ASSESSING THE MANAGEMENT EFFECTIVENESS OF MARINE PROTECTED AREAS IN MICRONESIA

A.L. Isechal[1], S. Koshiba[1], L. Rehm[1]
S. Victor[2]
[1]Palau International Coral Reef Center
[2]The Nature Conservancy, Micronesia Program

With funding support from The Nature Conservancy through the NOAA CRCP Partnership Agreement with The Nature Conservancy

Contents

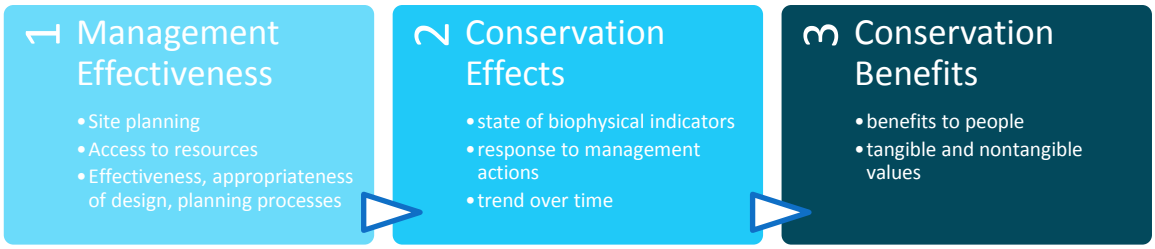
Introduction

Micronesia, much like the rest of the world, has seen the increasing trend of establishing marine protected particularly within the last 20 years. Most of these efforts have been spearheaded by local communities as a response to the general decline of important marine resources. This movement to establish marine protected areas has often been facilitated by environmental NGOs and government agencies that either have the mission or the mandate to ensure the long-term sustainability of marine resources.

The development of modern conservation in Micronesia has incorporated many elements of traditional management and has resulted in a variety of innovative co-management schemes, governance structures and strategies unique to Micronesia and even to each of the island jurisdictions. The bulk of conservation efforts have been focused on establishing MPAs through community engagement, mitigating immediate threats, and building networks and creating opportunities to increase capacity for various aspects of MPA management.

More recently the direction has somewhat shifted to effective planning for these MPAs. This shift to conservation planning has been driven by such tools as PIMPAC's Guide to Management Planning and TNC's Conservation Action Planning and has cast all these past and perhaps fragmented efforts into a more unified model of adaptive management (Fig 1.) And as MPA management plans and other action plans are being implemented, site managers will need to improve their ability to capture the experiences and results of current management actions and then using that to adapt, by refining existing strategies or developing new ones. This need to capture results has been made evident by current regional efforts to standardize the collection of monitoring data and how that data is managed and interpreted to inform management actions.

Figure 1. Linking management effectiveness assessments to other management tools



Much like the collection and interpretation of ecological data, it is anticipated that the assessment of the context, management structures, mechanisms, and processes that enable MPA management will increasingly become necessary. Such an assessment methodology would focus less on the status and trends of ecological indicators but would allow the assessment of the appropriateness, efficiency and effectiveness of the operational framework within which management occurs.

While the results of such assessments will be most useful for adaptive management at the site-level, there is potential usefulness at the network level. Such local and regional initiatives as

the Protected Areas Network in Palau and the Micronesia Challenge could potentially use the results of these effectiveness assessments to track network or regional progress and trends.

Evaluation methodology and site assessments

Marine protected area management effectiveness assessments were conducted in 7 Micronesia Challenge jurisdictions—Guam,RMI, Pohnpei, Chuuk, Kosrae, Yap and Palau. Sites were selected and assessments were facilitated by the local NGO or government agency partner in each of the jurisdictions (Table 1). A total of 20 protected areas or network of sites were assessed using an Excel-based questionnaire adapted from a management effectiveness score card developed by White et al. for Indonesia. This adapted score card was initially tested at 11 sites in Palau, Pohnpei, and the Marshall Islands in 2012.

The questions were answered by a facilitated group of 5 to 10 individuals. The composition of the groups varied amongst the sites, but management staff, NGO and agency partners, traditional leaders, and community members where typically represented in the assessment teams. The assessments were facilitated by representatives of the agency or NGO partner in each of the jurisdictions.

Table 1. Management Effectiveness Evaluation Implementing Partners

Jurisdiction	Assessment facilitated by
Guam	PMRI
RMI	Marshall Islands Marine Resource Agency (MIMRA)
Pohnpei	Conservation Society of Pohnpei (CSP)
Chuuk	Chuuk Conservation Society (CCS)
Kosrae	Kosrae Conservation and Safety Organization (KCSO)
Yap	Yap Community Action Agency (Yap CAP)
Palau	Palau Conservation Society (PCS)

The questions in the score card are either yes/no or multiple choice, in order to allow for a range of possible answers.Each of the questions are attributed to 1 of 5 management levels each of which conceptualizes a particular stage of MPA management and that all together represent a chronological management continuum, from initiation of a new MPA to the fully institutionalized MPA (Figure 2). Management level was determined by averaging all the scores for the questions in each of the levels. Management level of a site was simply the highest level at which a site got a satisfactory score, which was arbitrarily set at 75%.

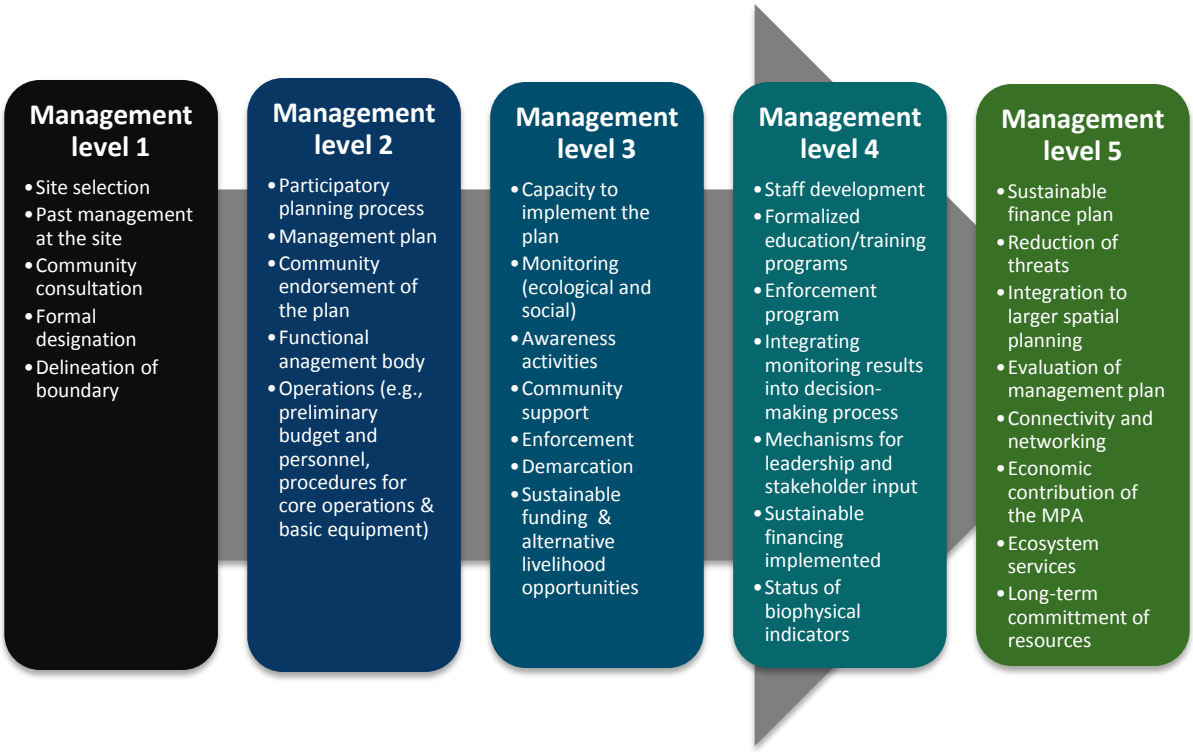


Figure 2. Continuum of management level and the associated management outcomes or outputs.

The questions are also attributed a 1 of 12 management categories. A score for each management category was also calculated by averaging all the scores for the questions in each of the management categories. Results of the assessments were examined by each site and aggregated both at the jurisdiction level and for the region in order to explore trends.

Regional management trends

Management levels for sites assessed in 2013

All sites assessed fall in management level 2 or lower (Table 2). Only 6 sites, both in the Marshalls and Palau, had a management level of 2 or higher. Eight of the 20 sites had a management level of less than 1. These sites scored less that 75% for the management level 1 questions in the assessment. The remaining 6 sites assessed are at management level 1.

All the sites can be generally grouped into sites with management level of less than 1 (8 sites) and those with management level of 1 or greater (12 sites). The top threats to the sites include sedimentation or land-based pollution and some form of resource extraction (poaching, overfishing, destructive fishing). The site in Guam was the only site that listed diver impact as a top threat. Based on available information captured by the assessments, the oldest sites were Piti (Guam) and Ngemai (Palau) which were both established in 1997. The newest site was Reey (Yap) that was established in 2011.

Table 2. Management levels of the 20 sites assessed in 2013

Jurisdiction	Marine Protected Area	Area	Year established	Top threats	Management level
Guam	Piti Bomb Holes Marine Preserve	-----	1997	Divers Land-based pollution	<1
RMI	Tolap	-----	-----	-----	2
	Enenemman	-----	-----	-----	2
	Aliet	-----	-----	-----	1
Pohnpei	Dehpehk/Takaiou	1.74 sq. km	2001	Poaching	1
	Nan Wap	3.04 sq. km	2010	Poaching	1
	Pakein	4.53 sq. km	2010	Poaching Management control	<1
Chuuk	Parem	-----	-----	-----	<1
	Onunum Uman	-----	-----	-----	<1
	Nematon	NA	-----	Poaching Destructive fishing	<1
Kosrae	Tafunsak	583.9 ha	2006	Poaching Climate change	1
	Utwe	96.4 ha	2005	Poaching Sediment	1
Yap	Reey	385.8 ha	2011	Overfishing Poaching	<1
	Riken	34.8 ha	2005	Overfishing Poaching	<1
	Belabat	140.4 ha	2010	Overfishing Sediment	<1
Palau	Ngiwal State Pas	2.05 sq. km	1997(2010)	Poaching Sediment	1
	Ngerderar	3.8 sq. km	2009	Sediment Logging Poaching	2
	Kayanel PA Network	1,686 sq. km	2012	Poaching Destructive harvesting	2
	Ngarchelong Marine Managed Area	-----	-----	Poaching Overfishing	2
	Ongedechuul System of Conservation Areas	10.3 sq. km	2013	Wildfires Illegal entry Sediment	3

Management levels of sites assessed in 2012 and 2013

There was a wider range of management levels for the sites assessed in 2012 when the management effectiveness tool was being tested. The 2012 sites ranged from management levels 1 to 4 (Table3). The highest management levels were recorded for the three sites in

Palau.The lowest management levels were for Bikirin and Woja in the Marshalls and Ngulu in Yap. The 2012 sites were deliberately selected to capture the range of management levels that exist in Micronesia.

Table 3. Management levels of sites assessed in 2012

Jurisdiction	Site	Management level	Level description
RMI	Bikirin	1	Initiated
	Woja	1	Initiated
Pohnpei	Lenger Island	2	Established
	Nahtik	2	Established
Yap	Ngulu	1	Initiated
	Nimpal	3	Implemented
Palau	Ngerumekaol	3	Implemented
	Ngerukuid	3	Implemented
	Ngelukes	1	Initiated
	Ebiil	2	Established
	Helen	4	Sustained

There are a total of 20 MPAs that have been assessed using the Micronesia management effectiveness tool. More than 80% (18) of the sites had a management level of 1 or less than 1 (Figure 3).Seven sites have a management level of 2, four sites had a management level of 3, and only one site had a management level of 4. None of the sites assessed so far has a management level of 5.

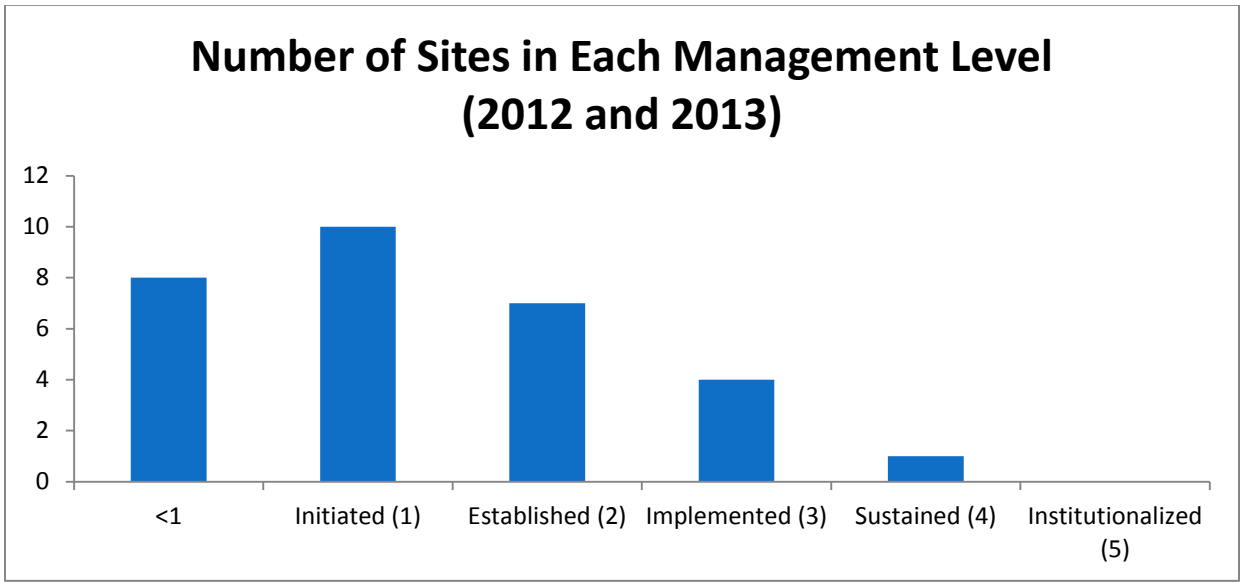


Figure 3. Number of sites in each of the five management levels (includes all sites assessed in 2012 and 2013)

Trends by management category

Categorizing sites into the continuum of management levels is useful for comparisons across sites and for providing a generalized picture of the MPAs in a jurisdiction or the entire region. However, to identify the gaps in management strategies and therefore, potential MPA investments in the future, it is more useful to examine the site scores for each of 12 management categories.

Table 4. Range of scores of all 2013 sites by management categories

Management category	Range of scores		
	Lowest score	Highest score	Difference
Biophysical	0	100	100
Conservation effect	0	71.4	71.4
Ecosystem services	0	100	100
Enforcement	13.9	88.9	75
Finance	0	80	80
Infrastructure/equipment	0	33.3	33.3
Legal	0	94.4	94.4
Planning	12.5	59.7	47.2
Socio-economics	0	83.3	83.3
Staffing	16.7	91.7	75
Stakeholder engagement	54.5	81.8	27.3
Traditional knowledge	0	100	100

The site scores for each of the 12 management categories are quite variable (Table 4). The range of scores (the difference between the highest and lowest scores) weregreatest for management categories Biophysical, Ecosystem services, Traditional knowledge, and Legal framework. The range of scores were lowest for the management categories of Stakeholder engagement, Infrastructure/equipment, and Planning. The scores for each of the management categories were averaged for all the 2013 sites in order to identify management effectiveness gaps and strengths for the region (Figure 3).

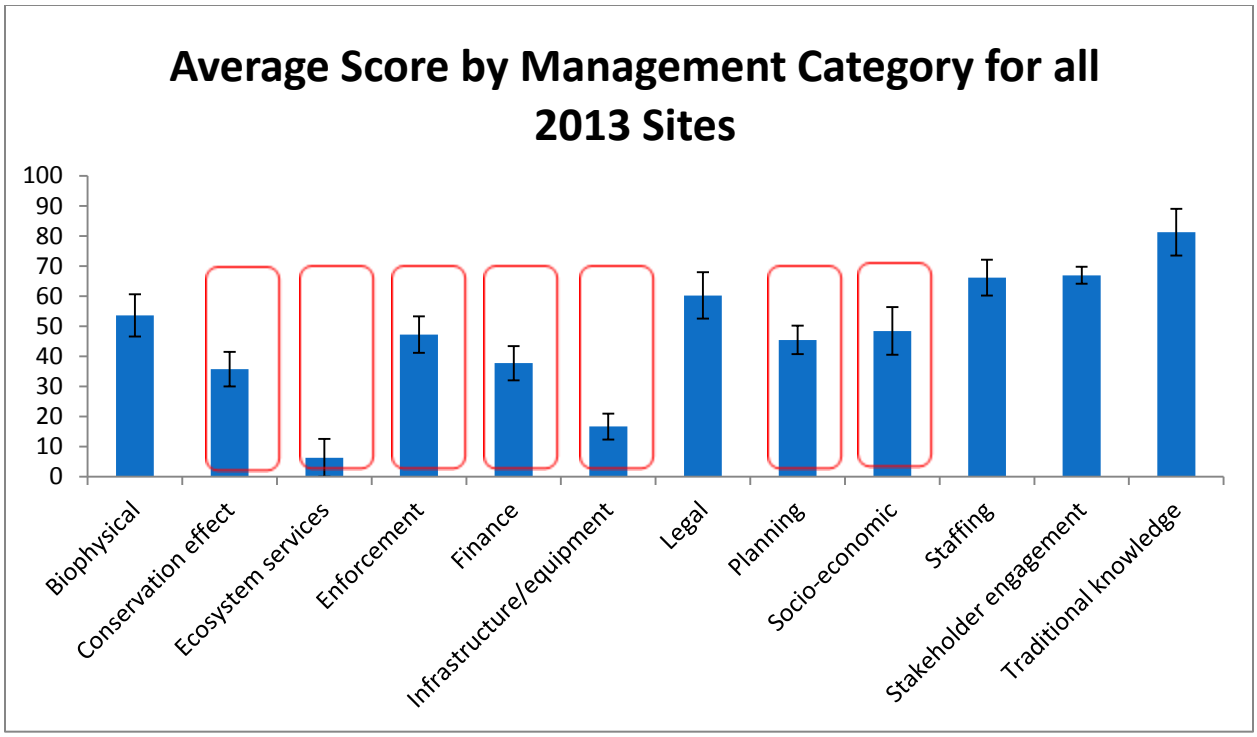


Figure 4. Percent averages of 2013 site scores for each of the 12 management categories. Management categories with regional averages of <50% are identified by a red box around the bar.

Capitalizing on traditional knowledge

An overwhelming number of the MPAs were selected based on traditional knowledge of the sites and resources. Formal resource assessments, both biophysical and socio-economic, were not often the main drivers for site selection. Communities, agencies and NGOs relied on the knowledge within the community to identify potential MPAs. Biophysical assessments were done at most of the sites assessed but at a much later time after the site had already been selected. These biophysical assessments only served to validate this traditional knowledge and provide a baseline for future biophysical monitoring activities.

Engaging communities and building consensus

Stakeholder engagementis another positive feature of MPA development in Micronesia. At all of the sites, efforts to engage with communities and other stakeholders began as early as site selection and continued to be a key management priority. The small local NGOs have been instrumental in facilitating this dialogue between communities and the government agencies and technical experts necessary for the MPA process. They have also assisted the MPA communities in accessing small, yet critical, financial resources to jumpstart the implementation activities at the sites.

