Policy Briefing

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Summary

This briefing contains findings of a preliminary ecosystem account for Southern Palawan region. They include physical and monetary ecosystem services account as well as ecosystem condition account for coastal ecosystems, focusing on the Pulot watershed and the adjacent coastal zone. In addition, a land account was developed for Southern Palawan.

Background

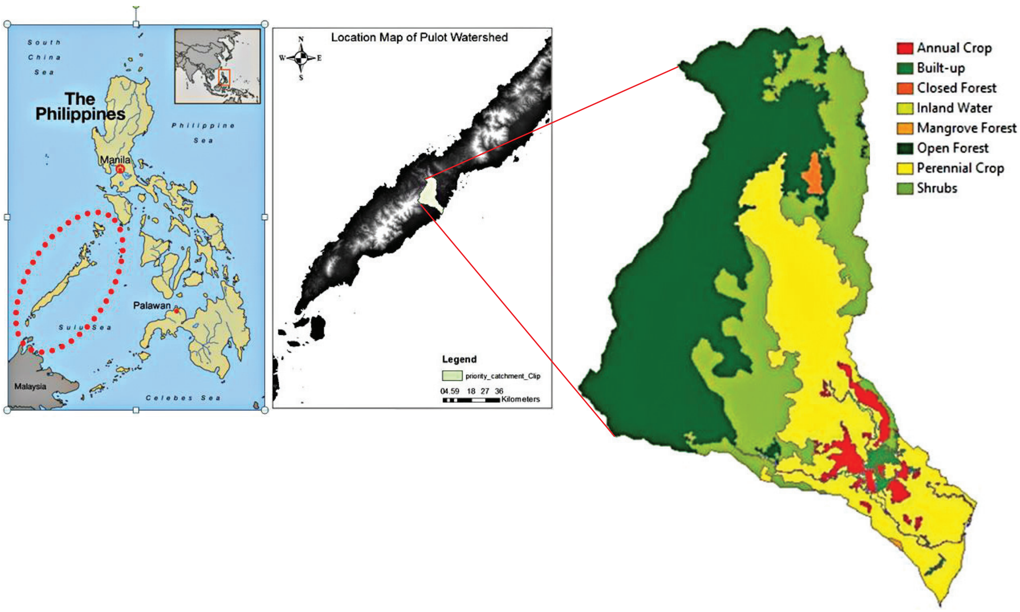
The development of the accounts is a multi-agency task involving key national and local government units, supported by national and international experts. The national technical working group (TWG) is co-chaired by the Department of Environment and Natural Resources (DENR). The TWG in Southern Palawan is co-chaired by the Palawan Council for Sustainable Development (PCSD) and the DENR Provincial Environment and Natural Resources Office.

Ecosystem Accounts for Southern Palawan

There are numerous competing demands on resources in biodiversity-rich Southern Palawan—the area is home to a number of indigenous tribes and three large protected areas; there is also great potential for ecotourism, agriculture and mining. The accounts include the ecosystem condition, capacity, and services flow indicators for land/soil, fisheries, and forestry resources. These are some key findings:

- The deforestation rate in Palawan seems to have reduced and potentially reversed in the period 2010–14.
- There have been dramatic declines in coral reef quality in the period 2001–10.
- Mangrove ecosystems also showed a strong decline, whereas there was no clear negative trend for seagrass communities.
- There has been a strong expansion of oil palm plantations in the Pulot watershed in the past decade, facilitated by the establishment of a palm oil mill.
- The forests of Southern Palawan are an important carbon sink and are important to maintain water supply to irrigated paddy fields.

Figure 1. Site of the Phil-WAVES Project in Southern Palawan: Pulot Watershed, Sofronio Española; Inset Maps: Southern Palawan and the Philippines



The Southern Palawan ecosystem account has been tested at different scales: (i) the Southern Palawan region; (ii) the Pulot watershed; and (iii) the coastal zone of Sofronio Española municipality (figure 1).

In the case study watershed area (Pulot watershed, in Sofronio Espanola in Southern Palawan), three distinct zones can be distinguished: uplands, lowlands, and coastal. For each zone, a number of key ecosystem condition indicators and services have been selected. The ecosystem accounts include four core accounts as well as a number of component accounts (table 1).

Land and Ecosystem Cover Account: Deforestation Reversed in Period 2010–14

The Phil-WAVES TWG for Southern Palawan together with the national mapping agency NAMRIA has mapped land cover in 2003, 2010, and 2014, and created land cover change matrices for these three years. Comparison of land cover classes (table 2) shows that there has been a marked increase in perennial crop. In addition, after 2007 there has been a rapid increase in oil palm plantations, in particular in the Pulot watershed (but not in most other areas of Southern Palawan). Closed forest decreased strongly in the period 2003–10, but it recovered somewhat between 2010 and 2014. In particular, closed forest cover increased by about 5,181 hectares in the period 2010–14, but the total amount that year still represents a substantial loss compared to the closed forest cover in 2003. The recent increase may be related to the effort of the Palawan Council for Sustainable Development, the local government units, and the DENR to effectively enforce Executive Order 23—that is, the total log ban for the entire country—and to create anti-illegal logging task forces.

