SORSOGON CITY



FOREST LAND USE PLAN 2024-2028







Sorsogon City's Forests and forest lands (FFLs) are crucial for peoples' well-being. Inherent in the FFLs is a suite of ecosystem functions and services that provide long-term benefits referred to as "natural assets/capital". There are four (4) categories of these services, namely: (a)*Provisioning Services*-or the provision of food, fresh water, fuel, fiber, and other goods; (b) *Regulating Services*- such as climate, water, and disease regulation as well as pollination; (c) *Supporting Services*-such as soil formation and nutrient cycling; and (d) *Cultural Services* - such as educational, aesthetic, and cultural heritage values as well as recreation and tourism .

For Sorsoguenos, good forests are linked not only to livability and sustainability, but to cultural survival. They have strong ties to the forestlands and thus concomitantly to their livelihoods, faith, tradition, and culture context.

On the other hand, well-managed forest ecosystems support disaster risk reduction and climate change mitigation and adaptation by continuing to provide protective functions as well as other ecosystem services that are threatened by climate change.

At present, population pressure in the forest and forestlands is relatively high, which frequently leads to the conversion or degradation of forests into unsustainable forms of land use. The FFLs is challenged not only by rapid population growth, but also high poverty levels, increase migration to the uplands, low economic growth, and rapid urban growth without sufficient attention to the environment.

With deforestation and degradation, FFLs capacity to function as regulators of the environment is also lost, increasing flood and erosion hazards, reducing soil fertility, and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.

This Forest Land Use Plan (FLUP) is formulated to address the above concerns; it provides the overall and specific direction for the improved management of forests and forestlands and its resources. FLUP is a roadmap, developed participatively and owned by all stakeholders, for the allocation of forest lands into their appropriate uses consistent with existing biophysical conditions (e.g., topography, soil type, land use, climate, water sources, etc.) and socio-economic, cultural and political realities.

Its aims are: (a) to prioritize sub-watersheds in the City of Sorsogon using the ecosystem services approach; (b) to quantify forest and forestland assets of Sorsogon City and describe its capacity to deliver ecosystem services; (c) to close open access forestlands by allocating land to suitable and responsible resource managers e.g. Peoples Organizations, Private Volunteer Organizations, LGUs, DENR and other development institutions; and (d) to



delineate two functional major land uses which are production and protection forests, (e) to assess forest and forest land improvements over time based on key performance indicators agreed by all stakeholders and, (f) spell out the different processes and major policies to address conservation and utilization of resources and assets.

Sorsogon City's Forest Land use Plan (FLUP) covers the 8,015.86 forest lands of the City. The forest reserve is mostly within the Energy Development Corporation (EDC) Bacon-Manito Geothermal Reservation Area. Some portions are located in the 631 hectares watershed area at the northeastern section of the city bounded by Mt. Suminandig in the west, and by Lubong-Macabaliw-Lantic-Alinao Mountain Range in the east. The remaining forestlands constitute the mangrove forests dispersed sporadically along the coastal areas bounded by Sorsogon Bay and Sugod Bay.

The FLUP covers eleven (11) Sub-watersheds namely: Luluwasan sub-watershed, Panlayaan-Suhi sub-watershed, Ticol-Cawayan sub-watershed, Osiao sub-watershed, San Juan sub-watershed, Anahaw sub-watershed, Salog sub-watershed, Buhatan sub-watershed, Su-Ba sub-watershed, Maigang-Macauayan sub-watershed and Eastern Bacon subwatershed.

In the formulation of Sorsogon City's FLUP, the Ecosystem Service (ES)- based Approach was used to build a better understanding of the values of forest and forestland assets as well as provisioning and regulating ecosystems services. Ecosystem Service (ES) Modeling was employed to quantify forest and forestland assets of Sorsogon City and described its capacity to deliver ecosystem services such as but not limited to water regulation, water provision, sediment regulation, and erosion control. Modeling was done using three (3) different landscape scenarios: "Business-as-Usual", "Forested" and "Bare-Urban" Scenarios.

These scenarios were used to assess the ecosystem service provision of the watershed under different land cover extent and spatial arrangements. Although the forested and bare-urban scenarios seem extreme, it showed how moving towards a direction of a more "forested" landscape for the forestlands of Sorsogon City can generate benefits derived from ecosystem services such as water provision, sediment control, and erosion control. Finally, the ecosystem services modeled were further used as indicators in prioritizing sub-watersheds in the City of Sorsogon.

After the ES Modeling, valuing the provisioning and regulating ecosystem services of Sorsogon's forest and forestlands was undertaken. It used exchange values, which is in line with the System of National Accounts (SNA) 2008 and System of Environmental Ecosystem Accounts (SEEA) 2012. The focus of valuation is on the contribution of ecosystems to economic activities including consumption and production, and not the contribution of ecosystems to welfare.

The valuation methodology used the replacement cost and resource rent methods in valuing the ES modeled. Replacement cost is based on the costs associated with mitigating actions if the ecosystem service was lost. Resource rent is based on the value of additional area or number of resource to recover lost ecosystem service.



Analysis of Forest Use employed the Program on Forests (PROFOR)'s *Poverty-Forests Linkages Toolkit* which provided a set of fieldwork methods and analytical tools based on participatory appraisal/assessment. These are: (a) Wealth Ranking, (b) Local Landscape Situational Analysis, (c) Time Line & Trends, (d) Livelihood Analysis, (e) Forest Problem & Solution Matrix, (f) Ranking Forest Products, (g) Millennium Development Goals Chart, and (h) Monetary Values.

In community profiling and mapping, a *Points of Interests/Issues (POI) Mapping* activity was conducted to identify points/polygons of interests/issues (POIs) in Sorsogon City. Participants were asked to locate per barangay the different POIs such as hazards, ecotourism sites, and other nature-based resources.

Highlight of FLUP findings are the ecosystem services. Specifically, bare landscapes yielded higher stream flow rates. This means higher average water volume is available to Sorsogon City, for domestic, agricultural, or industrial use. Also, stream flow rates under the forested scenario were fairly steady and not as fluctuating and responsive to rainfall when compared to a bare landscape. This reflects the importance of forests in facilitating water flow and regulation. Likewise, sub watersheds' forested scenario revealed that higher forest cover generated higher water volume and groundwater yield compared to lower forest cover or the bare-urban and business as usual scenarios. Lastly, maintaining forest cover can be a useful strategy for reducing erosion and sediment loss. ES modeling results showed that sediment outflow in Sorsogon City was significantly high under the bare- urban scenario when compared with the forested and business-as-usual scenarios. This showed the protective function of forests and its value for natural hazard reduction.

Monetary values of ecosystem services showed that replacing regulating ecosystem services is costly and man-made erosion and sediment control services are extremely costly. On the other hand, reforestation activities cost about Php20, 450 per hectare. Reforestation is a lower cost alternative for the security of erosion-regulating services over the medium term. Also, during the three driest months of the year (February, March, April), forests have the potential to increase the service area that could be irrigated.

Vision

"A fully restored, productive and well managed Forest and Forestlands significantly delivering ecosystem services towards development of Sorsogon City and the well-being of Sorsoguenos".

Mission

"To ensure pro-active, engaged and collaborative participation of all stakeholders through responsive and effective policies and programs for the conservation, protection, sustained health, diversity and productivity of the natural and cultural resources and values of the Forest and Forestlands for the enjoyment, education and inspiration of the present and future generations."



Goals

- 1. To enhance ecosystem services of various "natural assets/capital" of FFLs.
- 2. To establish mutual/harmonious relationship among stakeholders and implementing institutions/private organizations;
- 3. To establish co-management among allocated FFL users/holders (DENR-EDC-WD-LGU);
- 4. To allocate land uses based on scientific research and studies;
- 5. To protect, rehabilitate, enhance, and expand mangrove areas; To conduct actual mangrove inventory so as to address land area (protected areas) ownership issues;(activity)
- 6. To develop small islands as agro-eco tourism areas; to revert abandoned fish ponds back to mangrove areas thru rehabilitation and expansion.
- 7. To develop PES system within the context of sustainable financing mechanism.
- 8. To undertake REDD++ initiatives as climate change and disaster mitigation, adaptation and reduction measures.
- 9. To strictly implement and enforce all applicable laws, rules, regulations and policies concerning biodiversity, forest and forest lands.
- 10. To organize primary stakeholders into self-help groups of FFL earth scouts.
- 11. To provide forest and agricultural based livelihood trainings and assistance in coordination with different development institutions and organizations.

Objectives

A. Forest and Forestlands Assets

- 1. Restoration of denuded forestlands using rainforestation and assisted natural regeneration.
- 2. Sustainably develop, manage and protect the watersheds starting with those identified as priority.
- 3. Ensure implementation of appropriate forest management zones and prescriptions in the FLUP.
- 4. Rehabilitation of grasslands using Agroforestry development.
- 5. Promotion of environmental services of natural assets/capitals as well asNaturebased enterprises and tourism destination.
- 6. Rehabilitate forest lands both within FFL and A/D lands.
- 7. Preservation/conservation of watersheds for irrigation purposes.
- 8. Develop agroforestry farms as one arena for implementing payment for environmental services (PES) and REDD++ schemes.

B. Primary Stakeholders

- 1. Promote sustainable agroforestry farming systems technologies as alternative and/ or primary source of livelihood for the uplands.
- 2. Develop and support nature-based sustainable livelihood options. Recognize the qualified forest occupants and prevent the entry of new upland migrants.
- 3. Promote environmental ethics and values on sustainable management of forest and forestlands.
- 4. Capacitate communities and other stakeholders in forest protection and management.



- 5. Develop and disseminate information, education and communication (IEC) materials on forestlands conservation, protection and sustainable management.
- 6. Organize and /or capacitate people's organizations for protection, preservation, and sustainable management of forests and forestlands.

C. Secondary Stakeholders

- 1. Capacitate City and Barangay LGUs, SCWD ,EDC and other stakeholders in ensuring functional partnership to respond to challenges in implementing this FLUP.
- 2. Enact legislations and ordinances supportive of forest protection and improved forest management.
- 3. Generate and allocate sufficient funds for the FLUP implementation, monitoring and evaluation.
- 4. Mainstream Sustainable Environmental Services, Disaster Risk Reduction, and Climate Change Mitigation and Adaptation in FLUP implementation, monitoring and evaluation.
- 5. Package protocols in operating nature-based-ecotourism activities.
- 6. Conduct Carrying Capacity Assessments of nature-based tourism destinations
- 7. Incorporate forest ecology and forest resources management, watershed management, valuation of ecosystem services, climate change and disaster education in DepEd and CHED curricular offerings

Strategies

A. General Strategies

At present, the true socio-economic and cultural values of the so-called "natural capital" of Sorsogon City have been overlooked and have only been poorly factored into political and economic decision-making in development planning. Degradation of ecosystems and loss of biodiversity are often the result. The damage to natural ecosystems is subsequently reducing their ability to provide vital goods and services, undermining development and often drastically limiting social and economic opportunities.

Factors like climate change and a growing number of natural disasters are worsening the scenario. Furthermore, the increased demand for costly high-end technologies and expensive efforts to restore degraded landscapes have in many cases demonstrated the economic advantages of natural solutions. Making full use of ecosystems services to address development challenges such as climate change, not only makes ecological but also economic sense. It is therefore of critical importance to ensure that ecosystem services are fully incorporated into Sorsogon City's forest land use plan (FLUP) which will then be incorporated into the City's Risk Sensitive Comprehensive Land Use Plan and ultimately , into the Strategic Comprehensive Development Plan.

Integrating ecosystem services (ES) in FLUP planning process focus on the ff. critical questions of : (a) how does the FLUP impact and depend on ecosystem services?, (b) what risks and opportunities do ecosystem services pose to the FLUP?, and (c) which policy



measures can help in avoiding environmental costs and capture environmental benefits? These questions would help in clarifying the links between nature and development. It considers the environmental and economic trade-offs associated with development measures and helps to systematically incorporate ecosystem service-related opportunities and risks into the design and review of Sorsogon City's FLUP plan. Sustainable management of these environmental services provided by forests and forestlands should be sustained.

Other than the above, there is also the need to strengthen enforcement of environmental and natural resources laws and policies and ordinances at the ground level a well asstraighten out inconsistencies in the implementation of forest conservation policies; enhance limited livelihood opportunities;stop conversion of forest lands to other uses particularly for agriculture and residential houses;strengthen implementation of fishery code; and enhance understanding on the effects of unsustainable fishing activities. All these should also be given equal attention.

Other actions should be in terms of efficient management of tenure lands and non-conversion of forest lands and mangroves to other uses; giving priority to forest conservation initiatives; poverty alleviation; and continuous restoration of natural areas/ecosystems.

FLUP implementation cannot fully take-off if funding support is limited. As a strategy, the meager funding shall be used as a counterpart and leverage to bigger funding thereby providing a multiplier effect to the current funds. The City LGU shall actively mobilize resources by either directly accessing it or through its partner stakeholders particularly EDC-BacMan and Sorsogon City Water District. Both DENR and LGU-Sorsogon City will devise alternative financing mechanisms for resource generation such as Payment for Environmental Services (PES) and other options. Through this, management costs will not be solely sourced from line item budget of DENR and City LGU, but from beneficiaries of services provided by forest lands of Sorsogon City. Proceeds will be directly used for the management of forest lands as recommended under the FLUP.

Sub-watershed development is everybody's concern and each one should be given opportunity to take part in the efforts. To own the FLUP implementation process and outcomes, people's participation is very crucial to the success of programs/projects/activities.

To ensure that tenure or allocation holders effectively manage forest lands, DENR and LGU-Sorsogon City will develop and provide guidelines in the zoning and management of forest lands. Protection and production zones shall be specified based on national policies and agreed objectives of Sorsogon City forest lands. For proper management, protection and production zones shall be contiguous.

The policies formulated shall be supported through the passage of ordinances by LGU-Sorsogon City to ensure that it is institutionalized and long term. The legislated policies undergo a process of consultation and public hearings to solicit public support. It becomes part of LGU-Sorsogon City as an institution and may be amended only after proper consultation. The policies take effect longer beyond the term of the LGU legislators. Legislated laws are usually supported by institutional budgets and are provided for in the annual LGU budget. These legislated environmental policies/ordinances should form part of Sorsogon City Environment Code.



Details of the above general strategies are put forward. Recommendations are based from outputs of community consultation meetings conducted by FLUP-TWG and from key findings of the situational analysis.

Specific Technical Strategies

A. Recommendations for Unallocated Areas

- 1. Identify and impose strict protection and multiple use zones.
- 2. Relocate households living in the protection forest zone to alienable and disposable zones.
- 3. Come up with a documentation of people living in the multipurpose areas and restrict entry of new settlers.
- 4. Establish communal forest or individual family woodlots within production forests for fuelwood requirements.
- 5. Develop guidelines and protocols in sustainable agroforestry/upland farming.
- 6. Develop "natural assets/capital" and ecosystems services'assessment and monitoring systems in the protection and production forests zones.
- 7. Establish alternative financing mechanisms to support on-site management of watersheds especially in strict protection areas example: PES and REDD + mechanisms and linkages.
- 8. As much as possible for ease in management, protection and development of areas should be contiguous to one another.
- 9. Development of tree plantations in upland, lowland and mangrove areas.
- 10. Conservation and development of water production areas.
- 11. Conservation and development of biodiversity resources and opening of biodiversity corridors.
- 12. Developing protocols in sustainable nature-based tourism.
- 13. Enabling and capacitating resource users engage in sustainable nature-based enterprise development, sustainable upland & lowland farming practices and law enforcement;
- 14. Community Managed Biodiversity Conservation and Management
- 15. Para-Legal education
- 16. Organizing Self Help Groups of primary stakeholders as FFL earth scouts.

B. Recommendations for Allocated Areas

- 1. Conduct tenure assessment to review mandates, programs/projects /activities of each allocation holder during the 1st year of FLUP implementation.
- 2. DENR V and City Environment and Natural Resources Officer (CENRO) to technically assist thePeoples Organization (PO) in the preparation, implementation, monitoring and evaluation of Management Plan of PO Allocated Area.
- 3. Institute community-based barangay protection and law enforcement within tenured areas.
- 4. Provide technical assistance in reforestation, rainforestation, biodiversity and



other natural resources benchmarking and monitoring, establish sustainable livelihood options, development and promotion of suitable agroforestry systems, development and promotion of identified green ecotourism sites, and integrating disaster risk reduction and climate change adaptation.

- 5. Coordinate and collaborate with academic institutions in joint research and implementation of programs/projects/activities on forest land management, promotion and commercialization of watershed and upland technologies etc.
- 6. Massive awareness raising and promotional activities along watershed and biodiversity conservation, protection and management for children and youths through IEC materials development and dissemination, organizing environmental summits and youth camps, watershed festival etc.
- 7. Rehabilitation and development of grasslands, brush lands and cultivated forestlands.

C. Recommendations for Climate Change Disaster Risks Reduction and Management

- Vulnerability and Impact Assessment (VIA) of forest and forestlands to identify CC and Disaster risks and vulnerabilities of ecosystems and natural assets/capital, and develop appropriate mitigation, adaptation and risk reduction measures.
- 2. Sustainable environmental services management.
- 3. Change in livelihood strategies through non-extractive activities and more on "nature-based" enterprises; livelihood diversification.
- 4. Proper water resource utilization, harvesting and storage.
- 5. Proper waste management.
- 6. Changes in planting and harvesting time; use flood and/or drought resistant crops.
- 7. Improved animal, crops and tree management.
- 8. Carbon stock assessment of trees.
- 9. Land. Crop, trees and water suitability assessment.
- 10. Documentation of FLUP implementation highlighting good practices into popular information, education and linking, learning and documentation to be able to lobby.
- 11. Lobbying and Advocacy.
- 12. Cooperation and partnership with other stakeholders.
- 13. Mobilizing funds.
- 14. Putting on ground the recommendations of Sorsogon City's Local Climate Change Adaptation Plan (LCCAP).
- 15. Continuous capability building for the Community Based Disaster Risk Reduction Management (CBDRRM).

D. Cross Cutting Strategies

1. Documentation of FLUP implementation highlighting learning and good practices. These are translated into popular information, education and communication (IEC) materials to be used for advocacy, linking/lobbying for



funding.

- 2. Conduct of training needs assessment, development and conduct of trainings.
- 3. Marketing FLUP through investment fora and summits.
- 4. Crafting, implementing and administering environmental services user fee systems.
- 5. Investing resources in collective planning, implementation, monitoring and evaluation of ES Oriented FLUP.

Organizational Structure and Operations in Support of FLUP Implementation

A. Strengthening of the City Environmental and Natural Resources Office (CITY – ENRO)

The CENRO shall serve as the development arm of LGU-Sorsogon City in putting in place an effective and efficient management of its forests and forestlands for enhanced ecosystem services. It will take an active role in dispensing the overall technical and administrative functions in implementing FLUP. This function is based on the provision of DENR-LGU-DILG Joint Memo Circular No. 98-01 (DENR). At present, the City ENRO has seven (7) divisions namely: Administrative, Pollution Control, Regulatory and Law Enforcement, Climate change, Awareness and Advocacy, Biodiversity Conservation and Coastal Resources. Since the City ENRO is responsible for forest conservation, protection and management, an additional division on Forest Land Use Planning and Management (FLUPM) is proposed.

The FLUPM Division has specialized function and is divided into six (6) Sections namely: (a) *Forest Allocation and Tenure Management*, (b) *Forest Protection and Law Enforcement*, (c) *Social and Entrepreneurial Forestry*, (d) *Forest Restoration and Rehabilitation, and* (e) *Special Projects Section*. The special projects division focuses on specialized concerns such as Community-managed Disaster Risk Reduction (CMDRR), Enhancement of Environmental Services, Reducing Emission from Deforestation and Degradation Plus (REDD+), Payment for Environmental Services (PES), Nature-Based/Green Tourism and Community-managed Biodiversity Conservation.

Initially, the FLUPM will be manned by the City Environment and Natural Resource Officer, two forestry technical personnel, and technically backstopped by DENR V.