Building the capacity to manage

Almost all of the sites expressed the need to increase staffing capacity, both in numbers and skills. The Guam MPA is the only site that has staff with the adequate skill level relative to the

needs of the MPA. However, most sites have compensated for the lack of trained full-time staff by utilizing the services of community volunteers and staff of the local NGOs who are assisting with site management. Actually, with the exception of the sites in Palau and Guam, all the sites do not have full-time staff. The sites have created informal groups made up of community members and the staff of the local NGO that implement management activities at the sites. The training opportunities available to members of these groups are often focused on specific, usually hand-on, skills like ecological and socio-economic monitoring, group facilitation, and drafting a management plans. There is often a lack of training opportunities for the management body that provides the centralized leadership for MPA management. These trainings may include project management, long-term planning, staff management, fundraising, program evaluation etc.

Ensuring a stable legal framework

A positive for most MPAs is the legal framework that is established within each jurisdiction. The legal framework provides the backbone for funding and enforcement security. Rangers and managers are able to effectively enforce their MPAs with stable legislation. The legislation that is in place in this region allows the jurisdictions to deputize the conservation officers, giving them the right to prosecute or write tickets to violators of the laws established.

Implementing biophysical monitoring

Formal resource assessments, both biophysical and socio-economic, were not the main drivers for site selection. Communities, agencies and NGOs relied on the knowledge within the community to identify potential MPAs. Biophysical assessments were done at most of the sites assessed but at a much later time after the site had already been selected. These biophysical assessments only served to validate this traditional knowledge and provide a baseline for future biophysical monitoring activities

Securing basic infrastructure and equipment

The availability of funding was a challenge to all the sites assessed because the lack of an available budget presents a serious constraint on the capacity to manage. This financial challenge also translated into challenges in staffing, equipment and facilities.

Strengthening enforcement

Enforcement and monitoring were two of the management activities that have been initiated at most MPAs. More than a third of the sites have some enforcement and monitoring activities that are ongoing. Monitoring and enforcement are especially challenging for remote sites like Ngulu and Helen. A recent series of enforcement workshops in the region has also contributed to building enforcement capacity but for the moment, there is no regional network or organization that is primarily focused on enhancing enforcement activities.

Identifying and quantifying ecosystem services

Majority of sites were lacking in ecosystem services. These are the services that the MPA itself provides to the ecosystem and the people. Many sites did not have data or any survey results pertaining to ecosystem services.

Opportunities for progress

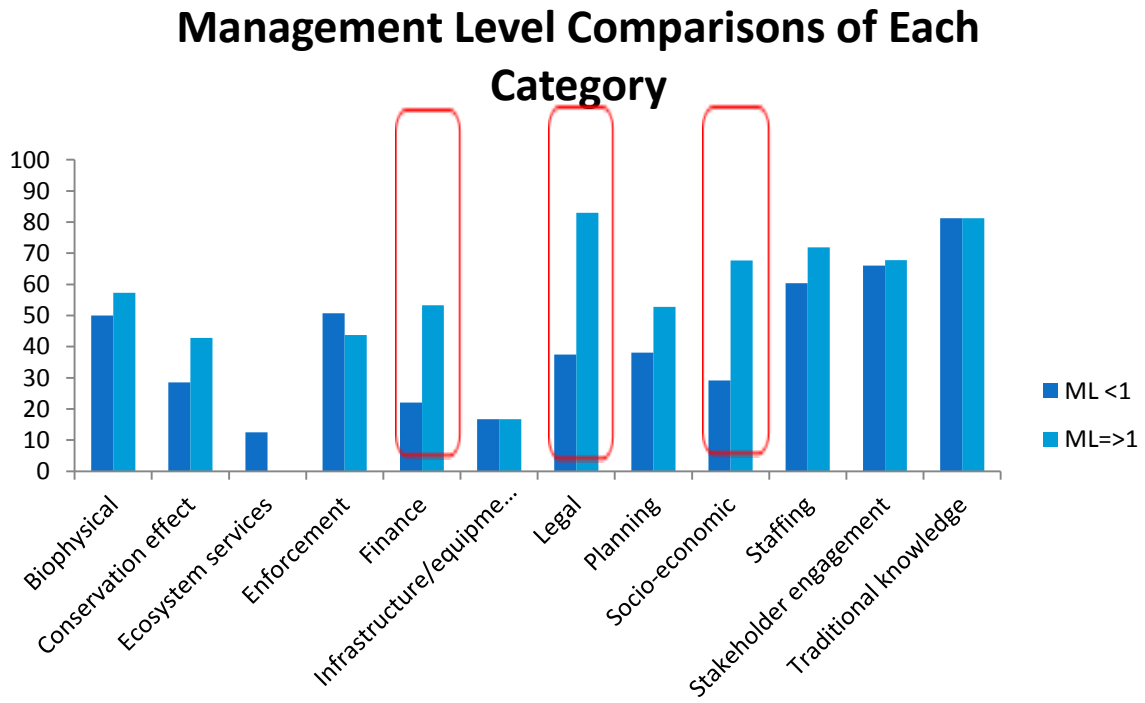


Figure 5. This figure compares the management level scores greater than one and equal to or less than one.

The MPAME tool allows for managers of marine protected areas to assess the effectiveness of their MPA. After the assessment, the scores are gathered for each framework category and graphed. The representative graph above is comparing those categories with a management level less than one compared to sites greater than one (Figure 5). 50% is arbitrarily chosen as the threshold between level 1 and greater than 1. Managers can graph the frameworks which do not meet level 1 requirements and those that do meet level one and greater and then understand where they are lacking in their sites. The graph above shows that most protected areas have strengths in their staffing, stakeholder engagement and traditional knowledge frameworks. But, the graph also shows that there are discrepancies between the finance, legal, and socio-economic frameworks. Managers can use this information to properly allocate

resources into areas that are lacking the services needed to grow and become a goal of a management level 5 protected area.

Trends within jurisdiction

The following graphs represent the average scores of the MPAs within the individual jurisdictions. The red boxes indicate areas where the scores were below the 50% threshold, indicating points of weakness within the framework of the MPAs. Guam is missing from this section due to the fact that they only have one representative MPA, the scores for that site will be shown in the next section.

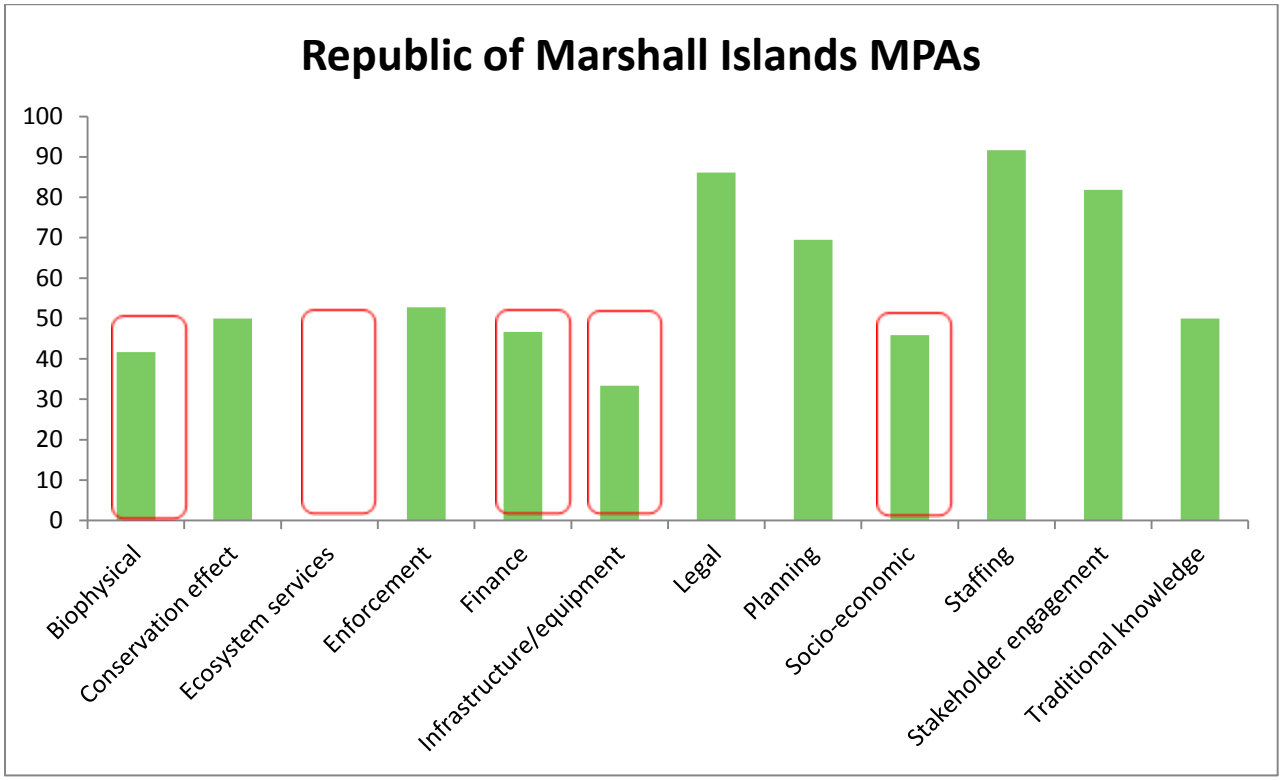


Figure 6. This figure shows the average management level scores for RMI MPAs

After assessing the MPAs of the Republic of the Marshall Islands using the MPAME tool, we were able to compile the graphs of each site and average the graphs to show total trends within the entire jurisdiction of RMI. RMI has obvious strengths in their legal, planning, staffing and stakeholder engagement throughout most of their MPAs but they are lacking in areas of

biophysical data, ecosystem services, finance, infrastructure/equipment and socio-economic data. These are areas where managers can focus future resources to improve the management effectiveness of all MPAs in RMI.

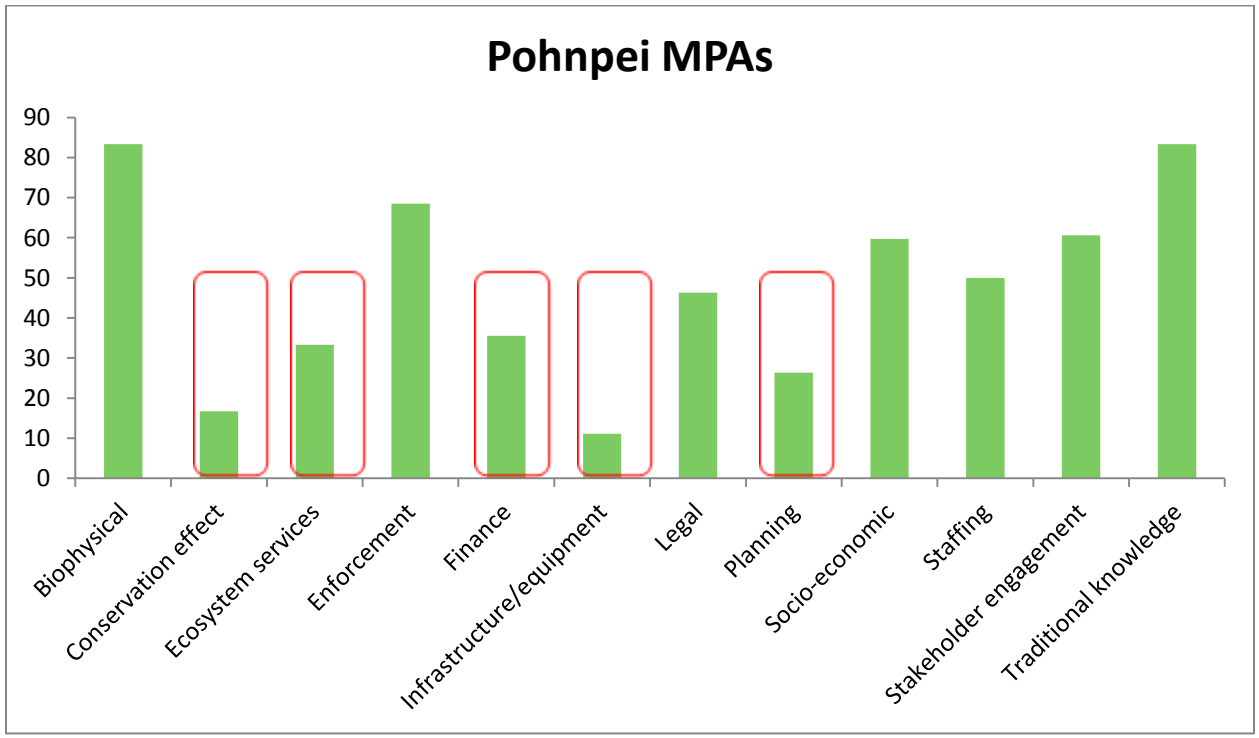


Figure 7. This figure shows the average management level scores for Pohnpei MPAs

In Pohnpei, the MPAME tool shows that the MPAs have strengths in their biophysical data, enforcement, stakeholder engagement and traditional knowledge. The weaknesses in MPA framework are conservation effect, ecosystem services, finance, infrastructure/equipment and planning. The managers of the MPAs in Pohnpei can increase the effectiveness of their MPAs by focusing future resources in these areas of weakness.

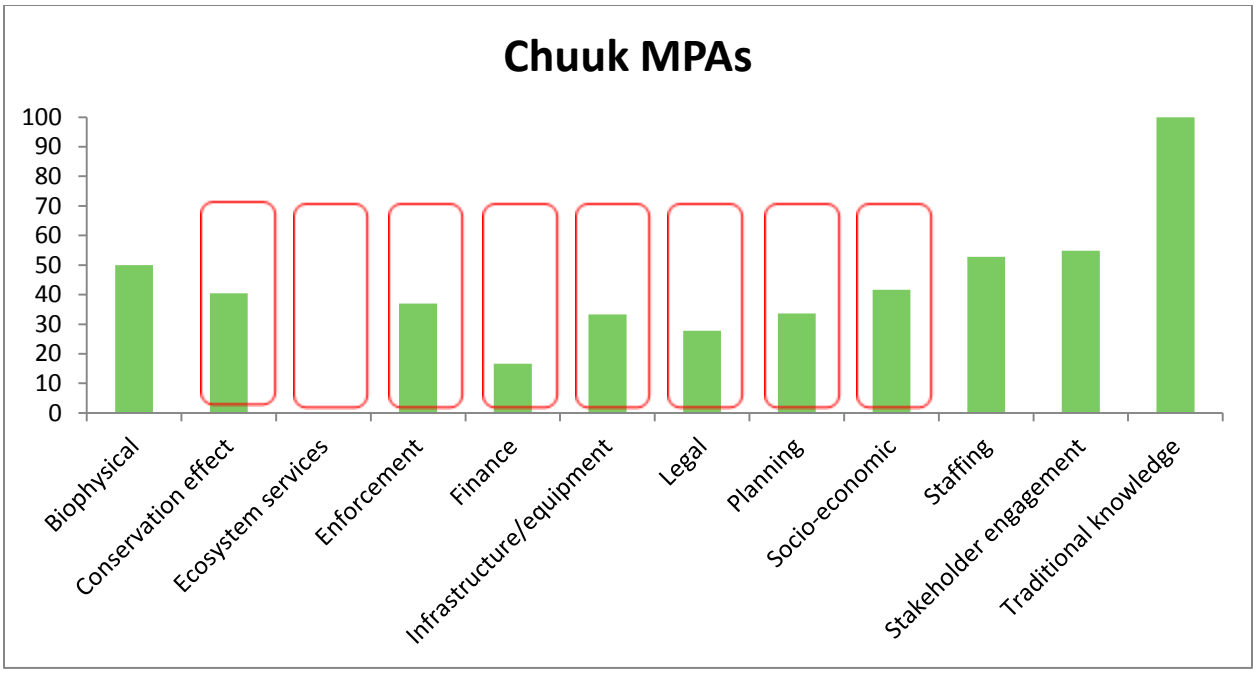


Figure 8. This figure shows the average management level scores for ChuukMPAs

Using the MPAME tool in Chuuk, we discovered that they have one main strength in their traditional knowledge but are lacking in many areas including; conservation effect, ecosystem services, enforcement, finance, infrastructure/equipment, legal, planning and socio-economic. These weaknesses should be addressed in the future by allocating more resources to focus these areas of the MPA framework.

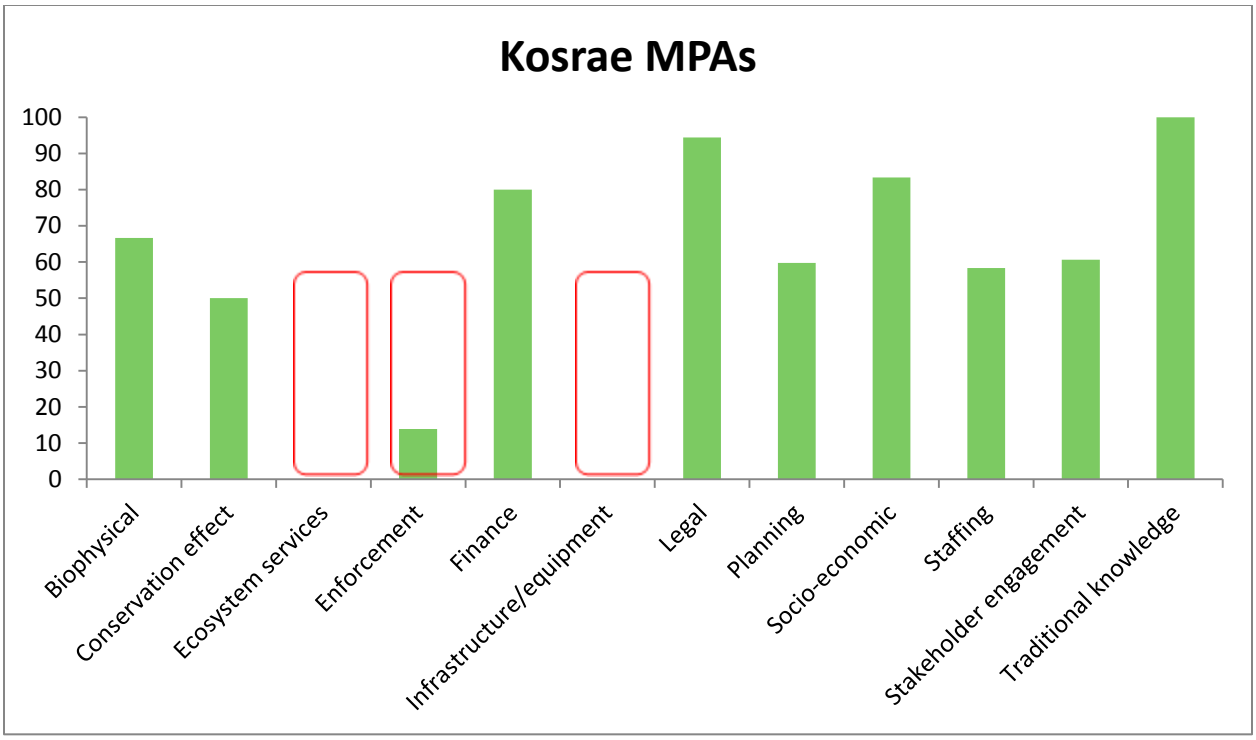


Figure 9. This figure shows the average management level scores for Kosrae MPAs

The Kosrae MPAs are shown to have strengths in their biophysical data, finance, legal, socio economic and traditional knowledge. Kosrae MPAs lack any infrastructure/equipment which could be due to poor management of funds. The MPAs also lack any ecosystem services, more studies need to be conducted to figure out what the MPAs provide to the ecosystem and the people of Kosrae. The MPAs lack in enforcement, an area that is important to keep violators from poaching or using destructive fishing practices. To get to a higher management level score, ecosystem services, enforcement and infrastructure/equipment should be the priority for future resource management.