The open/barren land cover class shows significant changes in a short period of time. However, it is only a small class, in absolute terms, and this class is sensitive to the timing of the remote-sensing images; for instance, annual crop land may be classified as open/barren if the image is taken just before planting. Likewise, the inland water category appears to vary considerably, but this may be related to using remote-sensing images from a period when paddy fields are under water (when some of the paddy fields may be recorded as open water) versus when they are dry.

Land and ecosystem accounts may be able to address a variety of policy questions, depending on the spatial scale of the "ecosystem" that is the subject of the account. Fine spatial scale accounts for specific forest/land cover areas could be used to assess and compare the physical and economic outcomes of different development and conservation strategies for a particular site or region. National accounts would be useful to track rates of ecosystem loss in order to track progress toward national conservation targets or international commitments, or to develop indicators of sustainability or depletion and to inform the design and development of payment for ecosystem services (PES) schemes. At even larger spatial scales, SEEA land accounts might be used to count the global cost of climate change and associated carbon stock, and could serve as an argument for national

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Account	Description	Application in Southern Palawan
Land and ecosystem cover account	Contains information on land cover, land use, and land titles	A land cover account was prepared for Southern Palawan for 2003, 2010, and 2014
Ecosystem condition Account	Measures the physical condition of ecosystems (and trends in condition)	Ecosystem Condition Accounts were created for the coastal ecosystems of one municipality, and terrestrial ecosystems for a watershed in the same municipality
Ecosystem services supply account	Measures flows of ecosystem services, per land cover/ecosystem unit	Ecosystem Services Supply accounts are created for three ecosystem services (oil palm production, paddy production, coconut production), and are almost completed for water regulation
Ecosystem services use account	Measures how ecosystem services are used by beneficiaries	This has not yet been done in Southern Palawan
Ecosystem asset (capacity) account	Measures the ability of ecosystems to generate ecosystem services under current ecosystem conditions and uses at the maximum level that does not lead to degradation of the ecosystem	A preliminary Ecosystem Asset Account has been prepared for crop production (rice, coconut, oil palm)
Biodiversity account	Contains information on biodiversity, in particular on aspects such as threatened species, habitat, iconic species, etc.	This was partly done; to be elaborated

Note: Based on UNSD 2014a.

Table 1. Ecosystem Accounts

Land cover	Land cover 2003 (ha)	Land cover 2010 (ha)	Land cover 2014 (ha)
Built-up	709	6,966	7,425
Annual crop	52,869	47,950	50,340
Perennial crop	46,130	113,735	115,845
Closed forest	130,121	28,025	33,206
Open forest, (wooded) grasslands, shrubs	305,086	334,713	322,817
Open/barren	1,383	961	1,761
Mangrove forest	16,297	17,020	17,054
Fishpond	720	1,440	407
Inland water	193	2,696	3,653
Grand total	**553,508**	**553,508**	**553,508**

Table 2. Land Cover Change in Southern Palawan

and global commitment to reducing greenhouse gas emissions.

Terrestrial Condition Account: Hydrology Changes Impacting Lowland Production and Coastal Ecosystems

Terrestrial ecosystem condition is described in this case study in terms of land cover and vegetation type and in terms of key hydrological parameters and landscape processes. The terrestrial condition account variables selected were (i) elevation, (ii) precipitation, (iii) evapotranspiration, (iv) slope, (v) hazards, and (vi) soil loss. These are important inputs for modeling hydrological services, including "soil erosion control" or sediment retention services. These indicators were selected because, in addition to land cover, they are important for understanding the services provided by the uplands and provide insights relevant for ecosystem management, in particular land use change and aspects such as encroachment in protected areas and forest reserves. The understanding of terrestrial ecosystem condition is now fairly complete for the Pulot watershed, and all if not most of this information would also be available if the condition account were scaled up to, say, the whole of Palawan. However, the analysis of ecosystem condition indicators conducted for this study shows that information is missing on river and coastal water quality in particular sediment and pollutant indicators. In addition, the river flow measurement stations in Pulot River are no longer operational, and this will increasingly be a constraint for modeling and monitoring the impacts of land use change on water availability and effects on coastal ecosystems—which is certainly a management issue, if not an issue on budget allocation policy.

Coastal Condition Account: Declining Quality of Coral Reefs, Seagrass Fields, and Mangrove Forests

The coastal resources included in the account are coral reefs, seagrass beds, and mangroves forests, which represent the three key coastal ecosystems supporting the fishery production services. Given the complexity and high spatial variability of the three types of coastal ecosystems included in the accounts, a relatively fine spatial grain is needed to understand the condition of these ecosystems. Therefore, this experimental ecosystem account focused on one municipality: Sofronio Española. The spatial extent of the three coastal ecosystems condition characterization was produced from images generated and interpreted by the European Space Agency (ESA) from unsupervised classification (figure 2).