B. Forging Partnership Agreements or Arrangement

The FLUP Steering Committee will be composed of an Executive Committee and Sub-Committees. The City Mayor will chair the Executive Committee with the DENR V –RED as Co-Chair. There will be five (5) Sub-Committees namely: (a) *Monitoring, Evaluation and Learning Sub-Committee*, (b) *Livelihood and Community Development Sub-Committee*, (c) *Forest Protection Sub-Committee*, (d) *Tenure Management Sub-Committee, and* (e)*Conflict Management Sub-Committee*.Members of the sub-committees are the DILG V Director ,SP-Chair on Environment, City Planning Devt. Officer, City Agricultural Officer,Head of EDC-



BacMan, Head of the Sorsogon City Water District, President of the Sorsogon State College, and Environment-Oriented Civil Society Organization Representative.

C. Estimated Financial Requirements for Implementing the Ecosystem Services-Oriented FLUP and Sources of Funds

The FLUP program implementation plan is divided into two parts. These are the 5-Years Medium Range Program and the Short Range Program. The short range program is a one year plan wherein the activities are scheduled to be implemented in one (1) year. The activities are focused on three major areas such as Bio-physical Protection and Development, Socio-Cultural and Economic Development, Institutional Development and Strengthening, and Infrastructure Development.

The total cost for five year implementation is amounting to Ten Million Pesos (P10,000,000.00). The initial activities scheduled for one year (2024) is approximately P2, 450,000.00. Possible sources of funds other than Sorsogon City and DENR V, are EDC-BacMan, SCWD, barangays within the sub-watersheds, and other development institutions

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1.INTRODUCTION

1.1 Importance of Sorsogon City's Forests and Forestlands



Figure 1. Sorsogon City's Mountain Range.

Forests and forest lands (FFLs) are crucial for the well-being of Sorsoguenos. Through FFLs ecological functions, climate and water resources are regulated. Through these processes, the watershed plays a vital role in global and local climate regulation. It shelter diverse species of flora and fauna.

Inherent in Sorsogon City's FFLs is a suite of ecosystem functions and services that provide long-term benefits to people. This suite of services is often the relationships between resources that provide service and are referred to as "natural assets/capital", capital that is difficult to ascribe economic value to and is typically undervalued. The difficulty in ascribing a particular value is inherent in the difficulty in segregating ecosystems/environmental functions and services (UN-MDGs, 2005).

Categorization of these ecosystems/environmental services is as follows:

- 1. Provisioning Services-or the provision of food, fresh water, fuel, fiber, and other goods;
- 2. Regulating Services- such as climate, water, and disease regulation as well as pollination;
- 3. Supporting Services-such as soil formation and nutrient cycling; and

4. *Cultural Services* - such as educational, aesthetic, and cultural heritage values as well as recreation and tourism.

Forests prevent stresses to fragile headwater streams or aquatic ecosystems. Stresses such as increases in water temperature range can affect fish by influencing their metabolic rate, changing the dissolved oxygen content and affecting growth, rigor and resistance to diseases. Changes in water temperature may also stimulate production of algae which can deplete the oxygen supply and lower the water quality, turbidity and sedimentation, dissolved nutrients and organic detritus. Likewise, forest and forestlands of the city prevents nutrients, organic debris and sediments from running off into streams and creeks where they reduce dissolved oxygen affecting turbidity of streams resulting to water quality deterioration.



Also, forest and forest lands furnish a wide range of essential goods such as wood, food, fruit, fodder, fuelwood and medicines to meet basic household and livelihood needs. Non-wood forest products e.g. edible fruits, resins, tannins and others from forest tree species and edible plants from the forest have significant contribution to food security. They are important raw materials in the development of forest/nature-based enterprises.Likewise, it provides opportunities for recreation, spiritual renewal, educational outdoor learning and other services.

For Sorsoguenos, good forests are linked not only to livability and sustainability, but to cultural survival. They have strong ties to the forestlands and thus concomitantly to their livelihoods, faith, tradition, and culture context.

On the other hand, well-managed forest ecosystems support disaster risk reduction and climate change mitigation and adaptation by continuing to provide protective functions as well as other ecosystem services that are threatened by climate change. The regulating services of ecosystems directly influence climate and natural hazards. These regulating and protective functions provide water regulation, storage, and retention; disturbance regulation (e.g., storm protection, flood control, drought recovery); erosion control; and sediment retention. In natural hazard regulation, forests affect both the probability and severity of events and modulate the effects of extreme events. For example, soils store large amounts of water, facilitate transfer of surface water to groundwater, and prevent or reduce flooding. Furthermore, natural buffers such as mangroves, tree green belts, wetlands, and lakes attenuate hazards by absorbing runoff peaks and storm surges.

Lastly, forest trees and other vegetation deliver both the greatest and most immediate benefits for the maintenance of carbon stocks and biodiversity. The trees act as carbon sink for carbon sequestration. Forest restoration and reforestation activities of the City generate rapid increases in carbon stocks but with varying impacts on biodiversity. Naturally regenerating forest or non-forest ecosystems have positive impacts on biodiversity compared to those forestlands converted to plantation forestry.

At present, Sorsogon City's forest and forest lands are characterized by secondary- growth trees, brush land, grass land and mangrove forest, but some portion is cultivated with coconut, abaca, root crops, fruit bearing trees and sugarcane.

Population pressure in the forest and forestlands is relatively high, which frequently leads to the conversion or degradation of forests into unsustainable forms of land use. The FFLs is challenged not only by rapid population growth, but also high poverty levels, increase migration to the uplands, low economic growth, and rapid urban growth without sufficient attention to the environment.

With deforestation and degradation, FFLs capacity to function as regulators of the environment is also lost, increasing flood and erosion hazards, reducing soil fertility, and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.

This Ecosystem Services- Oriented Forest Land Use Plan (FLUP) is formulated to address the above concerns; it provides the overall and specific direction for the improved management of forests and forestlands and its resources.

1.2 FLUP As A Tool to Align Land Uses and Ensure Effective On-Site Management of Sorsogon City's Forests and Forestlands

Forest Land-Use Planning involves the systematic assessment of forests and forestlands and its potential for various land uses, a consideration of the desirability of those land uses, and an understanding of economic, social and environmental conditions to enable the identification and adoption of the best land-use options in a forested landscape. Land-use planning is driven by the need for (i) improved management and (ii) a different pattern of land use, as dictated by changing circumstances.

For its legal bases, Forest Land Use Planning is a mandate of local government units since 2004. Executive Order 318 from the Office of the President was issued requiring LGUs to incorporate Forest Land use Plans (FLUPs) into Comprehensive Land Use Plans (CLUPs). Likewise, the Local Government Code (RA 7160) also mandates LGUs to carry out devolved forest management functions as well as enter into co-management agreement with DENR to develop, manage, protect, and sustainably use a specified area of forest/forestland (DENR, 1998).

With these legal bases and threats to forests, LGU-Sorsogon City and DENR V are interested to undertake co-management of forestlands to enhance ecological, economic and social potentials of these areas. This FLUP seek to address threats/issues/needs of the city's forestlands and sub- watersheds.

FLUP is a roadmap, developed participatively and owned by all stakeholders, for the allocation of forest lands into their appropriate uses consistent with existing biophysical conditions (e.g., topography, soil type, land use, climate, water sources, etc.) and socioeconomic, cultural and political realities. The FLUP also addresses impacts to non-timber resources. This includes identification and protection of important wildlife habitat; design of tree timber harvest to provide wildlife travel corridors and escape cover; uses of the forest for recreation and tourism activities and visual resources; other existing commercial and non-commercial uses; and impacts to adjoining lands.

It aims to: (a) prioritize sub-watersheds in the Municipality of Sorsogon City using the ecosystem services approach; (b) quantify forest and forestland assets of Sorsogon City and describe its capacity to deliver ecosystem services; (c) close open access forestlands by allocating land to suitable and responsible resource managers e.g. Peoples Organizations, Indigenous People, Private Volunteer Organizations, LGUs, DENR and other development institutions; (d) delineate two functional major land uses which are production and protection forests, (e) assess forest and forest land improvements over time based on key performance indicators agreed by all stakeholders, (f) spell out the different processes and major policies to address conservation and utilization of resources and assets, and (g) address hazard risks in vulnerable areas.

Forest Land Use planning is the process by which the desired future landscape of Sorsogon City' forest and forestlands will be envisioned, and by which local policies will be enacted to encourage land use practices that shapes the desired landscape. The City-LGU believes that active management of it forest and forests lands and related resources can keep forest lands



healthy for present and future generations and increase the economic and environmental benefits of those lands.

1.3 The FLUP in Support of the Provincial/Regional Development Plans

The Regional Development Plan envisions Bicol Region to be the *Most Livable Region in the Country*. One key strategy is "Sustain Development"; where ecosystem services-oriented and risk-sensitive forest land use planning and management across ecosystems is vital.

The Forest Land Use Plan (FLUP) which form part of the City's Comprehensive Land Use Plan (CLUP), Local Climate Change Action Plan (LCCAP), Disaster Risk Reduction Management Plan (DRRMP) would contribute to enhanced ecosystem services as an adaptation and mitigation mechanism to the impacts of climate change and disaster risk reduction specifically in the protection, development, and management of the subwatersheds through soil and water conservation measures. This minimizes catastrophic impacts of downstream flooding; improved water regime in the sub-watershed including the underground water recharge and supply, and improve the biological diversity of the watersheds. These processes would ensure viability of thewatersheds for socio-economic and ecological uplift, ending hunger, poverty, vulnerability and environmental degradation.

Forest land use zoning would also identify at-risk and vulnerable ecosystems and species in both the protection and production forests, for proper climate change disaster risk mitigation and adaptation responses/interventions as part of LGU-Sorsogon City's contribution to the Risk Resiliency and Sustainability Program (RRSP), and the expanded National Greening Program (NGP). It will likewise undertake forest ecosystems restoration and rehabilitation using endemic tree species with high carbon sequestration potentials to put on ground Intended Nationally Determined Contribution (INDC). Also, in FLUP, important ecosystems with high diversity of species among edible plant products, edible animal products and ornamental plants (mainly orchids) are to be identified .These resources and others contribute significantly to the local/provincial and regional economy due to their important role in the household economy, and in rural food security, which is one of the main government policies (at all levels) for the agriculture and forestry sectors.





2.1 Physical Boundaries

The Forest Land use Plan (FLUP) covers the 8,015.86 forest lands of Sorsogon City. The forest reserve is mostly within the Energy Development Corporation (EDC) Bacon-Manito Geothermal Reservation Area. Some portions are located in the 631 hectares watershed area at the northeastern section of the city bounded by Mt. Suminandig in the west, and by Lubong-Macabaliw-Lantic-Alinao Mountain Range in the east. The remaining forestlands constitute the mangrove forests dispersed sporadically along the coastal areas bounded by Sorsogon Bay and Sugod Bay.

It covers eleven (11) Sub-watersheds namely: Luluwasan sub-watershed, Panlayaan-Suhi sub-watershed, Ticol-Cawayan sub-watershed, Osiao sub-watershed, San Juan sub-watershed, Anahaw sub-watershed, Salog sub-watershed, Buhatan sub-watershed, Su-Ba sub-watershed, Maigang-Macauayan sub-watershed and Eastern Bacon sub-watershed.

2.2 Duration

The plan has a duration of five to ten (5-10) years and will require annual reviews during the period. Institutional mechanism, policies and agreements will be put in place during the 1st year of implementation. Full implementation of core activities will start 1st quarter of the second year.

Before the 5- year period ends, an implementation review/ assessment will be undertaken with the end view of renewing the plan for another five (5) years.

DENR V and LGU-Sorsogon City will form a FLUP Sub-Committee on Monitoring, Evaluation and Learning to regularly monitor progress and impact of the FLUP.

2.3 Relation with the City's Comprehensive Land Use Plan (CLUP)

LGU-Sorsogon City's Forest Land Use Plan (FLUP) is primarily the allocation of forestlands that will become the framework for forest land use zoning and enhancement of ecosystem services.

It form part of the Comprehensive Land Use Plan (CLUP) which is the framework of the physical development of LGU-Sorsogon City; it identifies areas where development can and



cannot be located and directs public and private investments accordingly.

The FLUP is not meant to duplicate or supplant pre-existing plans of the LGU but rather complements and reinforces other plans. Once legitimized by the Sangguniang Panglunsod, it remains in effect even after incumbent officials have been replaced. It becomes the framework plan for any forest development activity within the City's territory.

2.4 Data limitations

Data on the specific rivers draining water per sub-watershed will still be further analyzed to complete the picture of the natural drainage per sub-watershed. Also, biodiversity assessment will be undertaken to profile existing floral and faunal species and at-risk/vulnerable ecosystems in both the protection and production zones.





3.METHODOLOGY

3.1 Preliminary Activities

3.1.1 Sending Letter of Intent

In December 5, 2016, LGU-Sorsogon City officially informed the Department of Environment and Natural Resources (DENR V) of their intent for technical assistance in the Forest Land Use Plan (FLUP) preparation for sustainable management of their forest and forestlands.



Figure 2. Letter of Intent

3.1.2 Launching of the Program on Forests (PROFOR) Technical Assistance on Strengthening Capacity for Integrating Ecosystems Services Approaches in FLUP

To enhance capacity of LGU-Sorsogon City on the knowledge, tools and conduct of in-depth analysis of its FFLs' contribution to poverty reduction, sustainable economic development and protection of local environmental services, LGU-Sorsogon City attended the Launching of the Program on Forests (PROFOR) last February 28, 2017 in Manila.



The knowledge gained served as solid basis and a good reference in the formulation of an Ecosystem Service-Oriented FLUP, using standards set by national policies and international guidelines integrated with optimal use of ecosystem functions and services or natural assets/capital to reduce poverty, increase peoples resiliency to climate variability and restore ecological integrity of the environment.

3.1.3 MOA between LGU-Sorsogon City and Department of Environment and Natural Resources (DENR V)

A Memorandum of Agreement (MOA) between the Department of Environment and Natural Resources (DENR V) and Sorsogon City was signed last March 29,2017 at the DENR V Office, Rawis Legazpi City with a Resolution from the City Development Council (CDC) and Sangguniang Panglungsod (SP).

The MOA signing was attended by Sorsogon City Mayor Sally Lee, her LGU Department Heads, Sorsogon City Environment and Natural Resources Officer (City-ENRO) and DENR V Director Crisma Rodriquez. It covered the details of partnership and provision of technical assistance in the areas of Smart-Forest Land Use Planning (FLUP).



Figure 3. MOA signing between Sorsogon City and DENR V.

3.1.4 FLUP Orientation and Training

A FLUP Orientation and Training was conducted last April 25,2017 at the SP Social Hall, Sorsogon City. It was attended by the City FLUP Technical Committee and other guests. Topics discussed were FLUP key concepts, legal basis in land use allocation, data requirements and tools to be used, community mapping, tenure holders' assessment, stakeholders analysis outputs, action plans for the field data collection and community consultations.

3.2 Data and Map Collection

3.2.1 Gathering of Secondary Data and Mapping

The actual conduct of secondary data gathering and mapping was from May to June, 2017.



Both secondary and primary data were gathered. Secondary data focused on`(a) socioeconomic data including historical information; (b) topography, land use, land cover, and geohazards; and (c) partner development institutions and organizations and their respective programs/projects and activities. Also, ground validation and GPS reading of infrastructures were done.

Existing documents were reviewed such as: reports, articles, comprehensive land use plans, local climate change adaptation plan, climate change vulnerability and adaptation assessment report, comprehensive development management plans, and Sorsogon watershed report.

Inputs to the updating of thematic/ composite maps were the geospatial data obtained from both secondary and primary sources. The GIS expert of DENR assisted the LGU- TWG in the generation of thematic maps. There were seventeen (17) thematic maps generated namely:

- a. Administrative Map
- b. Map of DENR Projects
- c. Elevation Map
- d. Flooding Map
- e. Issue Map
- f. Land Allocation Map
- g. Land Classification Map
- h. 2004 Land Cover Map
- i. 2010 Land Cover Map
- j. Landslide Map
- k. Management Zoning Map
- h. Slope Map
- i. Tenure Map
- j. Watershed Divide Map
- k. Map of Tourist Spots





Figure 4. The GIS expert of DENR assisted the LGU- TWG in processing of raw maps to generate thematic maps.

3.3 Situational Analysis and Sub-Watershed Prioritization

Situational analysis of Sorsogon's forest and forestlands was enhanced through the use of *Ecosystem Service (ES)- based Approaches*. Training on "ES -based Approaches in FLUP Preparation" was conducted on July 25-28, 2017. The inclusion of this approach aimed to build a better understanding of the values of forest and forestland assets as well as provisioning and regulating ecosystems services.

3.3.1 Use of Ecosystem Service (ES) Modeling

Ecosystem Service (ES) Modeling was employed to quantify forest and forestland assets of Sorsogon City and describe its capacity to deliver ecosystem services such as but not limited to the following (Table 1):

ENVIRONMENTAL SERVICES	DESCRIPTION		
1. Water Regulation	Regulate water supply/allocation based on additional irrigable area; volume and delay of peak discharge during storm events.		
2. Water Provision	Supply of fresh water for domestic use of households.		
3. Sediment Regulation-	Reduction of sediment load in waterways		
4. Erosion Control	Capacity to prevent/avoid soil erosion		

Table 1. Different Environmental Services.

ES Modeling was done using two major software: Geographic Information System (ArcGIS); and an extension tool called Soil and Water Assessment Tool (ArcSWAT)to model water yield, water flow regulation, erosion control and sediment regulation. It also used two customized approaches for modeling timber provision and carbon sequestration.

Modeling was done in three different landscape scenarios: "Business-as-Usual", "Forested" and "Bare-Urban" Scenarios. "Business-as-Usual" is a landscape simulation that uses the current land cover of the watershed. "Forested" is a landscape simulation where the majority of the land cover of the watershed consists of closed forests. The "Bare-Urban" is a landscape where the watershed is highly urbanized with largescale conversion of natural vegetation to built-up areas.

These scenarios were done to assess the ecosystem service provision of the watershed under different land cover extent and spatial arrangements. Although the forested and bare-urban scenarios seem extreme, it shows how moving towards a direction of a more "forested"



landscape for the forestlands of Sorsogon City can generate benefits derived from ecosystem services such as water provision, sediment control, and erosion control.

Finally, the ecosystem services modeled were further used as indicators in prioritizing subwatersheds in the Municipality of Sorsogon City.

3.3.2 Valuation of Forest-based Provisioning and Regulating Ecosystem Services

Valuing the provisioning and regulating ecosystem services of Sorsogon's forest and forestlands was undertaken using exchange values, which is in line with the System of National Accounts (SNA) 2008 and System of Environmental Ecosystem Accounts (SEEA) 2012. The focus of valuation is on the contribution of ecosystems to economic activities including consumption and production, and not the contribution of ecosystems to welfare.

The replacement cost and resource rent methods were used in valuing the ES modeled therein (Table 2). Replacement cost is based on the costs associated with mitigating actions if the ecosystem service was lost. Resource rent is based on the value of additional area or number of resource to recover lost ecosystem service.

ECOSYSTEM SERVICE	VALUATION	VALUATION OUTPUT
	METHODOLOGY	
1. Water Provision	Replacement cost (based on the cost of replacing the water provision ES with delivered water or harvesting rainwater using Ferro cement tanks	Value of the water provision service in Php/year
2. Water Regulation	Resource rent (based on the value of additional ha of rice paddies that can be irrigated during the dry season)	Value of the water regulation service in Php/year
3. Erosion Control	Replacement cost (cost of replacing the service through the use of erosion blankets)	Value of the erosion control service in Php/year
4. Sediment Control	Replacement cost (cost of replacing the service based on the price of constructing check dams and the cost of removing the sediments/silt once these are filled up)	Value of the sediment control service w in Php/year

Table 2. Valuation Methodologies.





Figure 5. Participants to the situational analysis of ecosystem services

3.3.3 Analysis of Forest Use

Community profiling includes analyzing uses of forest resources by different stakeholders or user groups, and level of utilization for livelihood and subsistence. It basically answers the question 'How do forest communities use forest resources for livelihood and subsistence?' The approach employed the Program on Forests (PROFOR)'s *Poverty-Forests Linkages Toolkit* which provides a set of fieldwork methods and analytical tools based on participatory appraisal/assessment. The toolkit is composed of eight (8) instruments described in Table 3.

TOOL NO.	INSTRUMENT	PURPOSE
1	Wealth Ranking	Understand how poor households use and depend on forest resources.
2	Local Landscape Situation Analysis	Understand how villagers use local resources.
3	Timeline and Trends	Record changes in forest resources, agriculture, local livelihood strategies, and income.
4	Livelihood Analysis	Determine subsistence reliance on forests and the annual income from forests.
5	Forest Problem and Solution Matrix	Identify and rank forest problems, and suggest solutions.
6	Ranking Forest Products	Rank forest products by importance for cash and subsistence use.
7	Millennium Development Goals (MDGs) Chart	Show the contribution of forests to the achievement of the MDGs.
8	Monetary Values	Express the contribution of forestry in monetary terms.

