Acquire basic skills in building the accounts of selected natural resources
- Acquire an overview of linking ENRA to municipal accounts

1.3. Expected Outputs

At the end of the training participants are expected to:

- Have drafted a plan on developing an ENRA at the municipal level
- Have prioritized natural resources for development of physical and monetary accounts
- Have identified local core competency in developing ENRA

1.4. Criteria for Selection of Participants

The following criteria are proposed for selections of participants for the different categories of training.

Screening Parameters	Prospective Trainee		
	as Trainers	Local Managers and Decision-makers	Local Technical Working Group/Planner
<i>Capacity to Train/ Educational Background</i>	<p>Must have experience in teaching/handling subjects related to:</p> <p>a. ENRA and NRA: natural resource assessment (includes forestry, fisheries, agriculture, marine and coastal, energy) and accounting, climate change impacts and disaster risk reduction management and rural development planning</p> <p>b. GIS and Vulnerability Assessment: forestry, vulnerability assessment, environmental planning, ecological conservation, geography and rural development planning</p> <p>c. Project development and Financial Literacy: all subjects mentioned above, as all participants will attend this training session. Extensive knowledge in</p>	<i>Not necessary for decision makers</i>	Capacity to train is not pre-requisite; Educational background: College graduate

Screening Parameters	Prospective Trainee		
	as Trainers	Local Managers and Decision-makers	Local Technical Working Group/Planner
	rural development planning is a plus.		
<i>Aptitude</i>	Have conducted trainings in the past	<i>Not a prerequisite</i>	Have prior experience in planning or LGU assessments
<i>Current and future functions in the workplace/relevant work experience</i>	Must have been or presently engage with local government units in either extension program of local planning projects	Have direct decision making authority on plans and programs of the local government unit;	Directly involved in either planning, environment, disaster management planning
	With higher level of familiarity with local landscape, land use planning including local government programs and its regulatory elements	Decides or provides clear guidance on allocation of fund for the local government unit	Participated as member of technical working group in either land use planning, disaster planning, coastal resources management or solid waste management, and waste water management.
<i>Experience</i>	Had prior training or experience in climate change adaptation and mitigation; some knowledge of ENRA	(Not required)	Had prior training or experience in climate change adaptation and mitigation; some quantitative analysis skills
<i>Other Prerequisites</i>	Not retiring in the next six years	Not retiring in the next six years	Not retiring in the next six years; not job order holder or contractual employee of the LGU

1.5. Length of Session

For each topic in ENRA, the ideal length of session in minutes is proposed below.

Topics Covered	Length of Sessions (mins)
Foundations of ENRA	5 minutes
<ul style="list-style-type: none"> • Economic foundations of ENRA • Use of ENRA for score-keeping and policy development 	
Environment and Resource Accounting	30 minutes
<ul style="list-style-type: none"> • Introduction to the UN System of Economic and Environmental Accounting • Valuation approaches • Land Resource Accounting • Forest Resource Accounting • Fishery Resource Accounting 	
Developing Municipal ENRA	45 minutes
<ul style="list-style-type: none"> • Development of Physical Account <ul style="list-style-type: none"> ○ Physical Accounts for the Uplands/forests ○ Physical Accounts for Agriculture and Urban ○ Physical Accounts for Coastal and Marine • Social Accounting Approach to Generating the Municipal Accounts <ul style="list-style-type: none"> ○ SAM Accounting matrix ○ Simple monetary accounts of the Physical Accounts • Estimating Generating Gross Value Added 	
ENRA and Climate Change	15 minutes
<ul style="list-style-type: none"> • Use of NRA and ENRA for Local CC Mitigation & Adaptation Planning • Use of NRA-ENRA in policy development 	

1.6. Course Methodology

The training module will consist of lectures and practical exercise on the use of different ENRA tools. While there will be lectures for all the topics, some involve exercises to measure the learning of the participants and presentation of case studies to demonstrate the application of ENRA in ecotown sites.

Topics Covered	Objectives	Approach
Foundations of ENRA		
<ul style="list-style-type: none"> • Economic foundations of ENRA • Use of ENRA for score-keeping and policy development. 	At the end of the module, the participants will have acquired basic knowledge of the economic foundation of ENRA.	Prior to the lectures, there will be a diagnostic examination to gauge the knowledge of the participants. There will a written examination after the Module.

Topics Covered	Objectives	Approach
Environment and Resource Accounting		
<ul style="list-style-type: none"> • Introduction to the UN System of Economic and Environmental Accounting 	At the end of the session, the participant will acquire basic knowledge of UN SEEA.	Lecture-discussion.
<ul style="list-style-type: none"> • Valuation approaches 	At the end of the session, the participant will acquire basic knowledge of valuation approaches.	Lecture-discussion /prepared exercises.
<ul style="list-style-type: none"> • Land Resource Accounting 	At the end of the session, the participant will acquire basic knowledge of the methods on accounting and valuing land resources.	Lecture-discussion prepared exercises.
<ul style="list-style-type: none"> • Forest Resource Accounting 	At the end of the session, the participant will acquire basic knowledge of the methodology on accounting and valuing forest resources.	Lecture-discussion prepared exercises.
<ul style="list-style-type: none"> • Fishery Resource Accounting 	At the end of the session, the participant will acquire basic knowledge of the methodology on accounting and valuing fishery resources.	Lecture-discussion prepared exercises.
Developing Municipal ENRA		
<ul style="list-style-type: none"> • Development of Physical Account <ul style="list-style-type: none"> ○ Physical Accounts for the Uplands/forests ○ Physical Accounts for Agriculture and Urban ○ Physical Accounts for Coastal and Marine 	At the end of the session, participants will have an overview of different tables and maps of physical accounts of environment and natural resources	Lecture and case presentation (Case: Siargao Island and San Vicente ENRA)
<ul style="list-style-type: none"> • Social Accounting Approach to Generating the Municipal Accounts <ul style="list-style-type: none"> ○ SAM Accounting matrix ○ Simple monetary accounts of the Physical Accounts 	At the end of the session, the participant will acquire basic knowledge of the social accounting methodology.	Lecture and case presentation with discussion
<ul style="list-style-type: none"> • Estimating Generating Gross Value Added 	At the end of the session, the participant will acquire basic knowledge on using	Lecture-discussion followed by an exercise.

Topics Covered	Objectives	Approach
	social accounting data in building a municipal account.	
ENRA and Climate Change		
<ul style="list-style-type: none"> • Use of NRA and ENRA for Local CC Mitigation & Adaptation Planning 	At the end of the module, the participants will have gained understanding on how NRA-ENRA can be used in CC adaptation and mitigation planning.	Lecture-discussion followed by an Experts' panel discussion.
<ul style="list-style-type: none"> • Use of NRA-ENRA in policy development 		Lecture-discussion followed by small group discussion on CC policy implication of ENRA.
<ul style="list-style-type: none"> • Module Evaluation 		There will be self-evaluation and written examination to gain progress from the result of the diagnostic to knowledge after the training sessions. The participants will also be asked to evaluate the training program and suggest improvements.

1.7. Resource Requirements

The conduct of the ENRA training will the following equipment:

- Laptop or Computer
- Universal Service Bus (USB) or flash drives
- LCD Projector for the PowerPoint Presentations
- Manila paper, masking tapes, metacards
- Calculator (if necessary)
- White board and markers
- Chart stands

1.8. Course Content

The general content includes introduction about ENRA and its origins, key concepts and principles, the basic premise and framework, methods and tools of accounting and sources of data. The topic on framework will include discussion on environmental statistics, natural capital accounting, ecosystem accounts and how these contributed to the economy. This framework set the stage for methods of ENRA and data collection, tools used in data collection and accounting. The method of accounting covers both physical and monetary accounting. In physical accounting, the training covers environmental and ecosystem accounting, this includes measurement of ecosystem services in physical terms. In monetary accounting, the training covers valuation methods used in both the framework of the UN SEEA Central Framework and Experimental Ecosystem Accounting. The final stage of the training will discuss the applications and uses of ENRA. All these

aspects are covered in all three ENRA sub-modules but the levels of coverage differ. In the training of local planners, participants will be trained or oriented on how to use tools and develop models to arrive at measures and physical accounts, but in the training for decision makers these will only be broadly discussed.

The outline and list of topics below will be presented differently to different categories of trainees. The coverage of training and presentation will vary depending on participants and results of pre-diagnostics. The materials, tools and guides will be provided prior to the training sessions.

Introduction to ENRA

This part of the module discusses the origins of ENRA, its key concepts and principles and how ENRA is linked to System of Accounts. All these topics will be extensively discussed in the sub-module for the trainers, while briefly for the sub-module for decision makers. For the sub-module for local planners, historical origins of ENRA will not be covered and the link of ENRA to SNA will be summarized.

ENRA Framework

This section explores the economy and environment linkage, Natural Capital Accounting (NCA), System of Environmental and Economic Accounting and Experimental Ecosystem Accounting. The topic on framework includes discussion on environmental statistics, natural capital accounting, ecosystem accounts and how these contributed to the economy. Similar to the introduction part, these topics can all be found in the Trainers' sub-module with the complete details of NCA. Since these are technical concepts, this part will be simplified in the LCE's sub-module by presenting a diagram on the linkage of environment and economy. The same is true for the LGU's sub-module, except that listing of NCA and Ecosystem Accounting will also be provided.

Sources of Data

The ENRA framework set the stage for tools and methods of data collection and accounting. The method of accounting covers both physical and monetary accounting. In physical accounting the training covers environmental and ecosystem accounting, this includes ecosystem services. In monetary accounting, the training covers valuation methods used in both the framework of the UN SEEA Central Framework and Experimental Ecosystem Accounting. Other components of the CORE Initiative that are integral to the Ecotown Capacity Development project are discussed in this section. Natural Resource Assessments, GIS, Socio-economic surveys and focus group discussions which are methods in Project Development, models and secondary data are all significant in the methods of data collection in ENRA. These methods will be discussed in brief during the Trainers' training to show how ENRA is connected to the other components, but will be summarized during the training of LCEs. However, for the training of local planners, the section will focus on the steps and processes of data collection.

Guidelines and Tools for ENRA

In monetary accounting, the training covers valuation methods used in both the framework of the UN SEEA Central Framework and Experimental Ecosystem Accounting. The sub-module for trainers orients the participants on the International guidelines, such as the UN System of Environmental Economics Accounting and how to use the other models and tools. Case results of ENRA modelling will be

summarized in the sub-module for LCEs while tools and models will be described with case examples on the sub-module for local planners.

Development of the ENRA

The topics in this section are divided into two broad concepts: physical accounting and monetary accounting. The method of accounting covers both physical and monetary accounting. In physical accounting the training covers environmental and ecosystem accounting, this includes ecosystem services. In monetary accounting, the training covers valuation methods used in both the framework of the UN SEEA Central Framework and Experimental Ecosystem Accounting.. Both the sub-modules for trainers and local planners will cover the steps in developing the physical and monetary accounts. Discussions will include concepts and examples of valuation. A simplified version of the examples is presented in the sub-module for LCEs, specifically focusing on the interpretation of accounts.

Linking ENRA to Municipal Accounts

The final stage of the training will discuss the applications and uses of ENRA. All these aspects are covered in all three ENRA sub-modules but the levels of coverage differ. This section tackles the Accounting Matrix approach and Expenditures and Saving approach. The two accounting approaches are in the trainers’ sub-module, as well as how ENRA is linked to municipal accounts and their results and uses. The LCE’s sub-module focuses on the interpretation of the tables and summary outputs. Lastly, the local planners’ sub-module deals on the demonstration on how the accounts were developed and linked to municipal accounts, including the results and uses.

1.9. Training Activity Flow

The Ecotown Capacity Development Training of Trainers is conducted in three batches. Each batch follows the training program presented below.

Ecotown Capacity Development Project Climate Change Commission and the Global Green Growth Institute Training of Trainers	
Day 1	
AM Session:	
Opening Programs (Invocation, National Anthem, Opening Remarks)	
Leveling Off of Expectations	
Pre-Training Needs Assessment	
Plenary: Introduction to the Ecotown Framework and the CORE Initiative	
PM Session	
Plenary: Introduction to Project Development	
Day 2	
Breakout Session 1: Natural Resource Assessment (NRA) and Environment and Natural Resources Accounting (ENRA)	Breakout Session 2: Vulnerability Assessment (VA) and Geographic Information System (GIS)
Day 3	
Breakout Session 1: NRA and ENRA	Breakout Session 2: VA and GIS

Day 4
AM Session: Plenary: Financial Literacy
PM Session Plenary: Project Development Activity: Application of learning outcomes from Breakout sessions 1 and 2 and Financial Literacy by developing a project proposal concept note.
Day 5
AM Session: Project Development- Presentation of the Activity Results.
PM Session: Way Forward Post Training Needs Assessment Closing Session
End of Training Program

II. Toolkits for the ENRA Modules

2.1. Power point presentations

PowerPoint Presentations of the ENRA module are made available electronically and can be accessed through the following links provided.

2.1.1. Foundations of ENRA

https://docs.google.com/presentation/d/1_JBkYkyDBk7KIEjr_DwAm3DRxU6RYPaY51VUootnn0/edit?usp=sharing

2.1.2. Ecosystem Accounting Units and Developing Physical Accounts

<https://docs.google.com/presentation/d/1lhpBccR8YnOGf1BfwCqajJdUPxrl9nbI8tkFEb9z26l/edit?usp=sharing>

2.1.3. Valuation and Monetary Accounting

https://docs.google.com/presentation/d/13sr5vFnEK_nxKasL6Ji1OGuKv1u1Dkipkn9FVRk2HuA/edit?usp=sharing

2.2. Case Study 1: San Vicente, Palawan

The Municipal Income Accounts and the Final Asset and Municipal Accounts of San Vicente, Palawan

Environmental and natural resources accounting (ENRA) is used to establish baseline information on resources and ecosystem services, and to assess the value of the functions, goods, services, and benefits that the ecosystem provides. It also serves as the basis for placing appropriate prices for these resources in order to have a better informed policy, and to initiate green income accounts to monitor the impact of climate changes and adaptation measures on local economic development.

With the eco-town framework that seeks to establish climate change resilient model communities, the necessary initial process of conducting ENRA will enhance the ability of the Local Government Unit (LGU) and other stakeholders to formulate and implement projects consistent with climate change adaptation and mitigation measures. If eco-towns

are showcases of climate resilient green growth, the setting up of environmental accounts will provide local decision-makers sound data for sustainable environmental decision making.