The spatial accounting of the coastal ecosystem of the municipality of Española estimates a total area of 28,813 hectares (figure 2 and table 3). The largest part is composed of 10,125 hectares of coastal/marine waters, measured from the seaward limits administratively defined by the Philippine government as 15 kilometers offshore from the highest tide (based on Republic Act 8550). The other land/water cover ecosystem units, comprising the highest to lowest areas, include seagrass beds/macroalgae, sand or bare substrate, coral reefs, and mangrove forest.

The condition account for mangrove, seagrass, and coral reefs was developed primarily on data from the Coastal Resource Monitoring Report 2011 for the Municipality of Sofronio

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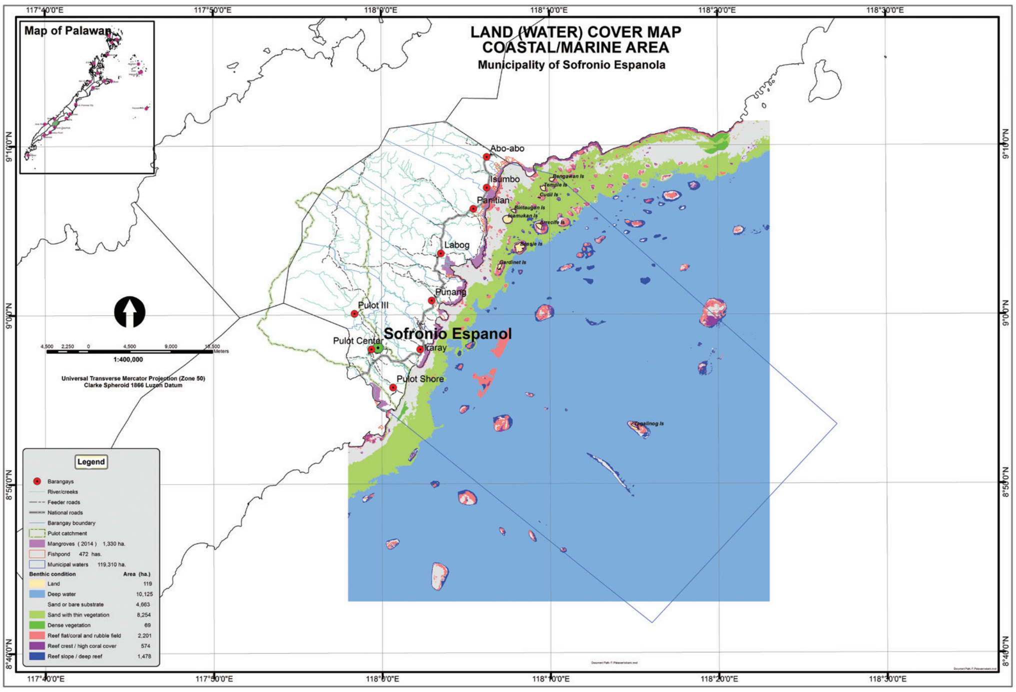


Figure 2. Coastal/Marine Ecosystem Extent Map, Sofronio Española, Southern Palawan, 2014

Source: European Space Agency, August 2014.

Española (PCSD 2011). The account shows the general decline of the three ecosystems in terms of selected key indicators.

- *Mangrove condition:* Province-wide, mangroves have expanded, but certain municipalities (including Sofronio Española) manifested reduction.

The municipalities with a noticeable increase (greater than 1,000 hectares) in mangrove forests since 1998 are Bataraza, Culion, Roxas, and Taytay. Municipalities that manifested reduction in mangrove forests include Dumaran, Sofronio Española, Quezon, San Vicente, and Jose Rizal. Natural regeneration of

Table 3. Coastal/Marine Land/Water Account, Sofronio Española, Palawan, August 2014

	Area (ha)	Percent of Total
Total Coastal Ecosystem Accounting Unit	28,813	100
Coastal/Marine deep waters	10,125	35.14
Land/Island	119	0.41
Sand or Bare Substrate	4,663	16.18
Seagrass beds and Macroalgae	8,323	28.89
Thin vegetation	8,254	28.65
Dense vegetation	69	0.24
Coral Reefs	4,253	14.76
Reef flat/coral and rubble field	2,201	7.64
Reef crest/high coral cover	574	1.99
Reef slope/deep reef	1,478	5.13
Mangrove Forest	1,330	4.62

Source: European Space Agency, August 2014.

certain mangrove forests is believed to compensate for the loss due to fishpond conversion and to account for the slight expansion of mangrove areas.

In Sofronio Española, the two period data showed a net decrease in the mangrove forest extent of 645.03 hectares, with largest deforestation recorded of 723.50 hectares in the area comprising Isumbo, Pinataray, Pinataray River, Labog 1, and Labog 2/Ingiaran Point. This reduction in area also has an implication on the decrease in the overall volume of trees, from 206,300 metric tons to 69,310 metric tons. There was also a reduction in the number of seedlings/saplings, from 1,114.67 individuals/hectare to 730.4 individuals/hectare. Species composition is relatively stable, with a decrease recorded for Pinataray River and Labog Island.