Table 3. PROFOR's Forests-Poverty Linkages Toolkit.

As the toolkit was applied in the Philippine setting, among the eight (8) instruments, theFLUP Team applied only (a) wealth ranking, (b) local landscape situation analysis,(c) livelihood analysis, (d) forest problem and solution matrix , and (e) ranking forest productswereused to achieve efficient and effective data collection and analysis strategies.



The Ecosystems Services (ES) modeling enhanced the situational analysis as it provided quantitative data to support and corroborate the qualitative data obtained from workshops. Through ES modeling, values of identified indicators were readily determined making the process of sub-watershed prioritization more scientific and reliable.



Figure 6. Sub-Watershed Prioritization Workshop.

3.3.4 Community Profiling and Mapping

In community profiling and mapping, a **Points of Interests/Issues (POI) Mapping** activity was conducted to identify points/polygons of interests/issues (POIs) in Sorsogon City. Participants were asked to locate per barangay the different POIs such as hazards, ecotourism sites, and other nature-based resources, and write such POIs in a sheet of paper to be posted in the base map of Sorsogon City.

3.4 FLUP Preparation

3.4.1 LGU-FLUP Technical Working Group Tasking

CHAIR- City Environment and Natural Resources Officer (CENRO) MEMBERS: City Planning and Development Officer City Engineer City Agriculture Officer City Zoning Administrator City Assessor City Social Welfare and Development Officer City Tourism Officer City Disaster Risk Reduction Management Officer

3.4.2 Report Writing

The actual FLUP preparation was done last October to November 2017. This was participated in by LGU-Sorsogon City TWG and DENR V staff. Components/parts of LGU-Sorsogon City FLUP are as follows:



- 1. Executive Summary
- 2. Introduction
- 3. Scope and Limitation of the FLUP
- 4. Methodology
- 5. Key Findings in terms of LGU profile, condition of forests and forestland assets, land resources,water bodies and water production,biodiversity resources,naturebased tourism assets, and other resources. Also, the key stakeholders and institutional assessment
- 6. Problems, Issues and Needs
- 7. Investment Opportunities
- 8. LGU's Vision, Mission, Goals and Objectives for its Forests and Forestlands
- 9. Recommended Strategies
- 10. Organizational Structure
- 11. Estimated Financial Requirements for FLUP Implementation and Sources of Fund





4.1 LGU Profile

4.1.1 Biophysical Profile

Location and Total land Area

Sorsogon City lies 123° 53' to 124° 09' east longitude and 12° 55' to 13° 08' north latitude, and is situated in the Philippine's Bicol Region (Fig. 1). It is 600 kilometers southeast of Manila and is located at the southernmost tip of Luzon. As part of the geographical chain linking Luzon to the rest of the Philippines, it serves as trans-shipment corridor and serves as the gateway to the Visayas and Mindanao Islands. Its geographical location is such that it opens into the Pacific Ocean to the West and East, through Albay Gulf and Sugod Bay, and the China Sea through the Sorsogon Bay.



Figure 7. Location map of Sorsogon City.

The city is bounded on the east by the municipalities of Prieto Diaz and Gubat, on the south by the municipality of Casiguran ad Sorsogon Bay, on the west by the municipality of Castilla, on the northeast by the municipality of Manito in Albay, and on the north by Albay Gulf. It covers 27,611 hectares and is composed of 65 barangays (Figure 7).

There are three major areas within Sorsogon City: first, is the Bacon district having 28 barangays; second, is Sorsogon West district having 22 barangays; and third, is Sorsogon East district having 14 barangays (Table 4). The administrative map is shown in Figure 8.





	Table 4. The Administrative	Map showing	different barangays of	Sorsogon City.
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BARANGAY	AREA	%
Poblacion	211.7306	0.77
Abuyog	837.5482	3.03
Abuyog vs. Mariñas	11.2748	0.04
Almendras	6.157084	0.02
Almendras	12.40849	0.04
Balete	320.5168	1.16
Balogo	132.231	0.48
Balogo	137.8692	0.50
Barayong	109.121	0.40
Basud	790.4683	2.86
Bato	380.5201	1.38
Bibincahan	891.3227	3.23
Bibincahan vs. Almendras	0.57391	0.00
Bitan-o	20.70711	0.07
Bitan-o vs. Talisay	2.534606	0.01
Bogña	228.287	0.83
Bon-ot	242.3381	0.88
Bucalbucalan	510.2287	1.85
Buenavista	158.5815	0.57
Buenavista	330.7829	1.20
Buhatan	898.0035	3.25
Bulabog	884.1856	3.20
Burabod	26.37713	0.10
Cabarbuhan	304.7613	1.10
Cabid-an	525.0572	1.90
Cambulaga	44.94673	0.16
Сариу	893.7399	3.24
Caricaran	169.0436	0.61
Del Rosario	58.13804	0.21



Continuation of Table 1.		
Gatbo	900.6801	3.26
Gimaloto	195.7545	0.71
Guinlajon	1471.198	5.33
Guinlajon vs. Pangpang	36.37964	0.13
Jamislagan	285.7491	1.03
Macabog	239.5112	0.87
Maricrum	136.4517	0.49
Mariñas	215.5112	0.78
Osiao	3536.008	12.81
Pamurayan	261.1228	0.95
Pangpang	477.8187	1.73
Panlayaan	615.0486	2.23
Panlayaan vs. Buenavista	1.508135	0.01
Peñafrancia	205.1932	0.74
Piot	81.69502	0.30
Polvorista	6.418157	0.02
Rawis	166.6345	0.60
Rizal	927.4016	3.36
Salog	13.9565	0.05
Salvacion	567.9321	2.06
Salvacion	326.5987	1.18
Sampaloc	16.64141	0.06
San Isidro	620.642	2.25
San Isidro	439.6859	1.59
San Juan	1195.517	4.33
San Juan (Roro)	410.9265	1.49
San Ramon	171.3871	0.62
San Roque vs. San Pascual	903.2705	3.27
San Vicente	216.2638	0.78
Santo Niño	1210.609	4.38
Sawanga	424.7988	1.54
Sirangan	5.116473	0.02
Sirangan vs. Talisay	1.363367	0.00
Sogod	477.1223	1.73
Sta. Cruz	353.3587	1.28
Sta. Cruz vs. Balete	10.06616	0.04
Sta. Lucia	236.5527	0.86
Sto. Domingo	147.7817	0.54
Sulucan	3.493121	0.01
Talisay	14.50336	0.05
Ticol	943.8715	3.42
TOTAL	27611	100.0



4.2 Ecosystem Services and Valuation

4.2.1 Average Stream Flow Rates in Sorsogon

Figure 9 below shows that bare landscapes yieldhigher stream flow rates which means, higher average water volume available to Sorsogon City, for domestic, agricultural, or industrial use. Results also show that streamflow rates under the forested scenario are fairly steady and not as fluctuating and responsive to rainfall when compared to a bare landscape. This reflects the importance of forests in facilitating water flow and regulation.



Figure 9. Average Daily Streamflow Rates in Sorsogon City During Dry Season under three (3)Landscape Scenarios, 2002-2012.

4.2.2 Water Volume and Groundwater Yield

Sorsogon City's sub-watersheds' forested scenario revealed that higher forest cover generates higher water volumeand groundwater yieldcompared to lower forest cover (bare-urban and business as usual scenarios). In Table 5, San Juan subwatershed has the highest (6,602 cu,m./yr.) water volume followed by Salogand Ticol-Cawayansubwatersheds (6,251 cu.m./yr. and 6,251 cu.m./yr. respectively).

	Average Water Volume (cu.m./yr)			
Subwatershed	BARE	BAU	FORESTED	
Luluwasan	2,665	2,792	2,789	
Panlayaan-Suhi	3,669	3,823	3,856	
Ticol-Cawayan	5,759	5,969	5,997	
Osiao	1,611	1,668	1,651	
San Juan	6,409	6,513	6,602	
Anahaw	4,108	4,180	4,189	
Salog	6,099	6,152	6,251	
Buhatan	4,144	4,189	4,222	
Su-Ba	1,925	1,969	2,001	
Maigang-Macauayan	722	753	739	
Eastern Bacon	687	725	712	

Table 5. Average Water Volume



Table 6. Groundwater Yield

	Groundwater Yield (cu.m./yr)			
Subwatershed	BARE	BAU	FORESTED	
Luluwasan	1,546	1,955	2,175	
Panlayaan-Suhi	2,128	2,676	3,007	
Ticol-Cawayan	3,340	4,178	4,678	
Osiao	934	1,168	1,288	
San Juan	3,717	4,559	5,150	
Anahaw	2,383	2,926	3,268	
Salog	3,537	4,307	4,876	
Buhatan	2,403	2,932	3,293	
Su-Ba	1,116	1,378	1,561	
Maigang-Macauayan	418	527	577	
Eastern Bacon	399	507	555	

4.2.3 Sediment Outflow, Stream and Hill Slope Erosion

Maintaining forest cover can be a useful strategy for reducing erosion and sediment loss. ES modeling results show that sediment outflow in Sorsogon City is significantly high under the "bare- urban" scenario when compared with the "forested" and "business-as-usual" scenarios (see Figure 10). This shows the protective function of forests and its value for natural hazard reduction.



Figure 10.Sediment Outflow in Sorsogon City (tons/yr) during dry season under three landscape scenarios: 2002-2012

Stream erosion washighest in the Luluwasan and Panlayaan-Suhi sub-watersheds in all scenarios. On the other hand, average stream erosion was lowest in Eastern Bacon given all scenarios (Table 7).



	Average Stream Erosion (tons/yr)			
Subwatershed	BARE	BAU	FORESTED	
Luluwasan	4,160	1,308	650	
Panlayaan-Suhi	2,600	1,171	738	
Ticol-Cawayan	809	324	190	
Osiao	762	448	203	
San Juan	1,965	835	490	
Anahaw	570	195	107	
Salog	222	225	146	
Buhatan	282	180	91	
Su-Ba	266	266	187	
Maigang-Macauayan	493	492	337	
Eastern Bacon	43	43	32	

Table 7. Average Stream Erosion (tons/yr)

While highest hill slope erosion was in Luluwasan ,Panlayaan-Suhi and Maigang-Macauayansub-watersheds given all scenarios (Table 8). These changes in both stream and hill slope erosions may be due to the different sizes and conditions present in these subwatersheds.

Subwatershed	Average Hillslope Erosion (cu.m./yr)			
	BARE	BAU	FORESTED	
Luluwasan	8,413	2,784	1,332	
Panlayaan-Suhi	3,016	1,629	1,021	
Ticol-Cawayan	1,888	740	383	
Osiao	2,322	1,825	777	
San Juan	878	518	318	
Anahaw	702	251	144	
Salog	172	175	120	
Buhatan	223	156	91	
Su-Ba	919	924	632	
Maigang-Macauayan	3,706	3,710	2,544	
Eastern Bacon	427	429	303	

Table 8. Average Hillslope Erosion

4.2.4 Monetary Values of Ecosystem Services

Replacing regulating ecosystem services is costly and man-made erosion and sediment control services are extremely costly. On the other hand, reforestation activities cost about Php20, 450 per hectare. Reforestation is a lower cost alternative for the security of erosion-regulating services over the medium term. Table 9 shows the top 5 highest monetary values in replacement to the ecosystem services per subwatershed.


Subwatershed	Ecosystem Services			
	Water Provision	Stream Erosion	Hillslope Erosion	
	(Php/hh/yr)	(Php/yr)	(Php/yr)	
	Replacement cost	Replacement cost	Replacement cost	
	based on water	based on check dams	based on erosion mats	
	delivery and rainwater			
	harvesting			
Luluwasan		306,152,101	951,379	
Osiao	-	33 650 233	84 104	
C Shuo	27 702	55,050,255	01,101	
San Juan	37,702	121,239,456	60,782	
	_			
Anahaw		40,277,460	76,226	
	_			
Buhatan		10,942,578	11,332	

Table 9. Monetary Values of Ecosystem Services per Watershed.

4.2.5 Potential Area for Irrigation

During the three driest months of the year (February, March, April), forests have the potential to increase the service area that could be irrigated. Shown in Table 10 are the potential irrigated paddies (in ha) of each subwatershed.

Subwatershed	BARE	BAU	FORESTED
	Potent	tial Irrigated Paddie	s (ha)
Luluwasan	134	140	140
Panlayaan-Suhi	184	192	194
Ticol-Cawayan	289	300	301
Osiao	81	84	83
San Juan	322	327	332
Anahaw	206	210	211
Salog	306	309	314
Buhatan	208	210	212
Su-Ba	97	99	100
Maigang-Macauayan	36	38	37
Eastern Bacon	36	36	34

Table 10. Area (in hectares) for potential irrigated paddies

4.3 Topography, Slope, Elevation and Land Cover

Sorsogon City can be divided into four (4) physical areas or land terrain. These are the northeastern range, the sloping uplands, the plain area, and the marshlands.

Topography ranged from level to very steep. More than half (56.2%) of the City's terrain is gently sloping to undulating to rolling with 8 to 18% slope and is suitable for development.

Higher terrains with an area of 7,473.65 hectares, characterized by steep to very steep mountainous slopes (30% to more than 50% slopes) comprised only 27.07 percent of the total land area of the city. The steeply sloping areas (30% - above) are mostly located in the northwestern portion of the province of Sorsogon where most of the forest areas can be found including the surrounding of Bacon geothermal facility. Likewise, the northeastern range is physically part of the Bacon-Castilla Range serves as watershed covered mainly by secondary growth forest and thicket. It starts from 200 meters above sea level to Mt. Rangas, the highest point that measures about 1,000 meters above sea level. Of this area, 2,336.26 hectares or 8.46% should be protection zone (1991 DENR Admin. Order and Memo Order).

Geographically, several barangays form part of the upland area in Sorsogon, namely, Salvacion, Panlayaan, San Isidro, Rizal,Bucalbucalan, Bulabog, Capuy, Ticol, Basud, Guinlajon, and Pangpang, including the hinterlands of barangays Macabog, San Juan and Bibincahan. From the side of the Bacon district, barangay's Sto. Nino, Osiao, San Juan, Sta, Cruz, and Cabarbuhan cover the upland area of the upper northwestern portion of the Sorsogon hinterlands. These sloping areas would require introduction of soil and water conservation measures to reduce siltation of streams and minimize impacts on lowlands. Figure 11 below, presents the slope map and Table 12 the slope distribution.



Figure 11. Slope map of Sorsogon City.

CATEGORY	AREA	%
0-8%, Level to Undulating	9,974.12	36.10
8-18%, Undulating to Rolling	5,548.78	20.10
18-30%, Rolling to Moderately Steep	4,614.47	16.72
30-50%, Steep	5,137.39	18.61
50% and above	2,336.26	8.46

Table 11.Slope Distribution.





Figure 12. Slope Distribution per Sub-Watershed.

Elevation starts from 0-100 meters above sea level (masl) to Mt. Rangas, the highest point at 1,000 meters. The sloping uplands are the shoulders of the range and the series of hills in the southeast. Coconut, abaca, and fruit trees cover this area. The plain is generally low and level. Settlements and other built-up areas and ricefields occupy the plain area. Marshlands are the mouth of rivers vegetated mainly by nipa and are developed into fishponds (Figure 13).



Figure 13. Elevation Map of Sorsogon City.



Table 12. Elevation Map.

Elevation Category (masl)	Area (hectares)	Percentage
0-100	14,902.24	53.98
101-200	3,234.71	11.72
201-300	1,870.59	6.77
301-400	1,778,95	6.44
401-500	1,339,56	4.85
501-600	1,339.51	4.85
601-700	1,338.84	4.85
701-800	1,070.73	3.88
801-900	553.57	2.01
901-1000	150.25	0.54
≻ 1,000	30.05	0.11
TOTAL	27,611 hectares	100

Trend analysis in terms of changes in land cover of the City shows that in 2004 (Figure 14), dominant vegetative cover were perennial crops and shrubs (39.91 and 39.45% respectively). The steep slopes and higher elevations, were covered by shrubs and open forests respectively. Then six years later in 2010, perennial crops and broadleaved forest comprised 56.60 % and 24.38% of the total land area. (Figure 15).A significant portion of the northwestern part of the of the city's uplands including the Bacon Geothermal Reserve are closed forests given the marked difference in forest cover from 2004 to 2010. Other parts are open forests.



Figure 14. 2004 Land Cover Map

LEGEND/LAND COVER CATEGORY

CODE	LAND COVER	AREA	%
	Mangrove forest	795.83	2.88
	Fishpond	67.82	0.24
	Built-up area	272.25	0.99
	Broadleaved Forest	1666.38	6.04
	Annual crop	2658.72	9.63
	Perennial crop	11020.12	39.91
	Natural grassland	237.15	0.86
	Shrubs	10892.72	39.45
	TOTAL	27611.00	100.00





Figure 15.2010 Land Cover Map

In terms of Land Classification, majority (71.34%) of the land area of Sorsogon City are alienable and disposable lands (Figure 16). Only 28.66% is classified as timberland/forestland. Of this, 6,992.88 hectares (25.33%) is upland, mangroves occupy 914.94 hectares (3.31%) and 6.21 hectares is composed of small islands (0.02%).



4.3.1 Climate and Meteorology

Generally, the climate of Sorsogon is under Type II of the Coronas classification system. Under Type II, there is no pronounced dry season but with a very pronounced maximum rain period from November to January. Sorsogon City's annual rainfall range from 2,800 mm to 3,500 mm. Rain is expected 200 days in a year and even in the driest month's unexpected downpour occurs (Figure 17).



The City's atmospheric temperature and relative humidityranges from 21 0C to 32 0C. Relative humidity is 82%. Prevailing air stream systems are the monsoons and Pacific Trade Winds which pass over the City and cause variations to climate. The Northeast Monsoon (Amihan) occurs/ dominates from October to March and brings significant amounts of rains. While the Southwest Monsoon (Habagat), occurs from June to September and during these months, the area is warm and very humid thus, increasing rainfall rates. The Pacific Trade Winds (Gurang na Habagat) occurs during April and May significantly raise temperatures (City Ecological Profile, 2015).



Figure 17.Climate Map of the Philippines

4.3.2 Watershed and Drainage

The FLUP-TWG Team, together with key participants from the communities, identified the City's sub-watersheds covering a total land area of 27,611 hectares. There are eleven (11) identified sub-watersheds, the biggest of which is Ticol-Cawayanoccupying 19.28% of the total land area(Figure 18).

Sub-watershed prioritization was based on a set of criteria which both FLUP-TWG Team and participants discussed and approved. For each criterion, there were set of indicators used to ensure systematization of the process and validity of results.





Figure 18. Sub-Watershed Map

Among the criterion, biodiversity and hydrological values were given highest equal weights of 25% each, given the reality that these are the "natural capitals" which provides varied ecosystems services e.g. provisioning services, regulating services, supporting services, and cultural services.

On the other hand, economic value was given 18% weight, while the protection of lives and properties as well as aesthetic values/ecotourism was given 16% and 7% weights respectively (Table13).

A. Biodiversity Value	1.Total natural forests within protection zone (close canopy, open canopy and mangrove)2.Presence of endangered species of wildlife
B. Water Production Va	 Irrigation service areas (within the LGU, outside the LGU) Number of HH benefited (by irrigation facilities, by domestic water infrastructures) Number of water irrigation, power & domestic water infrastructure Areas planned to be developed for irrigation, power and domestic water supply
C. Economic Production Va	 Total A&D lands Total production areas within forest lands (FL) Residual forests in A&D lands and production zones Plantations in A&D lands and production zones Cultivated areas within FL
D. Nature-Based Tourism Value	1. Number of nature-based tourism sites (existing, potential)

Table13. Criteria with Indicators Used in Watershed Prioritization.



Continuation of Table 1	3
E. Protection to	1. Frequently flooded areas
Lives and	2. Landslide prone areas
Properties	3. Estimated population affected by flooding and landslides
	4. Total population
	5. Settlement density
F. Protection to	1. Number of bridges which may be damaged by flooding or landslides
Infrastructures	2. Road Density
	3. Other infrastructures that maybe damaged

Priority ranking of sub-watersheds based on the cumulative points showed the top three priority sub-watersheds (Table14). Ticol-Cawayan, the biggest sub-watershed in terms of land area, is the 1st priority. It is followed by San Juan and Buhatan the 3rd biggest sub-watershed.