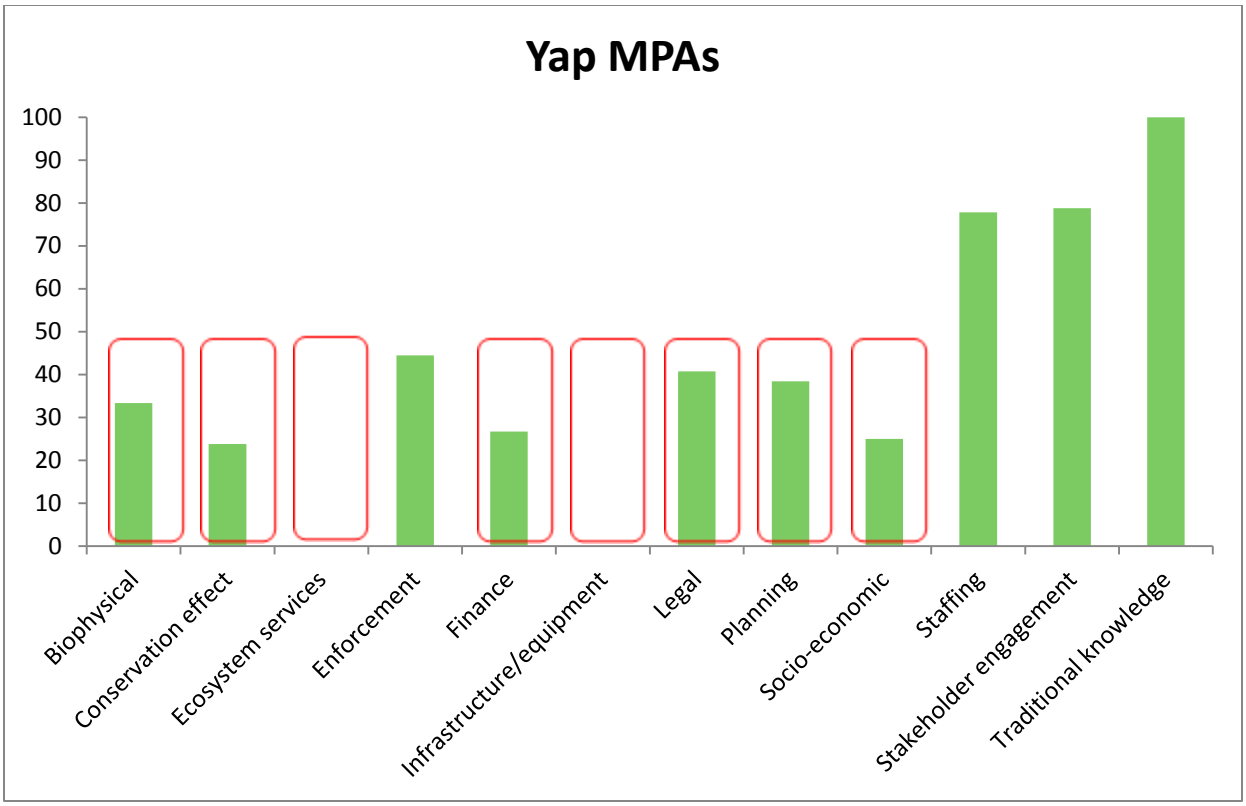


Figure 10. This figure shows the average management level scores for Palau MPAs

After conducting an assessment of all the MPAs in Yap, we found strengths in staffing, stakeholder engagement and traditional knowledge framework of the MPAs. Yap's MPAs are lacking in biophysical data, conservation effect, ecosystem services, finance, infrastructure/equipment, legal, planning and socio economic and their resources should be properly apportioned into these areas in the future

Regional strategies

The goal of the MPAME tool is to both assess areas of MPA framework that is successful and those that are lacking in overall effectiveness. Managers can use this along with the newly developed conservation benefits extension to quickly assess their MPAs and determine areas of weakness within the framework of the MPA, then they can properly allocate resources to those areas of need. The top priority for managers using this tool is improving those areas of weakness that are below level one. In order to do that, managers can allocate resources into

those areas and possibly reduce resources being used in areas with level 5 management. Overall, level 5 management is the ultimate goal towards sustainable and effective MPA monitoring and management.

Site planning

Below are graphs from individual sites within 7 jurisdictions, Chuuk, Republic of Marshall Islands, Pohnpei, Yap, Guam and Palau. The individual sites have two graphs, the management level graph and the category graph. The management level graph is used to look at the MPA as a whole and assess whether it is initiated or fully functional and then the category graph for each site is a more detailed graph showing the management level of each area of framework within the MPA site. These both are key tools that can be used over time to track progress within the MPA by using the category scores to prioritize actions and resources for individual sites.

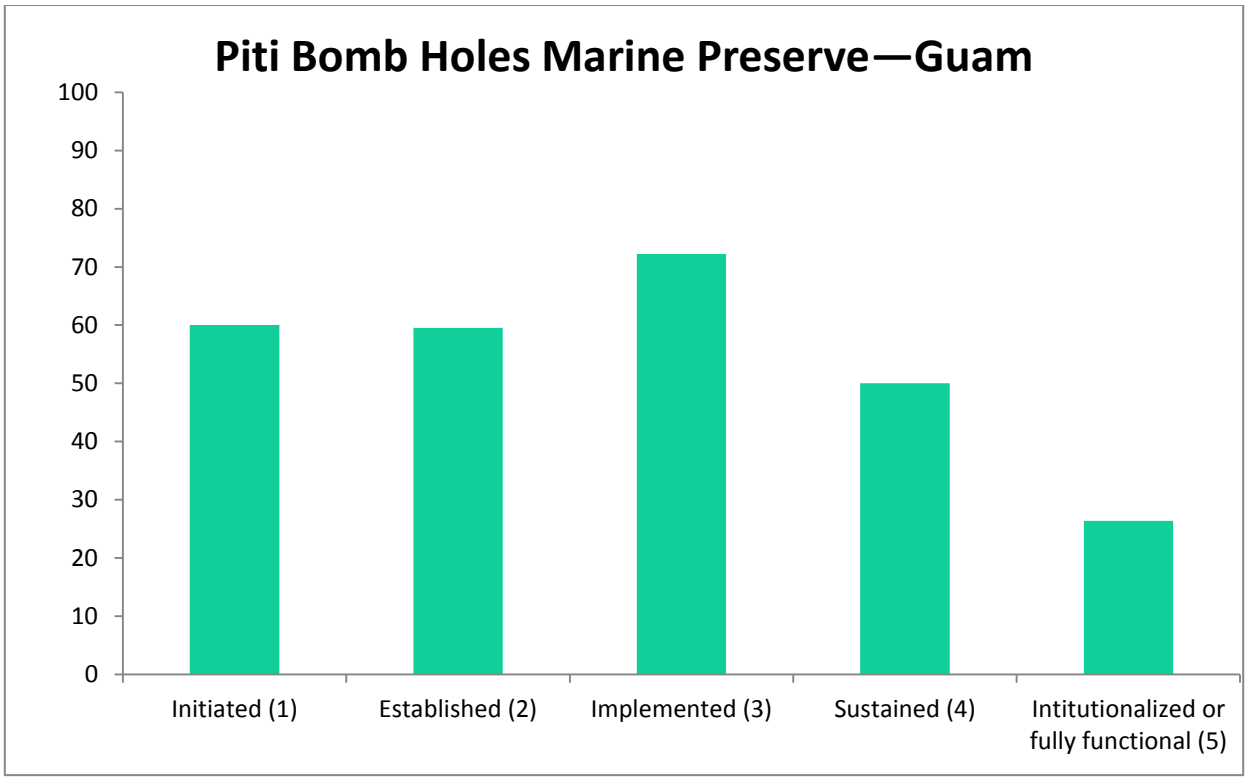


Figure 10. This figure shows the management level score for Piti Bomb Holes Marine Preserve

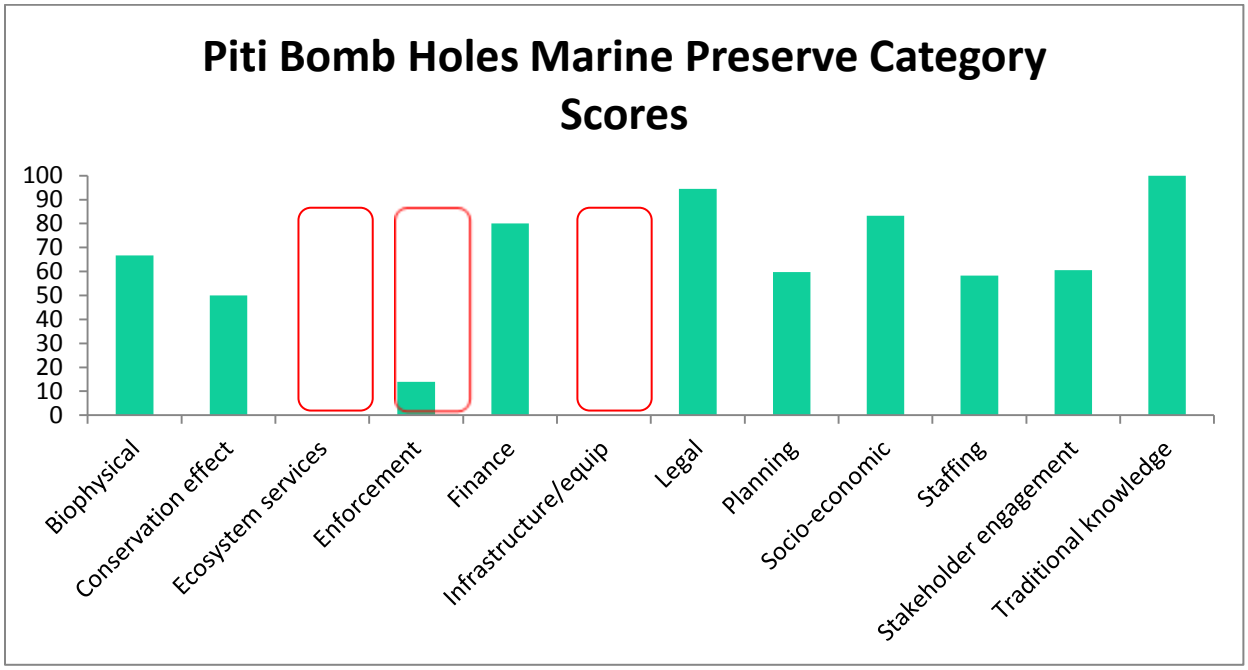


Figure 11. This figure shows the management level scores for each category in the Piti Bomb Holes Marine Preserve

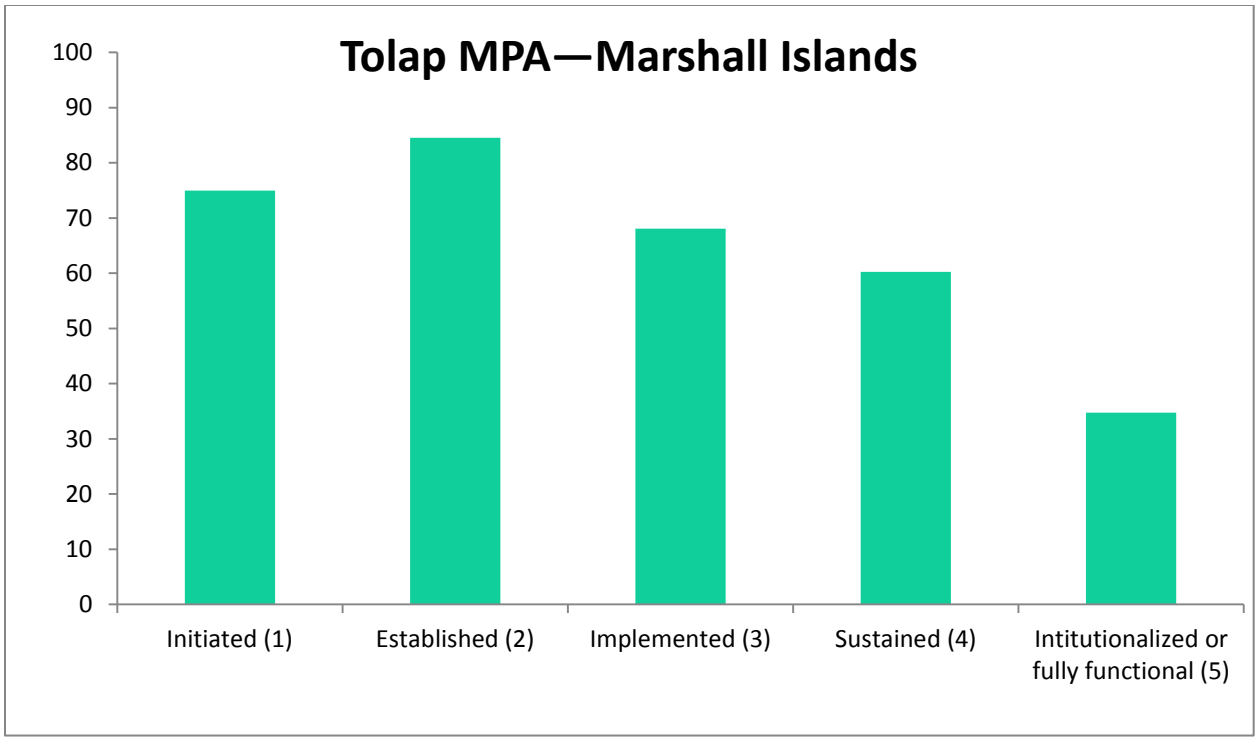


Figure 12. This figure shows the management level scores for the Tolap MPA

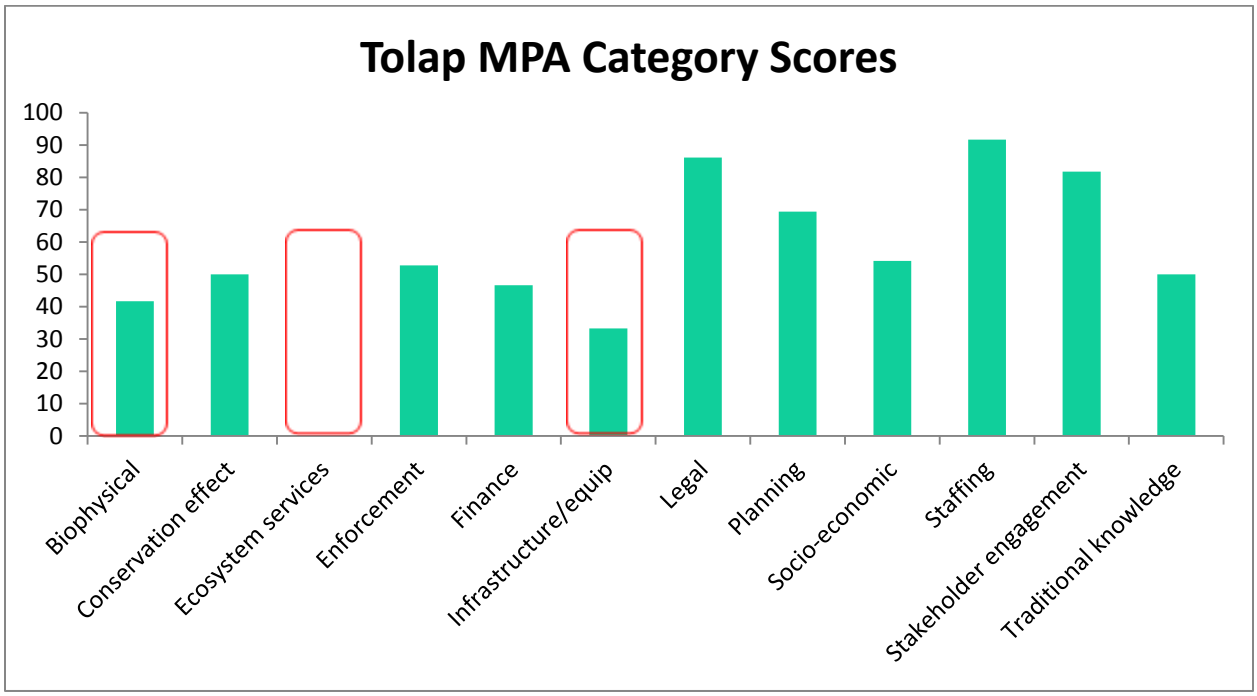


Figure 13. This Figure shows the management level scores for each category of the Tolap MPA

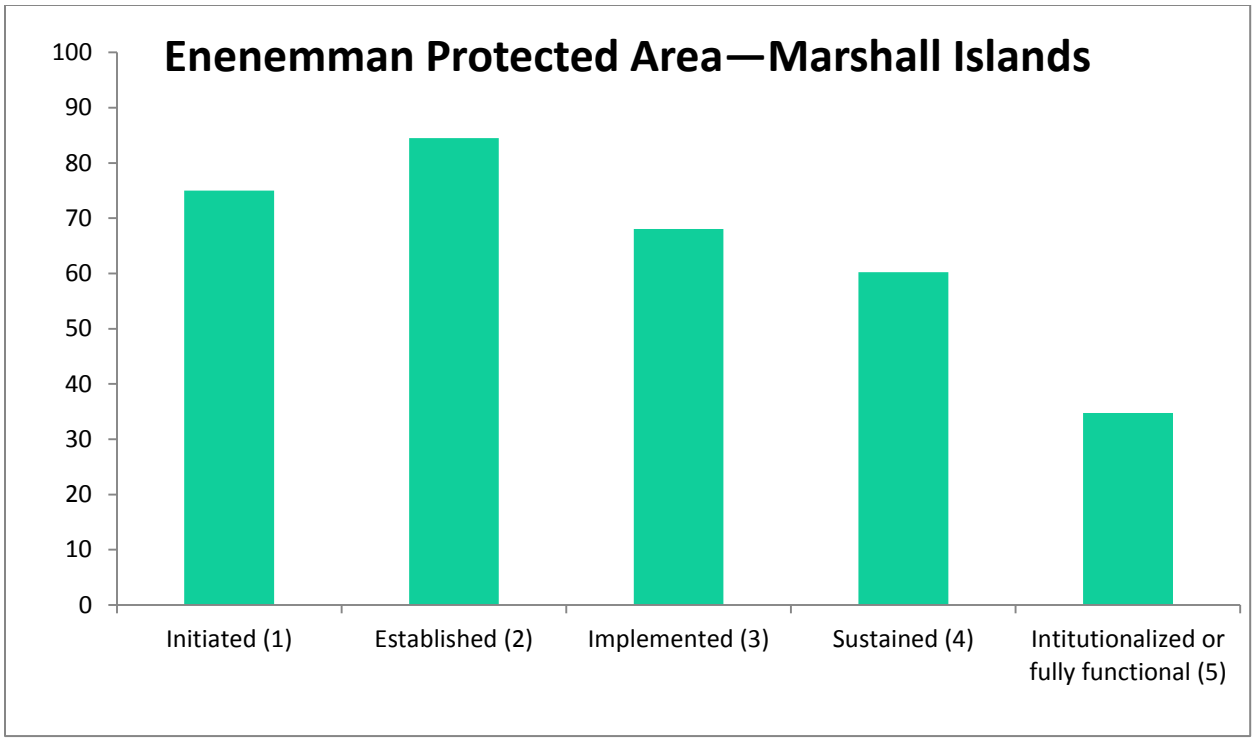


Figure 14. This Figure shows the management level scores for the Enenemman PA in Marshall Islands