- *Coral reef condition:* The live coral cover is rapidly declining.

  The Philippines has an estimated 27,000 square kilometers of coral reefs, with over 70 percent in poor or fair quality and quantity of coral cover. Of the remaining cover, only 5 percent are in excellent condition (Gomez et al. 1994). Coral reefs contribute from 8–20 percent to about 70 percent for some island reefs to the total fishery production (Alino et. al. 2004). The coral reefs in Palawan are, however, under high pressure and declining rapidly as a function of overfishing, physical destruction, and pollution. In Sofronio Española, overall coral condition declined rapidly in the past 10 years. The average percent of live coral declined from 50 percent to 35 percent, a net reduction of 15 percent. Of significance is the absence of survey sites under Category 5-Excellent coral cover condition in 2010, the decrease from 8 sites to 1 under Category 4-Very Good, the presence of sites under Category 1-Poor, and the increase in sites classified under Category 2-Fair from 4 to 8. Hard and soft coral were not separately analyzed in the 2001 survey.

- *Seagrass beds condition:* The species diversity, density, and extent are declining.

  The 2010 and 2001 comparison of ecosystem condition for seagrass in six monitoring sites showed two additional species were recorded in 2011, increasing the number of species from 9 to 10 (figures 3–5). This is approximately 53 percent of the seagrass species recorded for the country. However, one species recorded in 2001 survey was not recorded in 2011. For the other ecosystem condition indicators: species diversity, significant decrease was recorded at one site, Sand Bar (figure 3); species abundance, five out of six sites with two period data recorded a decrease in density (shoots/square meter) (figure 3). The former is also supported by the general decline in seagrass cover as a measure of species abundance (figure 4).

The decline of the extent and condition of the coastal/marine ecosystem reflects the management of these ecosystems in the municipality. It is also an indication of how activities in the adjacent lowland and upland ecosystems are being managed. While policies exist to ensure a sustainably managed coastal/marine ecosystem, the translation of these policies into programs and projects with corresponding fiscal allocation remains a challenge.

Figure 3. Ecosystem Condition, Seagrass Species Diversity (Shannon Index) per Monitoring Sites, Sofronio Española, Palawan, 2001 and 2010

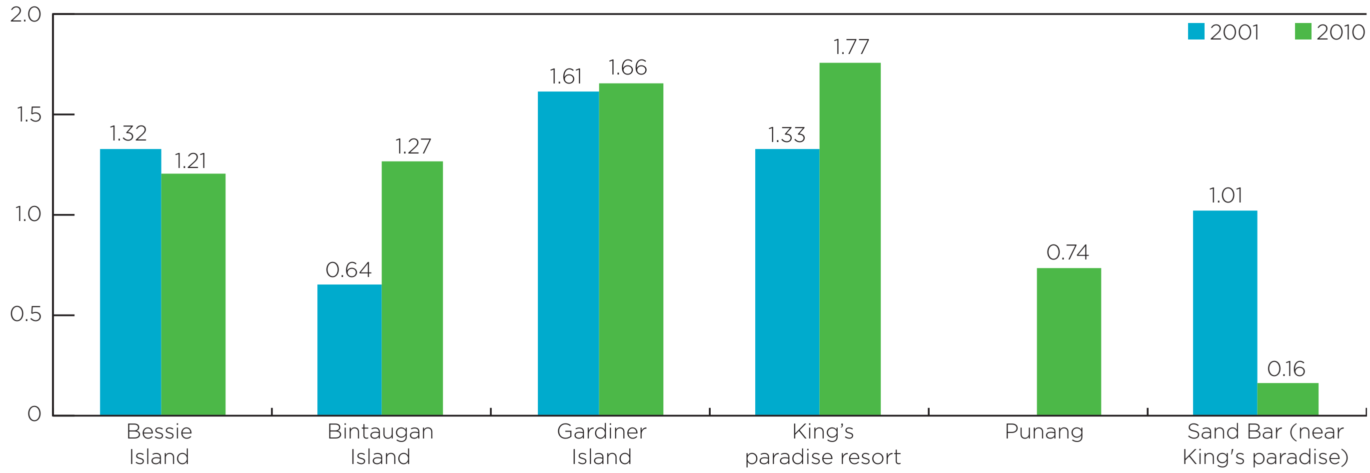


Figure 4. Ecosystem Condition, Seagrass Species Abundance (shoots/square meter) per Monitoring Sites, Sofronio Española, Palawan, 2001 and 2011