	Sub-Watershed	%
1. SW3	Ticol- Cawayan	91.27
2. SW5	San Juan	74
3. SW8	Buhatan	65.73
4. SW1	Luluwasan	64.91
5. SW7	Salog	64.18
6. SW6	Anahaw	61.82
7. SW2	Panlayaan-Suhi	54.73
8. SW9	Su-Ba	41.18
9. SW4	Osiao	40.73
10. SW10	Maigang-Maycauayan	32.36
11. SW11	Eastern Bacon	9.09

Table 14. Sub-watershed Ranking in Terms of Priority.

San Juan sub-watershed is the biggest in terms of barangay coverage (17 barangays) followed by Panlayaan-Suhi,Su-Ba and Eastern Bacon sub-watersheds (with 13 barangays each). While Buhatan and Osiao sub-watersheds has only two (2) and four (4) barangays covered. The barangays inside each sub-watersheds are shown in Figure 19.

	Raranga	v per Sub-Watershed
	Daranga	y per sub-watershea
CODE	SUBWATERSHED NAME	BARANGAY
1	Luluwesan	Salvacion, San Isidro, Rizal, Bucalbucalan, Bulabog, Capuy, Osiao, Santo Niño, Panlayaan
2	Panlayaan-Suhi	Salvacion, Buenavista, Panlayaan, San Isidro, Rizal, Bucalbucalan, Bulabog, Capuy
3	- Ticol-Cawayan	Rizal, Bucalbucalan, Bulabog, Capuy, Osiao, Basud, Ticol, San Juan, Pamurayan, Barayong, Cuinlajon, Pangpang, Cimaloto
4	Oslao	Oslao, San Juan, Sat, Cruz, Sto, Domingo
5	San Tuan	Osiao, Basud, San Juan, Guinlajon, Cabarbuhan, Sta. Cruz, Sto. Domingo, Bibincahan, Maricrum, Balete, Rawis, Del Rosario, San Rogue, San Pascual, Poblacion, Bogña, Caricaran
6	Anahaw	Macabog, San Juan (Roro), Cambulaga, Piot, Burabod, Bitan-o, Burabod, Talisay, Peñafrancia
7	Buhatan	Cuinlajon, Macabog, San Juan Roro), Biobincahan, Piot, Burabod, Salog, Almendras, Balogo, Talisay, Po/ivorista, Sulucan, Sampaloc, Sirangan, Cabid-an
		- Bibincahan, Maricrum, balete, San Rogue, San Isidro, San Ramon,
8	Salog	Abuyog, Jamislagan, San Vicente, Mariñas, Cabid-an, Buhatan
9	Su-Ba	San Roque, San Pascual, San Ramon, Salvacion, Bogha, Caricaran, Jamislagan, San Vicente, Sta. Lucia, Sogod, Catbo, Bato, Buhatan,
10	Maigang- Macauayan	Catbo, Buenavista, Bon-ot, Balogo, Sawanga
11	Eastern Bacon	Jamislagan, Socod, Catho, Bugnavista, Bon-ot, Balogo, Sawanga, Bato

Figure 19. Barangays inside each sub-watersheds.



Overlay analysis of slope category per sub-watershed (Figure 20.) reveal that big portions of land areas of Ticol-Cawayan, Luluwasan and Panlayaan-Suhi sub-watersheds have slopes of 30.1% to> 50% characterized by hilly to steep mountains.

The slope of Osiao sub-watersheds is mostly between 18.1% to 50%, with rolling to hilly to mountainous terrain. On the other hand, most of the barangays within San Juan, Anahaw, Salog, Buhatan, Su-Baand Maigang-Maycauayan sub-watersheds areas have level to undulating to rolling slopes of 0 to 18 percent. Lastly, the Eastern Baconsub-watershed ismostlylocated in undulating to rolling to hilly slopes of 8.1% to 30% slopes.



Figure 20.Slopes of the sub-watersheds.

Figure21 shows the elevation map of different sub-watersheds of Sorsogon City . Majority (18,138.95 hectares) of the land areas has an elevation of 0-200 meters above sea level (masl). The highest elevation of greater than 1000 masl covering 30.05 hectares, are within Luluwasan,Ticol-Cawayan and Osiaosub-watersheds.

The importance of elevation map is in identifying special areas for conservation purposes. In areas above 1,000 masl, the state policy imposes no logging activities implying that these are protection areas/zones (DENR,1991).





Figure 21. Elevation distribution per sub-watershed.

The vegetative cover map per sub-watershed shows that perennial crops are the dominant (56.6%) land cover of the sub-watersheds (Figure 22.). The Luluwasan, Palayaan-Suhi and Ticol-Cawayan sub-watersheds, located in high slopes and elevations, are predominantly covered by broadleaved forest (24.38%).

The other sub-watersheds are covered by annual crops (8.69%) and built-up areas (3.78%).





Figure 22. Land cover of sub-watersheds.

On the other hand, the natural surface drainages of the sub-watersheds are system of rivers and creeks and several small waterways. The drainage system consist of several rivers. Salog River is an urban river originating from Mt. Alinao and traversing eight barangays before discharging into the Sorsogon Bay. San Isidro, Rizal, and Cawayan Rivers originate from springs and tributaries of secondary forest areas within EDC Geothermal Reservation. Rivers in Bacon District, at the northwestern to northeastern portion of the city, drain to the Albay Gulf. These include Luluwasan Osiao, Gatbo, and Rangas Rivers. Rivers in the southwest & south namely San Isidro, Cawayan, Salog, and Abuyog Rivers at the East & West District drain into the Sorsogon Bay (Figure 23a - 23f).

Fresh water rivers, upon reaching the lowlands, are often tapped for irrigation and domestic uses. Brackish ones are source of shrimps and shellfish. Water resources in the City are generally classified into surface and groundwater. Springs and networks of creeks and tributaries at the upland converges at the down streams to form major river systems. There are also creeks that only exist during rainy periods and dries up during dry season





Figure 23a.Drainage and road network map.



Figure 23b.River systems serving as natural drainage of the sub-watersheds.



Table15. List of Major River Systems.

Name of River	Location
Capuy-Ticol River	Capuy-Ticol
Alinao River (Salog)	Roro
Cawayan	Guinlajon
Anahao River	Pangpang
Luluwasan River	Sto. Nino
Rangas River	San Roque
Pulog River	Ponco, Balete
Hotoc River	Rawis
Sugod River	Sugod
Osiao River	Osiao

Pictures of some of these major river systems are as follows:



Figure 23c. Salog RiverFigure 23d. San Isidro River



Figure 23e. Rizal RiverFigure 23f. Cawayan River



Most of these rivers are supplied/recharged by major springs (Table16).

Table 16. Major Springs Supplying Water to Major Rivers.

Name of Springs	Location
Ivanie of Springs	Location
Palhi Spring	Capuy
San Rafael Spring	Ticol
San Pascual Spring	San Pascual
Milabiga (small)	San Juan
Milabiga (big)	San Juan
Continuation of Table 16.	
Anahaw 1	Macabog
Anahaw 2	Macabog
Alinao 3	Macabog
Matacla 1 & 2	Macabog
Matacla 3	Macabog

4.4 Socio-Economic Political and Cultural Profile

4.4.1 Land Area, Political Subdivision and Demography

Sorsogon City is a 3rd class component city and was created by virtue of Republic Act 8806, which was signed into law on August 16, 2000 and ratified during a plebiscite on December 16, 2000. RA 8806, also known as the Cityhood Law, called for the merger of the municipalities of Sorsogon and Bacon into a component city of the province of Sorsogon.

Sorsogon City has a total land area of approximately 27,611 hectares. The City has a total of sixty-four (64) barangays composed of twenty two (22) urban barangays and forty two (42) rural barangays (Table 17). The barangays are further subdivided into three major areas within Sorsogon City, first is the Bacon district having 28 barangays, second is Sorsogon West district having 22 barangays and third is Sorsogon East district having 14 barangays.

The population of Sorsogon City as per National Statistic Office census of 2010 (Philippine Statistics Authority (PSA) is recorded at 155,144. Previously recorded total population from year 2007 is at 151,454.

In three years span the population growth increase is 0.81 % As of year 2010 the aggregate population of rural barangays is 82,646 or 53% of the City's total population which comprises more than half of Sorsogon City's population. The aggregate population of urban barangays is 72,498 or 47% of the Sorsogon City's population.

On the average, there are five (5) persons in each household. In totality there are 32,662 households in Sorsogon City as of 2010. The urban barangay holds 47% while the rural barangay which includes forestlands, holds 53% of the number of households in Sorsogon City.

The city is composed of barangays in transition to becoming urban barangays. With urbanization, speculative claims of upland areas will increase and would affect stability of forestlands. Adding to the pressure is the population that is expected to increase yearly. Increasing population means increasing demand for natural resources for livelihood, areas of cultivation and human settlements thus, the open access forest are at threat of deforestation and degradation.



Table 17. 2010 Population by Barangay

Barangays of Sorsogon City	Urban/Rural	Population (as of May 1, 2010)
Abuyog	Rural	3,898
Almendras-Cogon (Pob.)	Urban	1.162
Balogo (Sorsogon East District)	Urban	6,214
Barayong	Rural	1,200
Basud	Rural	2,615
Bibincahan	Urban	14,285
Bitan-o/Dalipay (Pob.)	Urban	3,053
Bucalbucalan	Urban	2,309
Buenavista (Sorsogon West District)	Rural	1,538
Buhatan	Rural	3,163
Bulabog	Urban	2,300
Burabod (Pob.)	Urban	2,464
Cabid-An	Rural	5,438
Cambulaga	Rural	4,057
Сариу	Rural	2,390
Gimaloto	Urban	955
Guinlajon	Rural	4,270
Macabog	Urban	3,290
Marinas	Rural	659
Pamurayan	Urban	1,889
Pangpang	Urban	8,224
Panlayaan	Urban	1,415
Penafrancia	Urban	1,608
Piot (Pob.)	Urban	2,507
Polvorista (Pob.)	Urban	529
Rizal	Urban	3,341
Salog (Pob.)	Urban	2,788
Salvacion	Rural	817
Sampaloc (Pob.)	Urban	4,720
San Isidro (Sorsogon West District)	Rural	1,478
San Juan (Koro) Sirangan (Pob.)	Urban	4,485
Sulucan (Pob.)	Urban	638
Talisay (Pob.)	Urban	2,714
Ticol	Rural	1,820
Tugos	Rural	2,900
Balete	Rural	2,429
Balogo (Bacon District)	Rural	439
Bato	Rural	1,682
Bonot	Rural	573
Bogna	Rural	1,367
Buenavista (Bacon District)	Rural	1,338
Cabarbuhan	Rural	810
Caricaran	Rural	1,871
Del Rosario	Rural	881
Gatbo	Rural	2,367
Jamislagan	Rural	946
Maricrum	Rural	1,258



Osiao	Rural	2,821
Continuation of Table 17.		
Poblacion	Rural	4,602
Rawis	Rural	1,253
Salvacion	Rural	1,179
San Isidro (Bacon District)	Rural	2,569
San Juan	Rural	1,950
San Pascual	Rural	1,250
San Ramon	Rural	995
San Roque	Rural	3,165
San Vicente	Rural	1,231
Santa Cruz	Rural	1,110
Santa Lucia	Rural	397
Santo Domingo	Rural	1,314
Santo Nino	Rural	2,128
Sawanga	Rural	1,547
Sugod	Rural	2,054

Map overlay of population and sub-watersheds shows that San Juan, Anahaw, Salog, Buhatan and Su-Ba sub-watersheds have high population concentration. More social and infrastructure support services are needed (Figure 24).



Figure 24. Population concentration per sub-watershed.





4.4.2 Ethnic Composition

Bicolanos are the fifth largest ethnolinguistic group in the Philippines. They are found mostly in the provinces of Albay, Camarines Camarines Norte, Masbate, Catanduanes, and Sorsogon.

Sorsogon City is a town famous for coconut based Bicol cuisine. Laing or Gulay Na Gabi in its dialect, is a famous dish that have delighted Filipinos and foreigners to the extent of their Bicol dining experience, it is a kind of vegetable called Taro leaves cooked in coconut-cream and mixed with variety of chilies. Another popular dish immensely flavored with chilli and cooked in coconut milk is called Bicol express, it is present in most restaurants of Bicol but for Sorsogenos, it is just a daily energizing food. Other dishes are Langka or jackfruit, a local fruit called Santol, or even the banana blossoms are simple ingredients usually prepared in coconut cream but when cooked the Bicolano way, turns out an exciting tasteful cuisine.

Sorsogon City celebrates a number of cultural festivities. Among them are:

1.Pili Festival

The Pili Festival celebrates the pili, which supports the livelihood of many Sorsoganons, although the growing of pili is popular in the other provinces of Bicol, it is Sorsogon which has the largest land area devoted to pili farming.

The Feast day of the Patron Saints of Sorsogon City- Saints Peter and Paul coincides with the celebration of Pili Festival, their feast day is on the 29th of June. Catholic Mass and Processions happen during this day.

2.Sorsogon Festival

Sorsogon Festival is a month-long celebration during December giving significance on the birth of Sorsogon City, this event highlights the history, culture and ethnicity of the City of Sorsogon and their good harvest pili.

3.Kasanggayahan Festival

The festival, celebrated in the whole province in the last week of October, commemorates the founding of Sorsogon as a province. Festivities include a series of cultural, historical, religious, agro-industrial and economic activities, showcasing the province's abundant agricultural products, particularly food and decorative items.

Though a provincial event, most of the festivities during the Kasanggayahan Festival including the "Pantomina sa Tinampo", street dances and others are conducted in the city since this is the provincial capital of Sorsogon and the seat of the province is in the city.

4. Holy Week Celebrations

Holy week celebrations commemorate the suffering, death and resurrection of Jesus Christ. Catholicism as a predominant religion in the city celebrates holy week either the months of March or April.

During this time many different cultural traditions like Pabasa and Way of the Cross were held, the City Procession was organized by the Parish of Sts. Peter and Paul and is participated by hundreds and thousands of people, it was held at sundown on Holy Wednesday and Good Friday and many religious icons are paraded around the city.

5.Barangay Fiestas

Sorsoguenos are very religious and fun-loving. Being mostly Roman Catholics, they are active in every festivity celebrated throughout the year. Like any other Filipino ethno linguistic groups, each barangay honors their patron saint with a celebration on its feast day.



4.4.3 Major Livelihood Sources

Sorsogon City, as the capital town of the province of Sorsogon, is a hub of trade and commerce. Its strategic location has given rise to a busy commercial district composed of local businesses and franchises of national and regional business chain. Business is concentrated in the downtown area near the public market and major commercial establishments primarily geared towards retail and wholesale and the Bacon District is the secondary business district of the City.

The City of Sorsogon is considered to be agricultural land. Thus, agriculture and fisheries sector is still the driving force of its economy. An approximate of 50% or 14,113 hectares of agricultural land covers the area with rice, coconut and corn as their major produce, all for local consumption. In addition, the City of Sorsogon have pili, abaca, banana, root crops, cacao, coffee, pineapples and other native fruits andvegetables. These are the raw materials needed by the different industries such as coconut oil and by-products, choco-pili candy and abaca by-products.

Aside from agriculture, there are other major industries operating in the city. These industries utilize large volume of water from the forestlands and during operations; they contribute to the pollution of waterways and the atmosphere. This is likewise a concern of the FLUP.

4.4.4 Infrastructure Services

There are ample economic support infrastructures. Sorsogon City's electrical power source comes from the Luzon Grid; transmitting electricity to the whole island of Luzon and is managed by the National Grid Corporation of the Philippines. The City's electricity is managed however by the Sorsogon Electric Cooperative II with its substation situated within the city limits on barangay Cabid-an, East district. Secondary electrical power source is a 600 Kilowatt hydroelectric power-plant on barangay Guinlajon, West district. It is expected to generate 2.786-gigawatt per hour (GWH) annually, would be a significant contribution to the province's peak demand of 12.406 MW.

Different water facilities are available both for domestic, commercial, agricultural and industrial uses. There is also a Level 1 Water Facility, either a protected well or a developed spring with an outlet but no distribution system, for less populated rural barangays and houses thinly scattered. Most rural barangays depends on Level 2 Water Facility using communal water pumps or jetmatics. And in urban barangays, households, commercial establishments and development institutions/schools are served by the water District's Level 3 Water Facility using piped distribution network and household taps.

Existing drainage and sewerage facilities are all over the City.Other infrastructure facilities available are dams, slope protectors or ripraps. Also, other than national, provincial and city roads, there are excellent barangay roads to provide access of households to the city and provincial roads. Farm to market roads and bridges were also constructed to assist farmers in transporting their agricultural produce.

Sorsogon City has a community airportat Bacon district where only small commuter planes can land. Likewise, the city has modern and efficient communication facilities which include



landline telephones and cellular mobile phone. Digitel and Bayantel makes long-distance and domestic landline telephone communication possible while Smart Communications, Globe Telecommunications and Sun Cellular Network provide mobile phone services. There are also Five (5) internet service providers offering dial-up connections and 3G services. Connecting through these five (5) providers are thirteen internet cafes that cater to the public.

For the broadcast media, the city have three (3) AM Radio stations, seven (7) FM Radio Stations, two (2) local broadcast television stations. Cable TV is also available with DCTV cable and ESTV cable providing the services.

For mail services, the Philippine Postal Corporation (Sorsogon City Post Office) provides domestic, international and other mail services and four (4) private messengerial and courier service companies which include JRS express, LBC, Mail and More Business Services, Incorporated, and Air21 express. Pawnshops also make use for local and international money transfer.

For newspaper and periodicals, two (2) national and five (5) local newspapers both in English and Filipino circulate in the city along with local newsletters and magazine printed in the City by the City Government and other entities.

On the other hand, the port of Sorsogon, classified as municipal port, has a 664m causeway and reinforced concrete pier. Incoming cargoes like cement, plywood and beer comes from Manila and Cebu. The port is also used by motorized bancas ferrying passengers and goods to and from neighboring towns. No regular trips and routes have been developed or revived since the mode of transportation shifted to land when roads eventually connected towns and barangays. The District of Bacon on the other hand, has two (2) ports, the Poblacion Port and Banao Port.

Also, there are three highways in the area. The Pan-Philippine Highway, also known as the Maharlika Highway runs north from Legazpi City passing the towns of Pilar, and Castilla. It also traverses through the central business district of the town all the way to the rest of the towns of the Second Congressional District of Sorsogon province. Sorsogon City Diversion Road leaves the Pan-Philippine Highway at Barangay Pang-pang at the western side of the city and heads north passing barangays Pang-pang, Bibincahan, San Juan, and reconnecting with the Pan-Philippine Highway at Barangay Cabid-an. The diversion road was created to prevent public utility vehicles from entering the center of the town during rush hours to prevent traffic congestion in the central business district. It also serves as an alternative road network for other vehicles coming from Legazpi City to the Second Congressional district and vice versa. The Bacon-Manito Road serves Bacon District and connects with Manito, Albay on the northeast and also reconnects with rest of the city to the south.

Other infrastructures include the provincial capitol, police station, barangay halls, churches/chapels, city hall, schools (colleges, high schools, elementary, day care centers), hospitals evacuation center, tanod outposts and public markets (Figure 25).

Most of these infrastructures are located within San Juan, Anahaw, Salog, Buhatan and Su-Ba sub-watersheds (Figure 26). Other sub-watersheds do not have access to these infrastructure services, particularly Luluwasan, Panlayaan-Suhi, Ticol-Cawayan, Osiao, Maigang-Maycauayan and Eastern Bacon.



Figure 25.Infrastructure support services.



Figure 26. Type of infrastures per sub-watershed.



4.5 Institutional Profile

The City Environment and Natural Resources Office (City ENRO) is task to manage all natural resources and assets including the forests and forest lands. The Office is headed by the City ENRO and assisted by a Senior Environment Management Specialist and six Divisions namely: Administrative, Pollution Control, Regulatory and Law Enforcement, Climate Change and Awareness Advocacy, Biodiversity Conservation and Coastal Resource.

Management of forests and forest lands will be the concern of three divisions e.g. Regulatory and Law Enforcement, Biodiversity Conservation, and Coastal Resource.