An assessment of the local government's income and expenses would indicate the status, capacity and orientation of the LGU vis-à-vis the requirements of the System of Environmental Economic Accounts (SEEA). Its current dependence on external grant sources and the small contribution of the ENR sector to its tax base reflect its limited capacity in managing the sector while its expenditures largely for personal services, operating expenses, and repairs and maintenance reflect the limited or sparse investment expenditures for environmentally productive facilities and services, like reforestation, watershed and marine protection, coral rehabilitation, irrigation, water reservoir, roads, bridges, and environment and sanitary services.

The first part of this study therefore seeks to measure the contribution of the Environment and Natural Resources (ENR) to the income accounts of the Municipality of San Vicente by using the methodology of the System of Environmental Economic Accounting (SEEA) at the level of the municipality. As a satellite account of the Standard National Accounts (SNA), the SEEA builds on the SNA methodology for measuring economic performance through the municipality's income level or Gross Domestic Product (GDP). As defined, the municipal GDP accounts for the production and expenditure in the town and barangays for both final consumable commodities and investment goods (physical capital) by household residents, businesses and local government, plus the net exports within a given period (quarter, semester or year).

In order to develop the natural resources and asset accounts of the municipality, the municipal government's income and expenses account is initially assessed and analyzed in order to determine its actual and potential links with the ENR. As noted, the total municipal tax revenue or operating income of San Vicente is composed of three general sources: income from external sources, non-tax revenues, and local tax revenues.

Income from external sources accounts for the largest contribution, with the bulk coming from the national government's Internal Revenue Allotment (IRA). Non-tax revenues consist mainly of the municipal government's own economic enterprise or business incomes and this includes income from the waterworks, rents, and market stall leases. Accounting for 2.6% of total municipal tax revenue in 2012, local tax revenues consist mainly of Business Tax and Real Property Tax.

Some of the municipality's natural resources already serve as a revenue source to the local government. The direct and indirect revenue contributions of particular natural resources, like water and fisheries are reflected in some non-tax revenue sources, specifically from the municipality's own Business Income and the payment of permit and registration fees. The revenue collections of Business Income in 2012 (P11.9M) come from the provision of domestic water supply through the Waterworks System (P4.88M), the lease of public property for the pearl farm operations (P2.9M), and the provision of landing and parking services for aircraft shipment of live fish export (P0.055M). From the payment of permit and registration fees, the local government collected fishery rental fees (P0.02M) and the registration fees (P0.37M) of live fish boxes shipped out of the municipality.

Moreover, the role of the ENR in municipal government income is also partly reflected in local business tax collections (P2.8M), some if not most of which were paid by ENR-related private companies either exporting marine products or providing tourist resort services. The contribution of the ENR sector to the local government's revenue base may seem extensive, but it actually plays a limited role, amounting only to 6.5% of total municipal operating income.

Apart from government savings, the economic rents in the forestry, fishery and farm sectors are accounted in the second part of the study in order to measure the income that particular natural resources have generated, or the resource value that has been extracted out of the natural resource stock. Thus, if extraction exceeds the yield of the ENR or is unsustainable, the economic rent is the value of resource depletion. As a strategic residual income concept, rent is not only important for natural asset valuation. It is also indicative of the potential amount of surplus income or savings that may be tapped and made available for investments in the restoration of depleted natural capital or for the improvement of deteriorating environmental services.

As the NR sector that yields the largest economic rent and consequently becomes the most depleted resource, the marine coastal and fishery sector would have the highest priority in natural capital restoration, not merely because of its depleted high-priced fish species but also because of the loss, if not impending demise of its non-marketed coral reefs. There are also pressures on forest resources from the extraction of wood for fuel wood supply, charcoal production, lumber, and boat production or from land clearing for *kaingin* cultivation that impinge on the residual forests. The pressures on the residual forest partly come from the unproductive farm lands and poverty of small farmers. Relative to the other resources, lands for agriculture yield very little rents.

Savings expectedly may be meagre, if not negative for some households in the municipality because their production and net incomes are small, if not adequate to meet their household consumption expenditures. This does not mean though that economic rents hardly exist. It only means that poor households obtain a small portion of economic rent, if any, while a greater portion is captured by those who secure a greater volume of higher-valued resources from the ENR and are able to sell the resource at a higher price. Investment decisions on the use of savings for the ENR sector must not only depend on the natural asset accounts or where rents have been realized. It must also be based on the results of the physical accounts of non-income generating natural capital and ecosystem services. In identifying the present weaknesses of ENRs, the threats to their sustainability, or the problems to be addressed, the physical accounts identifies the investment options where rents and savings should be invested, as well as the non-financial governance measures in dealing with the ENR issues. The combined use of the physical and asset accounts requires at least 3 conditions: 1) there must be efficient resource extraction to maximize rents; 2) a new system of taxes and royalties must be in place in order to enable government to recover the rents; and 3) there must be a clear policy for the investment of resource rent in natural capital formation, the restoration of environmental services, and the build-up of productive assets. All 3 requirements presuppose the active involvement of the municipal government and the build-up of the necessary capacities.

Conceptual Framework and Methodology

This report measures the contribution of the Environment and Natural Resources (ENR) to the income accounts of the Municipality of San Vicente by implementing the methodology of SEEA at the level of the municipality. As a satellite account of the Standard National Accounts (SNA), the SEEA builds on the SNA methodology for measuring economic performance through the municipality's income level or Gross Domestic Product (GDP) 1. As defined, the municipal GDP accounts for the production and expenditure in the town and barangays for both final consumable commodities and investment goods (physical capital) by household residents, businesses and local government, plus the net exports within a given period (quarter, semester or year). More formally, the GDP of the Municipal Economy is defined as:

Municipal GDP = Consumption Expenditure of households and the LGU + (Net Investment + Depreciation of physical capital) by private business and LGU + (Exports - Imports)

= Municipal Income + Depreciation – Net Factor Income (+ Indirect Business Tax) or

Municipal GDP – Depreciation = Municipal Net Domestic Product (NDP) =

Municipal Income – Net Factor Income (+ Indirect Business Tax)

where Municipal Income are the wages, other employee supplements, net interest income, rent and other property income, incomes of the self-employed and unincorporated enterprises, and gross corporate profits of municipal- based recipients. Net factor income is compensation from work abroad. At the municipal level, there is no sales or indirect business tax.

Since the Municipal GDP neither entirely includes nor fully accounts for the use of un-priced or non-marketed quantities of ENR, the SEEA provides a methodology for incorporating these excluded and partly unaccounted natural resources and environmental services (ENR) into the Municipal GDP. It must be noted, before discussing the SEEA methodology that some ENR are already included in the Municipal GDP, particularly those that serve as inputs to NR- based products and services that are sold in the market. Specifically, the following ENR are already part of Municipal GDP.

- 1) the sale of local raw natural products, e.g. manually gathered fuel wood, fish sold in the market or to buying agents;
- 2) the sale of processed natural resources, such wooden boats, charcoal, house construction or wood furniture;
- 3) the purchases of NRE services, such as the utility-provided water and particular ecotourism services;
- 4) the production of marketed final goods, like farm products and other goods that use freely obtained NR inputs, like rain, stream flow or groundwater; though free and hence not directly accounted, the use of such ENR are implicitly accounted in the value of the final market good; and
- 5) the sale of NRE-based final goods outside of the municipal economy is treated as exports in the municipal income accounts because the export earnings flow back and become part of the income-spending stream and savings of resident households, businesses and other local economic units.

There are exports of ENR-based goods, however, whose incomes do not flow back to the municipal economy, but remain outside and do not become part of municipal GDP. Such value leakages, for instance, happen from the shipments of live fish and squids by externally-based foreign exporters who do not contribute to the municipality's export account. What would only be accounted in the value of such exports are the revenues of local fisher folks who sell their catch to the local buying agents of foreign exporters.

Apart from the external sales revenues of local resident suppliers, the expenditures of foreign tourists for local goods and ecotourism services that are provided by municipality-based households and businesses can easily qualify as municipal 'exports'. Thus, the direct contributions of ENR to municipal income consists of the above production and purchases of raw or processed natural products, farm and fish goods, irrigation and

domestic water resources and ecotourism services by municipal households, domestic consumers and foreign tourists represent.

There are particular ENR, however, that are not fully included in the value of the final market goods and services of the municipal economy. These missing ENR contributions must be identified, quantified and valued under SEEA in order to make the necessary adjustments in the municipal GDP. The following are the missing ENR contributions:

- 1) the free use values, e.g. fish, fuel wood, medicinal plants, fruits, gathered food for home consumption, rain or surface or ground water for domestic use, and nature recreation;
- 2) the over-consumption or excessive use of ENR resulting in the depreciation/depletion of natural capital and the deterioration of environmental services; and
- 3) the benefits from environmental services or the regulation functions of the environment, such as the hydrological cycle, the provisioning of raw water, aquifer recharge, water regulation (in general represented by the availability of water supply); solar energy, nutrient cycling, erosion control, sediment stabilization, coastal protection (the natural productivity of the land and marine resources), waste assimilation and disposal, pest regulation (the natural protection of human capital), and carbon sequestration (climate stability);

Within the SEEA framework, these missing values must be brought in and incorporated into the accounts. The following adjustment procedures are then undertaken on the existing SNA.

One, the ENR stock or assets are measured either in physical or monetary terms, and as forms of (natural) capital, they are accounted together with the existing inventory of physical (produced) capital.

Two, the impact of the current use of ENR on its stock must be determined – does it result in the enhancement or the depreciation, if not outright diminution of the ENR stock and services? Specifically, economic activities that contribute to the depreciation, depletion of the NR stock and are not included in the GDP accounts must be identified and their values determined. For instance, the exportation of ENR-based goods whose income values leak out of the municipal economy directly diminish the NR stock, together with the consumption by households of free use values from the environment, like fish and fuel wood. Apart from accounting for the over- consumption of NR, SEEA also determines what current economic activities have degraded the quality of natural resources and environmental services.

Three, after quantifying the extent of NR depletion and environmental degradation, these are subtracted from the Municipal GDP, together with the depreciation of physical (produced) capital. The difference provides an estimate of the Environmentally-Adjusted Net Domestic Product, ea-NDP¹.

ea -NDP = GDP – Depreciation of Physical Capital – NR Depreciation or Depletion – Degradation of Environmental Services

In formulating the above ea-NDP, SEEA directly considers the magnitude of physical capital (machines, buildings, and equipment), the stocks of exhaustible resources, and the

¹ Individuals and households in highly urbanized areas are said to incur defensive expenditures in order to deal and cope with the problems of pollution, traffic congestion, crime and other hazards of complex modern life and thereby maintain their quality of life or level of comfort and security. These defensive expenditures must therefore be deducted from the GDP in order to obtain a more appropriate measure of national well-being.

quantity and quality of renewable natural resources. In other words, what matters is how much ENR the economy uses and how much remains that can then be passed on in the next period to the next generation. With this 'stock-based' or 'wealth' approach, SEEA's underlying concern is that current well-being depends upon the available ENR, so how these resources are used at present would determine what resources will be available and the level of well-being in the next period. In other words, present consumption will determine the well-being of future generations compared to the present.

By specifically accounting for NR depletion and environmental degradation, SEEA would then show or monitor whether current levels of ENR use can last over time, i.e. whether they are sustainable. Hence, once well-being in the future is expected to most likely decline, the imperative for sustainability becomes more urgent.

How is NR depletion and environmental degradation measured? NR depletion is simply measured by economic rent while environmental degradation is the quantified loss of the above environmental service benefits or the decline in natural productivity, in general, by the soil- land erosion and physical or by health damages, in particular. As a residual, economic rent is defined as:

= World Price – Unit Production (extraction or harvesting) Cost – Normal Return on Capital

Economic rent also represents savings that would finance the necessary investment to generate a perpetual equivalent stream of renewable substitutes. As such, it conceptually provides the basis for a policy and financial instrument that would restore the depleted resource stock or pay for the depreciation of natural capital.

2.2.1. Methodological requirements and limitation of SEEA for the Municipal Economy

SEEA's concern for sustainability naturally generates an expectation that its methodology can be extended not only to meet the challenges of climate change but also to realize the aspirations for poverty alleviation and inclusive development. Its underlying premise that the mode and level of ENR use determine not only the availability of resources but also the well-being of future generations forms the assumption that the level of ENR use and its resulting relative availability for the future can also affect the municipality's resiliency or vulnerability to climate change impacts. Thus, by itself or in combination with other tools, SEEA is perceived as capable of assessing particular ENR uses in terms of how it can help reduce the municipality's vulnerability to climate change impacts.

With its 'wealth' or 'stock-based' approach, SEEA goes beyond simply monitoring WHAT is carried over as stocks into the future to HOW it would be passed on to members of the future generation. Depending on the use of the economic rent, SEEA's sustainability notion may further be defined not merely in terms of maintaining natural capital, economic performance, living standards and levels of relative well-being and impoverishment, but also in determining the composition of wealth, i.e. the proportion of natural capital relative to social and intangible capital. In other words, SEEA may also be used to determine whether the stock of wealth in the future would consist of the additional human capital of future generations (through expenditures on education and research) or improvements in the quality of the institutions (intangible capital) transmitted to them that would help alleviate poverty.

2.2.2. Applying the methodology at the level of the municipal economy

There are a number of requirements in implementing SEEA at the municipal level. **One**, the computation specifically of the environmentally- adjusted (ea) NDP at the municipal level requires more estimation procedures than that at the national level where the national GDP and savings are already available. Because these are not available at the municipal level, it is initially necessary to compute for the municipal GDP through either the income-expenditure or value-added approaches and derive the savings of households, businesses and government at the municipal level, apart from accounting for the depreciation of physical capital. Given the definition of municipal GDP, the municipal investment expenditure can be expressed as

$$\text{Municipal GDP} - \text{Consumption Expenditures} - \text{Taxes} + (\text{Taxes} - \text{Government Expenditures}) = \text{Municipal Investment Expenditures}$$

$$\text{Household Savings (SHH)} + \text{Business Savings (SB)} + \text{Government Savings (SG)} = \text{Investment Expenditures (Physical Capital Depreciation (D) + Additional Capital)}$$

$$\text{SHH} + \text{SB} + \text{SG} = \text{D} + \text{Additional Capital}$$

With Municipal GDP less Depreciation as the Municipal NDP and the Depreciation shouldered by households and businesses,

$$\text{Net Savings of HHs and businesses} + \text{SG} = \text{Additional Capital (natural, human or social)}$$

Two, in order to obtain the ea-adjusted Municipal NDP, the municipal government must also be able to determine and monitor the stock and flow of ENR and then estimate the depreciation and depletion of natural capital and the degradation of environmental services. Specifically, the local government must be able to compute for the economic rent.

