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Biodiversity and Ecosystem Service Studies in the Philippines: Linking Valuation to Innovative Financing of the Country's Protected Areas

Protected Areas in the Philippines

The country has 526 identified protected areas, 240 of which are managed by the Department of Environment and Natural Resources (DENR), while the rest are under different types of authority and management. The DENR-managed protected areas, covering approximately 7.15 million hectares, include 56 protected landscapes and seascapes, 28 natural parks, 9 wildlife sanctuaries, 7 resource reserves, 4 natural biotic areas, 4 natural monuments, and the rest are other categories as established by law, conventions, or international agreements. Approximately 4.9 million are terrestrial, and the rest are combined marine and terrestrial areas. About 26 per cent of the country's remaining forests are found within these areas. The country has three protected areas categorised as UNESCO World Heritage Sites, while nine are ASEAN Heritage Parks. These areas are constantly under threat from human-induced habitat and land degradation, overharvesting of natural resources, aggravated further by rapidly growing population.

Findings from the review of existing research

A total of 768 publications in the Philippines were identified and reviewed from research projects and programme reports on biodiversity and ecosystem services, valuation, trade-offs, financing mechanism, and impacts of climate change. Of these publications:

- 79 per cent were published in journals
- 59 per cent were related to terrestrial areas
- 39 per cent were published or reported in 2014–2019
- 13 per cent were reports of programmes/ projects or consultancy reports
- Only 44 per cent specified research conducted inside protected areas
- 38 per cent were conducted in Region 4A and Region 4B; with these regions having 176 and 79 publications, respectively
- Authorship is spread across varied institutions nationwide, as well as foreign authors collaborating with local state colleges and universities

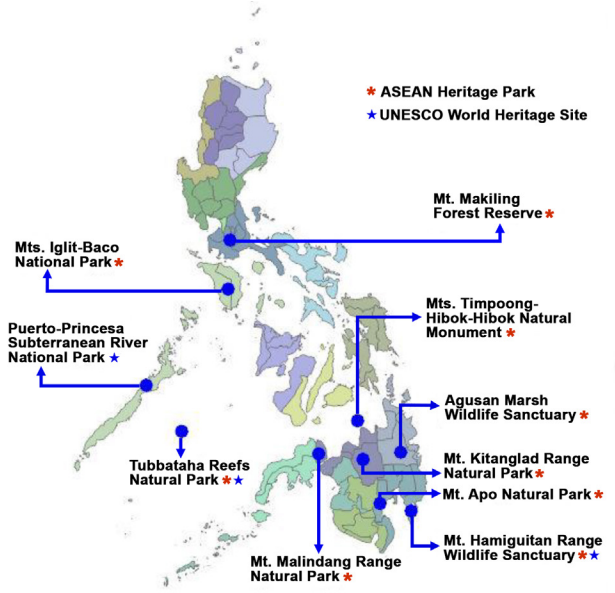

Figure 1: ASEAN and World Heritage sites in the Philippines

Discussion of findings

About 35 per cent, or 272 of 768 publications reported on biodiversity assessments, of which 96 or 13 per cent were conducted in protected areas. These included studies on the condition of biodiversity in the landscape, biodiversity monitoring, spatial assessment, flora and fauna species diversity, dispersion, and use of monitoring tools. Ecosystem assessments included habitat suitability, fragmentation, diversity, pollution, land cover change, resource assessment, restoration, conservation species-suitability, threats, and drivers. Of the 85 publications reporting ecosystem services assessments, 48 were conducted within protected areas.

The review indicated sparse efforts toward the conduct of sustained protected area system-wide biodiversity assessment. Biodiversity assessments at the protected area scale were limited to less than three per cent of even the DENR-managed protected areas. Systematic accounting of biodiversity in these areas is lacking. The review noted that most biodiversity assessments do not provide comprehensive assessments in each protected area, much less establish databases on biodiversity. Faced with finite resources, academic institutions are forced to limit biodiversity assessments to specific flora and fauna.

Only 36 per cent of publications (282) reported Ecosystem Service Assessments of which 85 (11 per cent of all publications) were conducted within protected areas. Moreover, 57 per cent of the studies was on Ecosystem Service Valuations, and 39 (5 per cent) covered trade-offs. Of the 57 publications on valuation of ecosystem services, only 5 per cent were within protected area. Almost half (45 per cent) of the valuation studies focused on provisioning services, with 38 per cent on cultural services and 24 per cent on regulating services. Notably, 31 publications or 4 per cent included economic analysis. Several studies are more than a decade old, some even more than three decades.

Ecosystem services assessments were found to be disposed towards resource use assessment and recreation services. The narrow breadth of ecosystem services assessment indicates limited capacity at the protected area level. Studies on valuation of ecosystem services reveal a similar picture to that for ecosystem services assessment: although available tools and methods have expanded and have become more refined, only a handful of studies undertake reliable valuation of environmental or ecosystem services. In terms of coverage, Tubbataha Reefs National Marine Park (TRNMP) and Mount Kanlaon Natural Park receive the most studies. Valuation studies in other protected areas are focused on provisioning services as well as recreation and tourism. The studies mostly

Figure 1: Pasonanca Natural Park, Zamboanga City, Western Mindanao Region (Source: DENR-9 PAMO – Zamboanga City)

consider a single ecosystem service instead of the ideal system-wide valuation studies. Economic analysis is constrained by limitations and availability of data for non-market services and externalities. Aside from data limitations, conduct of economic analysis requires well-trained implementers, and such capacity is not available in almost all protected areas under DENR management.