A City Environment and Natural Resources Council (CENRC) will be created with the following functions:

- a) Serve as a venue to discuss various environmental breakthroughs, issues and problems in the city and act on the same either by taking direct action and/or recommend the same to the appropriate body/office.
- b) Monitor progress of the implementation of the Environment Code.
- c) Make the discussions, deliberations and findings of the council public except when the council itself decides that the same is confidential.
- d) Recommend environmental/ecosystem plans to the SP.
- e) Take the lead role in information and education campaigns,
- f) Mobilized the council members in support of environmental protection and management. Meetings may be rotated among the different barangays or in some other places.

In the management of forests and forest lands, the City ENRO partners with different development institutions that support forest protection/conservation and sustainable management particularly with DENR V, Energy Development Corporation, Sorsogon State College, Bicol University, PrivateVolunteer Organizations, Peoples Organizations and Non-Government Organizations.

4.6 Climate Change Hazards

Sorsogon City is located in the eastern seaboard of the country and subjected to the pressures and consequent effects of climate change and disasters because of its geographic location, that of being situated along the *Pacific Ring of Fire* making it vulnerable to earthquake, tsunami and volcanic hazards and along the *Western Pacific Basin* which is a generator of climatic conditions such as typhoons, monsoon rains, and thunderstorms, among others. Because of its geographic location, it becomes vulnerable to disasters and to the effects of climate change as well(Albay Physical framework Plan- 2010-2016).

The City, together with the rest of Bicol Peninsula and the island-province of Catanduanes is experienced three tropical cyclones every two years. In the past ten years, three destructive typhoons have directly hit the city. Typhoons, tropical depressions, and cold fronts affect both rainfall and winds. The Province of Sorsogon, where the City is located, has been identified by a study of the Manila Observatory and the Department of Environment and Natural Resources being at Very High Risk from combined Climate Disasters (Figure 27).





Mapping Philippine Vulnerability to Environmental Disasters

Figure 27. The City's Combined Risks to Climate Change.

Previous disaster events caused massive destruction in SorsogonCity. Vulnerability of Sorsogon City to climate change is cause by the fact that as a coastal city directly facing the west pacific ocean basin where 75% of typhoons emanate, the city is highly sensitive or at higher risks to climate change induced hazards. This is further exacerbated by the 43% poverty incidence of the city, poverty affects people's capacity to adapt or adjust to climate change.

From the recently updated 2007 V&AA Results by the LCCAP Core Team (Sorsogon LCCAP), climate related induced hazard and risksare: increasing rainfall, typhoon and sea level rise. Increased rainfall leads to flooding, landslides and erosion. The resultant hazards for typhoon are flooding, storm surge and strong winds.For sea level rise, flooding and salinization were the identified climate induced hazards.

Based from the City's LCCAP and Ecological Profile, ground shaking and earthquake induced landslide are common threats to Sorsogon City. Likewise, the city is prone to liquefaction and being located at the eastern Pacific side, is at risk to foreign generated tsunami. Other related hazard that disrupts the socio-economic condition of the people is the occurrence of El Nino/La Nina phenomena and red tide.

Compared to other LGUs, Sorsogon City is on top with the largest area exposed to flooding, rain induced landslide, and storm surge. Specifically, there are nine (9) barangays affected by sea level rise (Table18); twenty (20) barangays from the east/west and bacon districts affected by flooding (Table19); and thirty –four(34) barangays are highly vulnerable to storm surge (Table20). Also, eight (8) barangays are prone to landslides (Table21).



Table 18: Barangays	Affected by Sea L	evel Rise (Source:	Sorsogon	City LCCAP).
	2		0	

Name of Barangay	Population	Land Area (Has.)
Balogo	6,932	152.85
Bitan-O	3,240	19.20
Cabid-an	7,255	223.56
Cambulaga (urbanizing)	4,418	37.10
Piot	2,647	65.96
Sampaloc	4,719	12.58
Sirangan	2,595	4.96
Talisay	2,600	12.40
Poblacion	4,187	174.51
Total	38,593	703.12



Figure 28.Flooding Map.

Table 19 Barangays	Vulnerable 7	To Flood	Hazard(Source)	Sorsogon Ci	tv LCCAP)
Table 17. Darangays	v uniciable .	1011000	Thazaru (Dource)	. Dorsogon Ci	ty LCCAI).

Flood Hazard	East/West Districts	Population
	Basud	2,811
	Buhatan	3,395
	Burabod	2,867
	Сариу	2,561
	Gimaloto	1,050
	Salog	2,920
	Sirangan	2,595
	Talisay	2,600
	Sampaloc	5,214



Continuation of Table 19		
	Piot	2,647
	Bitan-O	3,240
	Cambulaga	4,418
	Balogo	6,932
	Sulucan	523
	Bacon District	
	Poblacion	4,187
	Balete	2,684
	Buenavista	1,469
	Gatbo	2,494
	Osiao	3,174
	Sto. Niño	2,455

Table 20.Barangays Vulnerable To Storm Surge (Source: Sorsogon City LCCAP).

EAST/WEST DI	STRICT Coastal Areas	BACON DISTRICT Coastal Areas	
Barangay	Population	Barangay	Population
1. Abuyog	4,359	1. Bato	1,756
2. Balogo	6,932	2. Bogna	1,413
3. Bitan-o-Dalipay	3,240	3. Bon-ot	623
4. Bucalbucalan	2,533	4. Buenavista	1,469
5. Buenavista	1,736	5. Caricaran	2,371
6. Bulabog	2,443	6. Gatbo	2,494
7. Buhatan	3,395	7. Del Rosario	950
8. Cabid-an	7,255	8. Osiao	3,174
9. Cambulaga	4,418	9. Poblacion	4,187
10. Capuy	2,561	10. Rawis	1,354
11. Gimaloto	1,050	11. Salvacion	1,308
12. Pamurayan	1,966	12. Sta. Lucia	481
13. Penafrancia	1,763	13. Sto. Domingo	1,300
14. Piot	2,647	14. Sto. Nino	2,455
15. Rizal	3,645	15. Sawanga	1,533
16. Sampaloc	4,719	16. Sugod	2,148
17. Sirangan	2,595		
18. Talisay	2,600		
TOTAL	59,857	TOTAL	29,016

Table21. Landslide Prone Barangays (Source: Sorsogon LCCAP).

BARANGAY	TOTAL POPULATION (2007)
Osiao	3,174
Sto. Niño	2,455
Salvacion	787
Panlayaan	1,524
San Isidro	1,563
Rizal	3,645
Buenavista	1,736
Bucalbucalan	2,533



There are five (5) barangays within Anahaw,Luluwasan,Buhatan, Panlayaan-Suhi and Eastern Bacon sub-watersheds which are vulnerable to at least four (4) hazard risks e.g. sea level rise, flooding, storm surge and landslides (Table22).

SUB-WATERSHED	BARANGAY	HAZARD/ RISK					
		Sea-Level Rise	Flooding	Storm Surge	Landslides		
Anahaw	1.Bitan-O	X	X	X			
Anahaw	2.Cambulaga	X	X	X			
Luluwasan	3.Sto.Nino		X	X	X		
Anahaw & Buhatan	4.Piot	X	X	X			
Panlayaan-Suhi &	5.Buenavista	X		X	X		
Eastern Bacon							

Table 22.	Hazard	Risks c	of Sorsogon	City's	Sub-watersheds.

While Sorsogon City is not affected by volcanic hazard as the city is approximately 40 kms. away from Bulusan Volcano, however, the city is severely susceptible to ground shaking with a 94.47 percent high susceptibility affecting 280.51 sq.km. of the total 296.93 sq.km.

To develop resilience against these hazard risks and disasters, Sorsogon City developed its own Local Climate Change Action Plan (2017-2021). Capacity building along the four (4) steps of Disaster Risk Assessment and Analysis and pillars of DRR were undertaken and are being undertaken to reduce vulnerabilities and increase capacities.



Figure 29. Hazard map of Sorsogon City.

4.7 Conditions of Forest and Forestlands Assets

4.7.1 Land Resources

Of the total land area of 27,611 hectares, 7,914.03 hectares are forestlands, while the alienable and disposable lands consist of 19,696.97 hectares (Figure 30). The forestland is subdivided into small islands with a total land area of 6.21 hectares (0.02%), a 914.94 hectares of mangrove (3.31%), and uplands consisting of 6,992.88 hectares (25.33%). The alienable and disposal land (A&D) lands though occupies the biggest (71.34%) part of the city's land area.





Figure 30. Land Classification.

In terms of forestland's distribution according to tenure or allocation, it was observed that tenured/allocated/protection forest, contains the largest area of the forest measuring to about 6,992.88 hectares.

It include the Watershed Forest manage by Sorsogon Water District covering an area of 631 hectares. It is within the contiguous mountain range, from Mt. Suminandig (West) Lubong, Macabaliw, Lantic and Alinao (East) containing three (3) catchment water divides namely: Cawayan, Lubong and Sampaloc. Likewise, it also includes a portion of the 25,000 hectares Energy Development Corporation (EDC) Wildlife Conservation and Reservation area in Sorsogon.

Lastly, there are two (2) marine protected areas or sanctuaries, the marine reserve at the portion of Bacon municipal water and the fish sanctuary at the Sorsogon Bay side.

The watershed and reservation forests and marine sanctuaries serve as conservation areas to: (a) maintain the habitat of diverse species of flora and fauna, (b) sustain ecological services, and (c) ensure protection of upland and marine resources for the future generation.

Unallocated or open access areais only 921.15 hectares. Although small in size, unallocated open access areas should likewise be placed under effective management otherwise, quality of goods and environmental/ecological services will deteriorate without management. Figure 31 shows the distribution of protection forest according to tenure or allocation.





Figure 31.Land Allocation/Tenure Map.

Of the7,914.03 hectares of forest or timberlands, 3,008.54 hectaresis located in Luluwasan Sub-watershed, where the PNOC Reservation is located. Other forest areas are found in Ticol-Cawayan, Panlayaan-Suhi, Osiao, Su-Ba, San Juan, Buhatan, Anahaw and Salog Sub-watersheds. All lands in Maigang-Macauayan andEastern Bacon Sub-watersheds are classified as alienable and disposable(Figure 32).



Figure 32. Land Classification per Sub-watershed.



4.7.2 Natural Forests

The 7,612.76 hectares forestlands, is 24% of the total land area of the city. Thiswas once an economic resource when timber, mangrove firewood, and rattan poleswere being extracted. The period of Sorsogon City as a timber and hardwoodproduction place has long been gone. Secondary growth forest, which is equallyaccounted for by open and close canopy mature trees, now covers the logged-overtimberland. Some areas are cultivated, and the rest are brush land and grassland.

Forestlands is 7,914.03 hectares of the total land area of the city and classified as a Protected Area. The forestland is composed of the EDC Geothermal Reservation where a portion is allocated as watershed of the Sorsogon Water District. The mangroves on the marine areas along the coasts of Sorsogon Bay and Sugod Bay are also classified as forest areas of the city

Specifically, the City's forestland is composed of the PNOC forest reserve, mangrove forest reserve, mangrove timberland and mangrove for fishpond development (Table23).

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FORESTLAND (has.)	FOREST RESERVE (PNOC)	MANGROVE FOREST RESERVE	MANGROVE TIMBERLAND	MANGROVE FOR FISHPOND DEV'T.	TOTAL			
Bacon	3,1566.41	199.00	_	-				
Sorsogon	3,603.97	204.33	107.58	341.47				
Total	6,760.38	403.33	107.58	341.47	7,612.76			

Table23. Classification of Forestland (Source: SorsogonCity CLUP 2007-2012).

There are two (2) marine protected areas or sanctuaries in the City of Sorsogon – the Marine Reserve at the portion of Bacon municipal waters and the Fish Sanctuary at the Sorsogon Bay Side (Table24). The marine sanctuaries serve as conservation area to maintain the habitat and their ecological services as well as to ensure protection of marine resources for the future generations.

Table 24	. Marine	Sanctuaries	of Sorsogon	City	(Source:	Sorsogon	City	Ecological	Profile,
2015)									

PROTECTED AREA	LEGAL BASIS FOR ESTABLISHING NON- NIPAS AREA	DATE PROCLAIMED	AGENCY RESPONSIBLE FOR MAINTENANCE
1. Marine Reserve at the portion of municipal waters of Bacon, Sorsogon	City ordinance no. 01 Series of 2009 "Marine Protected Ordinance"	April 14, 2008	Marine Protected Management Council (MPMC)
2. Fish Sanctuary of Sorsogon City	City Ordinance No. 14 Series of 2005 "Fish Sanctuary Ordinance"	December 5, 2005	LGU Sorsogon City

The forestland of Sorsogon City is subdivided into protection and production management zones (Figure 33 and Figure 34). The 3,849.3 hectares protection forest is an area that is publicly owned. They are protected under the law, to preserve and protect biodiversity and to sustainably provide the different ecosystem services. The protection forest should be further



classified into strict protection and multiple use zones for sustainable management.

Meanwhile, the production forest covering4,064.73 hectares is maintained for timber production and also provision of different environmental/ecological services.

The city has mangrove areas located in the coastal barangays which show signs of degradation. To increase productivity in this ecosystem, it is best to implement forestry laws regarding the prohibition of cutting and utilization of any parts of mangrove species except for propagules for rehabilitation.

DENR Administrative Order 24 issued last May 3, 1991 prohibited logging in old growth forests, forest areas above 50% slope, forest areas above 1,000 meters above sea level and 20 meters on either side of the streambank, wilderness area, proclaimed watershed reservations, areas of historical value and other areas proclaimed for ecological or environmental protection. Based on this policy, the 3,849.3 hectares protection areas of Sorsogon City are automatically considered restricted areas for logging activities. Likewise, areas within 20 meters of both sides of streams are considered non-production or protection forests. Similarly, mangroves are also protected areas.

To protect the strict protection forests from further degradation by communities living within the area, who depend on existing resources for livelihood, bufferzones are introduced. This is called as multiple use zone where limited production activities can be undertaken, but with strategies/methodologies/approaches for conservation.



Figure 33. Management zones in the natural forest of Sorsogon City.





Figure 34.Protection and Production Forests.

4.7.3 Mangrove Forest, Plantations, Grasslands and Brushlands, Cultivated Lands

Mangrove forests in Ticol-Cawayan, Buhatan, Panlayaan-Suhi, Anahaw and Salog subwatershed cover 420.4 hectares of the entire city. Mangrove is an important habitat for different fish species as they serve as spawning grounds and nursery for fish juveniles. They also serve as live buffer or break water from strong waves.

There are reforestation plantation areas inside the EDC Forest Reserve and Watershed reserve of the Sorsogon Water District (SWD).Old plantations are broadleaved forests occupying a total of 6,730.30 hectares; they are mostly found in the upper slopes and elevations of Luluwasan, Panlayaan-Suhi and Ticol-Cawayan sub-watersheds.

Likewise, there are areas that are cultivated using agro-forestry farming systems that are implemented to control further encroachment of farmers in the protection zones. Cultivated areas in almost all sub-watersheds are planted with perennial and annual crops for food and livelihood securities of people. Fifteen thousand thirty four point thirty (15,034.30) hectares of land are planted to perennial cropssuch as coconut, abaca, fruit-bearing tress, and sugarcane. Annual crops such as cereals and vegetables are planted in 2,401.37 hectares.



The rest of the sub-watersheds are covered by shrubs (372.25 hectares), and natural as well as wooded grasslands (200.51has. and 133.43 has. respectively). These vegetative covers (Figure 35) and serves as soil and water conservation technologies (Table25).



Figure 35.Land Cover per Sub-Watershed.

4.7.4 Water Bodies and Water Production Areas

Surrounded by China Sea and Pacific Ocean, the City of Sorsogon is having a wide array of fishery and aquatic resources. With 203.11 hectares inland waters, municipal fishing is one of the four fishing industries as described by the FAO. This is further described as the inshore fishing using small boat or "banca" weighing no more than three (3) tons. This also includes stationary traps.Below is Table 25 describing aquaculture production of the City.

Table 25.	Type of	f Aquaculture	Production	and Prodution	in Metric	Tone
1 uoie 25.	. 1 ypc 01	riquaculture	riouuction	una i rouution	III Moule	1 One

TYPE OF AQUACULTURE PRODUCTION	PRODUCTION IN METRIC TONS
1.Municipal Fishing	0.75
2.Backyard Fishpond, Tilapia Cage, Fish Pen	0.25
3.Seaweed	11,470.00

Source: Sorsogon City's Ecological Profile, 2015)



4.7.5 Biodiversity Resources

The Watershed Forest Reserve managed by Sorsogon Water District (SWD) covers an area of 631 hectares. The reserve is a mosaic of different forest ecosystems e.g. Residual Forest, Molave Type Forest, Reforestation Areas, Kainging and Grassland. Wildlife species sighted are Philippine pig, monkey, horn bills and bats (flying foxes).

The Energy Development Corporation (EDC) wildlife conservation area, located within the boundaries of Manito, Albay and Sorsogon City, is habited by different bat species. The area is the habitat of the golden-crowned flying fox (*Acerodon jubatus*) and the large flying fox (*Pteropus vampyrus*), two of the world's largest bat species. A total of 9 species, representing three (3) families are found and having their habitat in the area. Also known as the golden capped fruit bats (*Acerodon jubatus*), the species is endangered and is currently facing the possibility of extinction because of poaching and forest destruction. It is also endemic to Philippine forests. Aside from the two (2) large flying foxes, a Mottled-wing flying fox, four (4) common fruit bats: common short-nosedfruit bat, Philippine pygmy fruit bat, dagger-toothed flower bat and musky fruit bat and two (2) insectivorousbats were also found (Table 26). The presence of these animals was officially verified in June 2006 during the wildlifesurvey conducted by the University of the Philippines – Los Baños (UPLB) Museum of National Historyteam (Sorsogon City Ecological Profile, 2015).

SPECIES	Conservation Status	ECOLOGICAL STATUS
Golden-crowned flying fox (Acerodon jubatus)	Endangered	Endemic to Philippines
Large flying fox (<i>Pteropus vampyrus</i>)	Near Threatened	Wide geographical range in Southeast Asia
Mottled-wing flying fox (<i>Pteropus leucopterus</i>)	Least Concern	Endemic to Philippines
Short nosed fruit bat (Cynopterus brachyotis, Cynopterus sphinx)	Least Concern	Wide geographical range
Philippine pygmy fruit bat (<i>Haplonycteris fischeri</i>)	Least Concern	Endemic to Philippines
Dagger-toothed flower bat (<i>Macroglossus minimus</i>)	Least Concern	Wide geographical range in Southeast Asia.
Musky fruit bat (Ptenochirus jagori)	Least Concern	Endemic to Philippine

Table 26. Conservation Status and Ecological Status of Bat Species.



The two (2) marine protected areas and sanctuaries of Sorsogon City are rich in diverse species of flora and fauna (Table 27).

Table 27. Conservation Status of Marine/Coastal Species in Sorsogon City.

SPECIES	LOCATION	STATUS	THREAT	DEGREE OF THREAT
Sea Turtles (<i>Chelonioidea</i>)	Sorsogon/ Bacon Area	Endangered	Fish corrals, fishing nets -through accidental and intentional catching; and disturbed spawning ground.	High
Corals (Anthozoa)	Bacon area	Poor to good – live corals	Anthropogenic and natural causes such as : Cyanide/ dynamite fishing; Siltation; High Sea grasses.	High
Seagrasses	Sorsogon/ Bacon Area	In Bacon nine(9) species dominated by Syringodium Isoetifolium	Fishing activity in shallow water (Seagrass area); Siltation; and erosion.	Moderate to High
Mangroves (<i>Rhizophoraceae</i>)	Sorsogon/ Bacon Area	Ten (10) mangrove species were identified alongside with another (3) associated species	Illegal fishpond in some coastal barangays; Siltation and erosion; and llegal cutting for domestic usage	Moderate to High
Fish Species such as: Sapsap, Tabudyos, Bolinao, Osoos, Kabalyas, Tambagoy, Mangagat, Palad, Sunog, Alimusan, Salay-salay, Alatan, Dampano, Bicoda, Baraka,Balanak, Kanasi, Lapis, Tabangongo, Manuping,Balo, Buroy,Tuko, Mulanbulan,Panangitan,Mani Sa species of blue tuna	Sorsogon/ Bacon area	Highly threatened Marine Protected Areas (MPAs) are established for protection and conservation	Illegal fishing method using active gear, fine mesh net, and dynamite ; cutting of mangroves which serve as fish habitat; Siltation / sedimentation; Water Pollution; Fishpond development on mangrove areas;	Moderate to High



			Flooding; and Electrofishing; and Shoreline erosion	
4.7.6	Nature-based Tou	urism Assets		

Nature-based tourism is one of the fastest growing sectors in Sorsogon City, and with its diverse natural attractions Sorsogon City is well placed to capitalize on this growth.