Three, most importantly the local government must have the capacity to determine, capture and utilize the economic rent for resource and environmental sustainability. And once the notion of sustainability is extended, it must be able to apply it to the goal of resiliency to climate change, poverty alleviation and inclusive development. At the level of action, the LGU must be able to capture the economic rent and collaborate with the households and businesses who obtain the economic rents to direct such savings (together with its own SG) for the formation of additional natural and human capital, possibly through some form of public-private partnership. The economic rent in the savings of some households and businesses may then finance and establish, if adequate the additional natural capital and human capital.

Thus, in order to realize sustainability at the municipal level, the local government must undertake the following tasks:

- 1) Identify the various natural resources, products and environmental services in the Municipality that have deteriorated. Determine the ENR uses that reduce the stock of natural capital (forest, fishery, farmlands, water, biodiversity, etc.) and degrade the flow of environmental services (from the protected areas, watersheds, mangroves, coral reefs, etc.)

- 2) Estimate the economic rents from the ENR-based production activities, and determine if there is enough savings for the future generation, i.e. whether the household and business savings of identified recipients would suffice to restore the depleted NR stock and degraded environmental services.
- 3) Raise and tap the necessary government savings to augment and combine with private savings for the required build-up of natural and human capital in order to realize sustainability, climate change resiliency and inclusive development.

An assessment of the local government's income and expense account provides an initial appreciation of its specific role and implicit capacities with respect to these objectives. For instance, what are the income sources of the local government, and how much do ENR resources and services contribute to the Municipality's income? How much does the local government spend in general, and for the management and protection of each ENR, in particular? Given its income sources and various expenses, how much savings, if any does it generate? How has it historically used its savings?

The economic rents generated in particular natural resource sector will also be presented and assessed in the second part of the study in order to partly complete the municipality's asset accounts. Specifically, the discussion on rents in fishery, forestry, farmlands and domestic water supply will demonstrate the estimation procedure and value of these natural assets. For this study, the discussion will be limited to these assets. Nevertheless, it will be instructive of the estimation procedure and the importance and value of the other natural and human assets.

2.2.3. Municipal Government Accounts

The Statement of Income and Expenses of a Municipality provides a number of information and raises some policy questions. It identifies the sources of local government income and the uses of its revenue, and over time it would be useful in monitoring the growth of LGU income sources and expenditures. It would also help assess whether the generation of particular income sources is sustainable, as well as consider whether and how the unsustainable sources can be more sustainably generated.

Also, particular municipal expense items may be assessed in terms of the benefits they provide, while others may be evaluated vis-à-vis alternative expenditure items. Moreover, by comparing municipal government incomes with expenditures, the actual and potential net income or savings of the municipality can be determined.

Total municipal tax revenue or operating income consists of 3 general sources: income from external sources, non-tax revenues, and local tax revenues (See Table 1). Income from external sources accounts for the largest contribution (89.65% in 2012), with the bulk (87.8% in 2012) coming from the national government's Internal Revenue Allotment (IRA). Non-tax revenues consist mainly of the municipal government's own economic enterprise or business Income (6.4% in 2010 and 7.0% in 2012), and this includes income from the waterworks (2.9%), rent (1.7%), and market stall lease (1.5%). Accounting for 2.6% of total municipal tax revenue in 2012, local tax revenues (P4.44M)

consist mainly of Business Tax (1.65% or P2.81M) and Real Property Tax (0.54% or P0.93M).

Table 1. Municipal Government Income

	PhP Income 2012			% of Operating Income		
	2010	2011	2012	2010	2011	2012
External Sources	142,577,686.00	156,867,753.00	152,444,602.38	89.86	89.47	89.65
IRA	142,567,686.00	156,631,930.00	149,325,401.00	89.85	89.33	87.82
Income from Grants and Donations	10,000.00	226,206.00	3,110,389.63	0.01	0.13	1.83
Share from PAGCOR/ PCSO		9,617.00	8,811.75	0.00	0.01	0.01
Non-tax Revenue	12,747,860.00	13,987,711.82	13,157,711.99	8.03	7.98	7.74
Income from Economic Enterprise (Business Income)	10,133,879.04	11,642,755.53	11,901,576.26	6.39	6.64	7.00
Income from Cemetery Operations		1,200.00	450.00	0.00	0.00	0.00
Income from Communication Facilities	545,017.55	514,345.75	506,803.57	0.34	0.29	0.30
Income from Dormitory Operations	46,415.00	34,380.00	27,635.00	0.03	0.02	0.02
Landing and Parking Fees	165,530.00	183,890.75	55,655.15	0.10	0.10	0.03
Income from Markets	1,776,900.36	2,642,266.68	2,596,910.73	1.12	1.51	1.53
Income from Slaughter house	444,485.48	151,945.00	210,642.36	0.28	0.09	0.12
Income from Waterworks System	4,667,351.65	4,676,229.02	4,880,392.45	2.94	2.67	2.87
Rent Income	1,868,495.00	2,560,498.33	2,916,789.00	1.18	1.46	1.72
Sale Revenue	610,834.00	859,476.00	92,076.00	0.38	0.49	0.05
Other Business Income	7,650.00	19,724.00	614,222.00	0.00	0.01	0.36
Other Income	925,789.21	309,111.00	183,140.57	0.58	0.18	0.11
Interest Income		33,951.00	8,871.30	0.02	0.00	0.01
Miscellaneous Income	891,838.21	309,111.00	174,269.27	0.56	0.18	0.10
Regulatory fees Permits, Licenses (Services/ user charge)	1,688,191.75	2,035,845.29	1,072,995.16	1.06	1.16	0.63
Fishery Rental Fees	39,380.00	948,238.00	20,260.00	0.02	0.54	0.01
Permit Fees	254,659.78	166,305.14	210,640.48	0.16	0.09	0.12
Registration Fees	495,360.50	532,292.20	369,230.80	0.31	0.30	0.22
Fines and Penalties - Permits and Licenses	48,640.23	33,630.00	63,194.78	0.03	0.02	0.04
Service Income	850,151.24	355,379.95	409,669.10	0.54	0.20	0.24
Clearance and Certification Fees	819,826.29	348,367.95	408,419.10	0.52	0.20	0.24
Garbage Fees		12,867.50	2,784.00	0.01	0.00	0.00
Inspection Fees	17,457.45	4,228.00	1,250.00	0.01	0.00	0.00
Tax Revenue (Local taxes)	3,342,434.78	4,478,842.81	4,442,758.24	2.11	2.55	2.61
Real Property General Fund	1,391,251.96	1,251,400.61	925,198.74	0.88	0.71	0.54

	PhP Income 2012			% of Operating Income		
	2010	2011	2012	2010	2011	2012
(current, fines/ rental)						
Business Tax (exporters, retail, contractors, bank)	1,583,241.61	2,822,031.96	2,810,938.61	1.00	1.61	1.65
Community tax	241,379.21	236,567.24	249,753.03	0.15	0.13	0.15
Occupation tax	126,562.00	168,843.00	233,606.00	0.08	0.10	0.14
Fines and Penalties - RPT			223,261.86	0.00	0.00	0.13

The large proportion of total municipal tax revenue (89.65%) coming mainly from external sources, like the IRA illustrates the municipality's dependence on external funds, and this suggests the great need to shift to more locally generated and sustainable revenue base. Is the municipality's ENR capital a potential base for local government revenue?

Some of the municipality's natural resources already serve as a revenue source to the local government. The direct and indirect revenue contributions of particular natural resources are reflected in some non-tax revenue sources, specifically from the municipality's own Business Income and the payment of permit and registration fees. For instance, the revenue collections of Business Income in 2012 (P11.9M) comes from the provision of domestic water supply through the Waterworks System (P4.88M), the lease of public property for the pearl farm operations (P2.9M), and the provision of landing and parking services for aircraft shipment of live fish export (P0.055M). And from the payment of permit and registration fees, the local government collects fishery rental fees (P0.02M) and the registration fees (P0.37M) of live fish boxes shipped out of the municipality. Moreover, the role of the ENR in municipal government income is also partly reflected in local business tax collections (P2.8M), some if not most of which were paid by ENR-related companies either exporting marine products or providing tourist resort services.

2.2.4. Municipal Asset Accounts

Historically the natural resource (NR) assets of San Vicente have provided a stream of incomes and savings to the government, households and businesses of the municipality. Though the LGU has largely depended on external income, it has obtained a portion of its income (6%) on the natural resource assets of the municipality, specifically as a domestic water supply provider, a lessor of coastal waters for pearl farming and other uses, and through the collection of fishery rental fees, terminal fees for live fish shipments, and indirectly from the business sales tax payments of live fish or squid trading companies and eco-tourist enterprises. With these incomes, a portion has gone to government savings.

Similarly, some households and businesses have drawn incomes and accumulated savings from the town's natural resources. With economic rents or NR-based incomes being made available to some future time, these NRs have effectively become assets, their value computed by their stream of present and future economic rents, up to the time the resource is available. Not all natural resources, however, are marketable, bearing a price and thereby yielding an income. Only marketable resources are monetarily valued as assets.

2.2.5. Three requirements for linking rents and savings to investments

As these questions are resolved within the LGU with technical expert guidance, the combined use of the physical and asset accounts requires at least three (3) conditions. One, there must be efficient resource extraction to maximize rent. More rents are obtained, however, not only with the efficient use of resources but also with the improved quality or productivity of the natural resource. It is inevitable that when land yields are low, small farmers can hardly obtain rents. Another reason the WB study failed to mention in seeking to maximize rents for sustainable resource management is that poor households may simply be impelled to consume their acquired rents⁶. Thus, in order to ensure that rents are available for investment in the natural resource, the NR-based producer must have other income sources to cover household expenses. NR-based enterprises differ from NR-based households in that rents remain intact as business savings.

Two, a new system of taxes and royalties must be in place in order to enable government to recover the rents. As earlier noted, the low sales income tax rate of the local tax code can hardly recover the rent. The problem, however, in recovering rents from business trading enterprises and commercial vessel owners is that being influential and powerful they can resist handing over or sharing their huge rent receipts. One way of securing cooperation is through an invitation to participate in public-private partnerships (PPP) for priority and strategic ENR and poverty alleviation programs, with the LGU pledging its net operating savings⁷. This brings in the third condition.

Three, there must be a clear policy for the investment of resource rents for natural capital formation, the restoration of environmental services, and the build-up of productive assets. This policy can be substantiated with the resolution of the above priority questions and the adoption of the strategic investment options that may be inferred, if not identified in the physical accounts⁸.

These three (3) requirements necessarily entail the active involvement of the municipal government, the accomplishment of important preliminary tasks, and the necessary capacities to fulfil these functions. At least five (5) important preliminary tasks must be accomplished:

- 1) establish the physical accounts in order to determine the state of ENR depletion and deterioration;
- 2) estimate the economic rents and the available household and business savings from the ENR-based production activities;
- 3) close the open-access areas (coastal waters, fishery, and forestry) to the registered and regulated users whose activities would be limited to predetermined allowable harvest levels and shipment volume, and stop illegal encroachment, harvesting activities, and shipment.
- 4) obtain and exercise the legal authority to locally impose fishery and forestry charges, raise taxes and royalties on fishery and forestry product sales; and

- 5) determine the priority actions and strategic measures to undertake, as informed by the physical accounts, and the investment expenditure requirements for these actions and measures, and how the available savings of NR-based households and businesses, including its own compare with the required investments.

Once these conditions are set in place, the municipal government can then direct if not capture the economic rents or savings for the investment requirements of resource and environmental sustainability. Apart from the use of its taxing authority, the LGU must exercise statesmanship and moral suasion to encourage the allocation of private savings for the desired investment options either through formal MOA with particular households and businesses or through public-private partnership arrangements in identified ENR programs.

2.3. Case Study 2: ENRA for Siargao Island, Surigao Del Norte:

Generalized Steps in Constructing the SAM

The generalized steps applied in developing the SAM for Del Carmen are as follows:

- 1) Identify the major accounts to be included in the SAM. This includes structuring the SAM into production activities, commodities, factors of production, institutions, capital accounts and exports or imports (called “Rest of the World” or ROW). Data for these various accounts come from different sources (see above discussion on sources of data)
- 2) Decide on the elements of each major account. In this step the developer decides on the primary issue or concern for account development. The emphasis of the SAM is on welfare of local population particularly poverty alleviation so that production activities are detailed depending on which activities are relevant for these issues. Likewise, the structuring of institutions is determined by the needs of analysis. These two major accounts are the main determinants of later analysis.
- 3) Consolidate data related to each major account elements. This is the most tedious part of SAM construction. The developer makes use of information from surveys of institutions, households, production activities, trading, export and imports, and government financial data. The developer must be careful that data inputs are not doubly counted to either receipts or expenditures.
- 4) Assess the consistency of input data. The SAM is a summary report of receipts and expenditures within the boundary of the municipality. It is a matrix structure where rows present Receipts and the columns present Expenditures. A constraint is imposed so that Receipts should equal Expenditures hence, it is a square matrix.
- 5) Analysis of the SAM result. The analysis is the second stage of SAM development. This is where the usefulness of the SAM comes in. The SAM constructed, like other SAMs, presents production decisions based on the opportunity set offered for one period – one year. It is a static matrix. This snapshot account does not readily reflect effects of external interventions, which could extend past the 1-year period. However, a series of SAM over time can exhibit the long-term trend of structural changes in the local economy brought about by these interventions. Constructing a SAM multiplier matrix facilitates comparing between periods. Prior to constructing the multiplier matrix, the SAM was divided into endogenous and exogenous

accounts (Taylor and Adelman, 1996; Pyatt and Round, 1985). The generalized relationship of income and expenditure as applied in the SAM are as follows:

$$Y = A_E \hat{Y} + x \quad (1)$$

Where:

Y = vector of total income or receipts

\hat{Y} = vector of total expenditures (representing column totals in the SAM)

A_E = square matrix of endogenous average expenditure propensities for each account

x = vector of exogenous injections or interventions (i.e. government, ROW, etc)

The $A_E \hat{Y}$ represents the endogenous component of the matrix. Since, Receipts equal Expenditures, therefore, $Y = \hat{Y}$

Hence, simplifying Y yields:

$$Y = (I - A_E)^{-1}x \quad (2)$$

So that,

$$M_E = (I - A_E)^{-1} \quad (3)$$

Where:

M_E = is matrix of Leontief-type multiplier for endogenous accounts

I = is an identity matrix

- 6) Construct the Impact Matrix. Exogenous accounts in the SAM link to various external factors that change over time. Market prices of exports or imports affect household production; savings/investment and government actions in the form of policy change, institutional arrangements or regulation affect opportunity set for consumption and/or production; external remittances or donations increase incomes of households. Thus, any income effect changes household expenditure/consumption decisions, and subsequently production decisions. Conceptually, various linkages can explain the effects. Exogenous impacts are transmitted to production activities, factors of production, whether natural or man-made, then to receipts by institutions from value added in production. Part of the income by institutions is spent on consumption goods or expenditures by institutions which are either imported or domestically purchased; thus, part of the production impacts leaks to outside of the community. A change introduced by exogenous factors can be positive or negative (Pyatt and Round, 1985). For each one unit (peso) of exogenous introductions into any account, say to fishery, means that the ultimate amount for production will be increased.

