Building the Technical Expertise of LGUs for the Robust Implementation of Ridge to Reef Approach/Watershed Ecosystem Approach to Local and Provincial Land Use and Development Planning in the Philippines

Activity Report

1. **Title:**
   Land Use Modelling and PDPFP Redrafting Workshop

2. **Duration and Date:**
   The activity was conducted for three (3) days, on October 15-17, 2025.

3. **Venue:**
   The first day of the workshop was held at La Jenn's Hotel and Resto Grill in Bantay, Ilocos Sur, while the second and third days took place at Selah Vie Resort Hotel in San Ildefonso, Ilocos Sur.

4. **Content and Methodology:**
   The Land Use Modelling and PDPFP Redrafting Workshop was led by the Office of the Provincial Planning and Development Coordinator (OPPDC) of the Provincial Government of La Union (PGLU). The 3-day writing workshop aimed to produce four main outputs:

Output	Sub-Output/Action
1.) Provincial Development Plan	- Development issues and problems - Development goals, objectives/targets
2.) Provincial Physical Framework Plan	- Existing land use map, with natural accounting - Projected 2035 land use map (do nothing scenario), with natural capital accounting - Land demand and supply
3.) Ecological Profile	- Complete tables and figures - Identify missing data
4.) Implementation, Monitoring, and Evaluation Plan Outline	

The activity program flow is as follows:

Day 1 (October 15, 2025)

Time	Activity	In-Charge	Output
AM Session			
7:00am - 7:30 am	Departure from La Union		
11:00 am - 11:30 am	Arrival in Ilocos Sur		
12:00 nn - 1:00 pm	Lunch		
PM Session			
1:00 pm - 1:10 pm	Message	Atty. Ruby Jean N. Balanon, EnP	
1:10 pm - 1:40 pm	Orientation: Writing Session Objectives	David Rabelas, EnP	
1:40 pm - 2:00 pm	Refresher: Anatomy of the PDPFP	Roshelle A. Mamaril, EnP	
2:00 pm - 2:30 pm	Writing Sprint: Development Issues and Challenges	Merven Medrano	Problem Tree
2:30 pm - 6:00 pm	Plenary Workshop: Objective Setting and Strategy Formulation	Merven Medrano	Sectoral Framework
6:00 pm - 7:00 pm	Dinner		

Day 2 (October 16, 2025)

Time	Activity	In-Charge	Output
AM Session			
8:00am - 8:10 am	Good Morning Message	Dr. Rex Victor O. Cruz	
8:10 am - 12:00 nn	Writing Sprint	Sector Writers, RSU	• Ecological Profile • PrDP Assessment and

			Challenges
	Workshop: Land USe Modelling	UPLB, PPU, SPU	• La Union Existing Land Use Map • Projected Land Use by 2035
12:00 nn - 1:00 pm	Lunch		
PM Session			
1:00 pm - 5:00 pm	Writing Sprint	Sector Writers	• Ecological Profile • PrDP Strategies
	Workshop: Land Use Modelling	UPLB, PPU, SPU	• La Union Existing Land Use Map • Projected Land Use by 2035
5:00 pm - 6:00 pm	Presentation: Provincial Development Plan	Sector Writers	
	Presentation: Projected Land Use by 2035	UPLB, PPU, SPU	
6:00 pm - 7:00 pm	Dinner		

Day 3 (October 17, 2025)

Time	Activity	In-Charge	Output
AM Session			
8:00am - 8:10 am	Good Morning Message	Dr. Vida Q. Carandang	
10:00 am - 12:00 nn	Breakout Workshop: Identification of Land Demand	Sector Writers	• Land Demand vs Supply
	Breakout Workshop: Natural Capital	UPLB, PPU, SPU	• Existing Land Use

	Accounting		vs Projected Land Use Natural Capital Accounts
12:00 nn - 1:00 pm	Lunch		
PM Session			
1:00 pm - 2:00 pm	Breakout Workshop: Identification of Land Demand	Sector Writers	● Land Demand vs Supply
	Breakout Workshop: Natural Capital Accounting	UPLB, PPU, SPU	● Existing Land Use vs Projected Land Use Natural Capital Accounts
2:00 pm - 2:30 pm	Presentation: Land Demand vs Supply	Sector Writers	
	Presentation: Existing Land Use vs Projected Land Use Natural Capital Accounts	UPLB, PPU, SPU	
2:30 pm - 3:30 pm	Brainstorming: Plan Monitoring and Evaluation		● Monitoring and Evaluation Plan Outline
3:30 pm - 4:00 pm	Moving Forward		

Focusing on the involvement of the APN Project Team, the team provided technical guidance to the designated mapping personnel of the OPPDC-PGLU in developing the projected land use model for the year 2035.