The city boasts one of the most accessible coastlines and developed system of land and marine parks. Visitors can enjoy high profile natural attractions such as Rompeolas, with its walkway that serves as promenade, offers spectacular views of sunrises and sunsets; as does Paroja Hill and Grotto, which overlooks Sorsogon bay; Bucalbucalan and Palhi Springs in the West District; and Busay Falls in the PNOCExploration Site are ideal for cooling down, especially in the summer months.

Bacondistrict has its beaches, limestone caves, lakes and a marine sanctuary. Mostnotable of these are Paguriran Beach, which is surrounded by dark basalt, Tolonggapo in Caricaran and the Bato Limestone Caves, inside of which were foundprehistoric artifacts (Table 28).

Natural assets or cultural ecosystem services, such as these, provide a wonderful opportunity for Sorsogon City to lead in this sector. To safeguard these nature-based tourism assets, appropriate environment policies and range of opportunities for tourism and conservation outcomes should be outlined. This would ensure both a financially viable nature-based tourism industry and a healthy environment. To become more sustainable, it should adopt carbon reduction initiatives to limit the industry's impact on climate change.

NATURAL TOURISM ASSETS	DESCRIPTION
1.Bacman Geothermal Project PNOC Exploration & NPC power plants	Atop Mt.Pocdol & Inang Maharang
Bacman Forest Reserve	Habitat of different species of bats
Bato Limestone Cave	3,000 years old articrafts
Bucalbucalan Springs	Natural cold spring
Cawayan Hydroelectric Plant	Green extraction of water power
Danao Lake	Covers 6 hectares pristine inland water
El Retiro Retreat house	Beautiful flower gardens
Halabang Baybay White sand,	seabreeze
Libanon Beach	Big waves and fine black sand
Manunggol Beach	Enchanted beach
Continuation of Table 29.	
Marine Sanctuary	Corrals and seaweed zone
Muralla Walls	Place of refuge during Moro raids & invasions
Ngarolan Reef	Diving site
Padaraw Beach	White sand with available amenities
Pagol Beach	White sand with available amenities

 Table 28. Nature-Based Tourism Assets (Sorsogon City CLUP 2007-2012)



Paguriran Beach	With lagoon inside, miniature island of hard and compact dark granite rocks
Palhi Spring Resort	Adult and children pools, springs
Continuation of Table 28	
Paroja Hill and Grotto	Across Pepita Park, overlooks Sorsogon bay
Pepita Park	Traveler's area overlooking Sorsogon Bay
Provincial Capitol Park and building	
Sorsogon Bay	Dawns & sunset from the many vantage points especially from the pier and leisure boating site
Sorsogon Dairy Farm	Complex includes dairy farm, training center, seaweeds research center and fishery office
Sorsogon National High School	
Sts. Peter & Paul Cathedral	
Tolonggapo Beach	Gentle sea breeze of the Pacific
Tajiran Island	Small island near the fishing community of Cambulaga and Pinacula
Bacon Church	Old church of the Immaculate Concepcion
Fort ruins	Caricaran Ruins of an Spanish fort, used to deter moro raiders
Paradise Resort, Aqua Gem Resort, Fritz Homestay, Alburo Resort, Suhi Spring, Caricaran Beaches, Paguriran Beach,	Natural Springs, Beaches, Artificial Pools are used for swimming and picnic area for local and foreign tourist

4.7.8 Mineral Resources

Sorsogon City is rich in non-metallic type of deposits. Guano, a mineral used as fertilizer is abundant at 42 MT. On the other hand, deposits ofred clay is estimated at 1,000 cu.m. It is also rich in non-metallic type of deposits.

Thecity's mineral resources are spread across East, West and Bacon District. Limestone can be found in Barangay Gatbo within Maigang and Macauayan sub-watersheds, with an estimated reserve of 9.6M metric tons. Marble can also be found in Su-Ba sub-watershed particularly in Barangay Gatbo and Bato (at 25,000 cu.m.as geologic reserve and 3,750 cu.m. as mineable reserve).

Guano, a mineral used as fertilizer is abundant at 42 MT, and Phospatic Rock (59MT) can be found in New Batolocated in Eastern Bacon sub-watershed. White Clay can be found in Barangay Osiao- Dalipay of Osiao sub-watershed with an estimated reserve of 1,050 metric tons. Pumice Stone is abundant at the mouth of Abuyog River in Barangay Abuyog. Sulfur deposits at 775 MT can be found in Barangay Rizal of Luluwasan sub-watershed .

On the otherhand, gravel and sand (2,000 cu.m.) are quarried along Cawayan River within Ticol-Cawayan sub-watershed particularly located in Barangay Basud, Barayong, and Guinlajon. Table 29shows the mineral resources of Sorsogon City.



Table 29. Mineral resources in different sub-watersheds (Source:Sorsogon City Ecological Profile, 2015)

SUB-WATERSHED	BARANGAY	MINERAL	ESTIMATED RESERVE (MT)
1.Maigang & Macauayan	Gatbo	Limestone	9.6 MT
2.Su-Ba	Bato-Gatbo	Marble	25,000 cu.m.(geologic reserve) 3,780 (mineable reserve)
3.Osiao	Dalipay- Osiao	White Clay	1,050 MT
4.Eastern Bacon	New Bato	Guano & phospatic rocks	42 MT & 59 MT
5.Luluwasan	Rizal	Sulphur	775 MT
6.Ticol-Cawayan	Barayong	Gravel &Sand	2,000 cu.m.

Source: Sorsogon City Ecological Profile 2015

4.8 Key Stakeholders

Stakeholders of Sorsogon City's forestlands are individuals, groups and institutions who have a vested interest in the natural resources of the forestlands. They are those who either will be affected by the forest land use plan, or have nothing to gain or lose if conditions of the forestlands change or stay the same. These stakeholders all have a stake or claim on the forestlands but, may or may not work in a collective manner with each other.

Forestland stakeholders are divided into different types: active stakeholders who will affect or determine a decision or action related to the forestland and these include the Department of Environment and Natural Resources (DENR V,PENRO and CENRO-Sorsogon); the City Government of Sorsogon City; and Energy Development Corporation (EDC).

On the other hand, Sorsogon City Water District (SCWD); Sorsogon State College (SSC); Department of Agrarian Reform (DAR V); National Irrigation Administration (NIA V); Department of Interior and Local Government (DILG V); Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR V); Provincial Agricultural Services (PAS-Sorsogon); Department of Tourism (DOT V); TESDA V ; and Department of Labor and Employment (DOLE V) are considered passive stakeholders who will be affected by the decisions or actions related to Sorsogon City's forest land use planning.

Another type are the primary stakeholders or intended benefiaries of this Sorsogon City's forest land use planning process are the fishers, different water users, small upland and lowland farmers, peoples' organizations and nature-based entrepreneurs whose livelihoods depend on forests and forest land resources and environmental services, and will benefit and most likely, to support the FLUP. Lastly, secondary stakeholders who are not the intended major beneficiaries of the forest land use plan and those who will most likely be negatively affected, are the furniture and boat makers, and other traders of forest products.

Industries operating in Sorsogon City such as nature-based enterprises, ecotourism, poultry and swine farms and quarrying industries, which depend on forest and forestlands resources


like water; they may support or may oppose the FLUP implementation. A city environmental code with its accompanying implementing rules and regulations is necessary to put on ground the forest land use plan (FLUP).

During the community consultations, problems, issues and recommended actions were discussed to be able to have a win-win situation between Sorsogon City' forest and forestlands, with its different resources and ecosystems' services, and the different stakeholders (Table30).

STAKE- HOLDER	MANDATE/ INTEREST	FFL MGT. SKILLS	ISSUES/CONCERNS	RECOMMENDA -TIONS
1.DENR	Forest conservation, protection & rehabilitation	National Greening program (NGP) implementation	none	none
2.LGU	RA 7160	Law enforcement	EDC forest mgt. approach	Mgt. conference with EDC
3.EDC	Sustainable geothermal devt.	Reforestation Law enforcement	Pollution,erosion,illegal forest activity, kaingin, charcoal making, timber poaching	none
4.Sorsogon State College	Avenue to conduct research, extension on how to better manage forest	Conducting research and extension activities	Absence of water assessment	none
5. PCA	Protection of coco lands and industry	Rehabilitation & improvement of coco lands	Conservation of FFL to other uses, illegal logging	None
6 .DAR	Agrarian reform	Community development	none	none
7 .TESDA	Policies, programs, standards towards quality technical education & skills development	Conduct of livelihoods skills trngs. & accreditation/NC 11	furniture industry vs.optimal utilization of timber resources; sustainable furniture industry not at the expense of the natural resource base /standing trees	none
8.NIA	RA 3601	Watershed protection	Water use conflict among different water users	none
9.DA-BFAR	development, management & conservation of aquatic resources; livelihood and sustainable access to offshore &deep sea resources	Mangrove reforestation	Illegal resource users, Cutting of Mangroves (Fishpond operators), municipal water use conflicts	none
10.PAS	Increase rural income and enhance farm and fishery productivity	Enhancing livelihood skills of farmers, rural youths and women	Livelihood security of marginalize famers	none
11.DILG	Strengthening of LG capability towards effective delivery of services	regulations	Conflicting policies and ordinances	none

Table30. Stakeholders ' Mandate, Skills and Issues/Concerns.



	to the citizens			
Continuation of	f Table 30			
12.SCWD	operates and maintains water supply system (watershed facilities); provision of water and wastewater services by virtue of PD 198	Reforestation, Protection, Livelihood, IEC, Technical (Water Supply Systems, Septage Systems), Community Organizing, Public Relations, Management and Policy Making	Resource Water Use (farmers/irrigators); Water allocation conflict with irrigators association at Cawayan River, On-going road widening works affecting water system (DPWH), politics	Identify the area managed by water district; Identify the extent of the coverage of FLUP; As of Oct 17, 2016, SCWD is in partnership with Prime Water Infrastructure Corp. thorugh a Joint Venture Agreement
13.DOT	Potential ecotourism sites		Fast rate of opening areas for ecotourism without protocols	none
14. DTI	Promotion of Green Development	Conduct of skills training on Product processing, packaging and marketing (using karagumoy, buri and bamboo)	none	none
15.DOLE	Economic security of people within FFL	Training Assistance and Livelihood Assistance; DILEEP- DOLE Integrated Livelihood and Emergency Employment Program	none	none
16.Fisherfolk s	Training assistance		Degradation of marine habitat	Mangrove reforestation; reversion of abandoned fishponds into public lands
17.Upland Farmers	Land		Encroachment of Forest Area	Alternative livelihood (co-managers of forests)
18. Sunwest Corporation, Farmers, Water users 19. Farmers 20 Other water users 21.Irrigator' s Association	Water availability & quality Water source/s	Water use conflicts	Conflicting water use	Watershed management
22. Craftsmen	Source of raw materials		Illegal cutting of trees; Overharvesting of raw materials	Reforestation Enforcement; Sustainability of resource materials



4.9 Institutional Assessment

The Forest Land use Plan (FLUP) implementation is a tripartite partnership among active stakeholders of Sorsogon City's forests and forest lands, these are DENR V, LGU-Sorsogon City, and Energy Development Corporation-Bacon Manito (EDC-BacMan). The functionability of this partnership will be instrumental in setting the direction and crafting of policies for the improved management of Sorsogon City's forest and forest lands. For this partnership to proceed, details of the working relationship and coordination shall be defined and institutionalized. Assessing the implementing partners will define what to address in the area of institutional partnership.

Specifically, DENR V with its expertise in forest and natural resources management, social forestry and forestry extension, will technically backstop LGU-Sorsogon City and EDC-BacMan in forest management. The Local Government Unit of Sorsogon City shall continue providing policies, budget and manpower support.

There are a number of local statutes, ordinances, resolutions and memos along environmental and natural resources management which, if implemented properly will make a difference in forest management. The very presence of the City Environment and Natural Resources Office (CENRO) manned by technical personnel with required degrees and expertise is an internal asset that can be mobilized for sustainable institutional partnership in FLUP implementation.

The created FLUP Technical Working Group (TWG) tasked to undertake forest land use planning headed by the City Environment and Natural Resources Officer, is asupport system for the eventual approval and implementation of the FLUP. The communities and stakeholders in the sub-watersheds will provide ground support and shall help in policing their ranks especially on forest protection, rehabilitation and upland development. Furthermore, aside from the annual internal revenue allocation (IRA) being tapped for environment and natural resources management, additional funds may be generated internally through resource use fees. Also, source mobilization through proposals with Development Assistance Organizations, Non-Government Organization, Private Volunteer Organizations and other sources will be explored.

Lastly, being one of the grantees of the DENR-World Bank Program on Forests 2 (PROFOR2) Technical Assistance on integrating Ecosystem Services Approach on Forest Land Use Planning and Management is another crucial success factor for FLUP implementation.

With the multi-factorial problems and issues confronting the forestlands of LGU-Sorsogon City, the FLUP-TWG recommends strengthening the City Environment and Natural Resources Office (CENRO).



4.9.1 Creation of a Forest Management Division in the City Environment and Natural Resources Office (CENRO)

As the development arm of the city for an effective and efficient management of its forests and forestlands, the CENRO will take an active role in dispensing the overall technical and administrative functions in implementing FLUP. This function is based on the provision of DENR-LGU-DILG Joint Memo Circular No. 98-01 (DENR).

Since forest conservation, protection and management is within the mandate of the City-ENRO office, a division on Forest Land Use Planning and Management (FLUPM) should form part of the organizational set-up.

The FLUPM Division has specialized function and is divided into six Sections namely: (a) Forest Allocation and Tenure Management, (b) Forest Protection and Law Enforcement, (c) Social and Entrepreneurial Forestry (d) Forest Restoration and Rehabilitation, and (f) Special Projects Section. The special projects division focuses on specialized concerns such as Community-managed Disaster Risk Reduction (CMDRR), Reducing Emission from Deforestation and Degradation Plus (REDD+), Payment for Environmental Services (PES), Nature-Based/Green Tourism, Enhancement of Environmental Services, and Community-managed Biodiversity Conservation.

4.9.2 Organization of the FLUP Steering Committee

During the implementation of the FLUP, a Steering Committee will be created composed of an Executive Committee and Sub-Committees. The City Mayor will chair the Executive Committee with the DENR V –RED as Co-Chair. Members are the DILG V Director ,SP-Chair on Environment, Head of EDC-BacMan, Head of the Sorsogon City Water District, President of the Sorsogon State College, and Environment-Oriented Civil Society Organization Representative.

There will be five (5) Sub-Committees namely: (a) Monitoring, Evaluation, Learning, and Sharing Sub-Committee, (b) Livelihood and Community Development Sub-Committee, c) Forest Protection for Enhanced Environmental Services Sub-Committee, d) Tenure Management Sub-Committee, and (e)Conflict Management Sub-Committee

The Monitoring, Evaluation and Learning Sub-Committee will ensure efficient implementation of FLUP Plan and schedule reviews and assessment of FLUP outcomes. The Livelihood and Community Development Sub-Committee is task to assist forest communities earn income and savings through optimal utilization of natural capital/assets. Meanwhile, the Forest Protection Sub-Committee will propose solutions to issues related to enforcement of forest laws, rules and regulations as well as optimal utilization of natural assets for environmental services. The Tenure Management Sub-Committee on the other hand, is tasked to ensure that forest lands under the jurisdiction of tenure/allocation holders are effectively managed. Lastly, the Conflict Management Sub-Committee is responsible for



innovating strategies along conflict negotiations and resolutions related to management of forests and forest lands.

4.10 Summary of Key Issues, Conflicts, Problems, Needs, Investment/Socio-Economic Opportunities

4.10.1 Causes of Forest Degradation

During the Workshop session attended by Sorsogon City's FLUP Technical Working Group together with key informants from different lowland, coastal and upland communities, a situational analysis was conducted. The session looked deeper into the issue of forest degradation; it was found out that it is multi-causal and multi-effect (Figure 36). The following are the causes of forest degradation:

- 1. Weak enforcement of environmental and natural resources laws/policies and ordinances resulted to inefficient management of tenure lands (CBFMA) and conversion of forest lands to other uses particularly upland agriculture. It also resulted to limited fish catch in coastal areas. These contributed to forest and marine ecosystems' deforestation and degradation.
- 2. Inconsistencies in the implementation of forest and coastal resources conservation policies and local statutes led to limited investment efforts in forest and coastal conservation resulting to degradation.
- 3. Limited livelihood opportunities and rapid population growth leads to poverty and conversion of mangrove, agricultural and upland areas to other uses. Poverty drives people to farm and settle in open access forestlands. Due to lack of knowledge on sustainable livelihood options, people earn a living by cutting down trees and mangrove species, kaingin farming, charcoal making, and other excessive extraction of forest products resulting to forest degradation, low productivity and occurrences of hazard risks e.g. upland and riverbank soil erosion, landsides, fish kill, and downstream flooding.
- 4. Degradation and deforestation of forests and forestlands contributes to decline in the quality and quantity of water both for domestic and farm needs and other environmental services. Lack of irrigation water would further result to water resource use conflicts.
- 5. Lack of cooperation among fisher folks and understanding on the effects of unsustainable fishing activities are factors causing poor protection and maintenance of coastal resources, resulting to degradation and low fish catch.
- 6. In turn, forest and coastal degradation has a lot of negative effects to the environment. These negative effects are loss of biodiversity due to destruction of natural habitats; disturbance of water supply, quality and quantity resulting to water shortage for household and farm consumption; decrease environmental services; as well as possibility for health and sanitation hazards.



7. Forest degradation also contribute to climate change induced hazards such as: flooding of low lying areas causing riverbank erosion and sedimentation of waterways; drying up of soil/drought/lack of soil nutrients, soil erosion and landslides in steep slopes during typhoons. All these disaster risks affect livelihood, lives and properties.



Figure 36. Cause and Effects of Forest and Coastal Deforestation and Degradation

4.10.20pportunities

As mentioned, there are a lot of wildlife in the sub-watersheds. Promoting wildlife awareness and conservation by setting up bird and bat houses, leaving native plants undisturbed, and landscaping areas using native trees and vegetation, and attracting "good" insects by



planting pollen and nectar plants can be an opportunity to develop these areas into wildlife leisure parks.

Other natural assets such as seashores, caves, rivers, springs, waterfalls, seascapes, landscapes, pristine water, and diverse species of flora and fauna can be transformed into nature-based ecotourism sites. Products from the agroforestry farms can be raw materials for nature-based enterprises.

Farmers undertaking agroforestry farming, showcasing different cropping farming system with soil and water conservation practices as well as tree farming and reforestation activities, can qualify for the payment for environmental services (PES) and reducing emission from deforestation and degradation plus biodiversity conservation and climate change disaster reduction (REDD+) schemes.





5.1 Vision

"A fully restored, productive and well managed Forest and Forestlands significantly delivering ecosystem services towards development of Sorsogon City and the well-being of Sorsoganons".

5.2 Mission

"To ensure pro-active, engaged and collaborative participation of all stakeholders through responsive and effective policies and programs for the conservation, protection, sustained health, diversity and productivity of the natural and cultural resources and values of the Forest and Forestlands for the enjoyment, education and inspiration of the present and future generations."

5.3 Goals

- 1. To enhance environmental services of various ecosystems and "natural assets/capital" of FFLs.
- 2. To establish mutual/harmonious relationship among stakeholders and implementing institutions/private organizations;
- 3. To establish co-management among allocated FFL users/holders (DENR-EDC-WD-LGU);
- 4. To allocate land uses based on scientific research and studies;
- 5. To protect, rehabilitate, enhance, and expand mangrove areas; To conduct actual mangrove inventory so as to address land area (protected areas) ownership issues;(activity)
- 6. To develop small islands as agro-eco tourism areas; to revert abandoned fish ponds back to mangrove areas thru rehabilitation and expansion.
- 7. To develop PES system within the context of sustainable financing mechanism.
- 8. To undertake REDD++ initiatives as climate change and disaster mitigation, adaptation and reduction measures.
- 9. To strictly implement and enforce all applicable laws, rules, regulations and policies concerning biodiversity, forest and forest lands.
- 10. To organize primary stakeholders into self-help groups of FFL earth scouts.
- 11. To provide forest and agricultural based livelihood trainings and assistance in coordination with different development institutions and organizations.