2.3.1. SAM of the Municipality of Del Carmen

Readers may refer to the Appendix of this report for the complete SAM structure for Del Carmen. The next sections discuss some specific sections of the SAM.

Production Activities

Table 2 presents the summary of total production which represents the total gross domestic product of the municipality for Year 2011. This is a snapshot of municipal GDP for the year based on the value of commodity sold in the market

or consumed by institutions. The emphasis on agriculture, fishery and forestry highlights the contribution of natural resources to include, land, water, soil and natural resources. Other economic production activities were lumped to “Others” in order to simplify presentation and analysis. Transportation was included to emphasize the contribution of human capital in production activities. The contribution of energy is also emphasized because of the potentials presented by coconut as alternate energy source. However, pending the availability of energy data from coconut, the values included are only those from fuelwood harvest.

Table 2. Total value of production (in Pesos, nominal prices) as value of commodity outputs in Year 2001

Production Activities	Commodities Domestic Supply	Household Consumption	Government Support	Export	Total Value of Production	Percent Contribution
Agriculture	89,427,300		9,600,000	182,400,000	281,427,300	53.30%
Fishery	74,816,728	18,731,007		49,877,819	143,425,553	27.20%
Forestry						0.00%
Transportation	4,337,840				4,337,840	0.80%
Energy	3,383,485				3,383,485	0.60%
Others	56,290,629		39,364,082		95,654,711	18.10%
Total Value of Production	64,011,954	18,731,007	39,364,082	232,277,819	528,228,889	100.00%

The total value of production is PHP528 million in Year 2011, at nominal prices. The GDP in agriculture and fishery comprise 80%, which have the largest shares of production value. The energy production is primarily fuelwood for domestic household needs. The “Others” sector is an aggregation of other production activities (urban and other production). The low figure of the latter is due largely to insufficiency of data of urban production activities. This latter figure also is subject for further scrutiny because some products were just labeled as product of skilled labor. Skilled labor could include handicrafts-making, quarrying and other domestic trades, but it can also include common trades such as carpentry and wood works. Some of these values may be double counts.

This picture of the economy does reflect the economic contribution of the natural capital and ecosystem services, but does not say how much was contributed particularly of the latter. The next section provides some indications on these.

Value of Production at Factor Cost

Table 3 presents summary of factor cost of production activities. Non-labor costs, which are mainly variable costs and fixed capital, both man-made and natural, comprise 56% of total factor cost. Government as factor cost is included through value added taxes. Imports of inputs are mostly commercial fertilizer and fuel.

Table 3. Value of production activities at factor costs (Nominal prices, Year 2011)

Factors of Production	Production Activities						Total Factor Cost	Percent of Total
	Agriculture	Fishery	Forestry	Transportation	Energy	Others		
Intermediate Demand for Commodity Inputs								
Seeds (Rice)	3,810,000						3,810,000	0.70%
Others	995,944			3,817,299		498,104	5,311,347	1.00%
Labor								
Skilled						55,792,525	55,792,525	10.60%
Unskilled Labor	83,912,000	-	521,290			5,039,138	89,472,428	16.90%
Capital Costs								
Man-made	128,187,310	61,267,250					189,454,560	35.80%
Natural	47,682,521	64,947,237			3,383,485		116,013,243	21.90%
Government	14,858,325	17,209,300		520,541	-	34,384,716	66,972,882	12.70%
Imports	1,981,200						1,981,200	0.40%
Total Factor Value	281,427,300	143,423,787	521,290	4,337,840	3,383,485	95,714,484	528,808,186	100.00%

Capital costs in this table means other costs aside from labor and inputs of commodities from other production activities. In which case, these include both variable and fixed capital costs. Capital costs were further disaggregated into man-made and natural capital primarily to highlight the contribution of natural capital. The figures of natural capital were arrived at by deducting all factor costs from the value of production activities, in which case these represent rent.

The question that now arises is, "What or how much is the contribution of ecosystem services to these production activities?" In this case, the value of natural capital being the residual value after deducting other production costs may represent ecosystem services contribution. The next question then would be, "Can this possibly be undervalued?" At this point the answer will vary depending on what ecosystem services came into the production of the commodities. Resource and environmental economists would argue that these are undervalued considering that externalities and public goods were not included in the valuation. In the present form, it appears that only the provisioning ecosystem services that have direct market values (use values) were covered by the valuation, non-market values are not included. Hence, if desired, a total economic valuation would reveal a complete picture. However, this will need further effort which is not covered by this task.

Further, the above estimates of production value are likely underestimated due largely to lack of data on other production activities. It is recommended that a survey of firms and urban industries be included in future surveys. It is important to note that factor costs of coconut and rice production under Agriculture production activities do not include natural capital depreciation. For fisheries the estimate of natural capital depreciation is PhP57 million of the existing stock of fishery. This is further discussed in later section of this report. It should also be noted that any intervention to reduce agricultural production will have negative impact on incomes of low income households since most of these production activities are done by households.

Incomes and Expenditures of Institutions

Institutions include households, government and local firms or businesses. Households were disaggregated into Farmer, Fisher, Government Employee, Non-Farm Employment, Other NR Livelihood, Own Business, Pensioner,

Skilled Worker, and Wage Earner, and Others (small various other trades). Firms include manufacturing, trading, services and other small industries.

(a) Government

Income and expenditures of Government come from production activities through direct and indirect taxes and other non-tax revenues such as fines and penalties, and through external sources such as donations and the Internal Revenue Allocation (IRA).

The local government reports two different versions of the income and expenditures: the Statement of Income and Expenditures and the Statement of Receipts and Expenditures. The latter was recently required to conform to Commission and Audit standards and to meet international standards of reporting. Table 4 present the previous format for reporting income and expenditures. This form reports details of Personnel and Maintenance and Operating Expenses. There are differences in the values reported, because of different period of preparation and intent of the report.

Table 4. Statement of Income and Expenditures of Year 2011

Income and Expenditure Items	Total	GEN. FUND	SEF
TAX REVENUE			
Local Taxes			
Business Tax	309,685.57	309,685.57	
Community Tax	88,880.75	88,880.75	
Real Property Tax	176,404.41	176,404.41	
Special Education Tax	223,290.99		223,290.99
Less: Discount on Real Property Tax	-36,283.35	-20,253.64	-16,029.71
Fines and Penalties-Local Taxes	148,092.10	64,618.35	83,473.75
<i>Total Taxes</i>	<i>910,070.47</i>	<i>619,335.44</i>	<i>290,735.03</i>
GENERAL INCOME ACCOUNTS			
Internal revenue Allotment	42,397,658.00	42,397,658.00	
Permits and Licences			
Permit Fees	245,319.27	245,319.27	
Registration Fees	70,247.00	70,247.00	
<i>Total Permits and Licences</i>	<i>42,713,224.27</i>	<i>42,713,224.27</i>	
Service Income			
Clearance and Certification Fees	38,965.00	38,965.00	
Other Service Income	238,105.00	238,105.00	
<i>Total Service Income</i>	<i>277,070.00</i>	<i>277,070.00</i>	
Business Income			
Income from Markets	106,700.00	106,700.00	
Rent Income	135,106.50	135,106.50	
<i>Total Business Income</i>	<i>241,806.50</i>	<i>241,806.50</i>	
Other Income			
Income from Grants and Donations			

Income and Expenditure Items	Total	GEN. FUND	SEF
Miscellaneous Income	681,705.38	681,705.38	222,300.00
<i>Total Other Income</i>	<i>681,705.38</i>	<i>681,705.38</i>	<i>120,330.00</i>
TOTAL OPERATING INCOME	44,533,141.59	44,533,141.59	
EXPENSES			
PERSONAL SERVICES	<i>20,046,265.07</i>	<i>19,703,635.07</i>	<i>342,630.00</i>
Salaries and Wages			
Salaries and Wages ~ Regular			
Salaries and Wages - Casual	10,678,028.76	10,678,028.76	
Salaries and Wages - Part time	222,300.00		
Salaries and Wages - Contractual	120,330.00		
Other Compensation			
Personnel Economic Relief Allowance (PERA)	97,500.00	97,500.00	
Additional Compensation (ADCOM)	1,466,704.54	1,466,704.54	
Representatives Allowance (RA)	2,221,090.00	2,221,090.00	
Clothing/Uniform Allowance	327,500.00	327,500.00	
Subsistence, Laundry and Quarters Allowance	155,393.18	155,393.18	
Honoraria	855,700.00	855,700.00	
Hazard Pay	338,264.13	338,264.13	
Cash Gift	329,327.83	329,327.83	
Year-end Bonus	886,720.21	886,720.21	
Personal Benefits Contribution			
Life and Retirement Insurance Contributions	1,229,543.03	1,229,543.03	
PAG-IBIG Contributions	205,738.83	205,738.83	
PHILHEALTH Contributions	122,500.94	122,500.94	
ECC Contributions	102,989.86	102,989.86	
Other Personal Benefits			
Terminal Leave Benefits	282,114.34	282,114.34	
Health Workers Benefits	13,159.58	13,159.58	
Other Personal Benefits	401,359.84	401,359.84	
<i>Total Personal Services</i>	<i>20,046,265.07</i>	<i>19,703,635.07</i>	<i>342,630.00</i>
MAINTENANCE AND OTHER OPERATING EXPENSES			
Traveling Expense			
Traveling Expenses: Local	2,364,421.89	2,364,421.89	17,880.00
Training and Scholarship Expenses			
Training Expenses	21,500.00	21,500.00	
Supplies And Material Expense			
Office Supplies Expenses	1,015,879.85	1,015,879.85	
Accountable Forms			
Food Supplies Expenses	204,328.91	204,328.91	
Drugs and Medicines Expense	205,365.98	205,365.98	

Income and Expenditure Items	Total	GEN. FUND	SEF
Medical,Dental and Laboratory Supplies Expense:	2,800.00	2,800.00	
Gasoline, Oil and Lubricants Expenses	683,843.65	683,843.65	
Other Supplies Expenses	1,875,683.40	1,875,683.40	
Utility Expense			
Water Expenses	27,810.77	27,810.77	
Electricity Expenses	566,931.77	566,931.77	
Communication Expense			
Telephone Expenses-Landline	125,909.78	125,909.78	
Telephone Expenses-Mobile	119,576.09	119,576.09	
Awards and Indemnities	30,000.00	30,000.00	
Membership Dues and contributions			
Advertising Expenses	93,776.00	93,776.00	
Representation Expenses	78,508.44	78,508.44	
Transportation and Delivery Expenses	365,629.34	365,629.34	
Survey Expenses	11,920.00	11,920.00	
Professional Services			
Legal Services	20,000.00	20,000.00	
Janitorial Services			
Auditing Services	3,650.00	3,650.00	
General Services	9,000.00	9,000.00	
Other Propessional Services	68,171.50	68,171.50	
Repairs and Maintenance			
Repairs and Maintenance-Office Buildings	839,976.15	839,976.15	
Maintenance-Other Structures	473,374.00	473,374.00	
Maintenance-Office Equipments	51,659.30	51,659.30	
Maintenance-Furniture and Fixtures	2,429.00	2,429.00	
Maintenance-Military and Police Equ	31,398.00	31,398.00	
Maintenance-Motor Vehicles	188,994.55	188,994.55	
Maintenance-Roads, Highways and	1,213,985.00	1,213,985.00	
Maintenance-Other Public Infrastructure	83,555.00	83,555.00	
Maintenance-Reforestation-Upland	764,880.00	764,880.00	
Intelligence Expenses	2,248,090.00	2,248,090.00	
Miscellaneous Expenses	563,198.06	563,198.06	
Fidelity Bond Premiums	7,500.00	7,500.00	
Non-Cash Expenses			
Depreciation-Office Buildings	141,320.66	141,320.66	
Depreciation-School Buildings	3,370.36	3,370.36	
Depreciation-Markets and Slaughterhouses	2,608.20	2,608.20	
Depreciation-Other Structures	2,068.67	2,068.67	
Depreciation-Office Equipment	14,580.00	14,580.00	

Income and Expenditure Items	Total	GEN. FUND	SEF
Depreciation-Furniture and Fixtures	32,653.83	32,653.83	
Depreciation-IT Equipment	130,027.41	130,027.41	
Depreciation-Firefighting Equipment and Access{	64,278.51	64,278.51	
Depreciation-Other Machineries and Equipment	16,792.53	16,792.53	
Depreciation-Other Property, Plant and Equipme.	68308.47	68308.47	
Other maintenance and operating expenses			
Other maintenance and operating expenses	1123882	1123882	
<i>Total Maintenance and Other Operating Expenses</i>	<i>15,963,637.07</i>	<i>15,945,757.07</i>	<i>17,880.00</i>
TOTAL OPERATING EXPENSES	36,009,902.14	35,649,392.14	360,510.00
<i>Income from Operations</i>	<i>8,813,974.48</i>	<i>8,883,749.45</i>	<i>(69,774.97)</i>
Financial Charges			
Bank Charges	18,400.00	18,400.00	
Total Income (from Operations) Before Subsidies	8,795,574.48	8,865,349.45	(69,774.97)
Subsidies and Donations			
Subsidy to LGUs	40,000.00	40,000.00	
Donations	198,650.00	198,650.00	
<i>Total</i>	<i>238,650.00</i>	<i>238,650.00</i>	
NET INCOME	8,556,924.48	8,626,699.45	(69,774.97)

Table 5 is the Statement of Receipts and Expenditures of the municipality of Del Carmen. It is a “balance sheet” and indicates sources of Funds namely General Fund, Special Education Fund, and Trust Fund. The values are almost entirely different from the SIE because of different treatment of Receipts and Expenditures. A column of Target Budget which is hardly realized is included. The obvious difference between Statements is the amount of savings or balance. In the SIE net Income is PhP 8.5 million whereas in the SRE the fund balance is PhP 23.7 million. The former is a statement of saving for the current year, whereas the latter is a running balance over time. The latter is useful for integrating natural asset accounts.