Mr. John Mark Anzia and Ms. Marinel Andal assisted in the preparation of model inputs and the execution of the land use simulation. They also led the processing and analysis of results generated through the InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) models, including the cross-tabulation and interpretation of outputs.

The proceedings and key discussion points from the presentation of the abovementioned models are outlined below.

Presentation on Land Use Modeling Results

Mr. Roland Faminialagao of the OPPDC-PGLU presented the land use model outputs focusing on the transformation of land use from 2020 to 2035. The model, generated using TerrSet software, indicated significant changes across land cover types. Various physical and environmental variables such as slope and rainfall were utilized to compute land use trends over a 10-year period. The model, initially developed for the entire watershed, will be clipped to the boundaries of La Union for more localized analysis.
The areas allocated for agriculture and built-up development are projected to increase by 2035, consistent with the expected growth in provincial centers identified in the Regional Framework Plan (e.g., Santo Tomas, Agoo, and Bangar).

In terms of integrating with planning frameworks, Ms. Roshelle Mamaril clarified that the generated land cover projections represent only one input to a broader set of frameworks, including those for production, settlement, protection, and infrastructure development. These will be used to define the overall physical framework of La Union and guide the province's development priorities.

An observed increase in brushland areas raised inquiries from the OPPDC-PGLU on whether this trend indicates a need to intensify environmental management programs. Dr. Rex Cruz explained that the model's accuracy depends on the availability of historical land cover data. The trend analysis was based on available datasets from 2003–2010 and 2015–2020. Since brushland increased between 2003 and 2010, this trend influenced the 2020–2035 projection, even though forest conditions improved between 2010 and 2020 due to initiatives such as the National Greening Program (NGP) and enhanced DENR forest protection. The 2025 land cover data from NAMRIA, expected in the first quarter of next year, will enable a recalibration of the trend using updated datasets.

For planning and policy implications, Ms. Mamaril asked how the projected scenario would affect development priorities. Dr. Cruz emphasized that the projection represents a "business-as-usual" or "do-nothing" scenario, intended to serve as a baseline reference for developing the PDPFP. The ideal 2035 scenario will be developed based on PDPFP implementation, allowing planners to visualize the expected land cover improvements resulting from policy interventions.

Mr. David Rabelas highlighted that the development plan should directly influence the land use plan. Dr. Cruz agreed, reiterating that the projected 2035 land use represents an inferior or baseline condition compared to the improved land cover expected once the PDPFP is fully implemented.

Presentation of InVEST Model Outputs

Mr. Anzia presented the results generated using the InVEST models. He discussed the land use and land cover (LULC) transitions, emphasizing the increase in brushland or shrubland projected for 2035, which reflects the trend observed from 2003 to 2010.

For the Natural Capital Accounting component, the model used a land use scenario based on the watershed's land capability zones, illustrating the ideal land use pattern consistent with the area's land capability classification.

Carbon Storage Model

Ms. Andal presented the carbon storage model outputs of InVEST. Key findings show that San Gabriel municipality exhibited the highest total carbon storage among all LGUs. Among the watersheds, Bayogao River recorded the highest carbon storage. By LULC type, open forests had the highest carbon content, though projections for 2035 indicate significant conversion of open forests to annual crops or brushland, resulting in reduced carbon storage.In terms of land area, brushland, being the most extensive, contributes the largest share of total carbon stored.

Under the land capability scenario, open forests remain the highest carbon-storing land cover type, with San Gabriel and Bayogao River maintaining their leading positions among municipalities and watersheds, respectively.

Sediment Delivery Ratio (SDR) Model

The Sediment Delivery Ratio (SDR) model assessed sediment retention as an ecosystem service, specifically measuring the avoided sediment export (i.e., sediment retained within the area) and the sediment deposited into water bodies. The results have shown that for 2020, the estimated soil loss was 100.7 tons per hectare. Under the 2035 "do-nothing" scenario, soil loss increased to 127.1 tons per hectare, with sediment deposited estimated at 227.6 tons per hectare.

The land capability scenario, on the other hand, demonstrated significantly lower soil loss (65.6 tons/ha) and sediment deposition (79.3 tons/ha), indicating the cost savings and ecosystem benefits of sustainable land management practices, particularly in reducing soil dredging requirements.

Mr. Merven Medrano inquired about the implications of the Sediment Retention Model. Mr. Anzia explained that increased sediment deposition, such as in dams, reduces water storage capacity, necessitating costly dredging operations. He emphasized that while erosion is natural, it can be minimized through vegetation cover. For instance, open forests had an estimated sediment deposition of only 4.8 tons/ha, much lower than that of brushlands or barren areas, highlighting the critical role of vegetation in watershed protection.

Dr. Cruz added that road construction, particularly in erosion-prone areas, is among the top global sources of sediment deposition. He stressed that agencies such as the DPWH should incorporate erosion mitigation measures into infrastructure projects to reduce sedimentation impacts.