5.4 Objectives

a. Forest and Forestlands Assets

- a.1 Restoration of denuded forestlands using rainforestation and assisted natural regeneration.
- a.2 Sustainably develop, manage and protect the watersheds starting with those identified as priority.
- a.3 Ensure implementation of appropriate forest management zones and prescriptions in the FLUP.
- a.4 Rehabilitation of grasslands using Agroforestry development.
- a.5 Promotion of environmental services of natural assets/capitals as well asNature-based enterprises and tourism destination.
- a.6 Rehabilitate forest lands both within FFL and A/D lands.
- a.7 Preservation/conservation of watersheds for irrigation purposes.
- a.8 Develop agroforestry farms as one arena for implementing payment for environmental services (PES) and REDD++ schemes.

b.Stakeholders

- b.1 Promote sustainable agroforestry farming systems technologies as alternative and/ or primary source of livelihood for the uplands.
- b.2 Develop and support nature-based sustainable livelihood options.
- b.3 Recognize the qualified forest occupants and prevent the entry of new upland migrants.
- b.4 Promote environmental ethics and values on sustainable management of forest and forestlands.
- b.5 Capacitate communities and other stakeholders in forest protection and management.
- b.6 Develop and disseminate information, education and communication (IEC) materials on forestlands conservation, protection and sustainable management.
- b.7 Organize and /or capacitate people's organizations for protection, preservation, and sustainable management of forests and forestlands.

c.Institutional

- c.1 Capacitate City and Barangay LGUs, SCWD ,EDC and other stakeholders in ensuring functional partnership to respond to challenges in implementing this FLUP.
- c.2 Enact legislations and ordinances supportive of forest protection and improved forest management.
- c.3 Generate and allocate sufficient funds for the FLUP implementation, monitoring and evaluation.
- c.4 Mainstream Sustainable Environmental Services, Disaster Risk Reduction, and Climate Change Mitigation and Adaptation in FLUP implementation, monitoring and evaluation.



- c.5 Package protocols in operating nature-based-ecotourism activities.
- c.6 Conduct Carrying Capacity Assessments of nature-based tourism destinations
- c.7 Incorporation of forest ecology and natural resources management, forest restoration and rehabilitation, climate change and disaster education in DepEd and CHED curricular offerings.





6. **RECOMMENDED STRATEGIES**

6.1 General Strategies

At present, the true socio-economic and cultural values of the so-called "natural capital" of Sorsogon City have been overlooked and have only been poorly factored into political and economic decision-making in development planning. Degradation of ecosystems and loss of biodiversity are often the result. The damage to natural ecosystems is subsequently reducing their ability to provide vital goods and services, undermining development and often drastically limiting social and economic opportunities.

Factors like climate change and a growing number of natural disasters are worsening the scenario. Furthermore, the increased demand for costly high-end technologies and expensive efforts to restore degraded landscapes have in many cases demonstrated the economic advantages of natural solutions. Making full use of ecosystems services to address development challenges such as climate change, not only makes ecological but also economic sense. It is therefore of critical importance to ensure that ecosystem services are fully incorporated into Sorsogon City's forest land use plan (FLUP) which will then be incorporated into the City's Risk Sensitive Comprehensive Land Use Plan and ultimately , into the Strategic Comprehensive Development Plan.

Integrating ecosystem services (ES) in FLUP planning process focus on the ff. critical questions of : (a) how does the FLUP impact and depend on ecosystem services?, (b) what risks and opportunities do ecosystem services pose to the FLUP?, and (c) which policy measures can help in avoidingenvironmental costs and capture environmental benefits? These questions would help in clarifying the links between nature and development. It considers the environmental and economic trade-offs associated with development measures and helps to systematically incorporate ecosystem service-related opportunities and risks into the design and review of Sorsogon City's FLUP planning and implementation. Sustainable management of these environmental services provided by forests and forestlands should be sustained.

Other than the above, there is also the need to strengthen enforcement of environmental and natural resources laws and policies and ordinances;straighten out inconsistencies in the implementation of forest conservation policies; enhance limited livelihood opportunities;stop conversion of forest lands to other uses particularly for agriculture and residential houses;strengthen implementation of fishery code; and enhance understanding on the effects of unsustainable fishing activities. All these should also be given equal attention.

Other actions should be in terms of efficient management of tenure lands and non-



conversion of forest lands and mangroves to other uses; givingpriority to forest conservation initiatives; poverty alleviation; and continuous restoration of natural areas/ecosystems. FLUP implementation cannot fully take-off if funding support is limited. As a strategy, the meager funding shall be used as a counterpart and leverage to bigger funding thereby providing a multiplier effect to the current funds. The City LGU shall actively mobilize resources by either directly accessing it or through its partner stakeholders particularly EDC-BacMan and Sorsogon City Water District. Both DENR and LGU-Sorsogon City will devise alternative financing mechanisms for resource generation such as payment for environmental services and other options. Through this, management costs will not be solely sourced from line item budget of DENR and City LGU, but from beneficiaries of services provided by forest lands of Sorsogon City. Proceeds will be directly used for the management of forest lands as recommended under the FLUP.

Sub-watershed development is everybody's concern and each one should be given opportunity to take part in the efforts. To own the FLUP implementation process and outcomes, people's participation is very crucial to the success of programs/projects/activities.

To ensure that tenure or allocation holders effectively manage forest lands, DENR and LGU-Sorsogon City will develop and provide guidelines in the zoning and management of forest lands.

Protection and production zones shall be specified based on national policies and agreed objectives of Sorsogon City forest lands. For proper management, protection and production zones shall be contiguous.

The policies formulated shall be supported through the passage of ordinances by LGU-Sorsogon City to ensure that it is institutionalized and long term. The legislated policies undergo a process of consultation and public hearings to solicit public support. It becomes part of LGU-Sorsogon City as an institution and may be amended only after proper consultation. The policies take effect longer beyond the term of the LGU legislators. Legislated laws are usually supported by institutional budgets and are provided for in the annual LGU budget. These legislated environmental policies/ordinances should form part of Sorsogon City Environment Code.

Details of the above general strategies are put forward. Recommendations are based from outputs of community consultation meetings conducted by FLUP-TWG and from key findings of the situational analysis.

6.2 Specific Technical Strategies

6.2.1 Recommendations for Unallocated Areas

- 1. Identify and impose strict protection and multiple use zones
- 2. Relocate households living in the protection forest zone to alienable and disposable zones.
- 3. Come up with a documentation of people living in the multipurpose areas and restrict entry of new settlers.



- 4. Establish communal forest or individual family woodlots within production forests for fuelwood requirements.
- 5. Develop guidelines and protocols in sustainable agroforestry/upland farming.
- 6. Develop "natural assets/capital" and ecosystems services assessment and monitoring systems in the protection and production forests zones.
- 7. Establish alternative financing mechanisms to support on-site management of watersheds especially in strict protection areas example: PES and REDD + mechanisms and linkages.
- 8. As much as possible for ease in management, protection and development of areas should be contiguous to one another.
- 9. Development of tree plantations in upland, lowland and mangrove areas.
- 10. Conservation and development of water production areas.
- 11. Conservation and development of biodiversity resources and opening of biodiversity corridors.
- 12. Developing protocols in sustainable nature-based tourism.
- 13. Enabling and capacitating resource users engage in sustainable nature-based enterprise development, sustainable upland & lowland farming practices and law enforcement;
- 14. Community Managed Biodiversity Conservation and Management
- 15. Para-Legal education
- 16. Organizing Self Help Groups of primary stakeholders as FFL earth scouts.

6.2.2 Recommendations for Allocated Areas

- 1. Conduct tenure assessment to review mandates, programs/projects /activities of each allocation holder during the 1st year of FLUP implementation.
- 2. DENR V and City Environment and Natural Resources Officer (CENRO) to technically assist thePeoples Organization (PO) in the preparation, implementation, monitoring and evaluation of Management Plan of PO Allocated Area.
- 3. Institute community-based barangay protection and law enforcement within tenured areas.
- 4. Provide technical assistance in reforestation, rainforestation, biodiversity and other natural resources benchmarking and monitoring, establish sustainable livelihood options, development and promotion of suitable agroforestry systems, development and promotion of identified green ecotourism sites, and integrating disaster risk reduction and climate change adaptation.
- 5. Coordinate and collaborate with academic institutions in joint research and implementation of programs/projects/activities on forest land management, promotion and commercialization of watershed and upland technologies etc.
- 6. Massive awareness raising and promotional activities along watershed and biodiversity conservation, protection and management for children and youths through IEC materials development and dissemination, organizing environmental summits and youth camps, watershed festival etc.
- 7. Rehabilitation and development of grasslands, brush lands and cultivated forestlands.



6.2.3 Recommendations for Climate Change Disaster Risks Reduction and Management

- Forest and forestlandsvulnerability and impact assessment (VIA) to identify CC and Disaster risks and vulnerabilities of ecosystems and natural assets/capital, and develop appropriate mitigation, adaptation and risk reduction measures.
- 2. Sustainable environmental services management.
- 3. Change in livelihood strategies through non-extractive activities and more on "nature-based" enterprises; livelihood diversification
- 4. Proper water resource utilization, harvesting and storage
- 5. Proper waste management
- 6. Changes in planting and harvesting time; use flood and/or drought resistant crops.
- 7. Improved animal, crops and tree management
- 8. Carbon stock assessment of trees
- 9. Land. Crop, trees and water suitability assessment
- 10. Documentation of FLUP implementation highlighting good practices into popular information, education and linking, learning and documentation to be able to lobby
- 11. Lobbying and Advocacy
- 12. Cooperation and partnership with other stakeholders
- 13. Mobilizing funds
- 14. Putting on ground the recommendations of Sorsogon City's Local Climate Change Adaptation Plan (LCCAP).
- 15. Continuous capability building for the Community Based Disaster Risk Reduction Management (CBDRRM)

6.2.4Cross Cutting Strategies

- 1. Documentation of FLUP implementation highlighting learning and good practices. These are translated into popular information, education and communication (IEC) materials to be used for advocacy, linking/lobbying for funding.
- 2. Conduct of training needs assessment, development and conduct of trainings.
- 3. Marketing FLUP through investment fora and summits.
- 4. Crafting, implementing and administering environmental services user fee systems.
- 5. Investing resources in collective planning, implementation, monitoring and evaluation of ES Oriented FLUP.





7. ORGANIZATIONAL STRUCTURE AND OPERATIONS IN SUPPORT OF FLUP IMPLEMENTATION

7.1 Creation and /or strengthening the City (ENRO) Environment and Natural Resources Office (CENRO)

The CENRO shall serve as the development arm of LGU-Sorsogon City in putting in place an effective and efficient management of its forests and forestlands for enhancing ecosystem services. It will take an active role in dispensing the overall technical and administrative functions in implementing FLUP. This function is based on the provision of DENR-LGU-DILG Joint Memo Circular No. 98-01 (DENR). At present, the City ENRO has two divisions, namely, the Technical Division and the Administrative Division. Under the Technical Division is the Reforestation Unit that undertakes forest conservation, protection, and management. Shown below is the City ENRO Organizational Structure:



Figure 37. Present Organizational Structure of the Sorsogon City CENRO.

The FLUP will be implemented by the Technical Division through its Reforestation Unit focusing on the following aspects: (a) Forest Allocation and Tenure Management, (b) Forest Protection and Law Enforcement, (c) Social and Entrepreneurial Forestry, (d) Forest Restoration and Rehabilitation, and (e) Special Projects Section. The special projects division focuses on specialized concerns such as Community-managed Disaster Risk Reduction (CMDRR), Enhancement of Environmental Services, Reducing Emission from Deforestation and Degradation Plus (REDD+), Payment for Environmental Services (PES), Nature-Based/Green Tourism and Community-managed Biodiversity Conservation. To ensure the proper implementation of the FLUP, City ENRO will recruit at least two (2) forestry technical personnel, and will be technically backstopped by DENR V.



7.2 Forging Partnership Agreements or Arrangements

The FLUP Steering Committee will be composed of an Executive Committee and Sub-Committees. The City Mayor will chair the Executive Committee with the DENR V –RED as Co-Chair.There will be five (5) Sub-Committees namely: (a) Monitoring, Evaluation and Learning Sub-Committee, (b) Livelihood and Community Development Sub-Committee, (c) Forest Protection Sub-Committee, (d) Tenure Management Sub-Committee, and (e)Conflict Management Sub-Committee (Figure 38).Members of the sub-committees are the DILG V Director ,SP-Chair on Environment, City Planning Devt. Officer, City Agricultural Officer,Head of EDC-BacMan, Head of the Sorsogon City Water District, President of the Sorsogon State College, and Environment-Oriented Civil Society Organization Representative.



Figure 38. Structure and Sub-committees of the FLUP Steering Committee.

The Monitoring, Evaluation and Learning Sub-Committee will ensure efficient implementation of FLUP Plan and schedule reviews and assessment of FLUP outcomes. It is headed by the CENRO and members coming from SSC and environment-oriented Civil Society Organization. The Livelihood and Community Development Sub-Committee headed by the City Community Development Officer and representatives from the CENR Office, DSWD, DTI, CAO, Vice-Mayor, DILGO, Gender focal Person and CPDO as members.

Sub-committees' task is to assist forest communities earn income and savings through optimal utilization of natural resources by setting up nature-based enterprises.

The Forest Protection Sub-Committee that will come up with solutions to issues related to enforcement of forest laws, rules and regulations. It is headed by the DENR-CENRO and



PENRO with members coming from the CENR Office, EDC-BacMan, Sorsogon City Water District, CSO representative, NGO representative, PNP, AFP, and ABC President.

The Tenure Management Sub-Committee headed by CENRO and deployed DENR V staff, representatives from the DENR-CENRO and DENR-PENRO, PO representative, CSO representative, and NGO representative as members. The Sub-Committee will ensure that forest lands under the jurisdiction of tenure/allocation holders are effectively managed.

Headed by the CENRO with the DILGO, representatives from DENR V, CSO, NGO, PNP, and AFP `as members, the Conflict Management Sub-Committee task is to undertake strategies along conflict negotiation and resolution related to management of forest lands.





8.0 ESTIMATED FINANCIAL REQUIREMENTS FOR IMPLEMENTING THE FLUP AND SOURCES OF FUNDS

The FLUP program implementation plan is divided into two parts. These are the 5-Years Medium Range Program and the Short Range Program. The short range program is a one year plan wherein the activities focused on three major areas such as Bio-physical Protection and Development, Socio-Cultural and Economic Development, Institutional Development and Strengthening, and Infrastructure Development.

The total cost for five year implementation is amounting th Ten Million Pesos (P10,000,000.00). The initial activities scheduled for one year (2018) is approximately P2, 450,000.00. Possible sources of funds other than Sorsogon City and DENR V, are EDC-BacMan, SCWD, barangays within the sub-watersheds, and other development institutions.

8.1 Medium Range Program (5 years)

8.1.1 Five Year Consolidated Targets

Table 31 Five Years Targets.

Strategies/Activities			Targets (Years)			Responsible Agency
	2024	2025	2026	2027	2028	
A.Bio-physical Protection and Development						
1. Creation, strengthening and skills development of Self Help Groups as Earth Scouts (Bantay Dagat and Bantay Gubat) : additional manpower, equipment and trainings		1 per sub- watershed	1 per sub- watershe d	1 per sub- watershe d	1 per sub- watersh ed	LGU- Sorsogon City , DENR V. EDC
2. To conduct watershed/upland rainforestation or revegetation of degraded areas by intensive planting of appropriate number of trees and understory species, and enrichment planting	1/yr/sub- watershe d	1/yr/sub- watershed	1/yr/sub- watershe d			LGU- Sorsogon City , DENR V , EDC & SCWD
3. To undertake watershed and mangrove and beachfront forest protection and conservation activities thru assisted natural regeneration and enrichment plantation.	1/yr	1/yr	1/yr			LGU- Sorsogon City, DENR V, & EDC



4.To undertake community-managed IEC particularly on Environmental Services,PES, REDD++, Fishery, Waste Management and biodiversity conservation awareness campaigns and projects/ initiatives in the upland, beachfront and mangrove forests, and encouraging biodiversity in human dominated ecosystems/areas e.g. farms, schools, backyards, gardens and community tree parks, nature-based enterprises and nature-based tourism.	1 Proj./initi ative	2 proj./ Initiatives	3 proj./ Initiatives	3 proj./ Initiatives	3 proj./ Initia- tives	LGU- Sorsogon City and DENR V, EDC & SCWD
5. Formulation (especially on land conversion) and strict implementation of Forestry and other environmental laws in partnerships with DENR: Ordinance formulation, joint task-force, trainings	Review of existing policies	Formulati on of Envt.Code	2 trngs/ sub- watershe d.	2 trngs./ Sub- watershe d	Review of extent of imple- menta- tion	Provl. Govt of Sorsogon, DAR& LGU Sorsogon City
6. Re-inventory and mapping of forest areas(mangrove, watersheds) and FFL Vulnerability and Impact Assessment (VIA) to identify hazard risks and vulnerabilities of natural resources in each of the 11 watersheds & Identify possible responses.	VIA in 5 sub- watershe d	VIA in 6 sub- watershed				LGU- Sorsogon City and DENR V,
7. Establishment of local nurseries (particularly on barangays in watershed areas) capable of producing native and other needed forest and fruit bearing trees	1 nursery per sub- watershe d	1 nursery per sub- watershed	1 nursery per sub- watershe d	1 nursery per sub- watershe d	1 nursery per sub- watersh ed	LGU- Sorsogon City and DENR V
8. Floodplain restoration thru creation of floodplain wetlands to intercept surface runoff and pollutants and increase infiltration, thereby reducing the incidence of floods, the provision of habitats for aquatic species, improvement of water quality and the increased recharge of groundwater.	1/flooded sub- watershe d					LGU- Sorsogon City, DPWH and DENR V
9. Riparian zone restoration thru massive planting of riparian trees along the river banks/stream banks/spring banks, removal of invasive species and on-site research on the suitability of trees for river bank restorations	1/sub- watershe d	1/sub- watershed	1/sub- watershe d			LGU- Sorsogon City and DENR V
10. Mangroves and seagrass beds' rehabilitation and protection thru enrichment planting, maintenance and protection activities	1/coastal sub- watershe d	1/coastal sub- watershed	1/coastal sub- watershe d			LGU- Sorsogon City, DENR V
11. Establishment of community Tree parks and tree (e.g., pili) plantation in communities in the different watersheds	1/sub- watwers hed	1/sub- watwersh ed	1/sub- watwers hed			LGU- Sorsogon City, DENR V



12. Operationalizing the city's waste Enforcement team and improving waste collection in different barangays	Whole LGU	Whole LGU	Whole LGU			LGU- Sorsogon City, DENR V		
B.Socio-Cultural and Economic Improvement								
1.Relocation of communities in flood prone areas	If the need arises					LGU- Sorsogon		
2 To capacitate resource users/Self help grps. engaged in sustainable nature-based enterprise development, sustainable upland & lowland farming practices, farm and fishery entrepreneurship, and law enforcement;	1 per sub- water- shed	2 per sub- watershed	2 per sub- water- shed	2 per sb- water- shed	2 per sub- water- shed	LGU- Sorsogon City and DENR V		
3 To develop nature-based ecotourism sites.		2 sites	2 sites	2 sites	2 sites	LGU- Sorsogon City and DENR V		
4. Development and provision of alternative livelihood to upland and lowland and coastal communities dependent of watershed/forest resources: tiger grass and bamboo and pili based livelihood , aqua culture, plant propagation etc.)		1/.sub watershed	1/.sub watershe d	1/.sub watershe d	1/.sub watersh ed	LGU- Sorsogon City, DTI V		
5. To establish and implement a system of participatory monitoring, evaluation and learning (can focus on pollution/effluent sources and quarrying activities)	1 PME & L system	1 PME&L sys-tem	1 PME&L system	1 PME&L system	1 PME&L system	LGU- Sorsogon City and DENR V		
6. Community-managed climate change disaster risk reduction	All Sub- watershe ds	All sub- watershed s	All sub- watershe ds	All sub- watershe ds	All sub- watersh eds	LGU- Sorsogon City		
7.Massive para-legal educational activities for the bantay-kalikasan & bantay dagat volunteers for capacitation and mobilization.	1 training	2 trainings	2 trainings	2 trainings		LGU- Sorsogon City and DENR V		
8.Presentation of rural theaters, movies and dissemination of IEC materials to promote sustainable natural resources use & practices, laws/policies/ordinances.	1 movie per sub- water- shed & 2 IEC materials	1 rural theater per sub- watershed & 5 IEC materials	1 rural theater per sub- water- shed & 5 IEC materials	1 rural theater per sub- water- shed & 5 IEC materials	1 rural theater per sub- water- shed & 5 IEC mater- ials	LGU- Sorsogon City		
9. creation of community Self-Help Groups Earth Scouts that would assist in undertaking conservation and protection activities in upland and mangrove forests.		1 per sub- watershed	1 per sub- water- shed	1 per sub- water- shed	1 per sub- water- shed	LGU- Sorsogon City		