The SIE include statements of depreciation mostly of government capital goods including office equipment that is not present in the SRE. On the other hand the SRE includes statements of Assets that is not present in the SIE. The statement of expenditures in the SRE are based on activities while that in SIE are based on expense accounts e.g. personnel and maintenance and operating expenses. Thus, the difference between these two statements is that the former reflects flows over time while the latter reflect only current income and expenditures.

Table 5. Statement of receipts and expenditures of the Municipality of Del Carmen LGU

Particulars	Income					Total C+D+E
	Target/Budget Appropriation	General Fund	SEF	Trust Fund		
LOCAL SOURCES	3,002,200	1,931,012	285,741			2,216,753
TAX REVENUE (10+11+12)	1,746,000	753,416	285,741			1,039,157
Real Property Tax	1,000,000	229,371	285,741			515,112
Tax on Business	566,000	372,679				372,679
Other Taxes	180,000	151,365				151,365
NON-TAX REVENUE (14+15+16+17)	1,256,200	1,177,596				1,177,596
Regulatory fees (permits and licenses)	216,200	236,663				236,663
Service/User Charges(Service Income)	320,000	295,920				295,920
Income from Economic Enterprises(Business Income)	320,000	234,707				234,707
Other Receipts (Other General Income)	400,000	410,307				410,307
EXTERNAL SOURCES (19+20+21+22)	192,862,722	41,823,615		7,317,115		49,140,730
Internal Revenue Allotment	12,862,722	41,702,616				41,702,616
Other Shares from National Tax Collection		1,999				1,999
Inter-Local Transfer						0
Extraordinary Receipts/ Grants/Donations/Aids	180,000,000	119,000		7,317,115		7,436,115
TOTAL CURRENT OPERATING INCOME (Local Sources + External Sources)	195,864,922	43,754,627	285,741	7,317,115		51,357,483
LESS: CURRENT OPERATING EXPENDITURES						0
General Public Service	32,327,156	29,994,965		1,716,139		31,711,104
Department of Education	250,000			643,956		643,956
Health, Nutrition, and population Control	3,051,658	2,889,953		274,204		3,164,157
Labor and employment						0
Housing and Community Development						0
Social Services and Social Welfare	2,781,636	934,459		2,910,406		3,844,865
Economic Services	63,043,624	1,555,102		99,929		1,655,031
Debt Service (FE) Interest Expense and other Charges						0
TOTAL CURRENT OPERATING EXPENDITURES (25 to 32)	101,454,073	35,374,479		5,644,634		41,019,113
NET OPERATING INCOME/(LOSS) FROM CURRENT OPERATIONS(23-32)	94,410,849	8,380,149	285,741	1,672,480		10,338,370
ADD: NON INCOME RECEIPTS		8,380,148				8,380,148
CAPITAL/INVESTMENT RECEIPTS (37+38+39)						0
Proceed from Sale of Assets						0
Proceeds from Sale of Debt Securities of Other Entities						0
Collections of Loans Receivables						0
RECEIPTS FROM LOANS AND BORROWINGS (41+42)	40,000,000					0
Acquisition of Loans	40,000,000					0
Issuance of Bonds						0
TOTAL NON-INCOME RECEIPTS (36+40)	40,000,000					0
LESS: NON OPERATING EXPENDITURES						0
CAPITAL/INVESTMENT EXPENDITURES	414,000					0
Purchase/Construction of Property Plant and Equipment	414,000					0
Purchase of Debt Securities of Other Entities (Investment)						0
Grant/Make Loan ID Other Entities (Investment Outlay)						0
DEBT SERVICE Principal Cost						0
Payment of Loan Amortization						0
Retirement/ Redemption of Bonds Debt securities						0
TOTAL NON-OPERATING EXPENDITURES (45+48)	414,000					0
NET INCREASE/(DECREASE) in funds	133,996,849	8,380,149	285,741	1,672,480		10,338,370
ADD: CASH BALANCE, BEGINNING	12,662,902	12,644,879	18,023	732,001		13,394,903
FUNDS AVAILABLE	146,659,751	21,025,028	303,764	2,404,481		23,733,273
Less: Payment of Prior Year Accounts Payable						0
FUND BALANCE	146,659,751	21,025,028	303,764	2,404,481		23,733,273
CONTINUING APPROPRIATION						
Total Assets (Can include natural assets accounts)	62,636,104					

Both of these statements can be supplemented by the production accounts using respective formats. As it stands, the natural resource accounts will simply become a supplement to these accounts, but using the principle behind the construction of the accounts, this time covering environment and natural resources. Meanwhile figures in these two accounts enter the SAM in row/column on Government.

The role of government is regulation of production activities through policy interventions and direct regulation through standards, sanctions, penalties and taxation. Thus, government can either stimulate more economic production or control, primarily for the welfare of the present and future generations. As will be discussed in latter section on multiplier effect of exogenous or outside interventions by government and the Rest of the World, government can also help regulate or stimulate use of natural capital so that it is used sustainably.

(b) Households

The sources of income of household come from employing factors of production activities, transfers from other households, business, government, pensions, and remittances from outside of the municipality including those from abroad. Approximately 89% of household incomes come from production activities, mostly in agriculture and fishery. Initial estimate indicates that the savings rate is roughly 3% thus, very little investment occur in other production activities. Savings was estimated by comparing with the reported expenditures. Some households indicate negative savings. These means three things: (a) estimates by households of expenditures were based on valuation of consumption expenditures that may include inputted value of household production activities that do not pass through market channels such as home gardens and family labor production activities that are directly consumed by households, (b) household respondents of survey underreported sources of income and overestimated expenditures during interviews by enumerators, and (c) errors of entry in recording of expenditures and income.

Table 6. Estimates of income and sources, savings and expenditures by households in Del Carmen

Households	No. of HHs	Factors of Production	Transfers				TOTAL	Savings	Total Expenditures
			House-holds	Business	Government	Rest of the World			
Farmer	1,014	159,004,299	-	289,606		3,185,662	162,479,567	40,310,328	162,479,566
Fisher	1,255	126,214,487	-	1,158,423		1,737,634	129,110,544	48,684,461	129,110,543
Government Employee	241	-	-	521,290	20,046,265	-	20,567,555	-10,610,841	20,567,555
Non-Farm Employment	48	10,309,961	-	-		-	10,309,961	3,545,205	10,309,961
Other NR Livelihood	97	9,523,124	-	521,290		-	10,044,414	5,817,596	10,044,414
Own Business	193	2,896,056	-	2,896,056		-	5,792,112	-8,579,252	5,792,113
Pensioner	48	-	-	-		2,316,845	2,316,845	-3,887,445	2,316,845
Skilled Worker	290	15,117,414	9,595,794	289,606		-	25,002,814	-60,055,436	25,002,813
Wage Earner	241	5,039,138	1,390,107	-		579,211	7,008,456	-20,521,529	7,008,456
Others		18,879,006	-	-		-	18,879,006	15,982,950	18,879,006
Total	3,427	346,983,485	10,985,901	5,676,271	20,046,265	7,819,352	391,511,274	10,686,038	391,511,272
Percent of Total		89%	3%	1%	5%	2%	100%	3%	

(c) Firms and Businesses

Information on activities of firms is not completed because of limited information obtained during the data gathering phase. This information on industries and business in the municipality (and the rest of the municipalities) can be improved by conducting separate industry and urban survey. Table 7 shows indicative income and expenditures. The figures were based on responses to household survey that provides details on the type of purchases for consumption expenditures. It is noticeable that the amount of savings is quite large. The basic assumption here is that firms reinvest these savings to production activities and so they are treated likewise as expenditures.

Table 7. Firms' income and expenditures in Del Carmen (Nominal PhP, 2011)

Firms	Income	Expenditures	Savings
Manufacturing	30,240,000	5,769,440	24,470,560
Trading	58,593,782	38,665,252	19,928,530
Services	141,581,246	93,170	141,488,076
Others	2,925,031	93,170	2,831,861

Other non-agriculture or fishery-based activities, and those that do not involve direct use of natural resources need to be included in the SAM. For instance, local expenses in the municipality by foreign visitors and other domestic visitors from other place must be treated as receipts from abroad. This can be obtained from survey of businesses.

Capital Accounts

Capital accounts are residual savings of institutions that were previously already recorded in their respective accounts. Of interest in this account is whether to include natural capital depreciation. For instance it was estimated that fishery production results to PhP57 million resource rent. The idea of including this negative amount is to reflect that future production is potentially reduced because of these overfishing activities. This point is relevant in the analysis of sustainability of production over time. In the present economic accounts the PhP57 million will not get reflected in the SAM. Detailed discussions on resource rents for each production activity such as fisheries are provided in individual reports by NRA team members.

Rest of the World

Thornbeck (Thornebeck 2001) explains that transactions between domestic residents, foreign residents, and between local residents and amount respectively, are recorded in the rest of the world account. These transactions include, on the receipt side the commodities' account expenditures on imported final goods as well as intermediate goods and raw materials, factor payments and current transfers. The economy receives income from the rest of the world (column 6) from export and factor and non-factor income earned. The difference between total foreign exchanged receipts and imports is by definition net capital received from abroad.

Total Economic Transactions in Del Carmen

Table 8 shows that the total transaction in the municipality of Del Carmen is PhP 2.15 billion. The total transaction should be PhP 2.2 billion if the negative resource rent of 57 million is not taken into account. Its total production value is PhP528 million, mostly in agriculture and fishery. It is important to highlight at this point that not all production activities are marketed so that PhP 219 million was reflected as production value that were household bound rather than marketed.

Further, had the government imposed tax on production activities it would have generated PhP 66 million, which is more than its share of IRA for the same year. Upon review of the resulting SAM, the total income of the government as indicated in this account is larger than what is reported in the SIE or SRE. The Statements indicate only PhP 44,533,141.59 and 94,410,849, respectively, which was approximately the same as its total expenditures in the SAM. In the SAM account for government a VAT was imputed as factor cost in production activities since it is supposed to accrue to the government. However, it is not clear if agriculture and fishery production are subject to value added tax. The capital accounts of PhP199 million is an aggregation of the residual savings of households and business.

The municipality exports PhP 289 million of its production mostly from copra and fish products, and imports only PhP40 million, which translates to PhP 289 million as net factor income from abroad (NFIA). Most of these is a result of export of copra.

Table 8. Total transactions in the Municipality of Del Carmen

RECEPTS	EXPENDITURES								TOTAL
	Production Activities	Commodities (Domestic Supply)	Factors of Production	Households	Business	Government	Capital Account	Rest of the World	
Production Activities		228,255,982		18,731,007		48,964,082		232,277,819	528,228,889
Commodities (Domestic Demand)	9,121,347			219,610,038		-	-		228,731,385
Factors of Production	450,732,756						-57,543,484		393,189,272
Institutions									
Households			346,983,484	10,985,900	5,676,270	20,046,265		7,819,352	391,511,272
Business			100,701,850	130,983,178		1,655,031		-	233,340,059
Government	66,972,883	1,177,596	151,365	515,112	372,679	23,733,273		49,140,730	142,063,638
Capital Account				10,686,038	188,719,027			-	199,405,065
Rest of the World	1,981,200				38,572,082				40,553,282
Total	528,808,186	229,433,578	447,836,699	391,511,272	233,340,059	94,398,651	-57,543,484	289,237,901	157,022,862*

* Total transaction is PhP 2,214,566,346 if the resource rent is not reflected in the accounts.

2.3.2. Uses of the SAM

Economic Profiling and GDP Estimation

The SAM has two main uses or functions. First, it is used for evaluating the level of economic performance such as GDP etc., – or economic profiling. This involves examining each activity's inputs, outputs and income distribution to institutions. In rural settings, one outcome of this type of evaluation is a picture of the poverty situation and associated income distribution.

2.3.3. Multiplier Analysis: Estimating Impact of Interventions

Second, the SAM helps in evaluating impacts of exogenous factors such as government and market forces on economic activities, income distribution, and in this case report, natural resources – an economic impact assessment. The SAM provides a snapshot of linkages of various exogenous and endogenous factors affecting consumption and production activities. One or two accounts or elements in the matrix, in this case government and rest-of-the-world (ROW) accounts, represent external factors affecting consumption and production. Any introduced changes of these factors will also affect natural resources stocks and flows. Hence, natural capital use accounts were included as new features of the SAM. For illustrative purposes consider the resulting coefficients shown in Table 9. These are impact multipliers when interventions are introduced to change endogenous variables in the SAM i.e. a 1 unit of intervention in Fishery will increase use of factors of production such as 0.11, 0.185, 0.008, 0.052, 0.027, 0.058, 0.591, 0.576, 1.607 of fish, rice, fuelwood, others, skilled labor, unskilled labor, man-made capital, and natural capital, respectively or a total of 1.607 total unit values of impacts.

Table 9. Factor coefficients of impact or multipliers of interventions

Production Activities	Impact Coefficients					
	Agri-culture	Fishery	Forestry	Trans- portation	Energy	Others
Fish	0.188	0.11	0.39	0.375	0.16	0.44
Rice	0.246	0.185	0.382	0.368	0.266	0.431
Fuelwood	0.009	0.008	0.011	0.016	0.011	0.019
Others	0.079	0.052	0.132	1.714	0.073	0.908
Skilled	0.042	0.027	0.07	0.91	0.039	1.065
Unskilled Labor	0.375	0.058	1.12	0.192	0.083	0.225
Man-made	0.673	0.591	0.357	0.344	0.235	0.403
Natural	0.331	0.576	0.269	0.265	1.177	0.311
Total Factor Coefficient	1.943	1.607	2.731	4.184	2.044	3.802

Table 10 and Table 11 show results of two consecutive interventions in Period 1 and Period 2. In Period 1 a PhP10 million worth of intervention in the Fishery sector will have a corresponding 11% change in fishery production and 1% change in total value of all transactions in the municipality, however the absolute value of total transaction has changed by PhP 16 million. A subsequent intervention in the next will have a slight increase in value of intervention in the same sector, and added value of almost PhP0.8 million.