Twenty (12) of the 768 reviewed publications (about 2 per cent) reported on financing studies; with 8 of these being within protected areas. Most of these financing studies have been used in developing user fees and other financing mechanisms at the local and national scale, focused mainly on protected areas. The complexity of innovative financing comes with the need for participation and engagement of stakeholders particularly those with the mandate to establish the institutional and legal proceedings. An objective and science-based approach in determining appropriate innovative financing is an important ingredient in the process. Also, a key indicator of success of implementing an innovative financing is the presence of champions and dedicated technical personnel.

Knowledge Gaps and Capacity Building

An online survey from June to October 2019 was conducted for protected area managers (103), researchers (89) of the Ecosystem Research and Development Bureau, faculty and staff from state colleges and universities who attended a training on valuation (60), participants of the national workshop on ASEAN Heritage Parks (37) sponsored by the project *Biodiversity Conservation and Management of Protected Areas in ASEAN* (BCAMP), and participants of the national workshop on BCAMP 2 Biodiversity/Ecosystem Services Assessment (BESA) stocktaking (28). Of the 317 potential respondents, 37 answered the online survey instrument. After a quick follow up, the primary reason provided for non-participation in the survey came down to lack of knowledge on the topics presented. Table 1 summarises the knowledge and skill level of respondents on ecosystem services valuation. The overall knowledge and skill are below "novice" for valuation of ecosystem services. The highest expressed level overall is level 1.7 from those in the national government agencies, mainly on survey of tourism in protected areas. The range of knowledge and skill level of a master's degree holder is between 0 (no knowledge) and 1.6 (novice).

Table 1: Summary of responses of the level of knowledge/skill on ecosystem services valuation.

Highest Education and Agency	No. of Respondents	Measurement and estimation of market prices of provisioning Ecosystem Services	Survey of Tourism in Protected Areas	Monitoring Harvest of Forest and Marine Products	Non-market valuation of regulating services	Estimation of avoided damage	Estimation of ecosystem assets
Bachelor's Degree	**16**	**0.8**	**1.3**	**0.8**	**0.9**	**0.8**	**1.0**
Academe	2	1.0	1.0	1.0	1.0	1.0	1.0
National Government Agency	13	0.8	1.5	0.8	0.9	0.8	1.0
Private Sector and NGO	1	0.0	0.0	0.0	0.0	0.0	1.0
Master's Degree	**17**	**0.6**	**1.6**	**0.8**	**0.8**	**0.8**	**0.7**
Academe	2	0.5	1.5	0.5	0.5	1.0	0.5
National Government Agency	14	0.7	1.7	0.9	0.9	0.8	0.8
Private Sector and NGO	1	0.0	0.0	0.0	0.0	0.0	0.0
Doctorate Degree	**4**	**1.0**	**1.0**	**1.0**	**0.8**	**1.0**	**1.0**
Academe	3	1.0	1.0	1.0	1.0	1.3	1.0
National Government Agency	1	1.0	1.0	1.0	0.0	0.0	1.0
Grand Total	**37**	**0.8**	**1.4**	**0.8**	**0.8**	**0.8**	**0.9**

Level of skill/knowledge: 0 = No knowledge; 1 = Novice; 2 = Practitioner/User of knowledge; 3 = Expert; 4 = Mentor/Innovator

Apart from the low participation in the survey, respondents were also found to have limited knowledge, particularly on ecosystem services valuation, economic analysis, and innovative financing mechanisms. These low ratings were clearly indicated in their response to the training needs assessment. A larger percentage of respondents indicated that valuation and financing are the critical training needs.

Recommendations

The specific recommendations that can be derived from the observations and discussion above are as follows:

1) There needs to be a programme of investment to generate strategic information specially for systematic biodiversity assessment of the DENR-managed protected areas.
2) In protected areas, in addition to provisioning services, equal attention must be given to assessing regulating services, such as regulating pollution, sedimentation, soil erosion, and flood flows. Those that have stakes in ecosystem assessment, especially institutions depending on ecosystem services from watersheds, must invest in these assessments.
3) The recent development of tools for ecosystem services accounting should now provide the basis for protected area managers to start accounting for these various ecosystem services. Capacity building in the use of these tools must be a collaborative undertaking with the participation of local academic institutions leading the process. Academic institutions must likewise invest in resources to train their constituents and establish information systems for protected areas within their area of influence.
4) The protected area management board should maximise the efforts of its technical committee to regularly conduct protected area-wide assessment and determination of gaps in relation to the Biodiversity/Ecosystem Services Assessment and Economic Analysis for Management, Policy and Innovative Financing Applications. Further, valuation, economic analysis and financing studies' results must find their way into discussion within the Protected Area Management Board's technical and decision-making levels. The relevance of these studies hinges on the demand by such entities.

A national consultation workshop was held on 6 September 2019 to gather inputs from stakeholders, both at the site and national levels. The outcomes of the national consultation were presented during the *Regional Training and Orientation Workshop on Biodiversity/Economic Analysis for Management, Policy and Innovative Financing Applications*, which was held from 16 to 18 September 2019 in Hanoi, Viet Nam.

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