10. development of.Market linkages for non-extractive nature-based enterprises such as bamboo industry.		3 linkages estab- lished	4 linkages estab- lished	5 linkages estab- lished	6 linkages estab- lished	LGU- Sorsogon City
C.Institutional Development and Strength	nening			1		1
1.Institute the FLUP Steering Committee and the Forest Land use Planning & Management Division of the City Environment and Natural Resources Office	1 Steering Commit- tee with 5 sub- committe es; 1 FLUP &M Division with 6 Sections					LGU- Sorsogon City & DENR V
2.To establish climate-resilient infrastructures for watersheds'resiliency.		3 structures	4 struc- tures	4 struc- tures	4 struc- tures	LGU- Sorsogon City
3. Identify and impose strict protection and multiple use zones.	1 sub- water- shed	6 sub- water- shed				LGU- Sorsogon City and DENR V
4.Come up with a documentation of people living in the multipurpose areas and restrict entry of new settlers.	2 sub- water- shed	5 sub- watershed				LGU- Sorsogon City
5. Establish alternative financing mechanisms to support on-site management of watersheds especially in strict protection areas example: PES ad REDD + mechanisms and linkages.		2 linkages	3 linkages	4 linkages	5 linkages	LGU- Sorsogon City, DENR V
6.Conduct tenure assessment to review mandates, programs/projects /activities of each allocation holder during the 1 st year of FLUP implementation.	1 review	1 review	1 review	1 review	1 review	LGU- Sorsogon City
7.Provide technical assistance (TA) in reforestation ; rainforestation; biodiversity and other natural resources benchmarking and monitoring; establishment of sustainable livelihood options and market linkages; development and promotion of suitable agroforestry systems; development and promotion of identified green ecotourism sites; carrying capacity research in eco-tourism sites,and integrating disaster risk reduction and climate change adaptation by putting on		1 TA per quarter per sub- watershed	1 TA per quarter per sub- water- shed	1 TA per quarter per sub- water- shed	1 TA per quarter per sub- water- shed	LGU- Sorsogon City and DENR V





ground recommendations in the City's LCCAP.						
8.Coordinate and collaborate with academic institutions in joint research and implementation of natural resources assessment and programs/projects/activities on forest land management, promotion and commercialization of watershed and upland technologies, climate change risk reduction, adaptations and mitigation, organizing self help groups etc.	2 lin- kages	2 activi- ties	2 activi- ties	2 activi- ties	2 activi- ties	LGU- Sorsogon City and DENR V
9. Enhance implementation of solid waste management ordinances		All sub- watershed s	All sub- watershe ds	All sub- watershe ds	All sub- watersh eds	LGU- Sorsogon City
10.Marketing FLUP through investment fora, conferences and summits.	1 fora	4 fora	1 sum- mit	1 natio- nal confe- rence	1 natio- nal confe- rence	LGU- Sorsogon City, DENR V
11.Formulation of nature-based tourism site development and management plans		1 Work- shop per sub- watershed				
12. Setting-up recreational/leisure tree parks in every barangay for continuous environmental services to communities.	7 urban tree park	10 bgy. tree parks	20 Bgy. tree parks	20 bgy. tree parks	4 bgy. tree parks	LGU- Sorsogon City, DENR V
D. Infrastructure Development						
1.Upgrading of the Decentralized Wastewater Treatment System in the public Market	1					LGU- Sorsogon City
2, Construction of centralized treatment system for commercial effluent sources	1					LGU- Sorsogon City
3. Riverbanks stabilization infrastructure projects	1/sub- watershe d	1/sub- watershed	1/sub- watershe d			LGU- Sorsogon City
4. Improvement of existing drainage systems especially in the Central Business District (CBD)		1				LGU- Sorsogon City



8.1.2 Consolidated Five Year Budgetary Requirements

Total amount of funding required for the 5-Year implementation of Sorsogon City's Forest Land Use Plan (FLUP) starting 2018 to 2022 is Ten Million Pesos only (Php 10,000,000.00). Other than LGU-Sorsogon City and DENR V, possible sources of funds are EDC-BacMan, Sorsogon City Water District, Barangay Local Government Units, and other development institutions.

Expense items are:

- 1. **Bio-physical Protection and Development** (Php 1,950,000.00.).
- 2. Socio-Cultural and Economic Improvement (Php 1,750,000.00).
- 3. Institutional Development and Strengthening (Php 6,100,000.00)
- 4. Infrastructure Development(Php 200,000.00)

Table32. Five Years Budgetary Requirements.

Strategies/Activities	Consolidated Budgetary Requirements (5 Years)	Responsible Agency
A Bio-physical Protection and Developme	nt- Php 1 950 000 00	
	ant- Frip 1,730,000.00	
1.Creation, strengthening and skills development of Self Help Groups as Earth Scouts (Bantay Dagat and Bantay Gubat) : additional manpower, equipment and trainings	100,000.00	LGU-Sorsogon City , DENR V. EDC
2. To conduct watershed/upland rainforestation or revegetation of degraded areas by intensive planting of appropriate number of trees and understory species, and enrichment planting	200,000.00	LGU-Sorsogon City , DENR V , EDC & SCWD
3. To undertake watershed and mangrove and beachfront forest protection and conservation activities thru assisted natural regeneration and enrichment plantation.	100,000.00	LGU-Sorsogon City, DENR V, & EDC
4.To undertake community-managed IEC particularly on Environmental Services,PES, REDD++, Fishery, Waste Management and biodiversity conservation awareness campaigns and projects/ initiatives in the upland, beachfront and mangrove forests, and encouraging biodiversity in human dominated ecosystems/areas e.g. farms, schools, backyards, gardens and community tree parks, nature-based enterprises and nature-based tourism.	100,000.00	LGU-Sorsogon City and DENR V, EDC & SCWD
5. Formulation (especially on land conversion) and strict implementation of	100,000.00	Provl. Govt of Sorsogon, DAR & LGU Sorsogon City



Forestry and other environmental laws in partnerships with DENR: Ordinance formulation, joint task-force, trainings		
6. Re-inventory and mapping of forest areas(mangrove, watersheds) and FFL Vulnerability and Impact Assessment (VIA) to identify hazard risks and vulnerabilities of natural resources in each of the 11 watersheds & Identify possible responses.	660,000.00	LGU-Sorsogon City and DENR V,
7. Establishment of local nurseries (particularly on barangays in watershed areas) capable of producing native and other needed forest and fruit bearing trees	100,000.00	LGU-Sorsogon City and DENR V
8. Floodplain restoration thru creation of floodplain wetlands to intercept surface runoff and pollutants and increase infiltration, thereby reducing the incidence of floods, the provision of habitats for aquatic species, improvement of water quality and the increased recharge of groundwater.	200,000.00	LGU-Sorsogon City, DPWH and DENR V
9. Riparian zone restoration thru massive planting of riparian trees along the river banks/stream banks/spring banks, removal of invasive species and on-site research on the suitability of trees for river bank restorations	100,000.00	LGU-Sorsogon City and DENR V
10. Mangroves and seagrass beds' rehabilitation and protection thru enrichment planting, maintenance and protection activities	100,000.00	LGU-Sorsogon City, DENR V
11. Establishment of community Tree parks and tree (e.g., pili) plantation in communities in the different watersheds	150,000.00	LGU-Sorsogon City, DENR V
12. Operationalizing the city's waste Enforcement team and improving waste collection in different barangays	150,000.00	LGU-Sorsogon City, DENR V
B.Socio-Cultural and Economic Improvem	nent- Php 1,750,000.00	
1.Relocation of communities in flood prone areas	To be externally sourced out	
2 To capacitate resource users/Self help grps. engaged in sustainable nature-based enterprise development, sustainable upland & lowland farming practices, farm and fishery entrepreneurship, and law enforcement;	100,000.00	LGU-Sorsogon City and DENR V



3 To develop nature-based ecotourism sites.	300,000.00	LGU-Sorsogon City and DENR V
4. Development and provision of alternative livelihood to upland and lowland and coastal communities dependent of watershed/forest resources: tiger grass and bamboo and pili based livelihood , aqua culture, plant propagation etc.)	300,000.00	LGU-Sorsogon City, DTI V
5. To establish and implement a system of participatory monitoring, evaluation and learning (can focus on pollution/effluent sources and quarrying activities)	100,000.00	LGU-Sorsogon City and DENR V
6. Community-managed climate change disaster risk reduction	200,000.00	LGU-Sorsogon City
7.Massive para-legal educational activities for the bantay-kalikasan & bantay dagat volunteers for capacitation and mobilization.	300,000.00	LGU-Sorsogon City and DENR V
8.Presentation of rural theaters, movies and dissemination of IEC materials to promote sustainable natural resources use & practices, laws/policies/ordinances.	150,000.00	LGU-Sorsogon City
9. creation of community Self-Help Groups Earth Scouts that would assist in undertaking conservation and protection activities in upland and mangrove forests.	200,000.00	LGU-Sorsogon City
10. development of.Market linkages for non-extractive nature-based enterprises such as bamboo industry.	100,000.00	LGU-Sorsogon City
C.Institutional Development and Strength	ening-Php 6,100,000.00	1
1.Institute the FLUP Steering Committee and the Forest Land use Planning & Management Division of the City Environment and Natural Resources Office	5,000,000.00	LGU-Sorsogon City & DENR V
2.To establish climate-resilient infrastructures for watersheds'resiliency.	300,000.00 (the rest will be externally sourced out)	LGU-Sorsogon City
3. Identify and impose strict protection and multiple use zones.	50,000.00	LGU-Sorsogon City and DENR V
4.Come up with a documentation of people living in the multipurpose areas and restrict entry of new settlers.	50,000.00	LGU-Sorsogon City
5. Establish alternative financing mechanisms to support on-site management of watersheds especially in	100,000.00 (the rest will be sourced out)	LGU-Sorsogon City, DENR V



strict protection areas example: PES ad REDD + mechanisms and linkages.		
6.Conduct tenure assessment to review mandates, programs/projects /activities of each allocation holder during the 1 st year of FLUP implementation.	100,000.00	LGU-Sorsogon City
7.Provide technical assistance (TA) in reforestation ; rainforestation; biodiversity and other natural resources benchmarking and monitoring; establishment of sustainable livelihood options and market linkages; development and promotion of suitable agroforestry systems; development and promotion of identified green ecotourism sites; carrying capacity research in eco-tourism sites, and integrating disaster risk reduction and climate change adaptation by putting on ground recommendations in the City's LCCAP.	200,000.00	LGU-Sorsogon City and DENR V
8.Coordinate and collaborate with academic institutions in joint research and implementation of natural resources assessment and programs/projects/activities on forest land management, promotion and commercialization of watershed and upland technologies, climate change risk reduction, adaptations and mitigation, organizing self help groups etc.	200,000.00	LGU-Sorsogon City and DENR V
9. Enhance implementation of solid waste management ordinances	100,000.00	LGU- Sorsogon City
10.Marketing FLUP through investment fora, conferences and summits.	200,000.00	LGU-Sorsogon City, DENR V
11.Formulation of nature-based tourism site development and management plans	100,000.00	
12. Setting-up recreational/leisure tree parks or continuous environmental services to communities.	200,000.00	LGU-Sorsogon City, DENR V
D. Infrastructure Development -Php 200,0	00.00	
1.Upgrading of the Decentralized	Mobilization fund is 200.000.00 but	LGU-Sorsoaon Citv
Wastewater Treatment System in the	actual fund for construction of	
public Market	identified infrastructures will be	
2 Construction of centralized treatment	externally sourced out	GIL-Sorsogon City
system for commercial effluent sources	onomany sourced out	
3. Riverbanks stabilization infrastructure		I GU-Sorsogon City
projects		
4. Improvement of existing drainage		LGU-Sorsogon City
systems especially in the Central Business		0



District (CBD)

8.2 Short Range Program (1 year)

Funding for Year 1 activities in the amount of Two Million Four Hundred Fifty Thousand Pesos (Php 2,440,000.00) will come solely from LGU-Sorsogon City. However, linkages will be undertaken to source out other funds for FLUP implementation for the succeeding years.

Objectives/Strategies/Activities Responsible Year1 Fund Targets Agencies Budget Sources Requirement A. Bio-physical Protection and Development-Php 650,000.00 LGU-Sorsogon LGU-2. To conduct watershed/upland rainforestation or 1/SW 40,000.00 City, DENR V, revegetation of degraded areas by intensive Sorsogon planting of appropriate number of trees and EDC &SCWD City, understory species, and enrichment planting 3. To undertake watershed and mangrove and 1. LGU-Sorsogon 20,000.00 LGUbeachfront forest protection and conservation City Sorsogon City activities thru assisted natural regeneration and enrichment plantation. 1 LGU-Sorsogon 20.000.00 LGU-4.To undertake community-managed IEC particularly on Fishery, Waste Management and City Sorsogon City biodiversity conservation awareness campaigns and projects/ initiatives in the upland, beachfront and mangrove forests, and encouraging biodiversity in human dominated ecosystems/areas e.g. farms, schools, backyards, gardens and community tree parks. LGU-5. Formulation (especially on land conversion) Review existing LGU-Sorsogon 20,000.00 and strict implementation of Forestry and other policies City Sorsogon City environmental laws in partnerships with DENR: Ordinance formulation, joint task-force, trainings VIA in 5 SW LGU-6. Re-inventory and mapping of forest LGU-Sorsogon 300,000.00 areas(mangrove, watersheds) and Sub-City Sorsogon City watershed risk assessment and analysis to identify hazard risks and vulnerabilities of natural resources in each of the 11subwatersheds 7. Establishment of local nurseries (particularly on LGU-Sorsogon 20,000.00 LGU-1 barangays in subwatershed areas) capable of City Sorsogon City producing native and other needed forest and fruit bearing trees 8. Floodplain restoration thru creation of LGU-Sorsogon 40,000.00 LGU-1 floodplain wetlands to intercept surface runoff and City Sorsogon City pollutants and increase infiltration, thereby reducing the incidence of floods, the provision of

1

LGU-Sorsogon

20,000.00

Table 33. First Year Work and Financial Plan.

9. Riparian zone restoration thru massive planting

habitats for aquatic species, improvement of water quality and the increased recharge of

groundwater.

LGU-



of riparian trees along the river banks/stream banks/spring banks, removal of invasive species and on-site research on the suitability of trees for river bank restorations		City		Sorsogon City
10. Mangroves and seagrass beds' rehabilitation and protection thru enrichment planting, maintenance and protection activities	1	LGU-Sorsogon City	20,000.00	LGU- Sorsogon City
11. Establishment of community Tree parks and tree (e.g., pili) plantation in communities in the different subwatersheds	1/SW	LGU-Sorsogon City	50,000.00	LGU- Sorsogon City
12. Operationalizing the city's waste Enforcement team and improving waste collection in different barangays	Whole City LGU	LGU-Sorsogon City	100,000.00	LGU- Sorsogon City
B.Socio-Cultural and Economic Improvement-Ph	np 350,000.00	1		
2 To capacitate resource users engaged in sustainable enterprise development, sustainable upland & lowland farming practices, farm and fishery entrepreneurship, and law enforcement;	1/SW	LGU-Sorsogon City	200,000.00	LGU- Sorsogon City
5. To establish and implement a system of participatory monitoring, evaluation and learning (can focus on pollution/effluent sources and quarrying activities)	1PME &L	LGU-Sorsogon City	20,000.00	LGU- Sorsogon City
6. Community-managed climate change disaster risk reduction	All SW	LGU-Sorsogon City	40,000.00	LGU- Sorsogon City
7.Massive para-legal educational activities for the bantay-kalikasan & bantay dagat volunteers for capacitation and mobilization.	1 training	LGU-Sorsogon City	60,000.00	LGU- Sorsogon City
8.Presentation of rural theaters, movies and dissemination of IEC materials to promote sustainable natural resources use & practices, laws/policies/ordinances.	1 movie/SW	LGU-Sorsogon City	30,000.00	LGU- Sorsogon City
C.Institutional Development and Strengthening	Php 1,240,000.00			
1.Institute the FLUP Steering Committee and the Forest Land use Planning & Management Division of the City Environment and Natural Resources Office	1 Steering Committee & FLUP Mgt. Div.	LGU-Sorsogon City	1,000,000.00	LGU- Sorsogon City
3. Identify and impose strict protection and multiple use zones.	1SW	LGU-Sorsogon City	50,000.00	LGU- Sorsogon City
4.Come up with a documentation of people living in the multipurpose areas and restrict entry of new settlers.	2SW	LGU-Sorsogon City	20,000.00	LGU- Sorsogon City
6.Conduct tenure assessment to review mandates, programs/projects /activities of each allocation holder during the 1 st year of FLUP implementation.	1 review	LGU-Sorsogon City	50,000.00	LGU- Sorsogon City



8.Coordinate and collaborate with academic	2 linkages	LGU-Sorsogon	40,000.00	LGU-
institutions (BU etc.) in joint research and		City		Sorsogon City
implementation of natural resources assessment				
and programs/projects/activities on forest land				
management, promotion and commercialization				
of watershed and upland technologies, climate				
change risk reduction, adaptations and mitigation,				
organizing self help groups etc.				
10.Marketing FLUP through investment fora,	1 fora	LGU-Sorsogon	40,000.00	LGU-
conferences and summits.		City		Sorsogon City
12 Sotting up represtional/laigure tree parks for	2 urban traa nark		40,000,00	
12. Setting-up recreational/leisure tree parks for	3 urban nee park	City	40,000.00	LGU-
communities		City		Sursuguri City
communities.				
D. Infrastructure Development- Php 200,000.00 (Mobilization Cost for sourcing out external funds)				
1.Upgrading of the Decentralized Wastewater	1			
Treatment System in the public Market				
2. Construction of centralized treatment system	1			
for commercial effluent sources				
3. Riverbanks stabilization infrastructure projects	1/SW			
TOTAL COST			2, 440,000.00	





9.0. Participatory Monitoring, Evaluation and Learning

The FLUP Steering Committee has a Sub-Committee on Monitoring, Evaluation and Learning (ME &L). This Sub-Committee will be responsible for developing a Participatory ME&L System that is simple and easy to understand and usable by the community based on FLUP goals and objectives.

The ME&L system revolves around a systematic process of continuous action and reflection, and places learning and empowerment at the heart of FLUP implementation process. Monitoring and evaluation indicators shall be developed. ME&L will be participatively done with the community for them to develop ownership of the FLUP management process and outcomes.

There will be three components of the ME&L system, these are (a) quarterly monitoring, (b) annual FLUP implementation review and planning and evaluations. At the start of FLUP implementation, a baseline evaluation will be conducted. Then, after two years or 1st quarter of the third year, a mid-term evaluation will be undertaken and a final evaluation before the FLUP implementation commenced. Monitoring will take care of activities, while evaluation takes care of results.

The quarterly monitoring will determine status of FLUP programs/projects/activities implementation; particularly issues, problems and constraints. Results of the quarterly monitoring will be decision tools for the FLUP Steering Committee to come up with appropriate intervention to respond to issues and concerns. The Annual FLUP Implementation Review and Planning will assess the specific outcomes and formulate the following year's activities.

The baseline survey will profile the forest and forest lands in terms of the status of natural assets/capital and the various ecosystem services provided. Likewise, the primary stakeholders as well as environmental services provided by the forest and forestlands. Same data and information will be looked into during the mid-term and final evaluation. Evaluations will determine if management objectives are met through positive changes in the status of environmental services, natural assets/capital and people.