Table 10. Change in value of production activities (GDP) due to intervention in Period 1

Change Variables	Value of Intervention	Original Value	New Value	Change in Value	Absolute Value of Change
Value of Production Activities (GDP)					
<i>Agriculture</i>		281,427,300	281,427,300	0%	-
<i>Tourism</i>		-	-		-
<i>Recreation</i>		-	-		-
<i>Fishery</i>	10,000,000	143,423,787	159,496,717	11%	16,072,930
<i>Forestry</i>		521,290	521,290	0%	-
<i>Transportation</i>		4,337,840	4,337,840	0%	-
<i>Energy</i>		3,383,485	3,383,485	0%	-
<i>Others</i>		95,714,484	95,714,484	0%	-
Value of Natural Capital Used		116,013,242	121,776,520	5%	5,763,278
Total Transaction Amounts		2,157,022,862	2,173,095,868	1%	16,073,005

It is of interest that that the use of natural resources is changed by 5% in both periods. Naturally, this increased use of natural resources will also increase the rate of depreciation of natural capital.

Table 11. Changes in value of production activities (GDP) due to subsequent intervention in Period 2

Change Variables	Value of Intervention	Original Value	New Value	Change in Value	Absolute Value of Change
Value of Production Activities (GDP)					
<i>Agriculture</i>	-	281,427,300	281,427,300	0%	-
<i>Tourism</i>	-	-	-		-
<i>Recreation</i>	-	-	-		-
<i>Fishery</i>	10,000,000	159,496,717	176,298,123	11%	16,801,407
<i>Forestry</i>		521,290	521,290	0%	-
<i>Transportation</i>	-	4,337,840	4,337,840	0%	-
<i>Energy</i>	-	3,383,485	3,383,485	0%	-
<i>Others</i>	-	95,714,484	95,714,484	0%	-
Value of Natural Capital Used		121,776,520	127,533,384	5%	5,756,865
Total Transaction Amounts		2,173,095,868	2,189,897,351	1%	16,801,483

The fact that PhP10 million worth of intervention will be multiplied by 1.607 should provide indication to local decision-makers to further assess which sector will have greater contribution. It should interest local decision makers that the total multiplier in all production activities is 16.311 (by summing up all the multipliers).

2.3.4. Estimate of Marketed and Household-Bound Commodities

The third evaluation approach identifies major sources of consumption: whether own-production, local-market-purchased, or if the institutions are net importer of consumption goods. This type of evaluation determines whether the households are subsistence-type, partially or fully integrated into the market. Simply described, a fully integrated community suggests that consumption goods and production output are marketed; all commodities are transacted in the market, and hence possess market price.

2.3.5. Indicate Sustainability of Production

The fourth approach that directly links with natural resources is to evaluate component inputs or factors of production. How much percent of the factors of production come from natural resources. Can the natural resource sustain the level of extraction for the production activities? As the SAM indicates, the present level of production has natural resource content of 21%, or almost $\frac{1}{4}$ of the values of factor inputs came from natural resources exploitation.

2.4. Exercises/ Practice Sets in Physical Accounting

Topic: Developing Land Asset Accounts from GIS-Analysis of Land Cover Change Matrix

Data Needs and Sources: GIS Layers for two periods. Objective: In this exercise, shapefiles of classified land cover for 2010 and 2014 interpreted and produced by NAMRIA from acquired satellite imageries.

Description of the Data: Attributes data of shapefiles of land cover for at least two periods. In this exercise are land covers of 2010 and 2014 for the Pulot Watershed of Sofronio Espanola in Southern Palawan. The data can be generated from any GIS software. The pre-processed data is generated by intersecting the two shapefiles in GIS software. The resulting attribute table is exported as excel spreadsheet file with single column headers.

Link to the Sample MS Excel Worksheet:

<https://drive.google.com/open?id=0B6ryv7mIA46WQklyUW9mczl0Xzq>

Tools for this Exercise: MS Office Excel spreadsheet software for transforming attributes table into a land cover change matrix

Objectives of the Exercise:

- a) To learn and experience developing land accounts
- b) To familiarize with the steps in developing accounts from primary or secondary data
- c) To learn how to develop a land asset account derived from spatial information

Steps in Developing the Land Asset Accounts:

- 1) Process the layers in GIS software to generate the intersect of the two-period land cover:

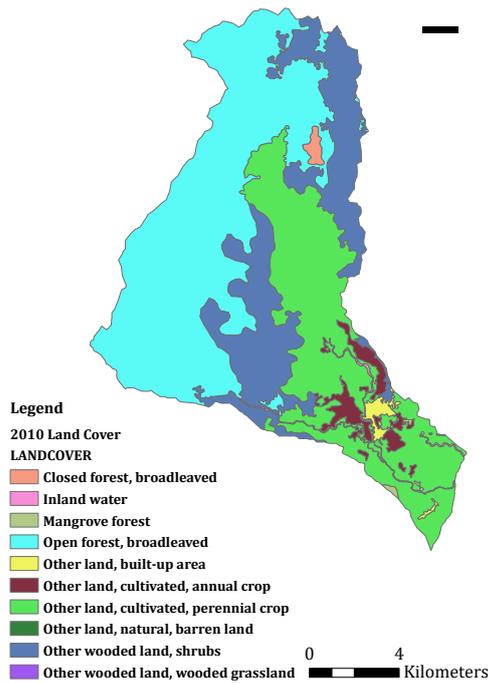


Figure 1a. Land cover of 2010 generated by NAMRIA

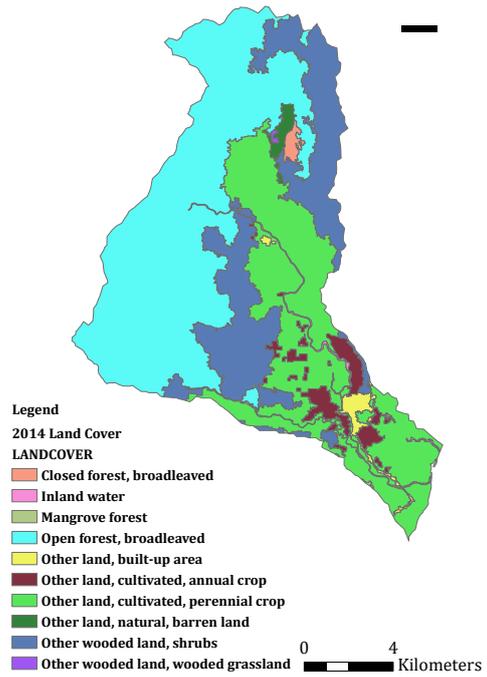


Figure 1b. Land cover of 2014 generated by NAMRIA

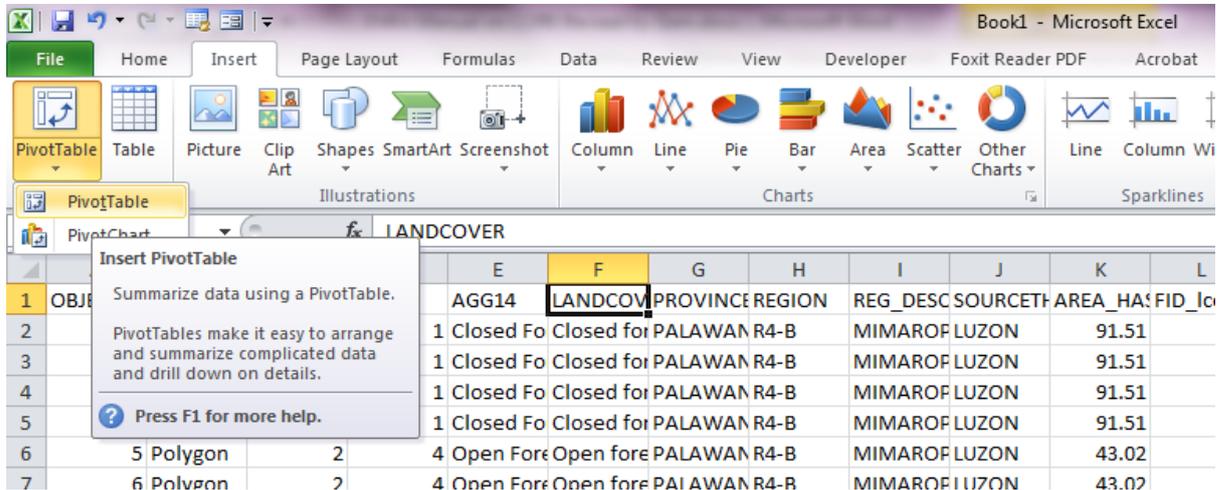
- Export the attributes tables of the shapefile produced from intersect of 2010 and 2014 land cover to MS Excel and review the output ensuring that all data are included;

The exported attributes table will appear as below:

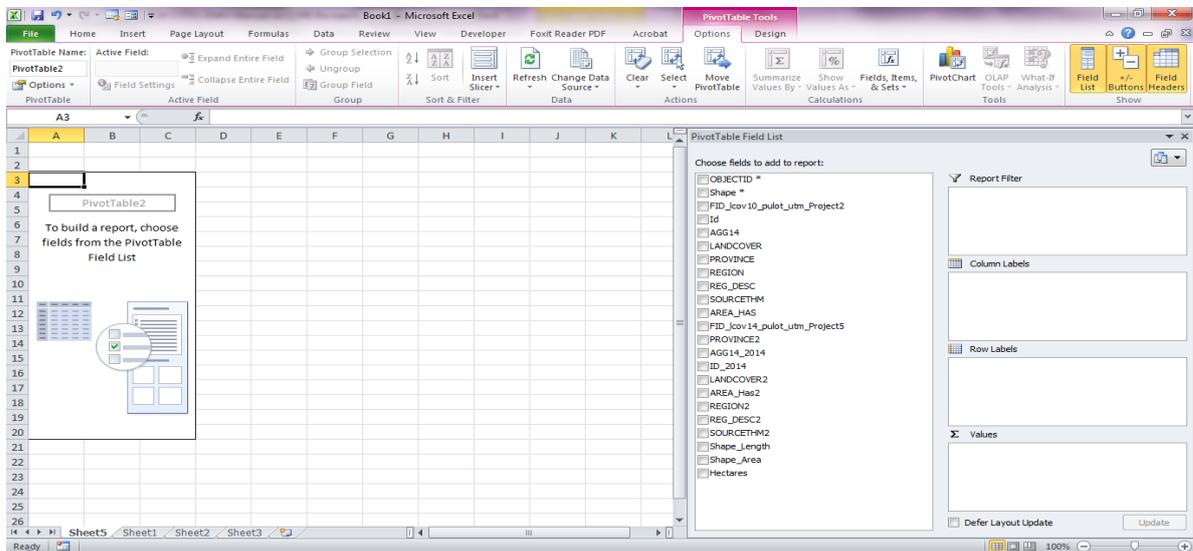
OBJECTID	Shape	FID	LANDCOVER	PROVINCE	REGION	REG_DESC	SOURCETH	AREA	HA	FID	PROVINC	AGG14	2014	LANDCOV	AREA	Has	REGION	REG_DESC	SOURCETH	Shape
1	Polygon	1	Closed Fo	Palawan	R4-B	MIMAROF LUZON	91.51	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	2371				
2	Polygon	1	Closed Fo	Palawan	R4-B	MIMAROF LUZON	91.51	37	Palawan	Open For	4	Open fore	7815.34	REGION IV	MIMAROF LUZON	5400				
3	Polygon	1	Closed Fo	Palawan	R4-B	MIMAROF LUZON	91.51	40	Palawan	Closed Fo	1	Closed fo	94.77	REGION IV	MIMAROF LUZON	6856				
4	Polygon	1	Closed Fo	Palawan	R4-B	MIMAROF LUZON	91.51	52	Palawan	Open/Bar	13	Other lan	136.51	REGION IV	MIMAROF LUZON	1145				
5	Polygon	2	Open For	Palawan	R4-B	MIMAROF LUZON	43.02	4	Palawan	Shrubs	10	Other wor	1707.05	REGION IV	MIMAROF LUZON	3413				
6	Polygon	2	Open For	Palawan	R4-B	MIMAROF LUZON	43.02	15	Palawan	Perennial	17	Other lan	1561.19	REGION IV	MIMAROF LUZON	712.7				
7	Polygon	2	Open For	Palawan	R4-B	MIMAROF LUZON	43.02	26	Palawan	Open Fore	4	Open fore	47.28	REGION IV	MIMAROF LUZON	4128				
8	Polygon	2	Open For	Palawan	R4-B	MIMAROF LUZON	43.02	41	Palawan	Shrubs	10	Other wor	3.54	REGION IV	MIMAROF LUZON	483.8				
9	Polygon	2	Open For	Palawan	R4-B	MIMAROF LUZON	43.02	45	Palawan	Inland Wa	21	Inland wa	131.1	REGION IV	MIMAROF LUZON	622.4				
10	Polygon	3	Open For	Palawan	R4-B	MIMAROF LUZON	62.21	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	2566				
11	Polygon	4	Open For	Palawan	R4-B	MIMAROF LUZON	58.54	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	1658				
12	Polygon	5	Open For	Palawan	R4-B	MIMAROF LUZON	44.59	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	4331				
13	Polygon	5	Open For	Palawan	R4-B	MIMAROF LUZON	44.59	44	Palawan	Open Fore	4	Open fore	20.94	REGION IV	MIMAROF LUZON	2612				
14	Polygon	6	Open For	Palawan	R4-B	MIMAROF LUZON	143.06	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	873.9				
15	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	4	Palawan	Shrubs	10	Other wor	1707.05	REGION IV	MIMAROF LUZON	2434.7				
16	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	13	Palawan	Shrubs	10	Other wor	1833.92	REGION IV	MIMAROF LUZON	3004.6				
17	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	14	Palawan	Perennial	17	Other lan	1838.71	REGION IV	MIMAROF LUZON	1887.7				
18	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	20	Palawan	Wooded g	12	Other wor	13.9	REGION IV	MIMAROF LUZON	2951				
19	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	30	Palawan	Shrubs	10	Other wor	127.28	REGION IV	MIMAROF LUZON	1092.7				
20	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	36	Palawan	Open/Bar	13	Other lan	3.73	REGION IV	MIMAROF LUZON	354.7				
21	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	37	Palawan	Open Fore	4	Open fore	7815.34	REGION IV	MIMAROF LUZON	1145.5				
22	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	39	Palawan	Shrubs	10	Other wor	36.52	REGION IV	MIMAROF LUZON	602.6				
23	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	40	Palawan	Closed Fo	1	Closed fo	94.77	REGION IV	MIMAROF LUZON	7236				
24	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	45	Palawan	Inland Wa	21	Inland wa	131.1	REGION IV	MIMAROF LUZON	8200				
25	Polygon	7	Open For	Palawan	R4-B	MIMAROF LUZON	69952.02	46	Palawan	Perennial	17	Other lan	844.06	REGION IV	MIMAROF LUZON	1165				