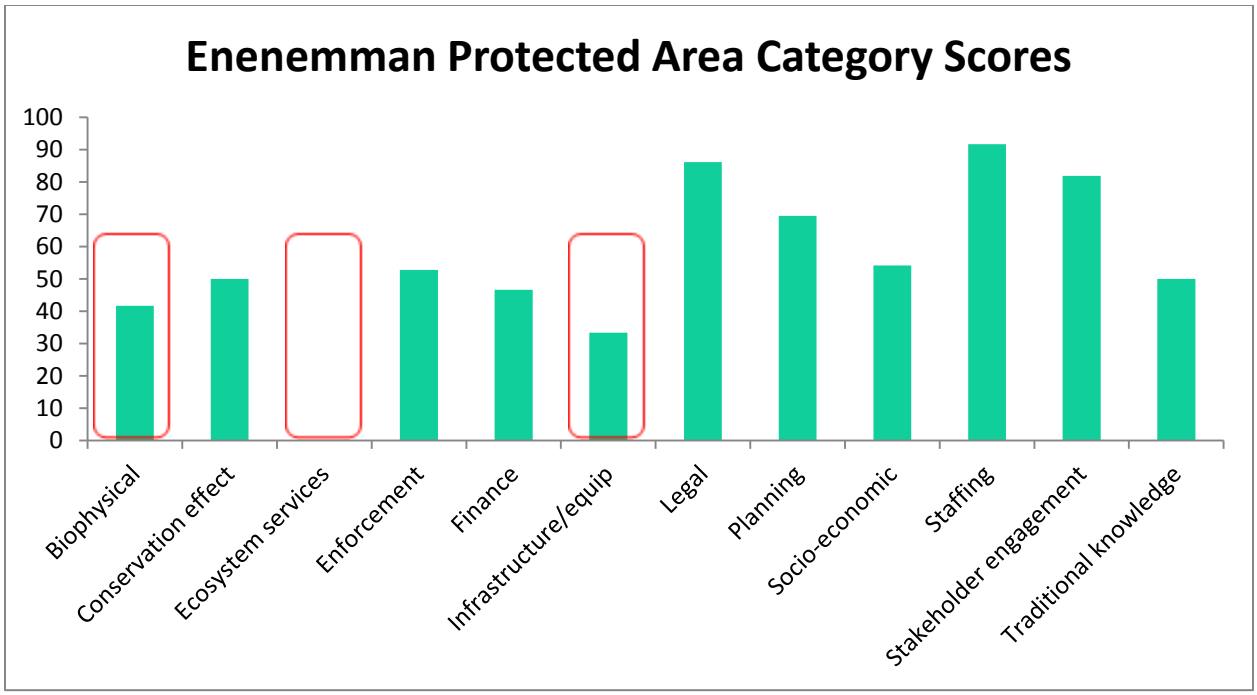


Figure 15. This Figure shows the management level scores for each category of the Enenemman PA in Marshall Islands

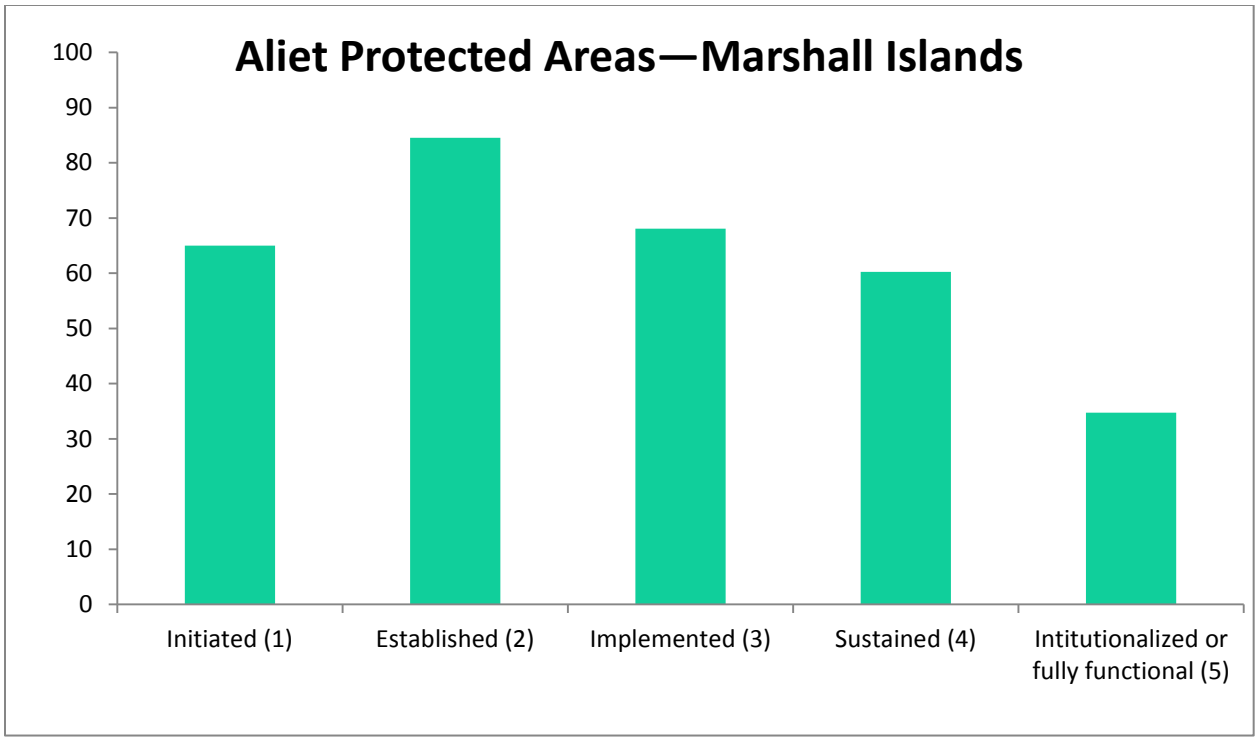


Figure 16. This Figure shows the management level scores for the Aliet PA in Marshall Islands

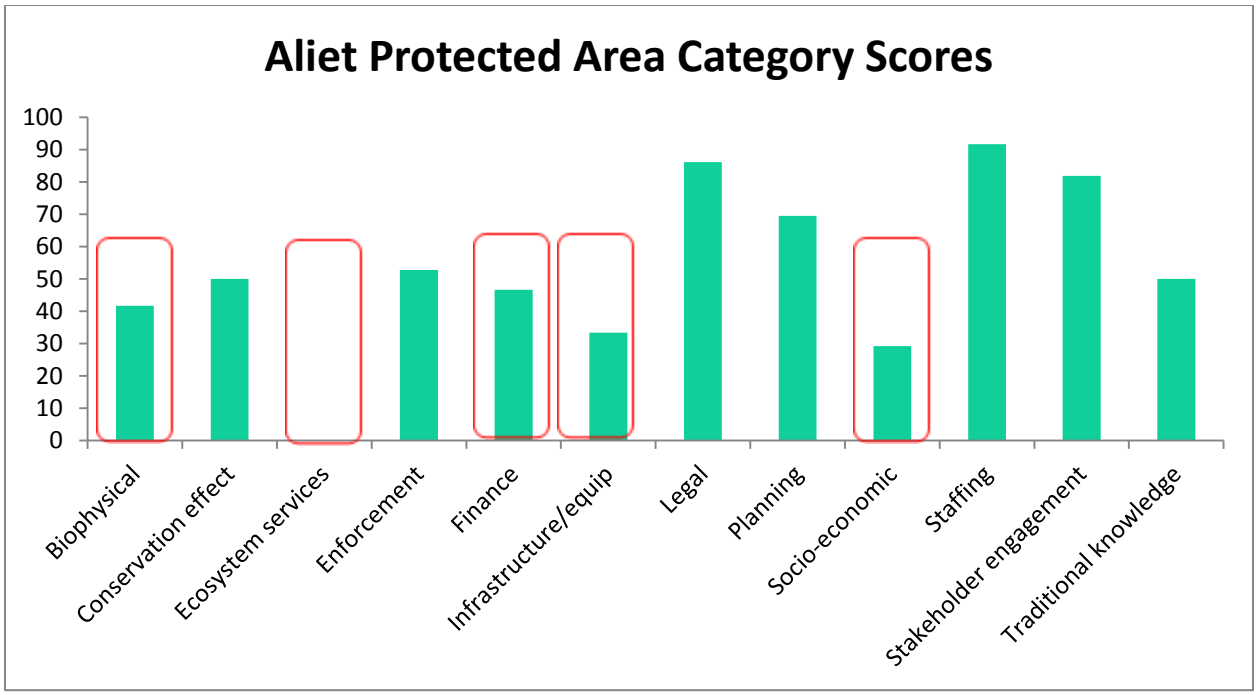


Figure 17. This Figure shows the management level scores for each category of the Aliet PA in Marshall Islands

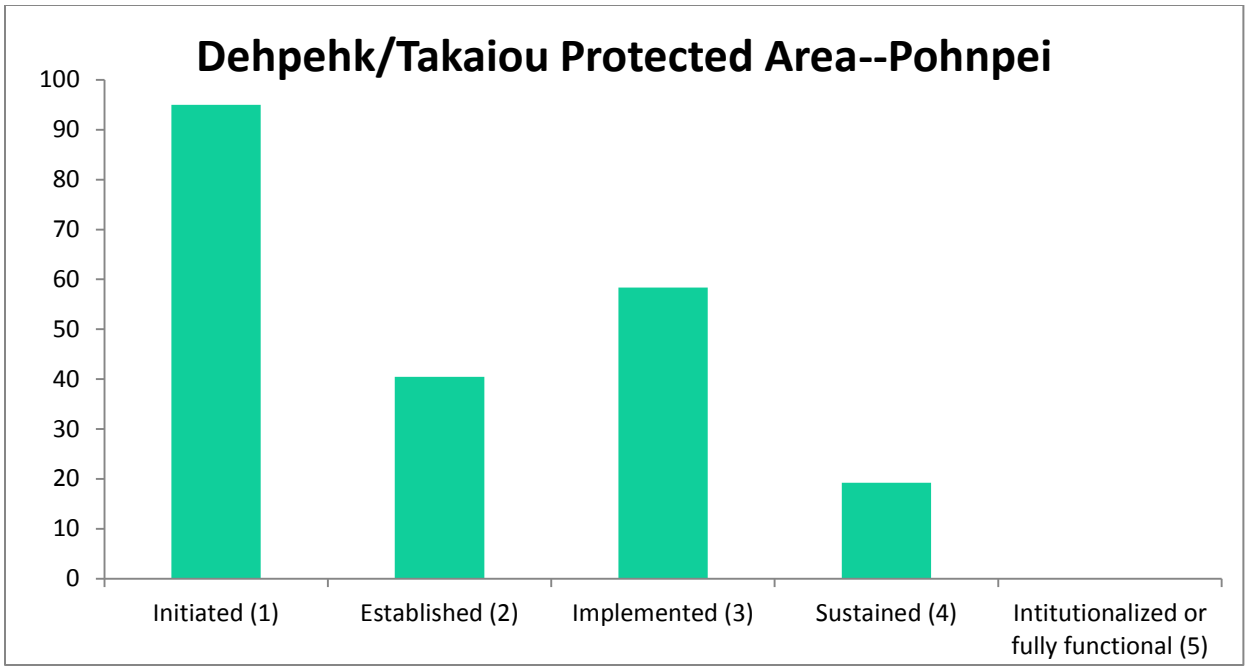


Figure 18. This Figure shows the management level scores for the Dehepehk/Takaiou PA in Pohnpei

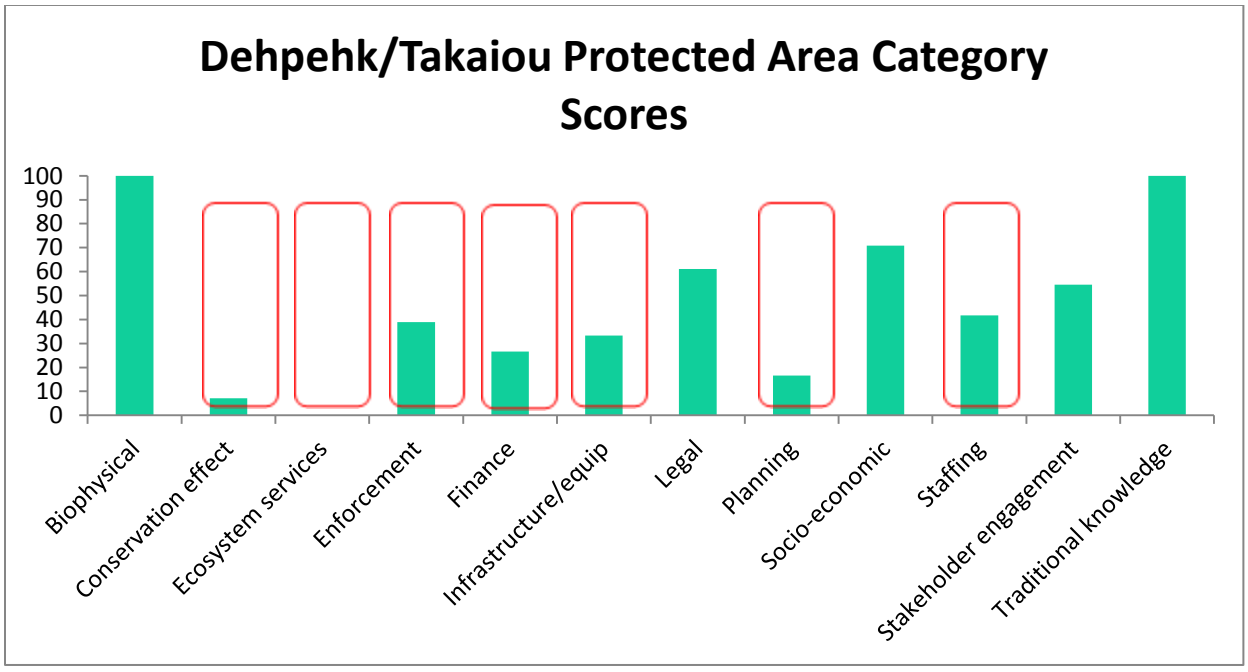


Figure 19. This Figure shows the management level scores for each category of the Dehpehk/Takaiou PA in Pohnpei

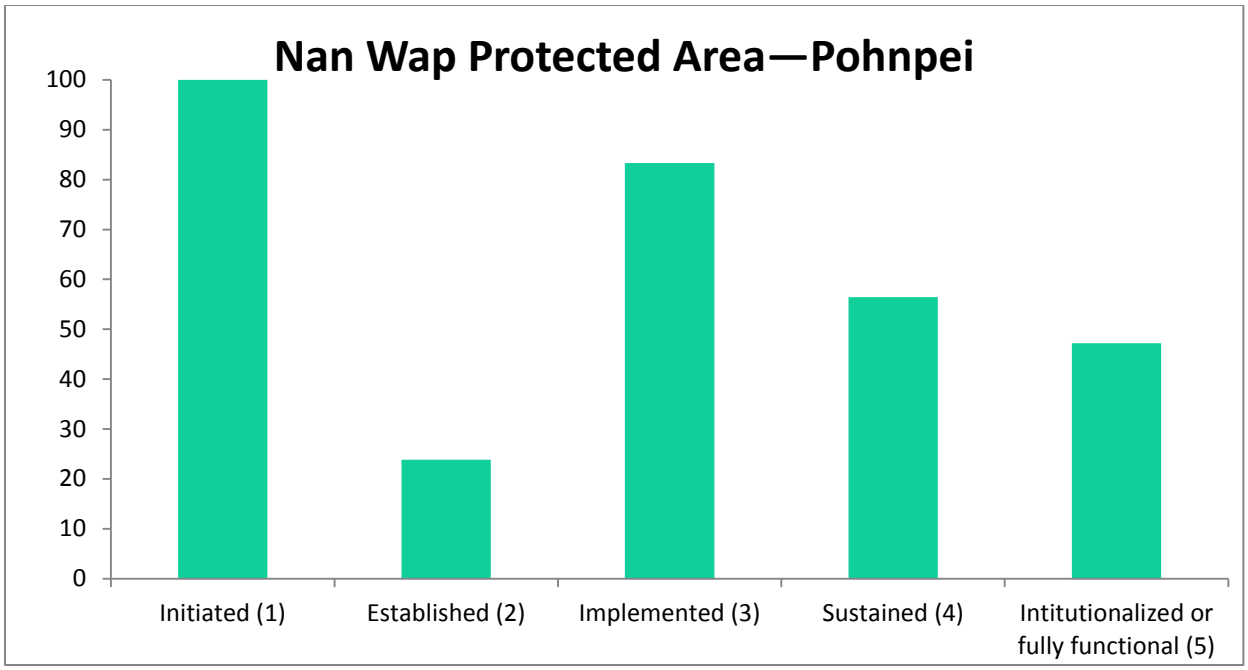


Figure 20. This Figure shows the management level scores for each category of the Nan Wap PA in Pohnpei

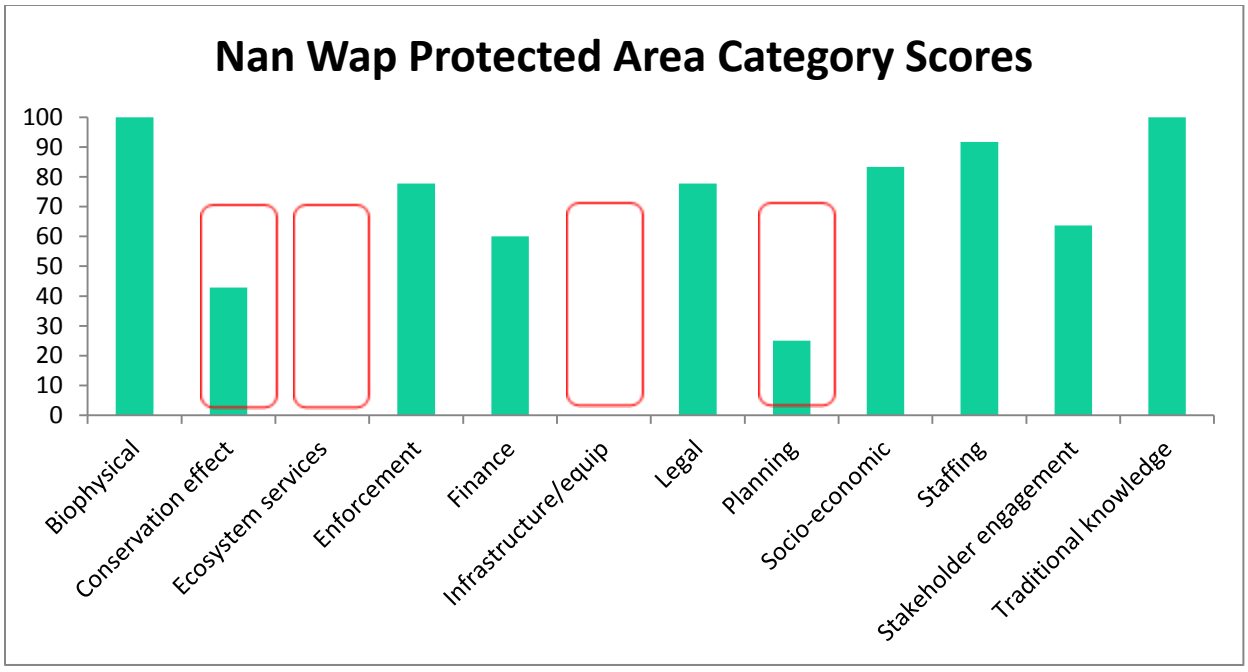


Figure 21. This Figure shows the management level scores for each category of the Nan Wap PA in Pohnpei