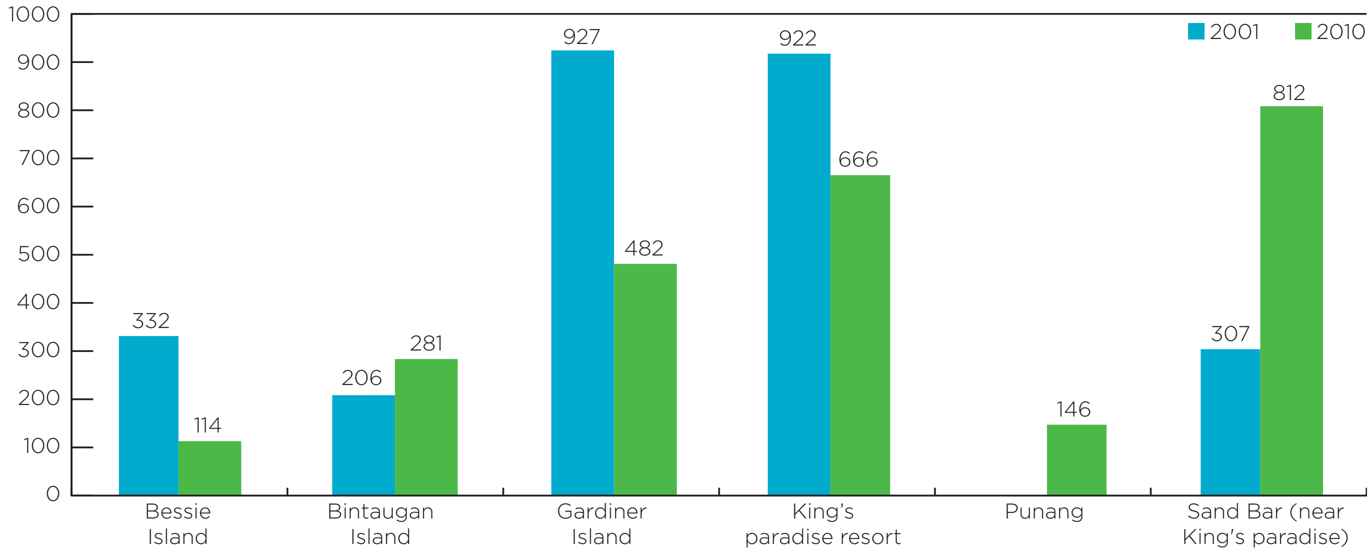
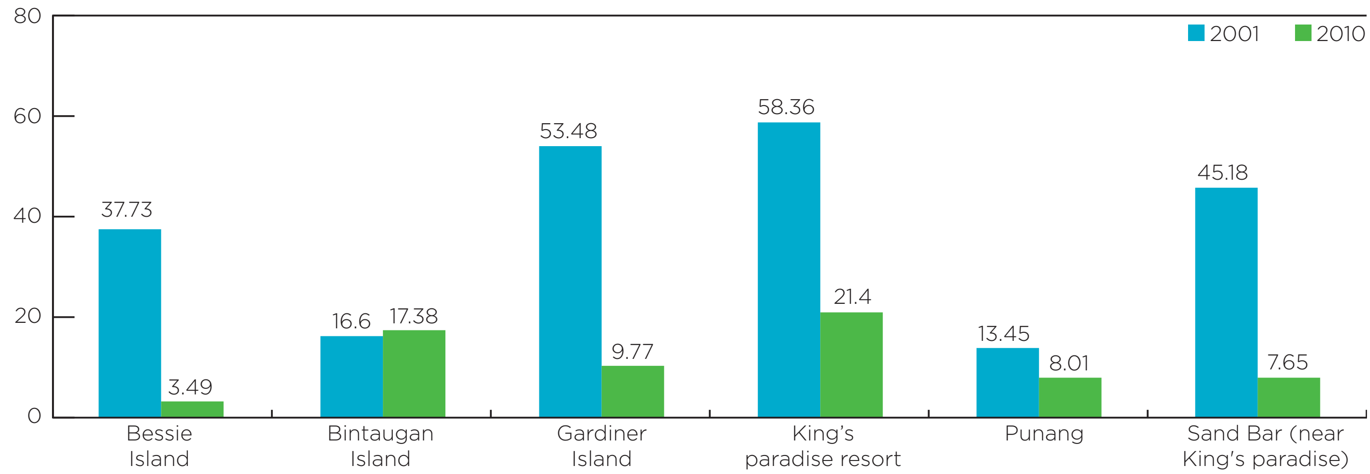


Figure 5. Ecosystem Condition, Percent Seagrass Cover, Municipality of Sofronio Española, Palawan, 2001 and 2010



Ecosystem Service Supply Account

The ecosystem services supply account records the flow of ecosystem services in both physical and monetary terms. For this account, the services carbon sequestration (uplands), water regulation (uplands), palm oil production (lowlands), rice production (lowlands), and coconut production (lowlands) were selected. The selection was made on the basis of the relative importance of these services for the local economy, and the availability of data.