Figure 2. GIS generated intersect layer attributes table exported in MS Excel

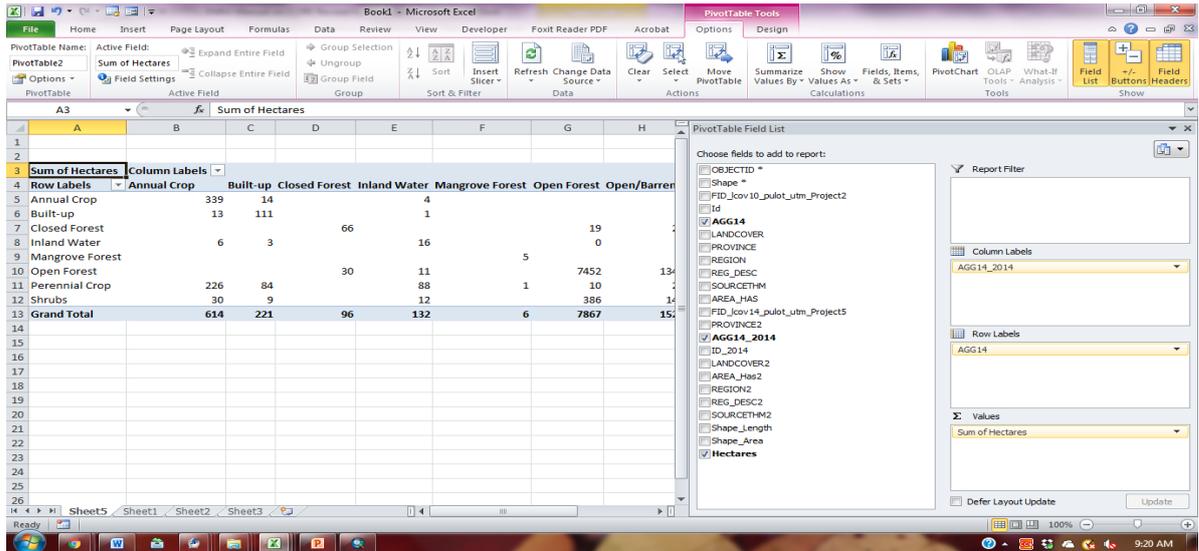
- 3) Generate a land cover change matrix for 2010 and 2014 by creating a pivot table in MS Excel as shown below:
 - a. Creating a Pivot Table: (Click INSERT, PIVOT TABLE, Pivot Table)
 Make sure that your cursor is inside the data table to ensure that Excel automatically select all data in the spreadsheet



The output is a blank pivot table template with the corresponding column headers of the database for which to select and place in the Column Labels, Row Labels, and Values boxes.



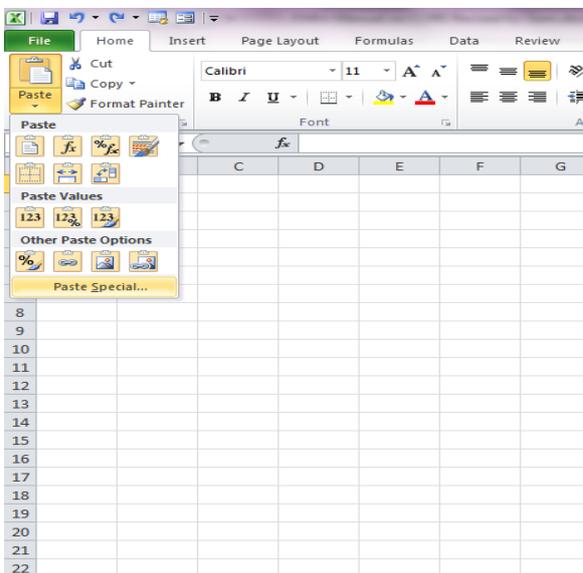
- b. Drag the AGG14 (2010 Land Cover Classification) from the Field List to the Row Labels Box, then drag the AGG14_2014 (2014 Land Cover Classification) to the Column Labels box, and finally drag the Hectares (area per land cover by land cover class) to the Values box. The output is a matrix of land cover change from 2010 to 2014:



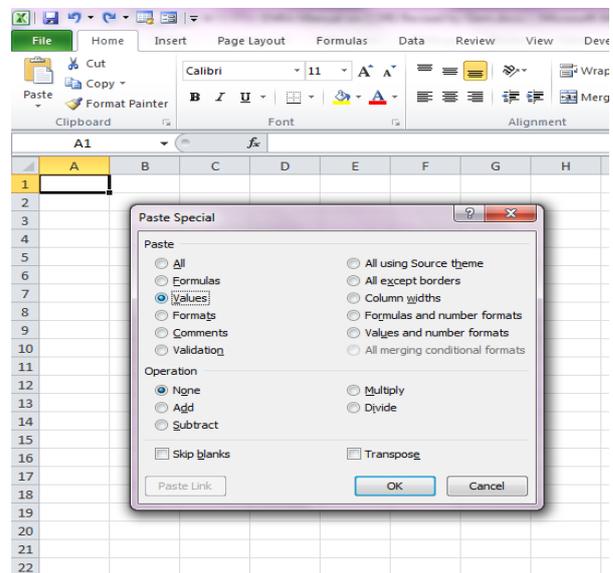
c. Move the slider of excel to view the whole table or click X to remove the field list. You can restore the Field List by clicking on the Field List icon at the top menu.

4) Prepare Land Cover Change Matrix for creating Land Asset Accounts. The steps in preparing the Land Asset accounts as follows:

a. Copy and whole matrix (pivot table output) to another worksheet. In the Paste operation ensure the cursor is in A1 in the new worksheet. Click on Paste, Paste Special, then Values as show below:



First, Click Paste, Paste Special



Second, Click Values

The resulting spreadsheet should be plain numbers and text with no special formatting and filter marks. However, the matrix needs a few re-structuring in order to create an asset account structure.

b. Re-structure the matrix. Note that the column header labels do not have the same number as the row labels. This means that it is not a square matrix (same

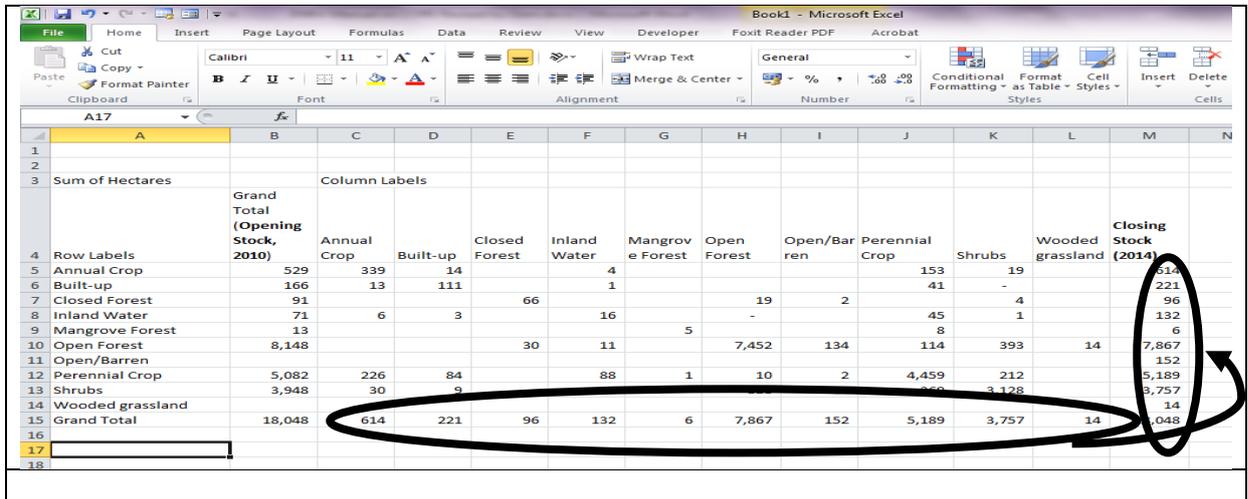
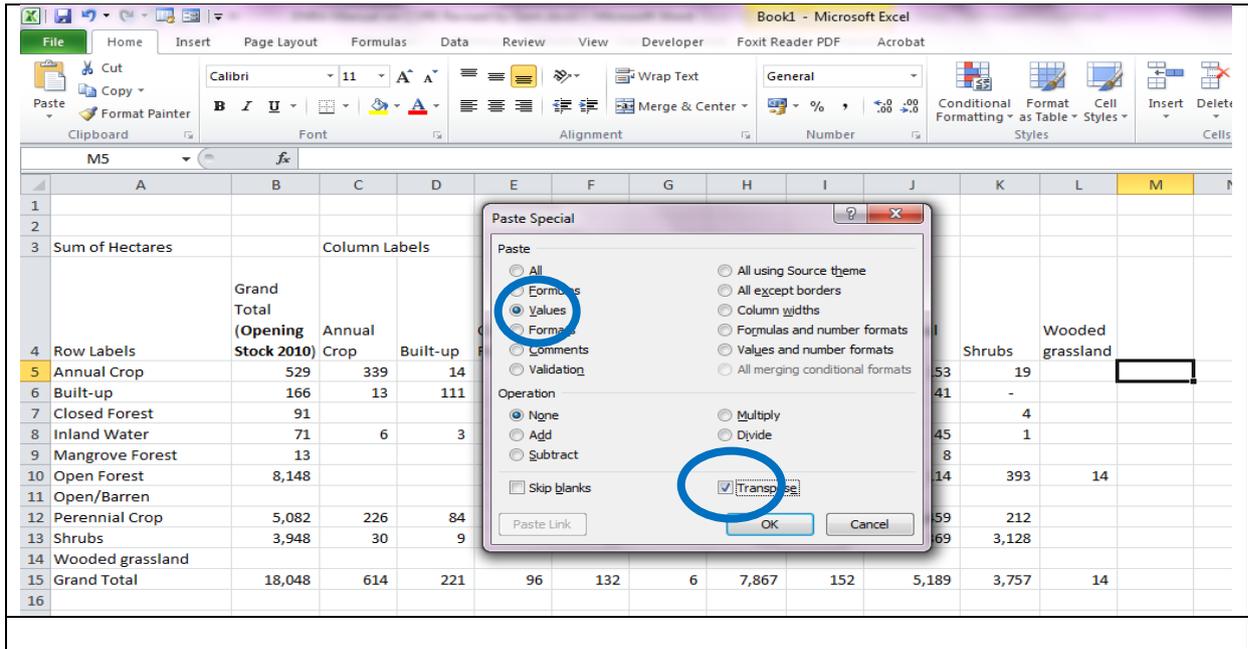
number of rows and columns). In the row column INSERT a row after Open Forest and type “Open/Barren,” then INSERT a row after Shrubs and type “Wooded Grassland.” Finally Cut the Grand Total column (Right Click on the L header on top and click Cut) and then Right Click on B header on top then click Insert Cut Cells:

Row Labels	Grand Total	Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland
Annual Crop	529	339	14		4				153	19	
Built-up	166	13	111		1				41	-	
Closed Forest	91			66			19	2		4	
Inland Water	71	6	3		16				45	1	
Mangrove Forest	13					5			8		
Open Forest	8,148			30	11		7,452	134	114	393	14
Open/Barren											
Perennial Crop	5,082	226	84		88	1	10	2	4,459	212	
Shrubs	3,948	30	9		12		386	14	369	3,128	
Wooded grassland											
Grand Total	18,048	614	221	96	132	6	7,867	152	5,189	3,757	14

Note: The grey highlight simply shows where the changes were made.

- c. In the Grand Total row, highlight from Annual Crop column to Wooded Grassland Column then click Copy, then move your cursor to M2 (or the Annual Crop row and after Wooded Grassland column), then click Paste, Paste Special, Value and Transpose

Row Labels	Grand Total (Opening Stock 2010)	Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland
Annual Crop	529	339	14		4				153	19	
Built-up	166	13	111		1				41	-	
Closed Forest	91			66			19	2		4	
Inland Water	71	6	3		16				45	1	
Mangrove Forest	13					5			8		
Open Forest	8,148			30	11		7,452	134	114	393	14
Open/Barren											
Perennial Crop	5,082	226	84		88	1	10	2	4,459	212	
Shrubs	3,948	30	9		12		386	14	369	3,128	
Wooded grassland											
Grand Total	18,048	614	221	96	132	6	7,867	152	5,189	3,757	14



Explanations for the data in the matrix (Refer to table below):

- The blue shaded cells are areas retained as existing land cover from Year 2010
- The rest of the data in each row corresponding to the land cover are REDUCTIONS to the existing stock, in hectares;
- The rest of the data, corresponding to the land cover in each column are ADDITIONS to existing stock, also in hectares;
- Opening Stock (or Land Cover in 2010, in hectares) Plus Additions Minus Reductions equals Closing Stock (or Land Cover in 2014, in hectares)

Land Cover	Grand Total (Opening Stock, 2010)	Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland	Closing Stock (2014)
Annual Crop	529	339	14		4				153	19		614
Built-up	166	13	111		1				41	-		221
Closed Forest	91			66			19	2		4		96
Inland Water	71	6	3		16		-		45	1		132
Mangrove Forest	13					5			8			6
Open Forest	8,148			30	11		7,452	134	114	393	14	7,867
Open/Barren												152
Perennial Crop	5,082	226	84		88	1	10	2	4,459	212		5,189
Shrubs	3,948	30	9		12		386	14	369	3,128		3,757
Wooded grassland												14
Grand Total	18,048	614	221	96	132	6	7,867	152	5,189	3,757	14	18,048

5) Prepare Land Asset for each land cover class. The Account has Opening Stock, Additions, Reductions, and Closing Stock as minimum components.

a. Create table of the Asset Account similar to the structure below:

Asset Accounts	Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland
Opening Stock										
Addition										
Annual Crop										
Built-up										
Closed Forest										
Inland Water										
Mangrove Forest										
Open Forest										
Open/Barren										
Perennial Crop										
Shrubs										
Wooded grassland										
Reduction										
Annual Crop										
Built-up										
Closed Forest										
Inland Water										
Mangrove Forest										
Open Forest										
Open/Barren										
Perennial Crop										
Shrubs										
Wooded grassland										
Closing Stock										
Net Change in Stock										

b. Using the example Annual Crops,

- Under REDUCTIONS: Copy the row values in the row corresponding to other land covers in the Annual Crops Row to the rows as shown below (14 under Build Up Area, 4 under Inland Water, 153 under Perennial Crop, and 19 under Shrubs)
- Under ADDITIONS: Copy the column values corresponding to other land covers in the Annual Crop column to the rows as shown below (13 under Build-Up, 6 under Inland Water, 226 under Perennial Crop, and 30 under Shrubs)

	A	B	C	D	E	F	G	H	I	J	K	L
	Asset Accounts		Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland
1	Opening Stock		529									
2	Addition		275									
3	Annual Crop											
4	Built-up			13								
5	Closed Forest											
6	Inland Water					6						
7	Mangrove Forest											
8	Open Forest											
9	Open/Barren											
10	Perennial Crop									226		
11	Shrubs										30	
12	Wooded grassland											
13	Reduction		190									
14	Annual Crop											
15	Built-up			14								
16	Closed Forest											
17	Inland Water					4						
18	Mangrove Forest											
19	Open Forest											
20	Open/Barren											
21	Perennial Crop											
22	Shrubs											
23	Wooded grassland											
24	Closing Stock		614									
25	Net Change in Stock		85									

c. Do the same for all the rest of the land covers.