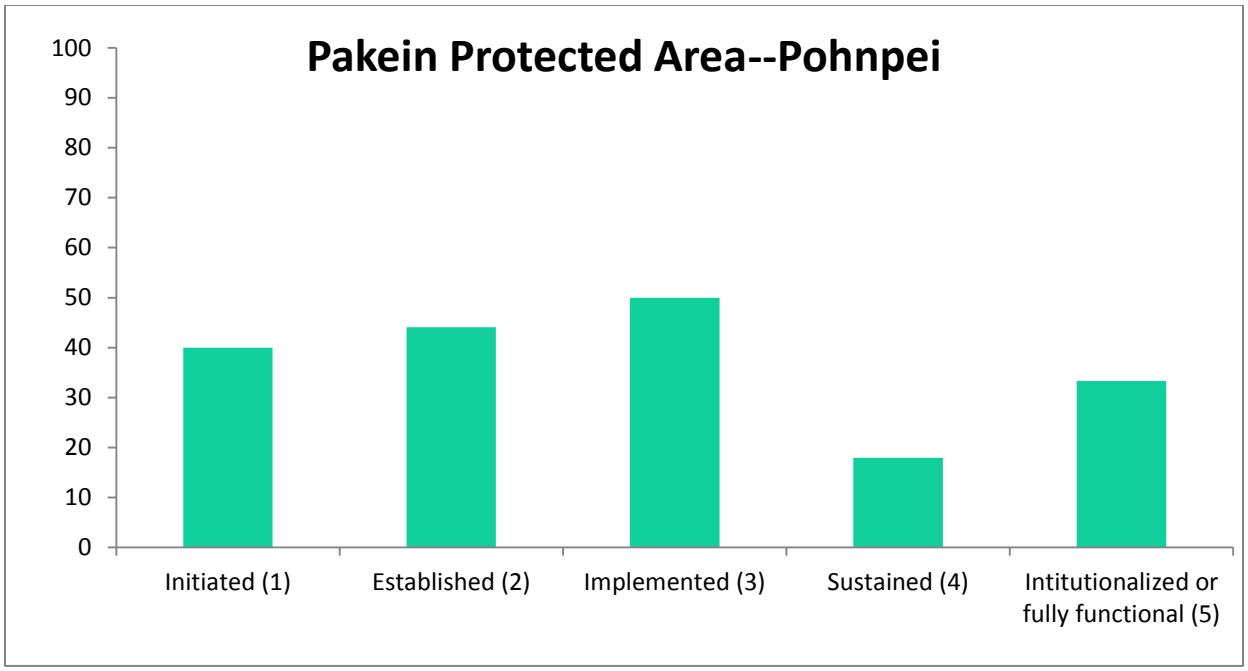


Figure 22. This Figure shows the management level scores for the Pakein PA in Pohnpei

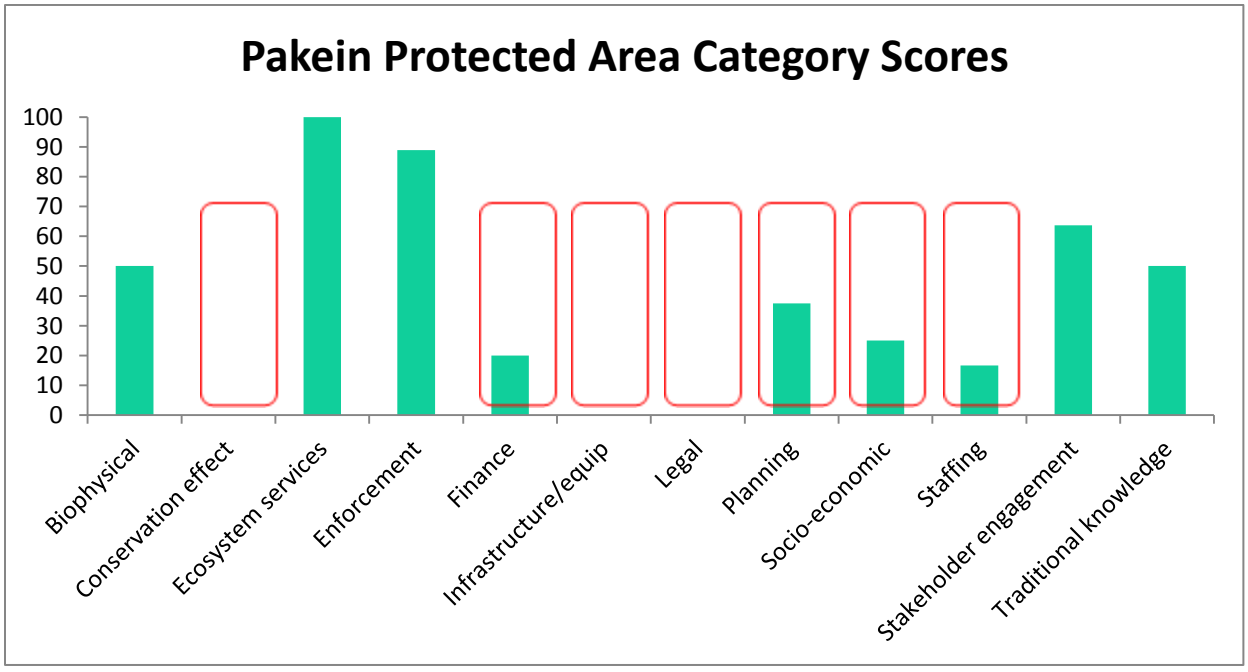


Figure 23. This Figure shows the management level scores for each category of the Pakein PA in Pohnpei

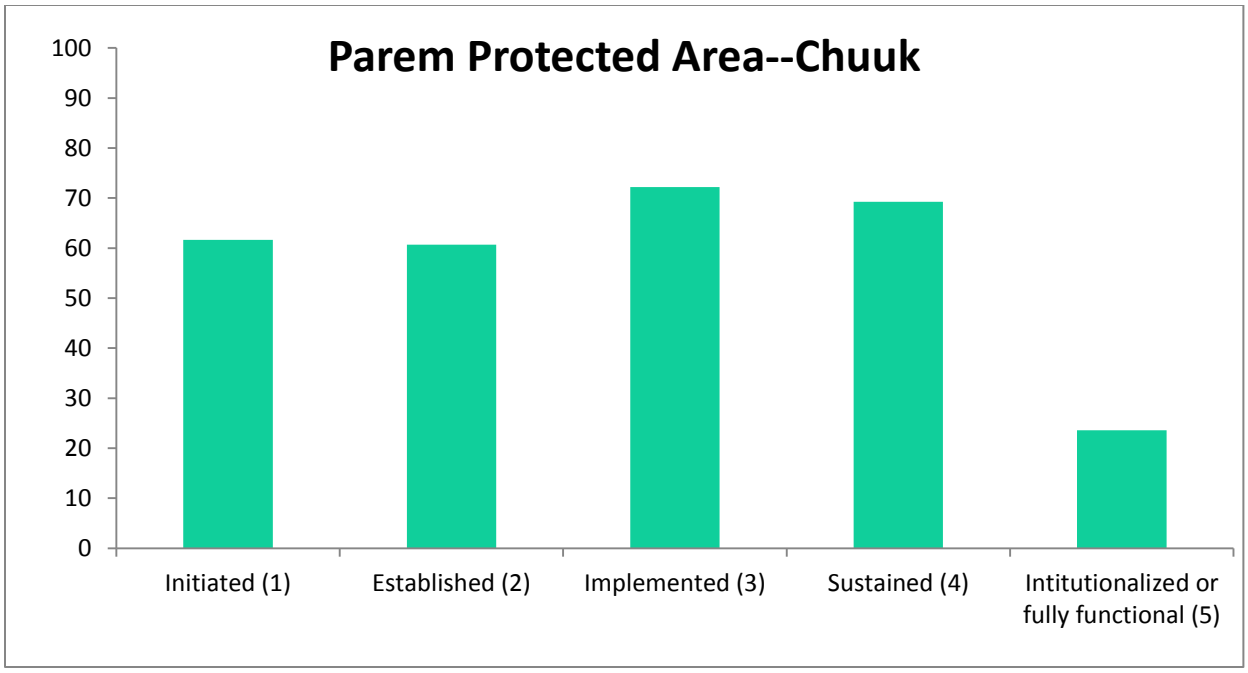


Figure 24. This Figure shows the management level scores for the Parem PA in Pohnpei

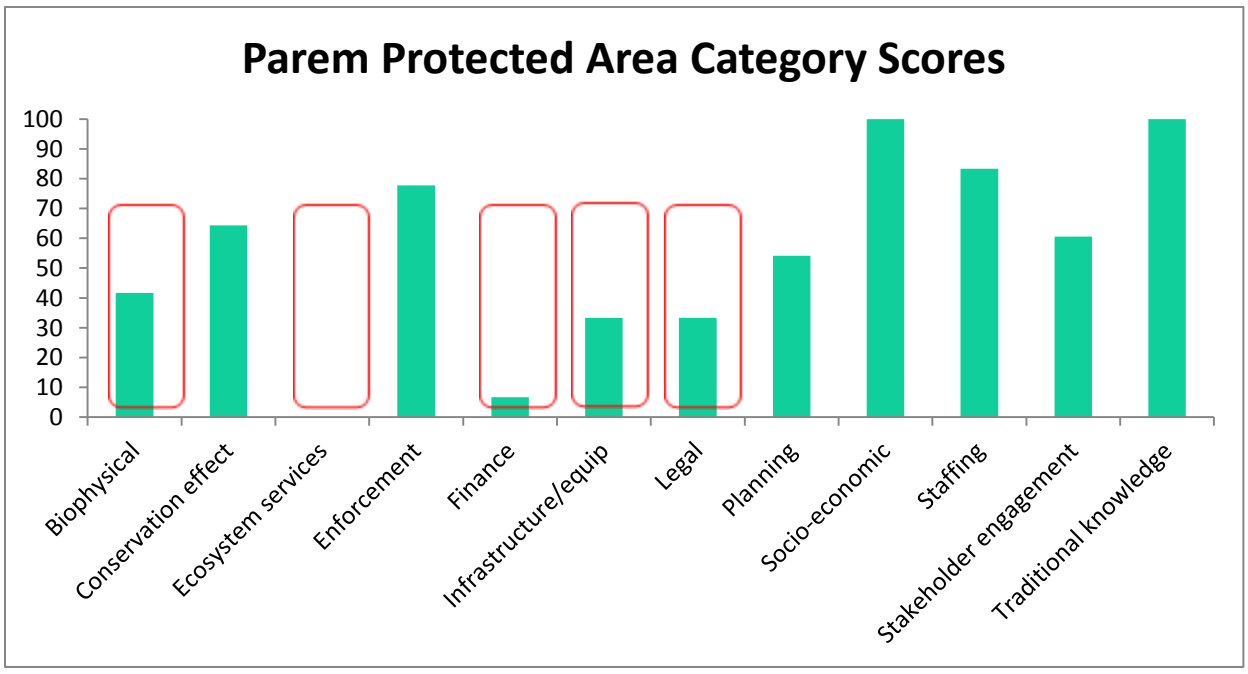


Figure 25. This Figure shows the management level scores for each category of the Parem PA in Pohnpei

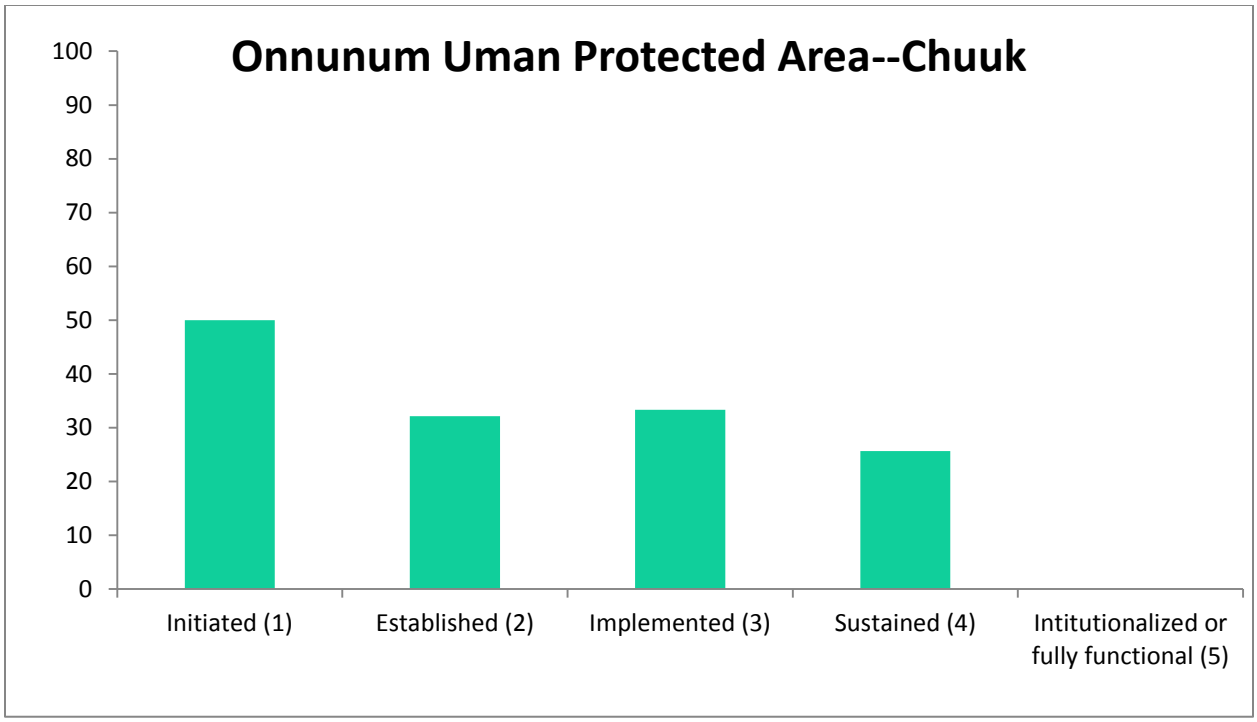


Figure 26. This Figure shows the management level scores for the Onnunum Uman PA in Pohnpei

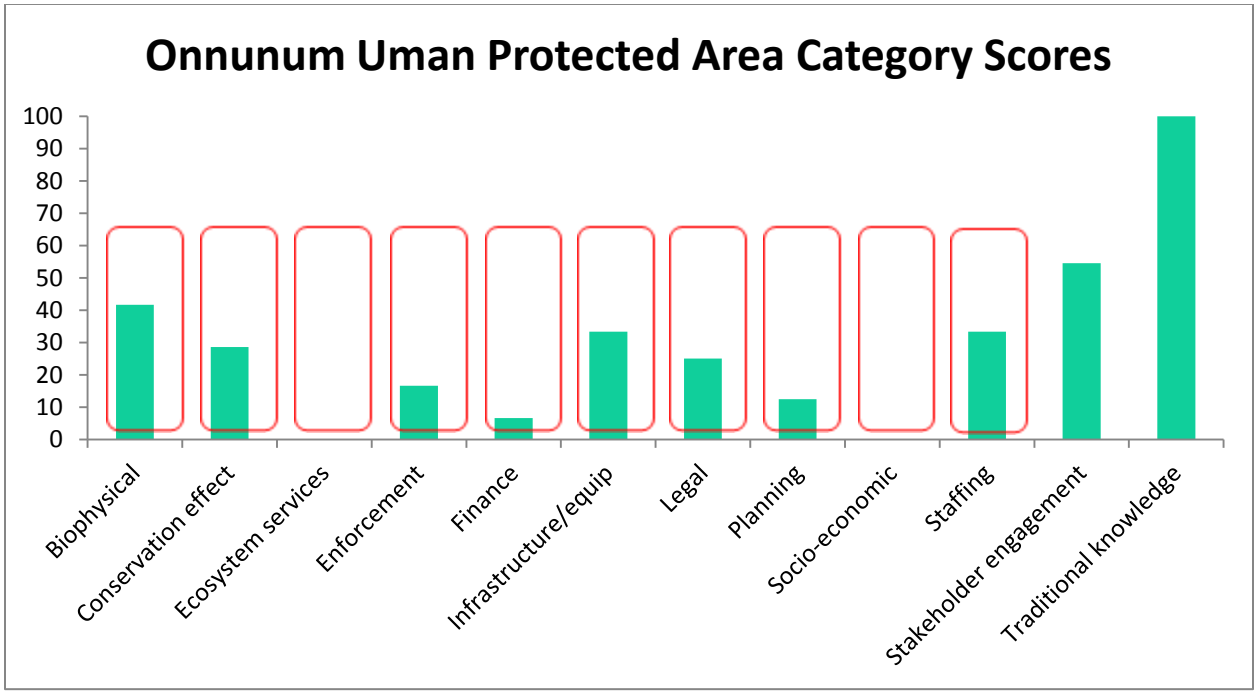


Figure 27. This Figure shows the management level scores for each category of the Onnunum Uman PA in Pohnpei