- Declining carbon stock between 2003 and 2010, but reversed for the period 2010–14

  The Phil-WAVES Palawan TWG has prepared the biomass and carbon account for the years 2003, 2010, and 2014 to provide physical and monetary accounts of carbon in Southern Palawan and to link policy issues or concerns affecting the forestry sector. This includes the breakdown of the carbon sequestered and released in each key land cover, namely closed, open, and mangrove forests. The forest biomass takes into account the stem, above-ground (AGB), below-ground (BGB), and tree biomass. The total opening carbon stock in 2003 is 12.4 million tC (tonne carbon); stock in 2010 is 9.3 million tC; and the closing carbon stock in 2014 is about 10 million tC. Between 2003 and 2010, closed, open, and mangrove forests have declining carbon contents that range from an average stock of 54 tC per hectare to 41 tC per hectare. However, in 2014, it increased to 43 tC per hectare. The decrease in the first period can be attributed to the decrease in the area (and volume) of closed forest and the wide-range conversion of closed forest to other land cover. The increase of stock in the period 2010–14 is also due to the increase of area (and timber volume) from 2010 to 2014 in these forests.

  In terms of carbon annually sequestered in closed forest, the values are as follows: 672,000 tC in 2003; 145,000 tC in 2010; and 172,000 tC in 2014. For open forests, the values are 777,000 tC in 2003; 1.65 million tC in 2010, and 1.63 million tC in 2014. In line with expectations, closed forests have the highest carbon storage whereas most open forests have a higher annual sequestration of carbon. In general, 2003 had the lowest carbon sequestration, and sequestration gradually increased again between 2010 and 2014.

  In translating the physical account on carbon into monetary terms, the net present values (NPVs) (in pesos) for closed and open forests in 2003 and 2010 were computed. The present values generated for carbon from the net price method were then used to yield the NPVs through the asset value approach.

  Although there is slight increase in carbon stock in 2014, the results show that forests as natural capital have depreciated during the period 2003 to 2010, which means that over the longer term the forest resources in Southern Palawan have not been sustainably managed. This is indicative of some challenges in implementating forest policies, particularly the ban on commercial logging in Palawan, and dealing with illegal logging as well as the regulation on the possession, ownership, or use of power chain saws within the province of Palawan (DENR Administrative Order 49, dated November 6, 1992). This shows that

The decline of the extent and condition of the coastal/marine ecosystem reflects the management of these ecosystems in the municipality. It is also an indication of how activities in the adjacent lowland and upland ecosystems are being managed.

the present efforts of the government in implementing the National Greening Program are timely, relevant, and need continuous support. The continuing pressure on the forests shows the rationale of a clear, appropriate, and well-funded forest protection and law enforcement program, including strict implementation of forest policies such as EO 23, and policies related to community-based forest management and integrated forest management agreement, among others.

Ecosystem accounting is useful in identifying areas subject to particularly rapid land use change (such as the Pulot watershed), and areas where illegal logging is having an impact on overall forest cover. Such information should be regularly updated (at least every two years) in order to support planning of forest monitoring activities. Frontline forestry services need strengthening and equipping with the necessary logistics to undertake regular monitoring and evaluation on the ground, in particular since the remote-sensing imagery cannot differentiate between different types of closed and open forest.

In terms of regulating services, the Forest Management Bureau should explore the possibility of valuing not only carbon sequestration but also water yield and soil erosion protection in watersheds in partnership with the Ecosystems Research and Development Bureau. With the realization of the effects and impacts of climate change, people want to balance the ecological and socioeconomic benefits derived from the forest ecosystem. In this connection, efforts should also be made to protect forestlands per se against encroachment to allow natural regeneration of other wooded lands.

- *Lowland provisioning services accounts:* Unregulated land conversion and expanding oil palm plantations

The Palawan TWG has prepared coconut, oil palm, and rice production accounts (Table 4). Given the importance of these crops for Southern Palawan, and the increasing trends in plantation crops, these crops were selected for the ecosystem account. Crop production was mapped, and yields were retrieved from farm interviews to obtain total production of the crops in the Pulot watershed.

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Table 4. Indicators for Selected Ecosystem Assets and Provisioning Services

Type of ES	Ecosystem assets	Indicator	Ecosystem services	Indicator	Flow indicator	Capacity indicator
Provisioning Services	Rice paddies	Hectare	Provisioning of rice	Palay	Tons per hectare per year	Tons per hectare per year
	Coconut plantations	Hectare	Provisioning of coconuts	Copra	Tons per hectare per year	Tons per hectare per year
	Oil palm plantations	Hectare	Provisioning of oil palm fruits	Fresh fruit bunch (FFB)	Tons per hectare per year	Tons per hectare per year