Mr. Rabelas raised the concern that in a Ridge-to-Reef management approach, downstream LGUs are often affected by sediment movement originating from upstream areas, over which they have limited control. He suggested inter-LGU coordination, especially with adjacent provinces, to address shared watershed concerns.

Dr. Cruz explained that the Philippine Ecosystem and Natural Capital Accounting System (PENCAS) Act can help establish accountability among LGUs by identifying both ecosystem service providers and beneficiaries. He added that LGUs maintaining forest ecosystems should receive incentives or compensatory benefits, such as increased IRA or payments for ecosystem services.

The DENR's Watershed Management Areas were cited as potential platforms for inter-LGU collaboration, especially for watersheds that span multiple provinces or regions. These bodies can facilitate planning, monitoring, and policy integration to ensure collective watershed protection efforts.

5. Participants and Facilitators

The activity was attended by a total of 21 participants, consisting of personnel from the OPPDC-PGLU and the APN Project Staff from UPLB. Led by Dr. Cruz, the APN team included four members who provided support during the workshop, particularly in the sessions on land use modeling and natural capital accounting.

6. Reflections/Concerns/Recommendations/Lesson Learned:

The Land Use Modelling and PDPFP Redrafting Workshop served as an effective platform for advancing the development of the PDPFP of La Union. The activity provided valuable opportunities for collaboration, knowledge exchange, and hands-on application of land use and ecosystem service modeling tools. While the workshop was highly productive, the allocated time was not sufficient to fully accomplish all target outputs. Allowing additional time for each component in future sessions would facilitate more in-depth discussions, feedback sharing, and refinement of technical outputs—particularly in the generation of projected land use models and InVEST model analyses.

7. Appendices

SCANNED COPIES OF ATTENDANCE SHEETS

HRM-021-1

ATTENDANCE SHEET

Activity: **Land Use Modeling and PDPFP Drafting**
Date. : **October 15, 2025**

NO	NAME	SEX		OFFICE/ AGENCY	CONTACT NUMBER	SIGNATURE
		M	F			
1	L.Y. YAÑEZ	/		HDTC	09455886900	
2	ROSHELLE A. MAMARIL		/	GPPDC		
3	DAVID RABEDAS	/		OPPDC		
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6	JULIE ANN ARCIAGA		/	OPPDC	09294771609	
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9	Merven Medrano	✓		OPPDC		
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12	Yaren Corten	/		OPPDC		
13	Rolando Faminiagao	/		OPPDC		
14	Pocholo Jairus del Rosario	/		UPLB		
15	Rex Cruz	/		UPLB		
16	John MARK L. ANZIA	/		UPLB		
17	Marind B. Andal		/	UPLB		
18	RIDA CAMANDAHC		/	UPLB		
19	RANDY GARCIA	/		UPLB		
20	JAAPNIE C. OBLIGACION		/	GPPDC		
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Certified Correct:

ROSHELLE A. MAMARIL, EnP
Planning Officer II

HRM-021-1

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Date : **October 16, 2025**

NO	NAME	SEX M	SEX F	OFFICE/ AGENCY	CONTACT NUMBER	SIGNATURE
1	ROSHELLE A. MAMARIL		✓	OPPDC		[signature]
2	David Rabelas	✓		OPPDC		[signature]
3	Kathrina Manipon		✓	OPPDC		[signature]
4	JULIE ANN ARCIAGA		✓	OPPDC	09204771609	[signature]
5	Glo Ann Miranda		✓	OPPDC		[signature]
6	Mariel Faye M. Mina		✓	OPPDC		[signature]
7	Merven Medrano	✓		OPPDC		[signature]
8	JOSEPH GARCIA	✓		OPPDC		[signature]
9	Warren Cortez	✓		OPPDC		[signature]
10	ROLAND FAMINIALAGAO	✓		OPPDC		[signature]
11	ERNESTO CALLAPTA	✓		OPPDC		[signature]
12	Rochol Jaime del Rosario	✓		UPLB		[signature]
13	Rex Cruz	✓		UPLB		[signature]
14	JOHN MARK L. ANZIA	✓		UPLB		[signature]
15	Marinel Andal		✓	UPLB		[signature]
16	VIVA Q. CANADANC		✓	UPLB		[signature]
17	RANDY GARCIA		✓	UPLB		[signature]
18	LEANNIE C. OBLIGACION		✓	OPPDC		[signature]
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ROSHELLE A. MAMARIL, EnP
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HRM-021-1

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7	Merven Medrano	/		OPPDC		[signature]
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NO	NAME	SEX		OFFICE/ AGENCY	CONTACT NUMBER	SIGNATURE
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16	Pide Q Caranda		✓	UPLB		
17	LAURENCE V. YASAY	✓		HOR		
18	RANDY GARCIA	✓		UPLB		
19	JANNIE C. OBLIGACION		✓	OPPDC		
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