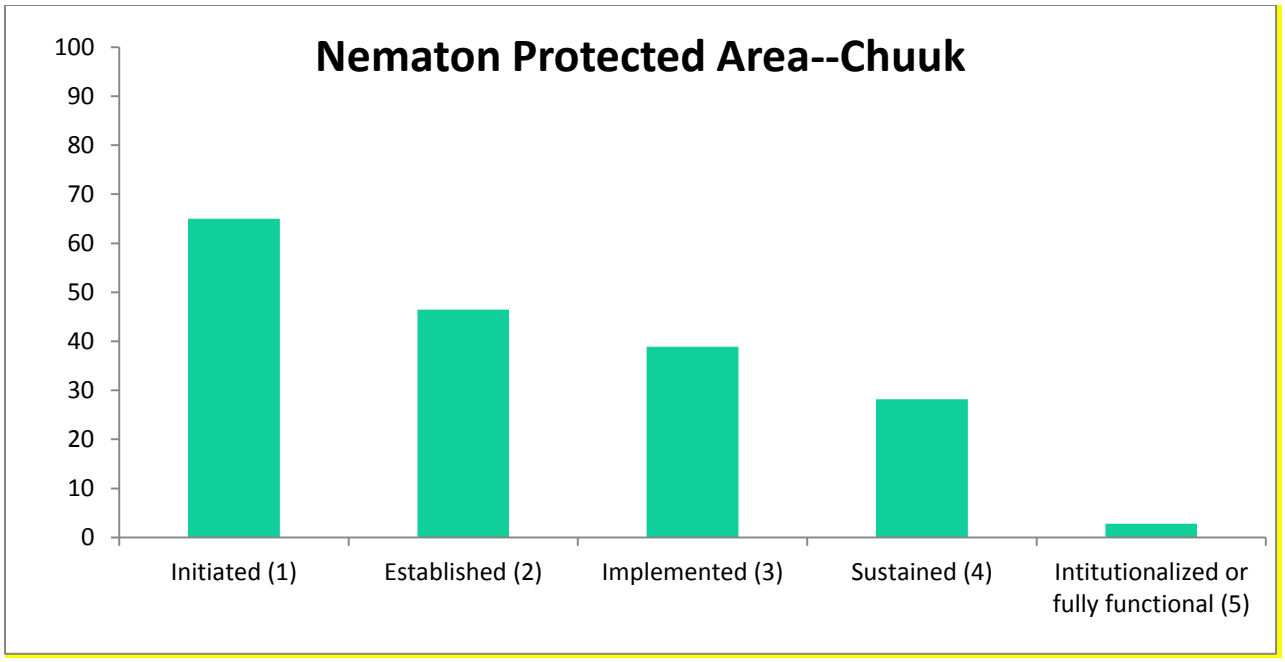


Figure 28. This Figure shows the management level scores for the Nematon PA in Pohnpei

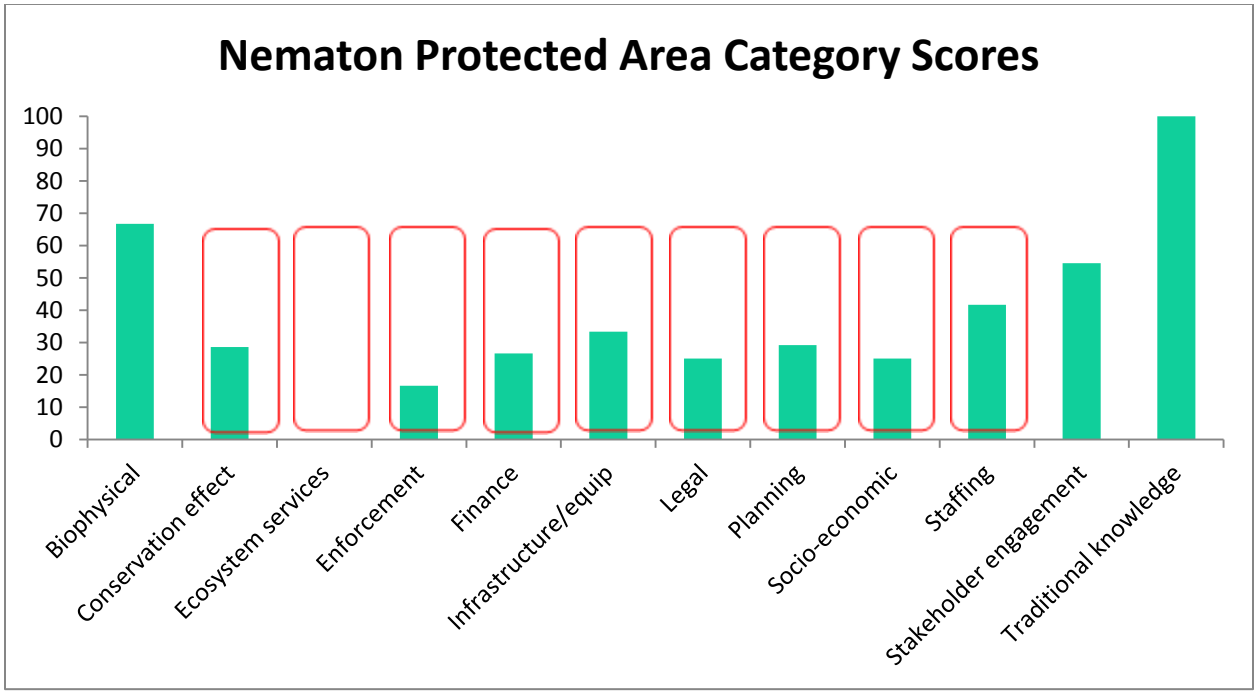


Figure 29. This Figure shows the management level scores for each category of the Nematon PA in Pohnpei

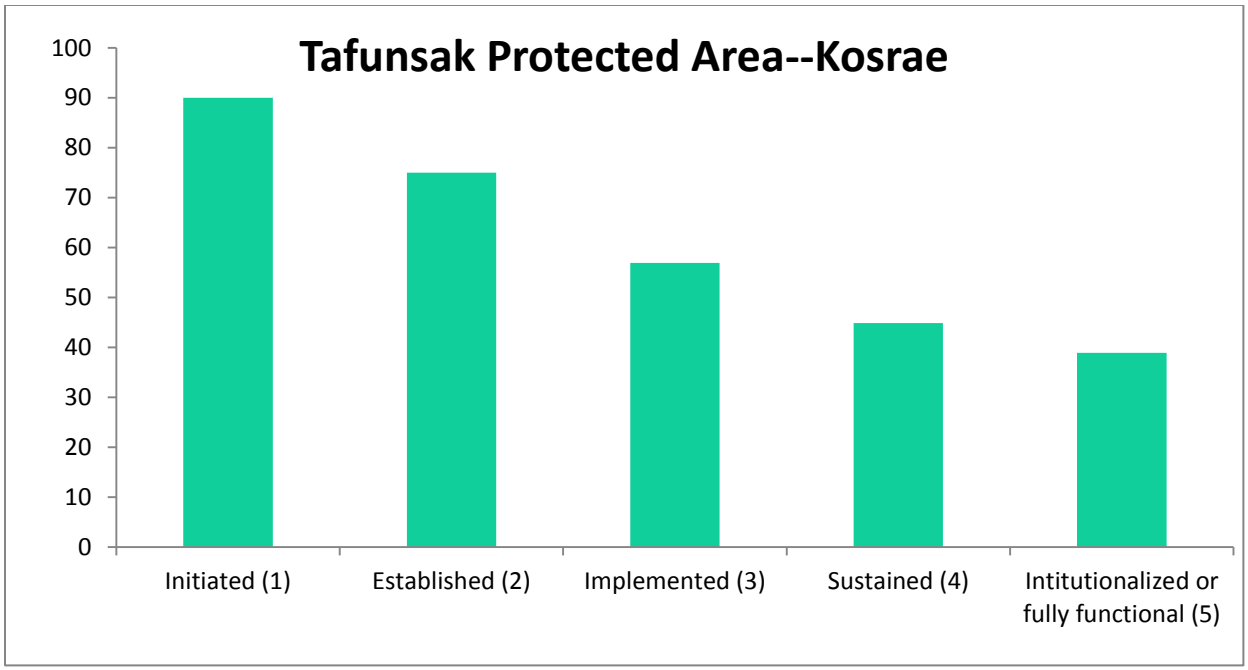


Figure 30. This Figure shows the management level scores for the Tafunsak PA in Kosrae

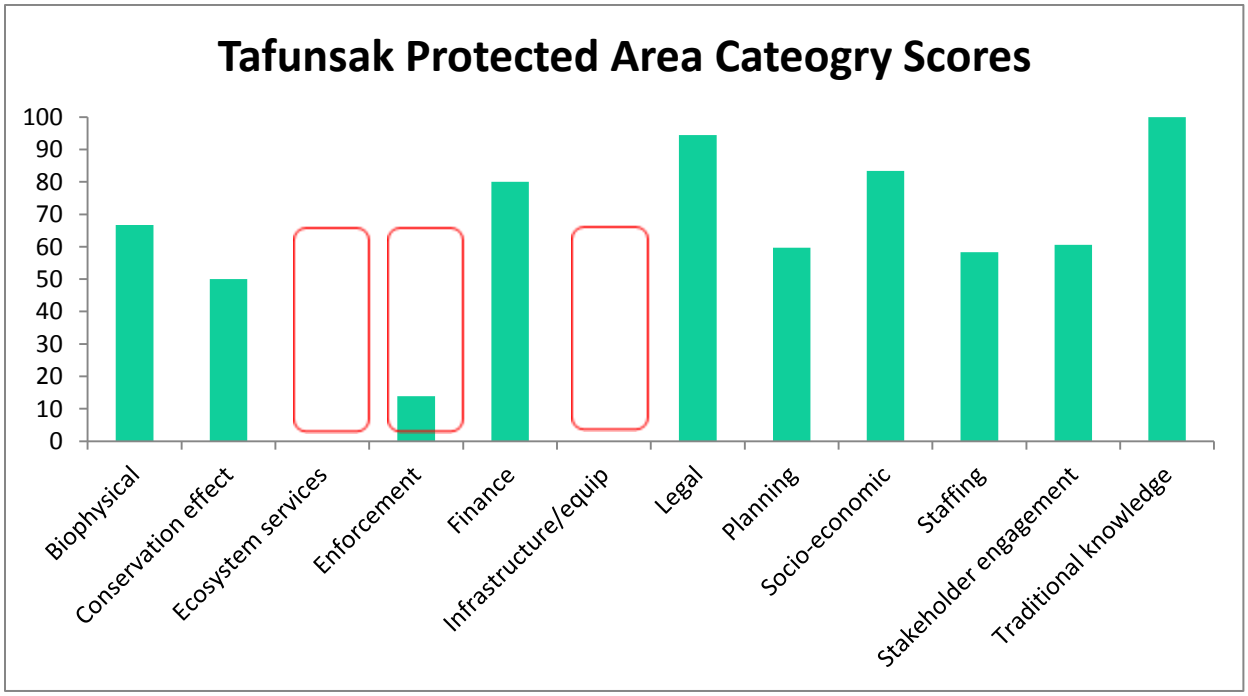


Figure 31. This Figure shows the management level scores for each category of the Tafunsak PA in Kosrae

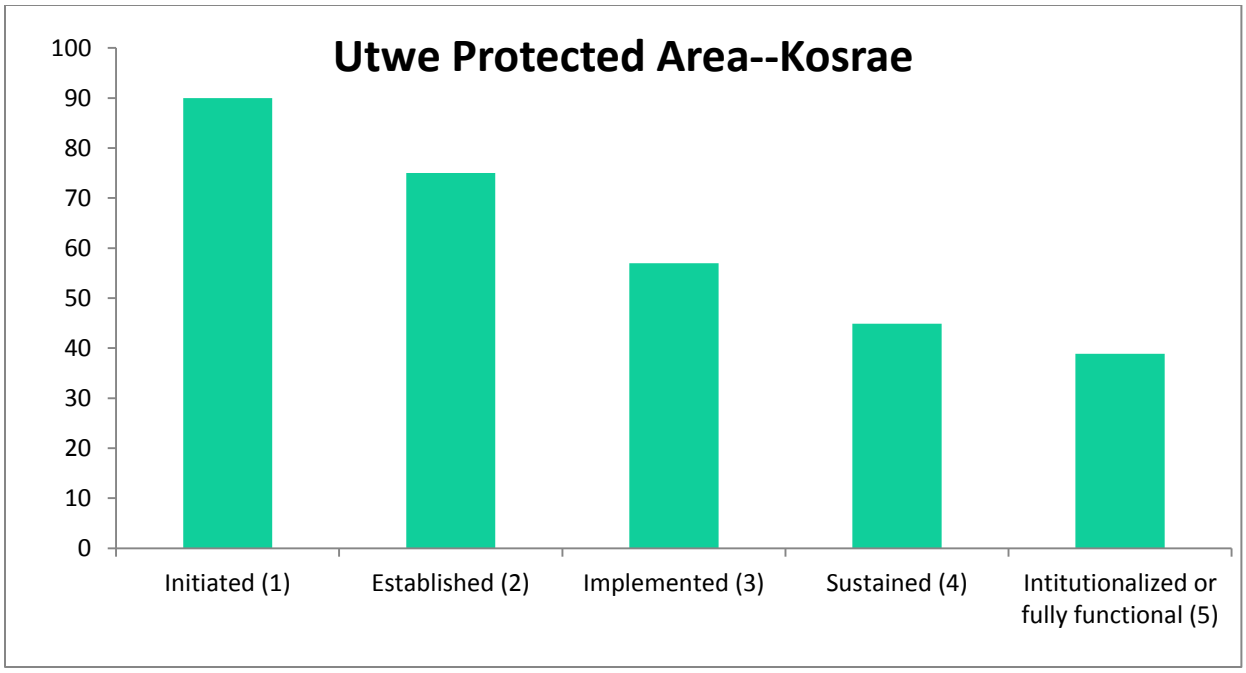


Figure 32. This Figure shows the management level scores for the Utwe PA in Kosrae

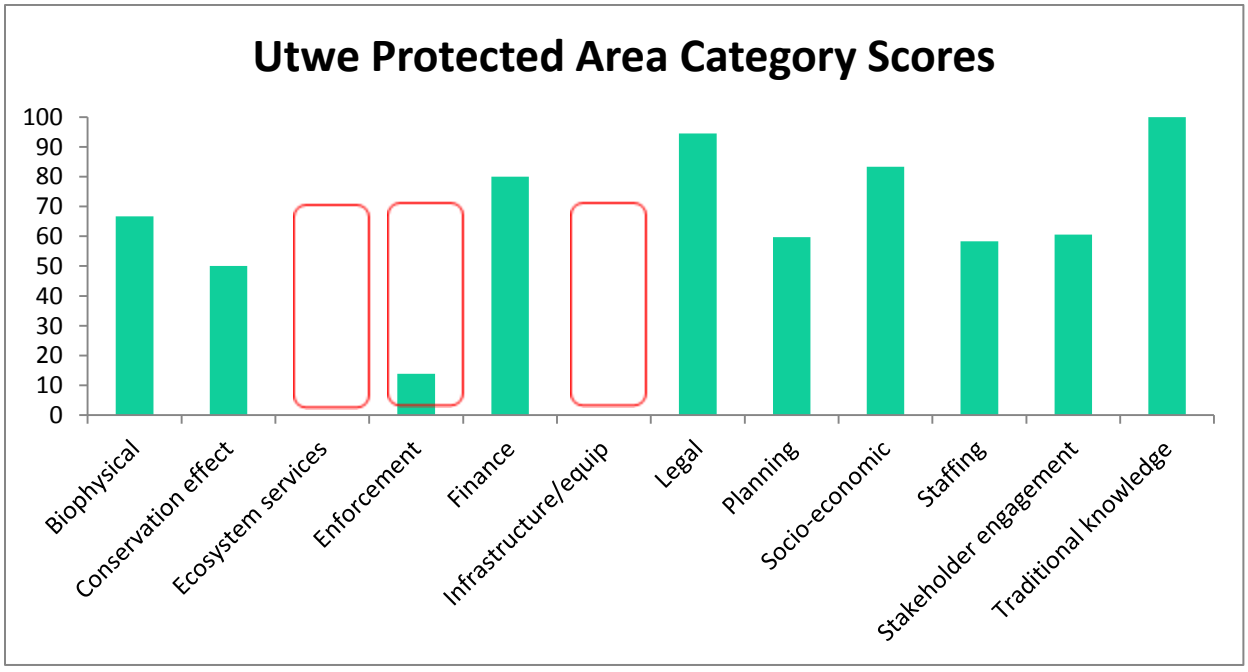


Figure 33. This Figure shows the management level scores for each category of the Utwe PA in Kosrae

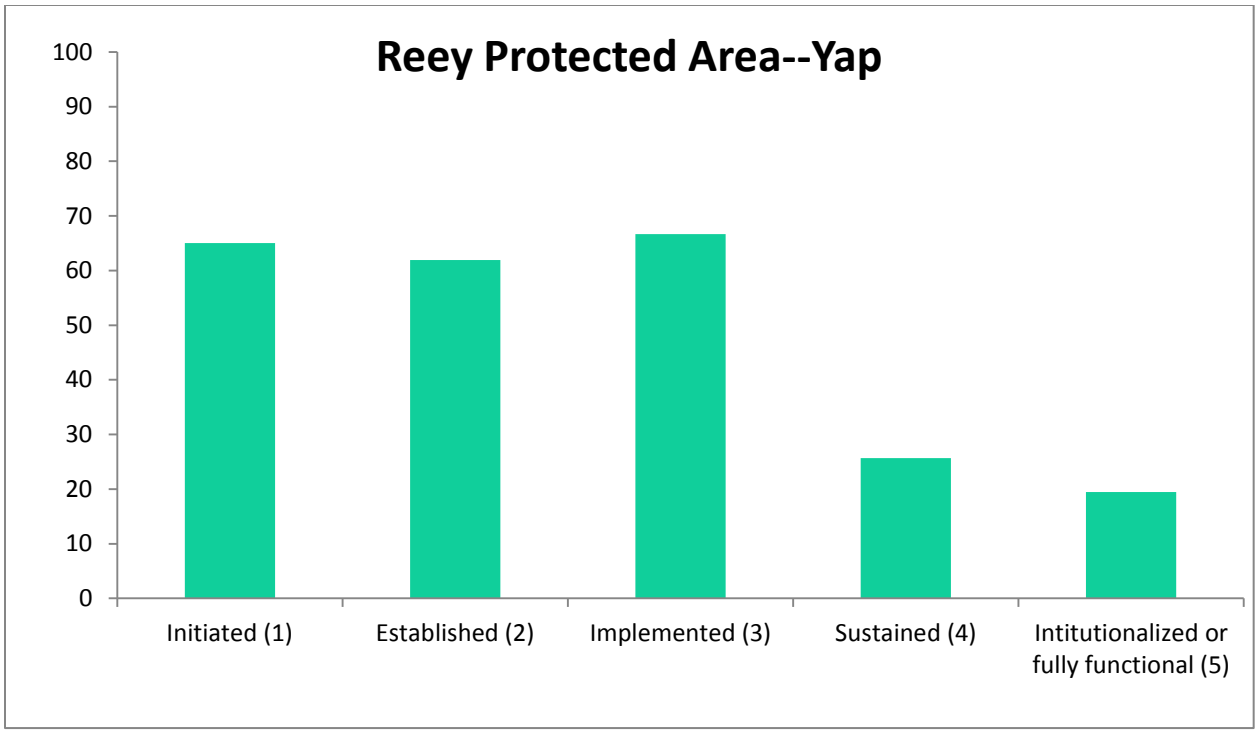


Figure 34. This Figure shows the management level scores for the Reey PA in Yap

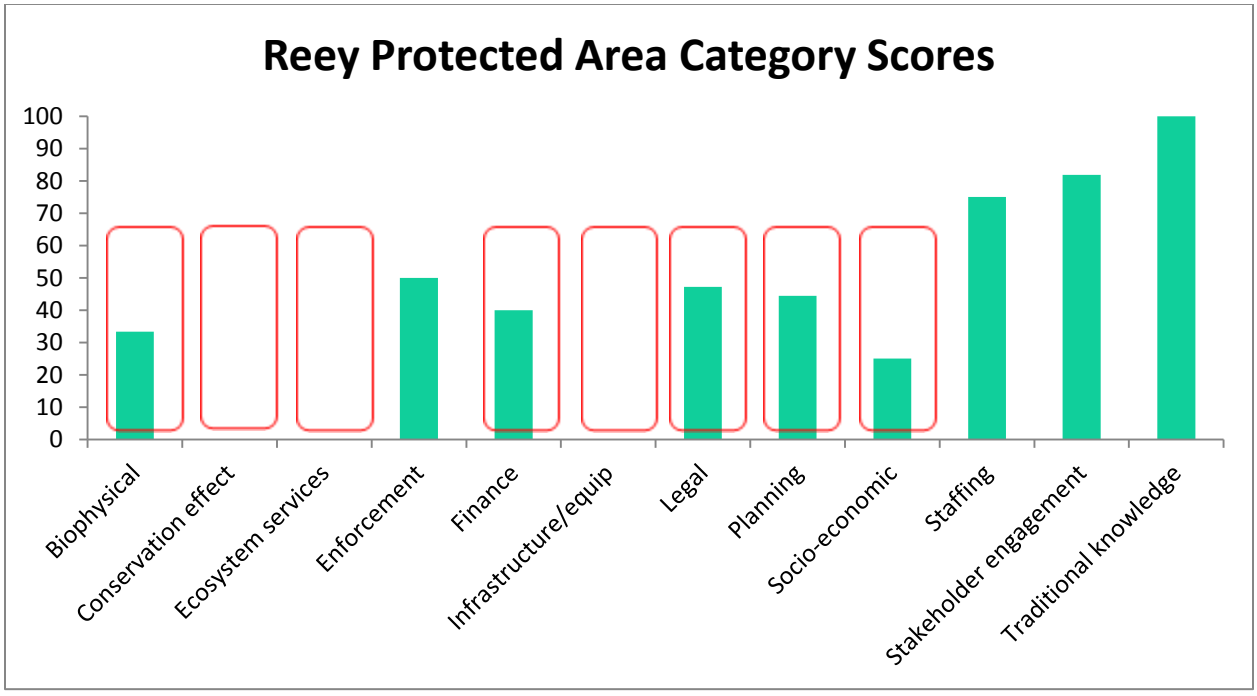


Figure 35. This Figure shows the management level scores for each category of the Reey PA in Yap