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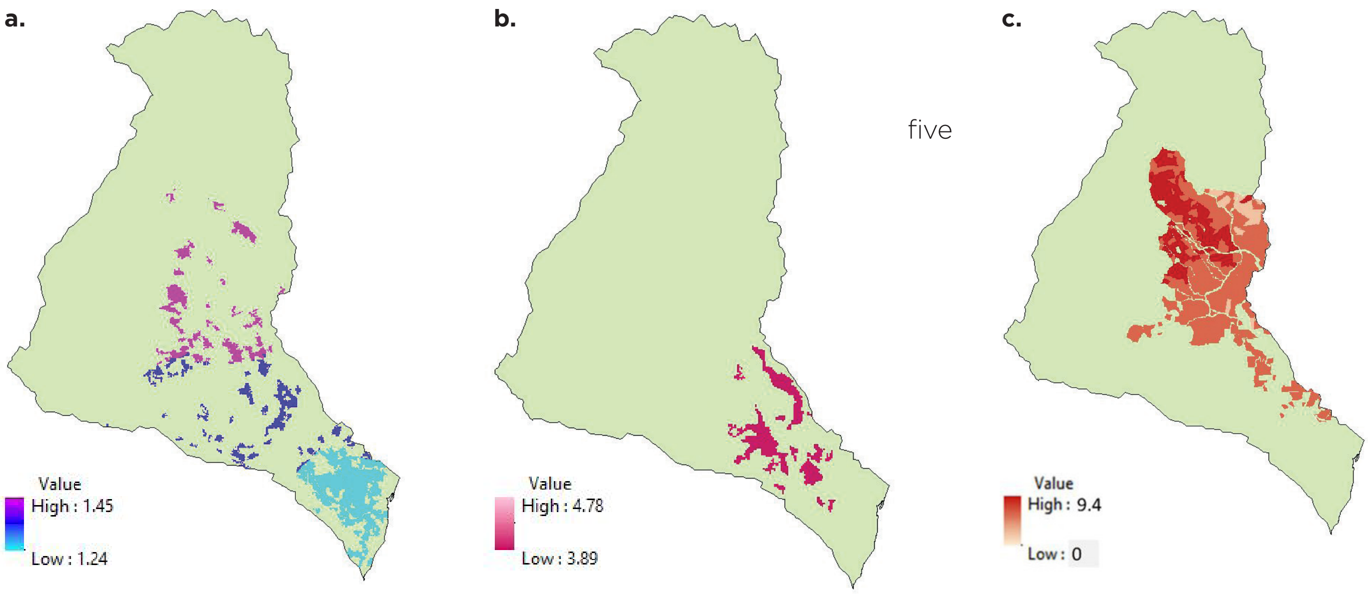
Coconut production. The minimum copra yield is 1.27 tons ha^{-1} yr^{-1} while the maximum is 1.45 tons ha^{-1} yr^{-1}. Figure 6 presents the coconut production map that attributes the average yield of copra production to every pixel of the coconut land cover using a Look-Up Table approach, where three groups of production levels were differentiated based on the results of the survey.

Paddy rice production. Rice is the staple food in the area and its production covers about 570 hectares of land in the Pulot watershed. For paddy, the minimum yield encountered in the survey is 3.89 tons ha^{-1} yr^{-1} and the maximum yield is 4.78 tons ha^{-1} yr^{-1}. Figure 6 shows the distribution of yield for paddy rice production based on the annual crop land-cover class using a Look-Up Table approach.

Palm oil production. The conversion of land to oil palm plantations started in 2007 and is expanding within the Pulot watershed. Farmers have enlisted their lands to Cooperatives to farm oil palms. Currently the area covered by palm plantations is 3,324 hectares. The maximum fresh fruit bunch (FBB) harvest is 9.4 tons ha^{-1} yr^{-1}, which are the yields produced by the oldest oil palm plantations that were planted in 2007. Newly planted oil palm is not yet productive and does not yield any oil palm yet (plants start producing fruits after three to five

Figure 6. Crop Production in the Pulot Watershed



Coconut production (copra) in tons ha^{-1}yr^{-1}

Paddy rice production (palay) in tons ha^{-1}yr^{-1}

Palm oil production in tons ha^{1}yr^{-1} (FBB)

Table 5. Provisioning Services Account for Rice, Coconut, and Oil Palm, 2013

Land cover units	Area (ha)	Average yield (ton/ha)	Yield in Pulot watershed ton/year (ton)
Rice paddy	569	3.9	2,230
Coconut	1,454	1.3	1,890
Oil palm*	3,324	3.0	9,783

* Including productive and immature oil palm plantations.

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Table 6. Monetary Value of Provisioning Services, 2013

Land cover units	Area (ha)	Average yield (ton/ha)	Farm-gate price (pesos/kg)	Total production costs (pesos/kg)	Resource rent (pesos/ha/year)	Resource rent in watershed (million pesos/year)
Rice paddy	569	3.9	14	12	7,800	4.4
Coconut	1,454	1.3	11	8.3	3,575	5.2
Oil palm*	3,324	3.0				

* Including productive and immature oil palm plantations.

years, depending on plantation management and variety used).

For all three crops, the resource rent generated by the crop is calculated, except for palm oil where data on production costs are missing (table 6). For rice, the production costs are retrieved from farm interviews. For coconut, these are based on the Philippine Coconut Authority annual costs of production in 2013.