6) The Closing Stock is simply Opening Stock + Addition in Stock – Reduction in Stock. The resulting summary table of asset account are as follows:

	A	B	C	D	E	F	G	H	I	J	K	L
	Asset Accounts		Annual Crop	Built-up	Closed Forest	Inland Water	Mangrove Forest	Open Forest	Open/Barren	Perennial Crop	Shrubs	Wooded grassland
1	Opening Stock (Year 2010)		529	166	91	71	13	8148		5082	3948	
2	Addition		275	110	30	116	1	415	152	730	629	14
3	Annual Crop			14		4				153	19	
4	Built-up		13			1				41	-	
5	Closed Forest							19	2		4	
6	Inland Water		6	3				-		45	1	
7	Mangrove Forest									8		
8	Open Forest				30	11			134	114	393	14
9	Open/Barren											
10	Perennial Crop		226	84		88	1	10	2		212	
11	Shrubs		30	9		12		386	14	369		
12	Wooded grassland											
13	Reduction		190	55	25	55	8	696	0	623	820	0
14	Annual Crop			13		6				226	30	
15	Built-up		14			3				84	9	
16	Closed Forest							30				
17	Inland Water		4	1				11		88	12	
18	Mangrove Forest									1		
19	Open Forest				19	0				10	386	
20	Open/Barren				2			134		2	14	
21	Perennial Crop		153	41		45	8	114			369	
22	Shrubs		19	0	4	1		393		212		
23	Wooded grassland							14				
24	Closing Stock (Year 2014)		614	221	96	132	6	7,867	152	5,189	3,757	14
25	Net Change in Stock		85	55	5	61	(7)	(281)	152	107	(191)	14

7) Evaluate the results and its implication so land management and impacts of policies. The next change in stock is simply Closing Stock – Opening Stock. A negative Net Change in Stock mean there was a reduction in the asset between 2010 and 2014.

III. Supplemental Reference Materials

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World Bank (2006) Where is the Wealth of Nations? Measuring Capital for the 21st Century. Washington D.C: World Bank Publications.

World Bank (2011) The Changing Wealth of Nations Measuring Sustainable Development in the New Millennium. Washington D.C: World Bank Publications.

World Bank (2012) A Guide to Valuing Natural Resources Wealth. Environment Department. Washington D.C: World Bank Publications.

IV. Frequently Asked Questions (FAQs)

What is environment and natural resource accounting?

Environmental and natural resources include land, air and water resources that are used in economic and other human activities. Environmental resources include air, landscape and its aesthetics that provide benefit to economic and human activities. Natural resources include renewable and non-renewable resources provided by aquatic and terrestrial ecosystem that provide benefits differently from environmental resources. Economic activities use resources from forests, land and soil, watershed to maintain production. The value of these resources are not readily captured in national accounts and thus its contribution is not easily known unless values are assigned to these resources. The accounting of these resources will improve policy and decision making in the use of these resources.

What is natural capital accounting?

Natural capital includes all of the resources that we easily recognize and measure, like minerals, energy, timber, agricultural land, fisheries and water. It also includes the ecosystem services that are often “invisible” to most people, such as air and water filtration, flood protection, carbon storage, pollination of crops, and habitats for wildlife. These values are not readily captured in markets, so we don’t really know how much they contribute to the economy. We often take these services for granted and don’t know what it would cost if we lost them.

What is ecosystem accounting?

Ecosystem accounting is a tool for understanding, measuring and monitoring the contributions of ecosystem to economic and other human activities. It includes terrestrial, coastal and marine ecosystem and man-dominated systems such as croplands or intensive pastures are not part of the ecosystems. Ecosystems provide services that sustain economic activities that are not included in traditional measure of economic growth such as GDP so that its contribution is not easily recognized.

What is an ecosystem service?

Ecosystem Services are the benefits people obtain from ecosystems. These include provisioning, regulating, and cultural services that directly contribute to economic and other human activities. Many of the services are interlinked through various ecosystem functions such as primary production, photosynthesis, nutrient cycling, and water cycling, and many others.

V. Queries Asked During the Trainings

1. **Coming from the perspective of Community Development, Where can we place indigenous knowledge in ENRA?** (Citing the case of Aetas use of local knowledge on indigenous plant species for medicine to cure common ailments)

Answer: Developing accounts on species and biodiversity based on indigenous knowledge, community surveys are useful information. The accounts can be used in transactions relating to trade of pharmaceutical species.

2. **Are carbon and water footprint already included in the input of Accounting? / Can water and carbon foot print be accounted in ENRA?**

Answer: Evaluation of carbon footprint can be developed from sustained production of Carbon Accounts. Estimating carbon footprint requires additional steps by obtaining other parameters such carbon emissions sectors identified.

3. **What is the difference of ENRA when it was first introduced vs. ENRA in Climate Change? (Evolution of ENRA and its application to Climate Change).**

Answer: Since the beginnings of ENRA in the 1990s a number of revisions have been made on the guidelines of environment and natural resources accounting. The present guideline, which is the basis for the ENRA processes in Samar and Leyte was based on the 2012 UN System of Environment and Economic Accounting both the Central Framework and the Ecosystem Accounting Framework.

4. **How to evaluate agricultural ecosystem services vs. forest ecosystem services?-**

Answer: Agriculture ecosystems also provide provisioning, regulating and cultural services, but mostly the first two. The support of ecosystem to agricultural production is the emphasis of identification, measurement, physical and monetary accounting processes. In which case the valuation of ecosystem services is based on monetary contribution to the production of economic goods such as crops, livestock and other agriculture products, thus exchange valuation approaches are used. All ecosystem services accounts are evaluated policy analysis.

5. **What services are provided by the sea?**

Answer: The marine ecosystem provides many ecosystem services that support economic production activities in fishery. Examples of ecosystem services are: (1) Provisioning Services: fishes, shellfish, (2) Regulating Services: carbon sequestration, and (3) Cultural Services: seascapes provided by coral reefs for recreational diving, etc.

6. **What are the effects of cutting mangroves to the fishery sector?**

Answer: (1) Support Services: Mangrove provide nursery services to several fish species. (2). Regulating Services: Regulating water quality that minimizes pollution of marine waters, and coral reefs; Sediment retention services that minimizes siltation in coral reefs and sea grasses, which are habitats or feeding areas of fishes.

7. How to quantify environmental information (other economic activities on environmental expenditures)?

Answer: (1) Quantification: Conduct of surveys to ask benefits of information; Review of literature on informational uses of the environment. (2) Valuation: Conduct of surveys to determine how much individuals or group pay for the provision of environmental information. Cost-based method of valuation may undervalue the benefits of information because environmental information are considered public goods, and non-excludable, where others benefit without paying for the provision.

8. What about ancestral domain and the ownership of it with regard to ENRA?

Answer: (1) In the UN SEEA Central Framework accounting, all expenditures on the environment, including protection and management services must be accounted, and (2) In the UN SEEA Experimental Ecosystem Accounting, the benefits to the IPs in ancestral lands e.g. cultural service that includes traditional benefits can be accounted and included in the spatial accounting units. Further, all other provisioning and regulating services provided by the ancestral lands where there are other beneficiaries should also be included in accounting. The development of ENRA for ancestral domains is important particularly for transactions related to compensation for implementing conservation practices in the domains.

9. Can policies be formalized to back up accounting?

Answer: The Philippines has several policies on ENRA since 1995. In planning, the NEDA has included ENRA in its medium term plans; CCC also includes ENRA in LCCAP.

10. What are Intermediate Costs or Intermediate Consumption?

Answer: Value of goods and services consumed as inputs by a production process, excluding fixed assets.

11. Is there a policy on data sharing?

Answer: The President just issued an Executive Order on FOI; The DENR has created GeoPortal where all data should be placed by accountable agencies but for some data access is controlled by source of information e.g. a request is needed from NAMRIA for some geospatial data.

12. If we are going to value water for its irrigation purposes, how do we do the valuation?

Answer: Water for irrigation is an input in agricultural production, mainly rice production in the Philippines. The value of irrigation is translated as how much contributed to the production of, for instance of paddy rice. One approach in valuation is to measure the marginal contribution of water in agricultural production. In marginal terms, a one unit increase in water for agriculture production has a corresponding increase in yield in kilogram. So that that value of water contributing to agriculture is the value of per unit of agricultural product that is contributed by irrigation water. The other approach is by estimating the specific resource rent of water. The latter will require estimates of values of other inputs per unit of agricultural produce.

13. How to measure cultural services like festivals (ex: Mango festival in Guimaras)

Answer: Measurement begins with identifying ecosystem services contribute to the economic or human activity. In Mango Festivals, part of the celebration includes enjoying the aesthetic and the cultural values of the site or landscape. If these aesthetic and cultural values are enhanced by the quality of the ecosystem, the contribution of the ecosystem is the added value to the visitors of such landscapes so that they are willing to travel to the site rather than the remote experience. In measurement, estimate how many visit the site and how much they spend to visit the site. The specific approach in measurement and valuation are detailed in travel cost approaches to valuation of ecosystem services.

14. How to measure soil erosion in a particular type of forest?

Answer: The technical process of measuring soil erosion is contained soil erosion and watershed modeling. These are mostly spatially modeled using such softwares as SWAT SedNet. The process required data on soil type, digital elevation models, precipitation over time, drainage patterns, slope, topographic data, and gradient.

15. What are the special considerations on valuation?

Answer: An example would be water. There is a specific guideline for developing accounts for water UN SEEA Central Framework. Water can be estimated for provision services, regulating services or cultural services. The UN SEEA gives special consideration so that a separate guidelines for water accounts was developed. In the same manner for energy and minerals are special accounts in the UN SEEA.

16. What is the formula in determining natural capacity?

Answer: There is no formula for determining natural capacity as this kinds of effort are site specific. Nevertheless it will require characterization of the sites to include landscape attributes, ecosystem interactions and defined ecosystem services.

17. How can we simplify the accounting (how to cost damages) of environmental damages applying the NIPAS law in pushing for a penalty to a contractor to achieve justice for the environment (Ex: conservation of protected area with presences)

Answer: Environment and natural resources accounts can be used for discussion and negotiations on compensation or payment for damages.

18. How much is the damage? Do people agree in terms of defensive expenditure?

Answer: There are valuation methods that are not yet applicable in economic accounting. Only a few are applicable to accounts.

19. Where do we classify ecotourism in ecosystem services?

Answer: In the UN SEEA the ecotourism as benefit is providing the cultural services or aesthetic values of the site.

Other comments/ recommendations:

- a. Emphasis that SUCS will not train the LGUs in doing valuation. Instead, they will help in gathering data needed for doing ENRA
- b. In training the LGUs, these are the items that should be kept in mind: (1) What data will be needed? and (2) How to do data gathering for environmental damages?
- c. Indirect values are subjective. There is a tendency to put lesser value if people do not have appreciation of ecological services. For example, its provisioning services such as maintenance, water control, etc. We must urge people to educate others regarding its direct and indirect values.

VI. Capacity Assessment Tool

1. Pre-Training Assessment

1. What are the types of capital used in undertaking production or economic activity? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

2. What contributes most to the assets of a municipality or province for its economic growth? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

3. Why is the Gross Domestic Product not a sufficient measure of sustainable economic growth?

- a. It is not an accounting indicator
- b. It is manufactured by politicians and economists
- c. It does not correctly measure and value the contribution of natural resources and the environment
- d. It missed out on key poverty measures
- e. None of the above
- f. All of the above

4. Is the contribution of the environment and natural resources fully included when you pay your water bill?

- a. Yes, because it includes a measures the value of water
- b. Yes, cost of management of the water source is paid for by the water district
- c. No, the cost maintaining the watershed that is the source of water is the responsibility of the DENR
- d. No, in large part of what is included are the cost of tapping the source, the distribution infrastructure, and operating costs
- e. None of the above

5. How do you measure the monetary value of natural resources in economic activities that do not have market price? List all that you know.

6. Please list different types of non-market valuation methods applied to environment and natural resources that you know.

7. What are the four different types of ecosystem services that contribute to economic and other human activities?

8. What is PES?

9. What is the most common application of PES in the Philippines?

10. What is PEENRA?

11. What is the difference between market and non-market value?

12. What are the different types of ecosystems? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

13. What is Discount Rate?

Local Managers:

Environment and Natural Resources Accounting

1. What are the types of capital used in undertaking production or economic activity? List all that you know.

- a. _____
- b. _____
- c. _____
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12. What the different types of ecosystem? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

13. What is Discount Rate?

2. Post Training Assessment

1. What are the types of capital used in undertaking production or economic activity? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

2. What contributes most to the assets of a municipality or province for its economic growth? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

3. Why is the Gross Domestic Product not a sufficient measure of sustainable economic growth?

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6. Please list different types of non-market valuation methods applied to environment and natural resources that you know.

7. What are the four different types of ecosystem services that contribute to economic and other human activities?

8. What is the most common application of PES in the Philippines?

9. What is PEENRA?

10. What is the difference between market and non-market value?

11. What are the different types of ecosystems? List all that you know.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

12. What is Discount Rate?



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