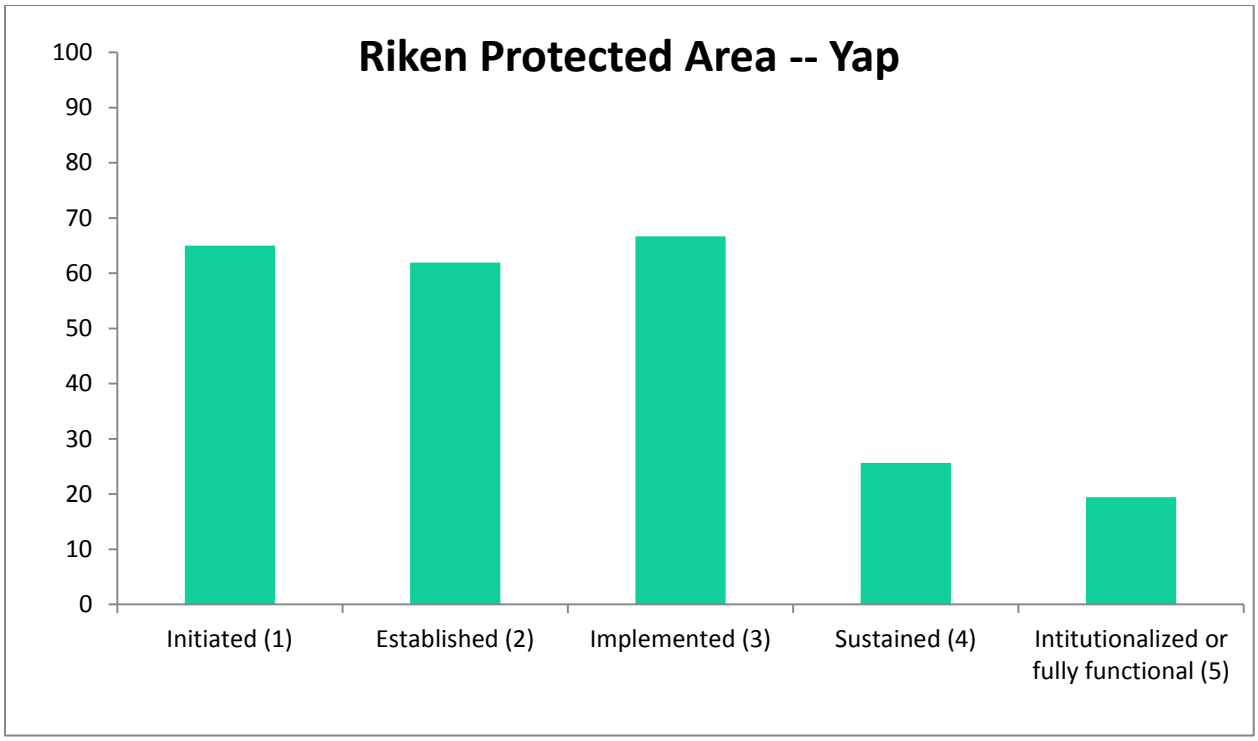


Figure 36. This Figure shows the management level scores for the Riken PA in Yap

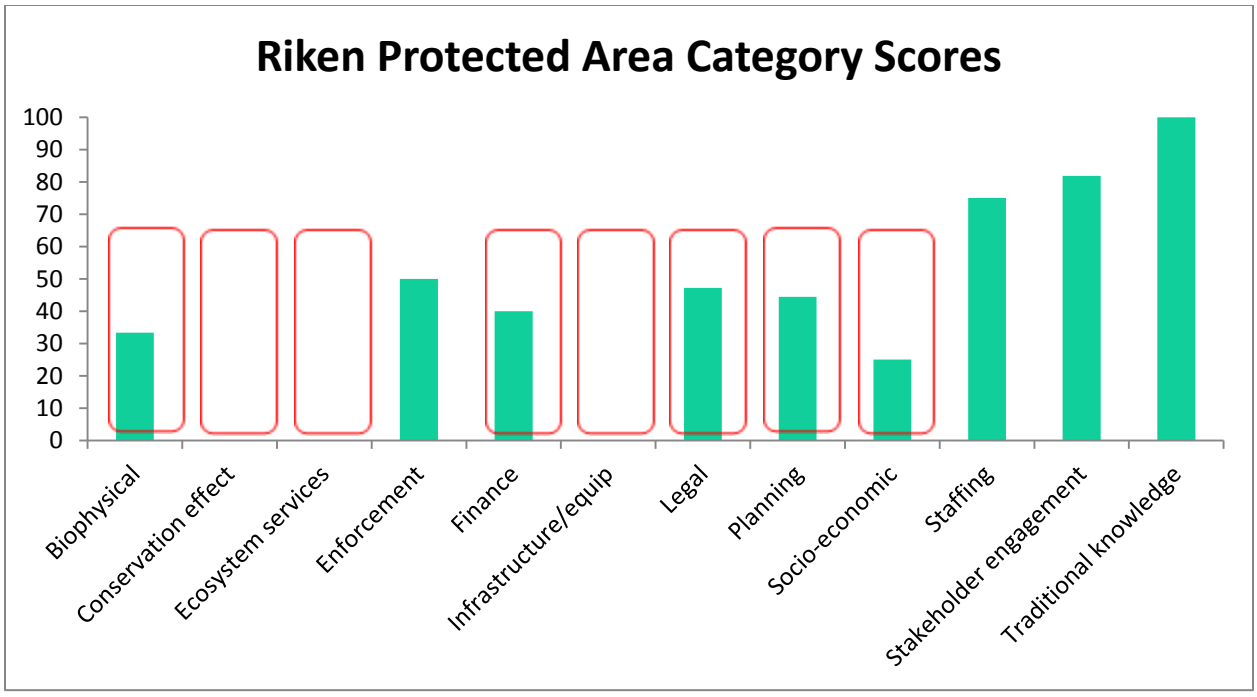


Figure 37. This Figure shows the management level scores for each category of the Riken PA in Yap

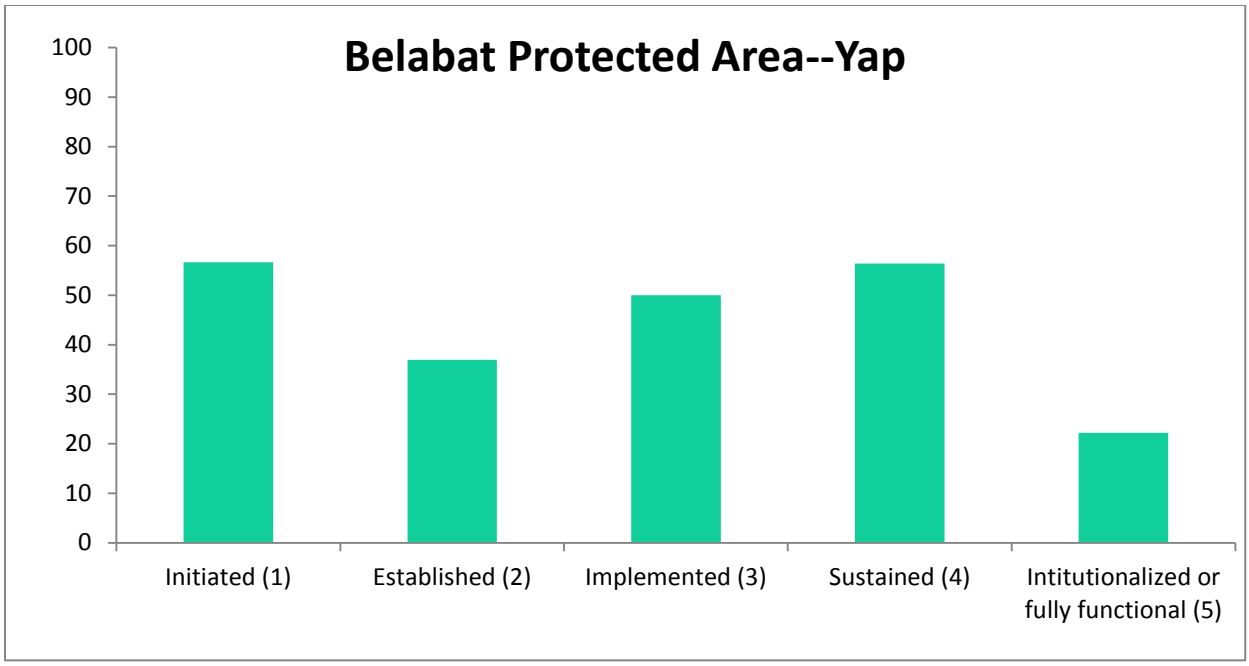


Figure 38. This Figure shows the management level scores for the Belabat PA in Yap

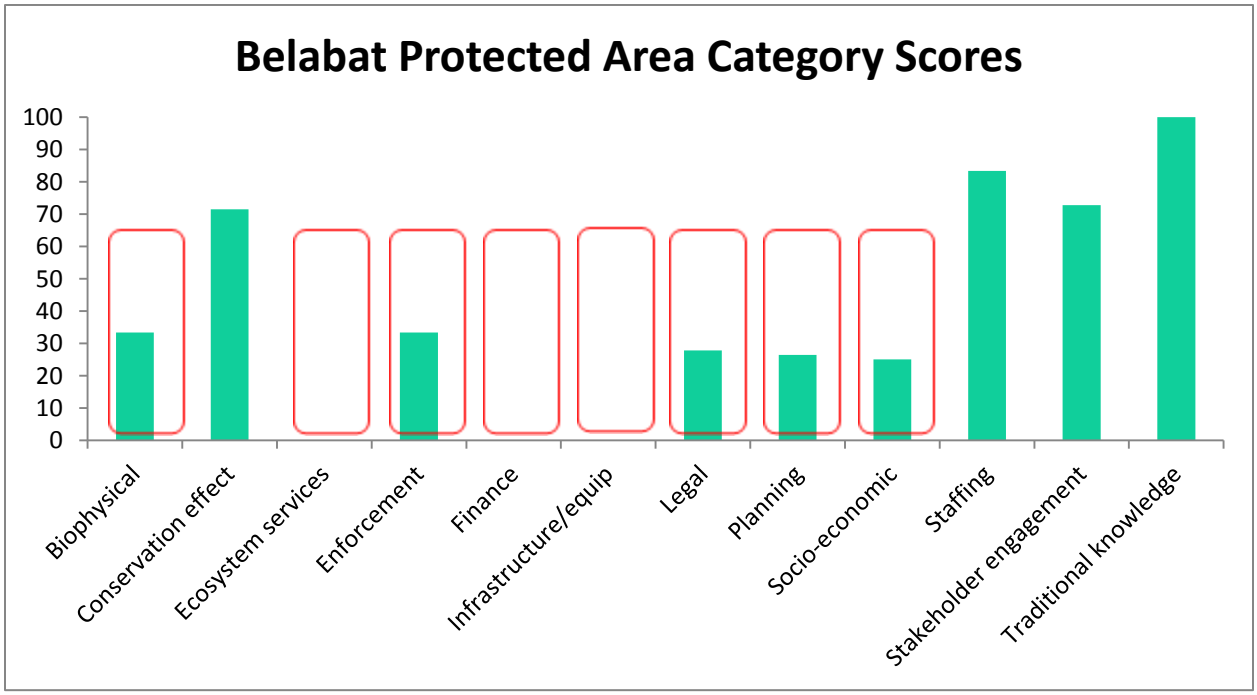


Figure 39. This Figure shows the management level scores for each category of the Belabat PA in Yap

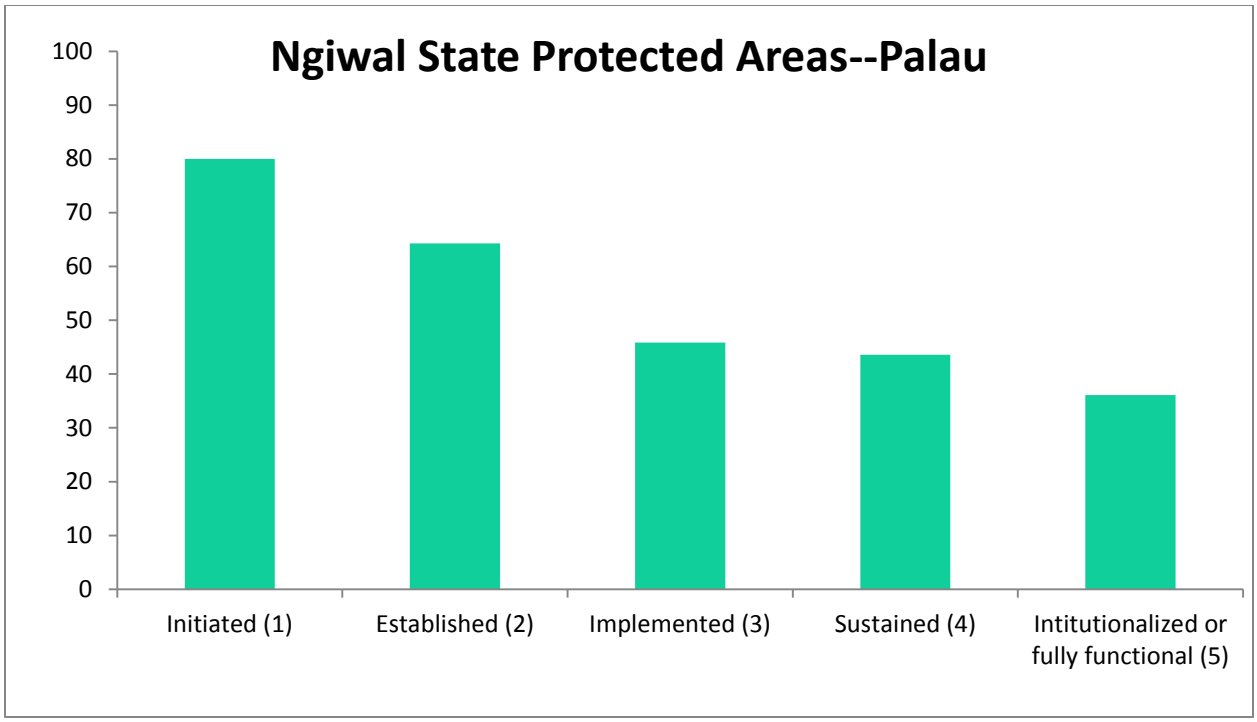


Figure 40. This Figure shows the management level scores of the Ngiwal State Pas in Palau

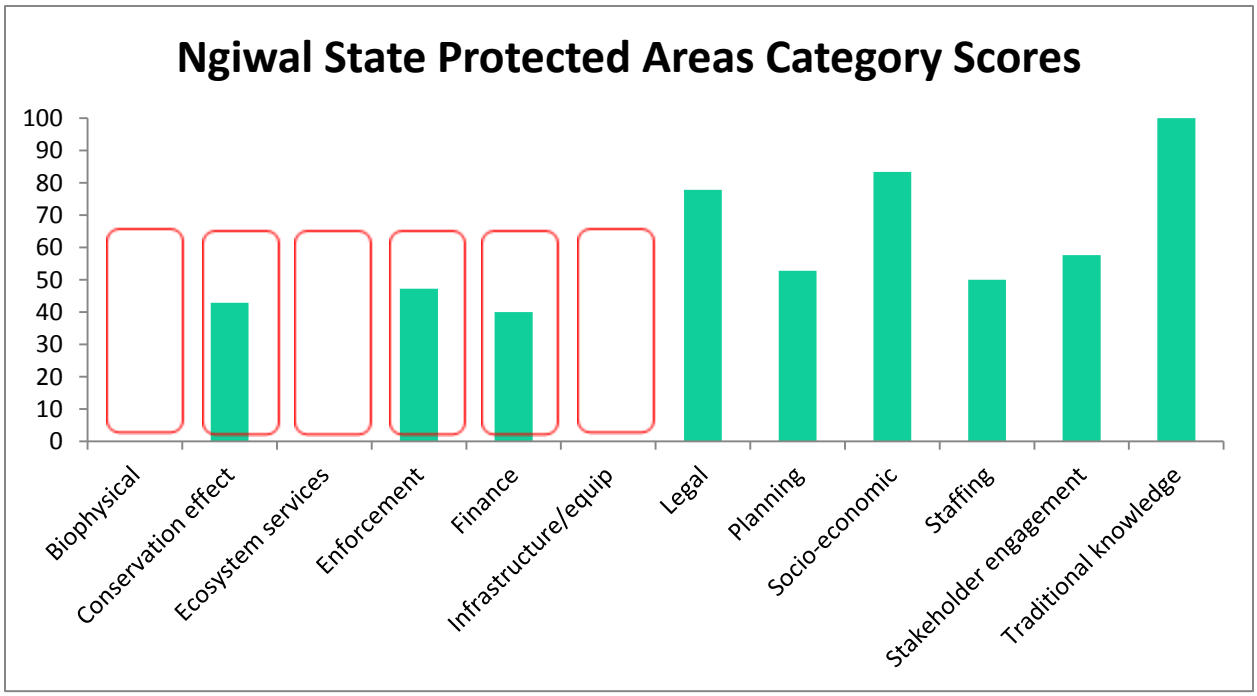


Figure 40. This Figure shows the management level scores for each category of the Ngiwal State Pas in Palau