The case of the lowland provisioning services confirms the importance of having access to accurate and detailed land cover data as well as data on crop production and production costs. Selecting administrative rather than physical boundaries is helpful in particular for provisioning services. The study showed the rapid expansion of oil palm plantations in the uplands of the Pulot watershed, facilitated by the presence of an oil palm mill in the area (fresh oil palm fruit needs to be processed within 24 hours to maintain quality). It also illustrates a strong lack of data on where new plantations are established. In addition, the accounts show that government regulations are not adhered to; land conversion also takes place on slopes that are reserved for forest cover, and in areas designated as protected areas. This is facilitated by the cadastre, which titles land without in all cases sufficient consideration of applicable regulations restricting land conversion.

Ecosystem Asset Account for Crop Production

The concept of asset account is still under development, and the Southern Palawan ecosystem account provided an opportunity to test some of the potential options for designing an account to reflect ecosystems' capacity to generate ecosystem services. Note that it is also still under discussion if this should be called an asset account or a capacity account, as part of the ecosystem accounting framework.

In the case of Southern Palawan, capacity is analyzed for crop production. For provisioning services, the capacity of an ecosystem to generate a provisioning service would normally depend upon the (re)growth of the service involved (for example, timber or fish), with (re)growth in itself usually a function of, among others, stock (in relation to carrying capacity) and ecosystem condition.

Table 7 shows the result of compiling data for the asset account. The asset account considers two years, 2010 and 2014. As explained above, capacity to produce the crop is based

Table 7. Biophysical Asset Account for Rice, Coconut, and Oil Palm Ecosystem, 2010 and 2014, Pulot Watershed

Account Type	Land Cover		
	Rice	Coconut	Oil palm
Opening (2010)			
Area (in hectares)	562	1,454	1,012
Capacity to grow crop (ton/ year)	2,192	1,890	3,036
Addition to stock			
Regeneration, natural (net of normal natural losses)			
Regeneration, through human activity	4		2,312
Reclassification			
Total addition to stocks	4		2,312
Reduction in stock			
Reductions due to ongoing human activity		0.6	
Catastrophic losses due to human activity			
Catastrophic losses due to natural events			
Reclassifications			
Total reductions in stocks		0.6	
Revaluations			
Closing stocks (2014)**			
Area	566	1,454	3,324
Capacity to grow crop (ton/ year)	2,207	1,890	9,972

on hectares, current management, and the resulting harvests.

Policy Relevance of the Findings: Informing Policy Implementation and Decision Making

The ecosystem accounts can and are intended to inform policy making with information on changes in land cover, ecosystem condition, ecosystem use, ecosystem services supply, and ecosystem's capacity to generate ecosystem services. Because of the spatial approach, detailed and location-specific insights can be provided.

The accounts can support policy making in different ways. First, they can inform policy makers of the status, uses, and monetary values of ecosystems at the time a policy is designed. For instance, the account can indicate sensitive areas or areas particularly important for supplying ecosystem services. Second, they can alert policy makers to trends in ecosystems and the services they supply. In some cases, this may already have affected incomes of the people depending upon these ecosystems; in other cases, this information can be used to forecast potential future impacts, for instance, in case the underlying ecosystem condition and capacity to generate services is deteriorating but not yet the actual supply of services (for example, because of increases in harvest efforts). Third, the accounts allow monitoring trends in ecosystems over time, thereby providing information on the effectiveness of specific policies.

A particular added value of the accounts is that they bring together information that is usually dispersed in different government units and line agencies, leading to easier access to an integrated data set and new insights resulting from bringing together these data. The accounts also make clear what data are missing in order to obtain a good understanding of environmental change and its effects on people's livelihoods.

The pilot ecosystem account completed by the TWG with support from national and international experts demonstrates a number of points:

i. Ecosystem accounting fills an important information gap in provincial- and municipal-level ecosystem management.

ii. The pilot demonstrated that information required for analyzing many ecosystems was available in the various line agencies; data availability was much higher than anticipated.

iii. The accounts demonstrated that it was time-consuming to compile the accounts, requiring the effort of a number of staff from the PCSD and DENR, as well as substantial support from national and international experts. However, with increasing experience further accounts can be produced in a more cost-effective manner.

iv. It is clear that an important part of the value of the accounts is in showing trends in ecosystem condition, asset, and service flows. This means that the accounts should be regularly updated.

v. The pilot provided a number of lessons on the appropriate scale of the accounts. For some services, such as carbon sequestration, it is likely to be most cost-effective if they are analyzed for large areas at a time, rather than for individual watersheds.

vi. The pilot study showed the need for a proper and well-designed system to store and share information, including GIS maps, as well as the critical importance of having people with good GIS capacity involved.

vii. The ecosystem accounting approach shows the key data gaps for information required for environmental management.

viii. There is a need to consider what lessons can be drawn from the case study for national-level environmental and environmental-economic statistics, jointly with the Philippines Statistics Authority.

The policy relevance of the account will be tested and evaluated by means of a stakeholder consultation process.

The World Bank through the WAVES Partnership Program provided technical assistance and capacity building in ecosystem accounting while other national government agencies and government-owned and controlled corporations provided support in data acquisition.

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