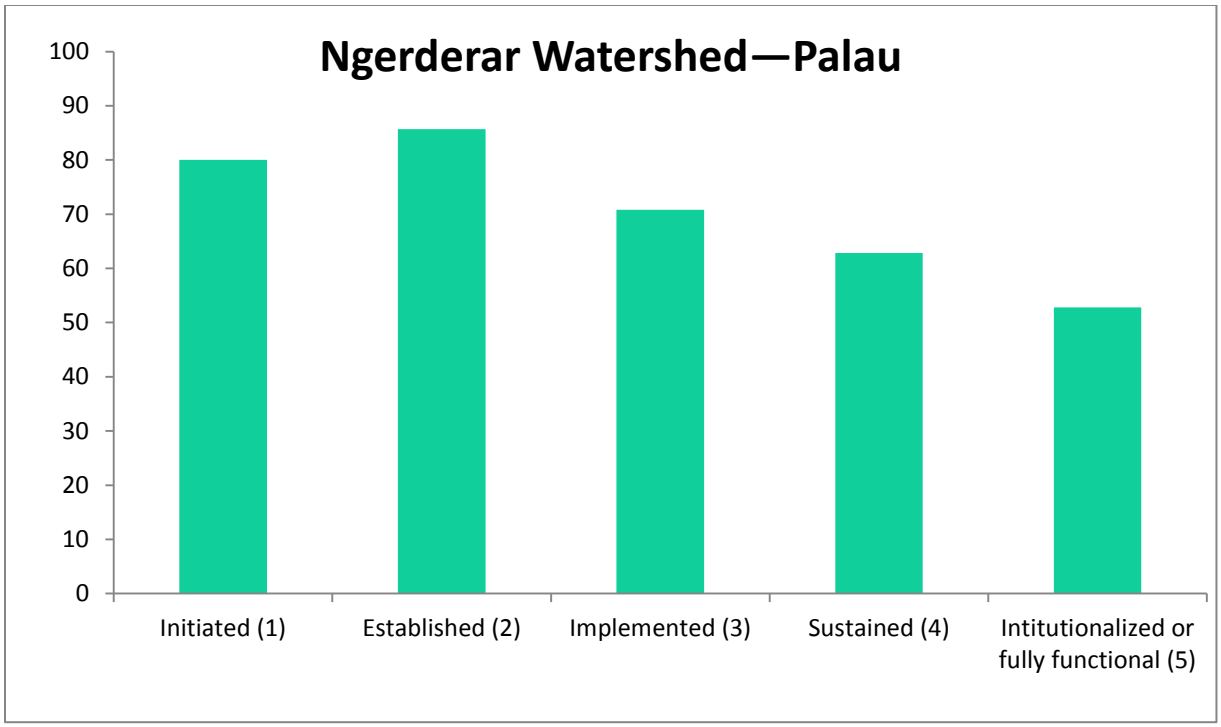


Figure 41. This Figure shows the management level scores for theNgerdarar Watershed

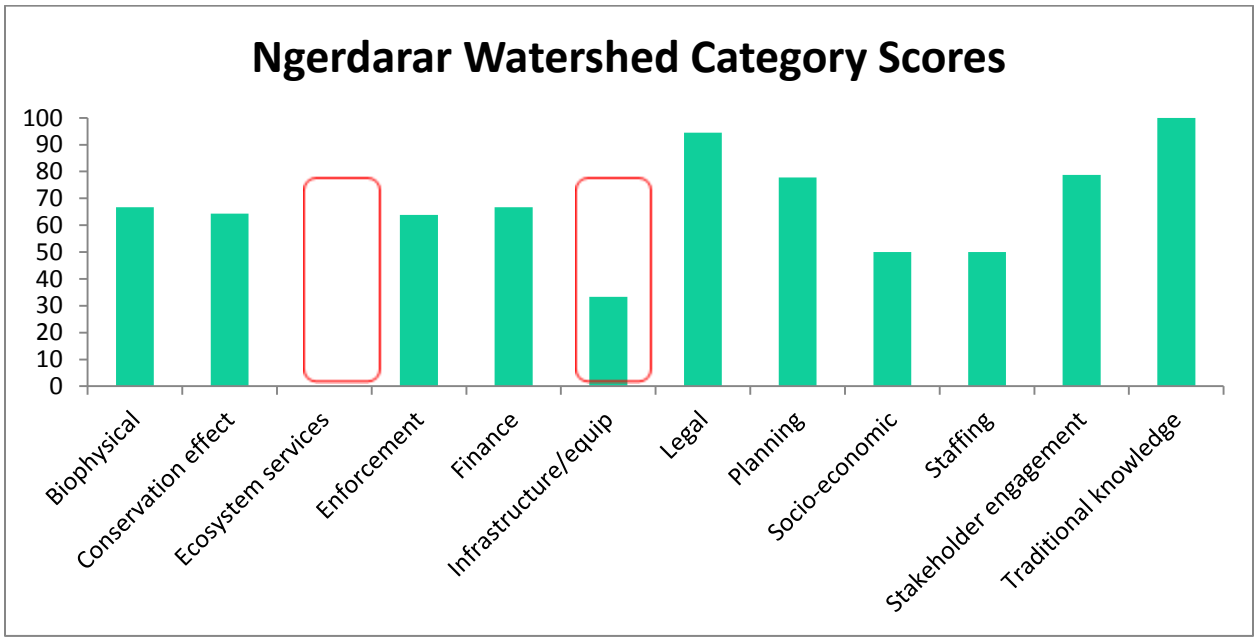


Figure 42. This Figure shows the management level scores for each category of the Ngerdarar Watershed

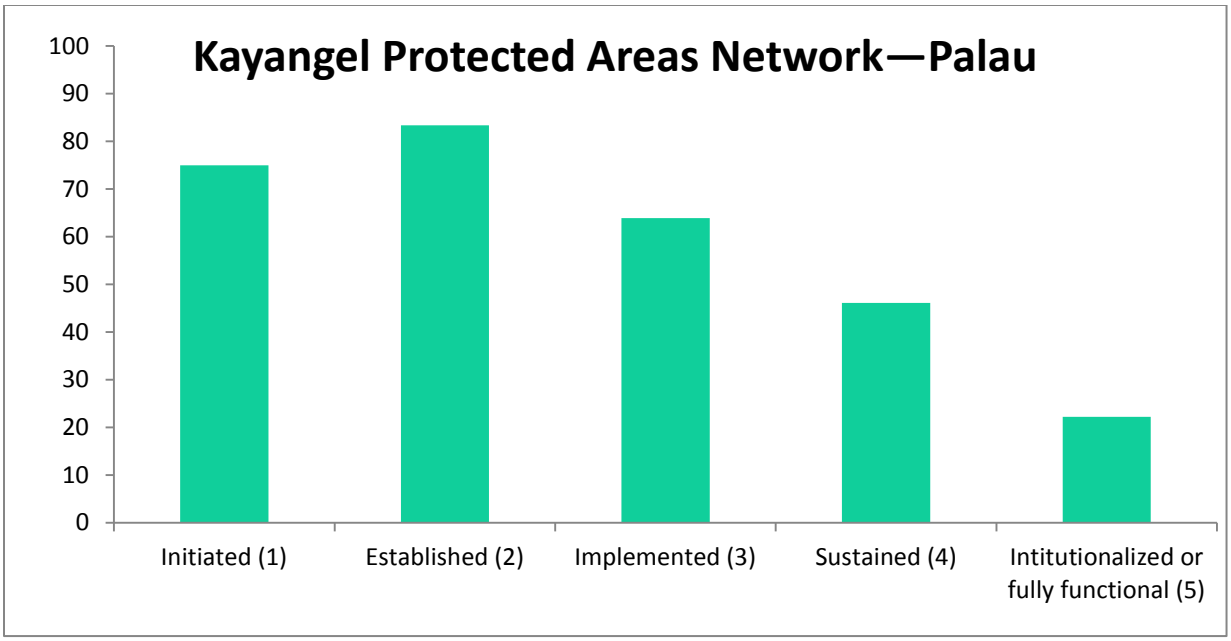


Figure 43. This Figure shows the management level scores for each category of the Kayangel PA Network in Palau

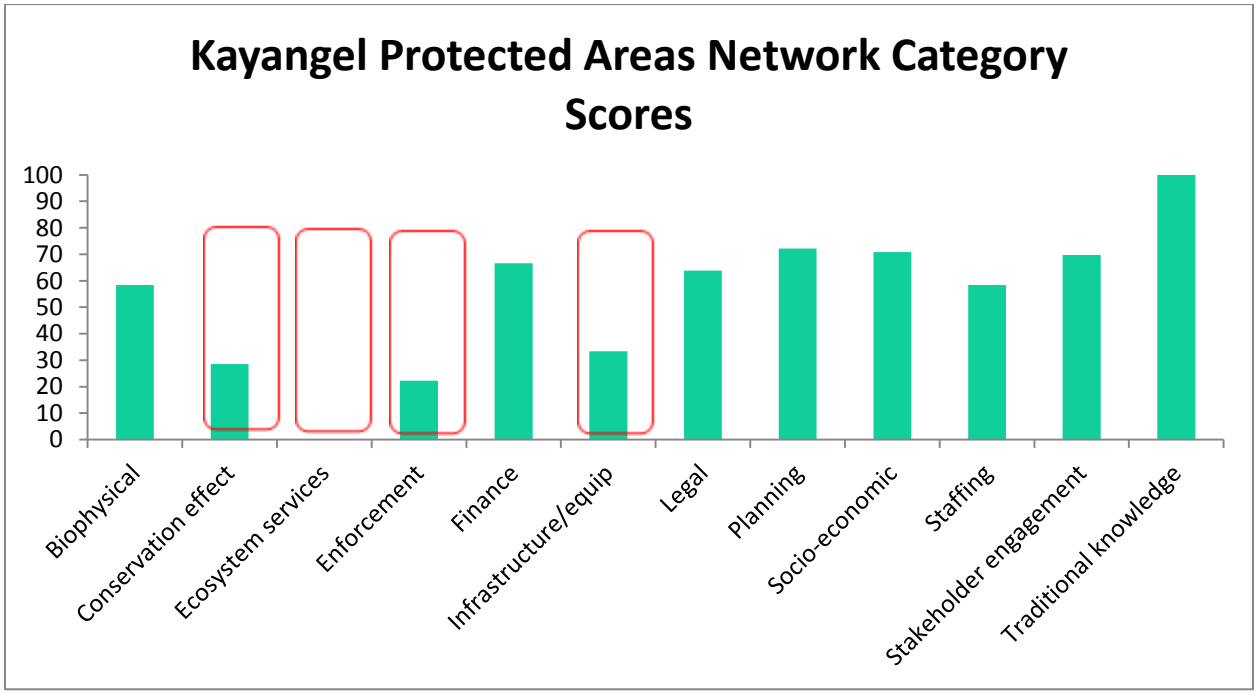


Figure 44. This Figure shows the management level scores for each category of theKayangel PA Network in Palau

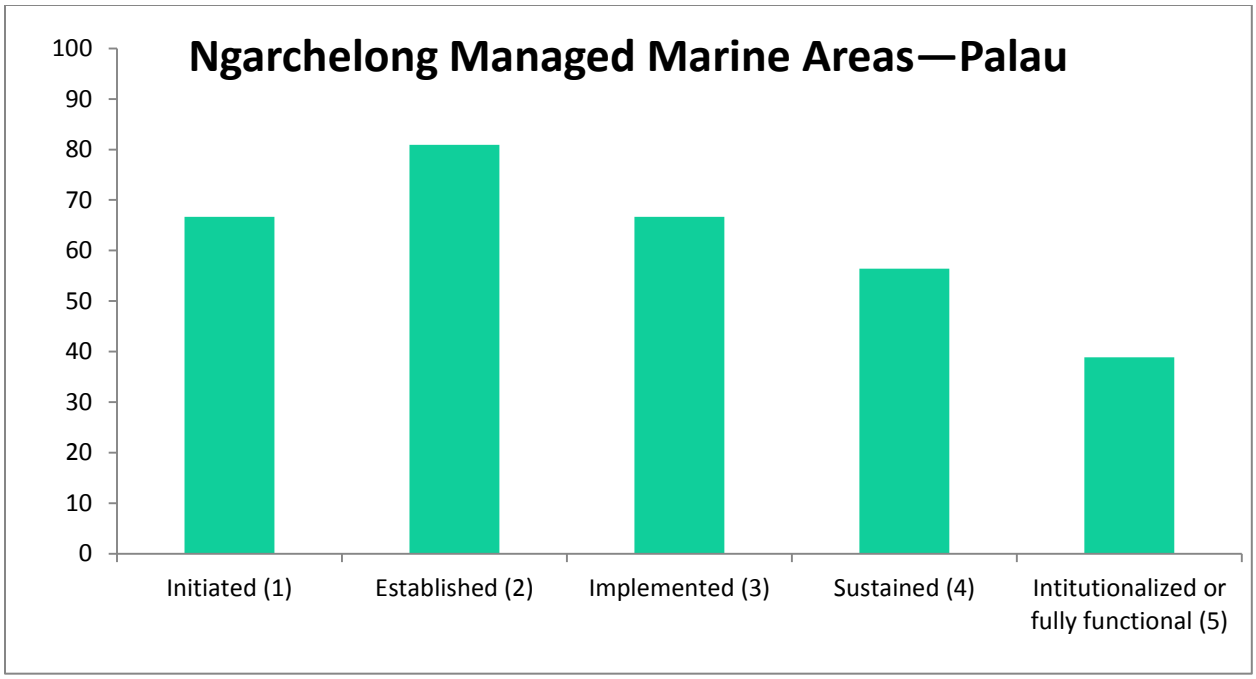


Figure 45. This Figure shows the management level scores for the Ngarchelong Managed Marine Areas of Palau

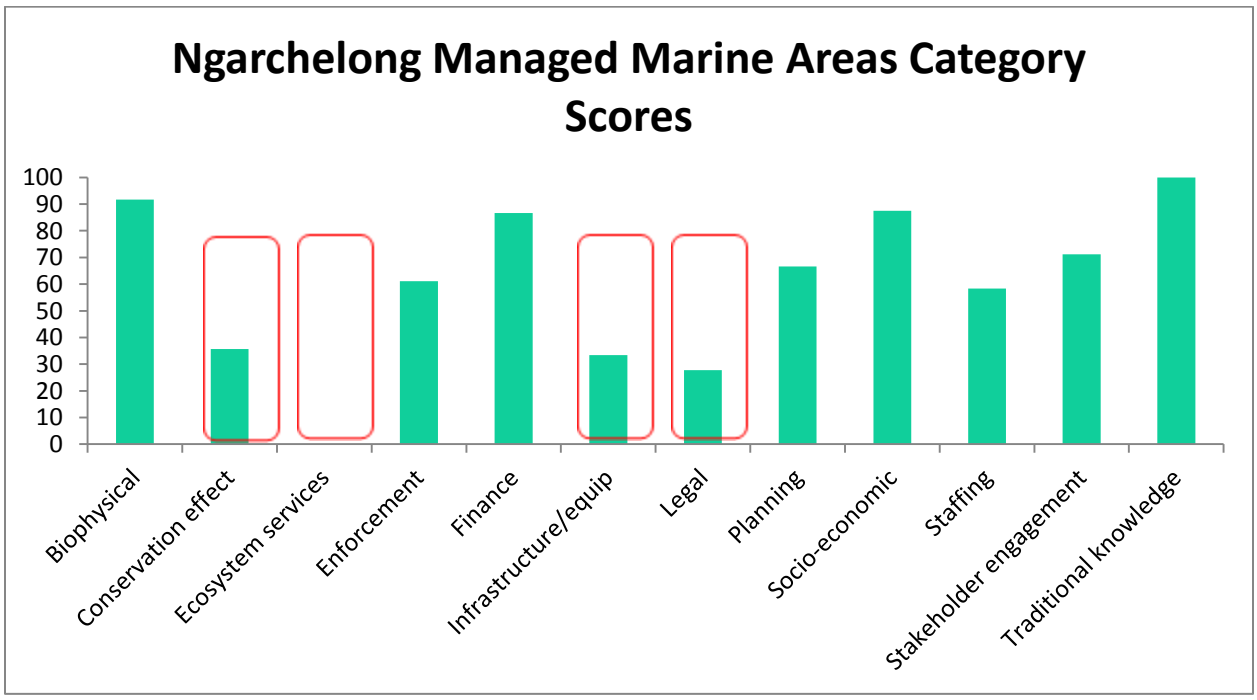


Figure 46. This Figure shows the management level scores for each category of the Ngarchelong Managed Marine Areas

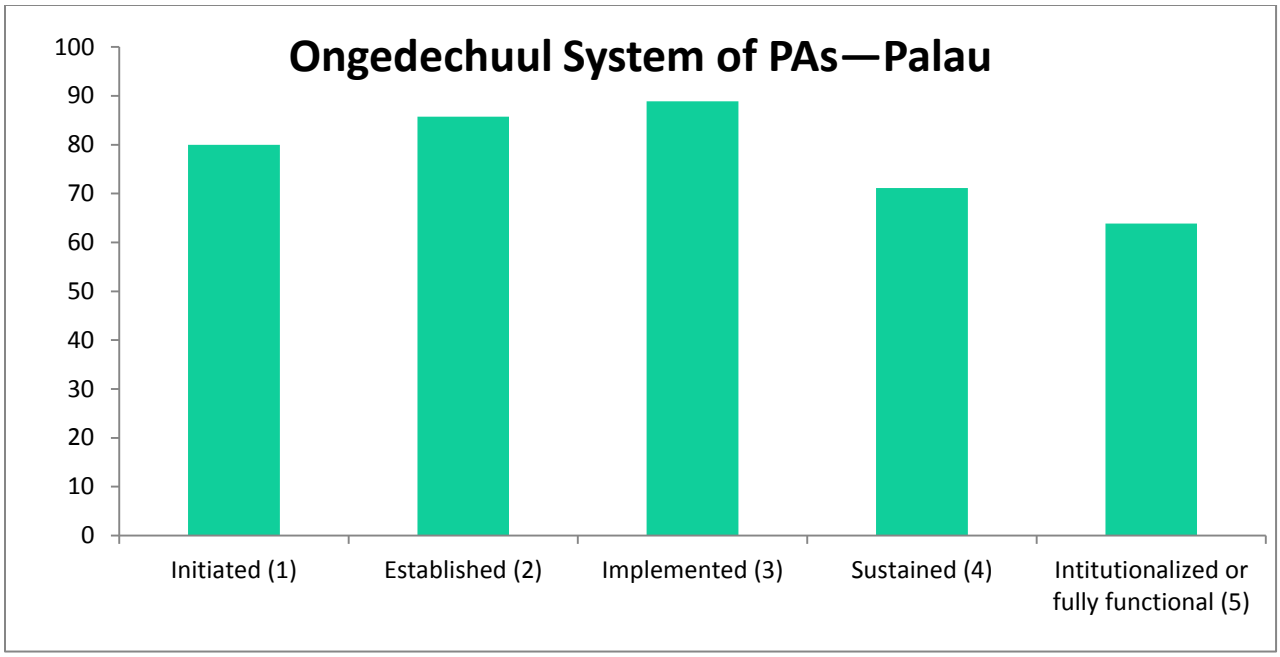


Figure 47. This Figure shows the management level scores for the Ongedechuul System of Pas in Palau

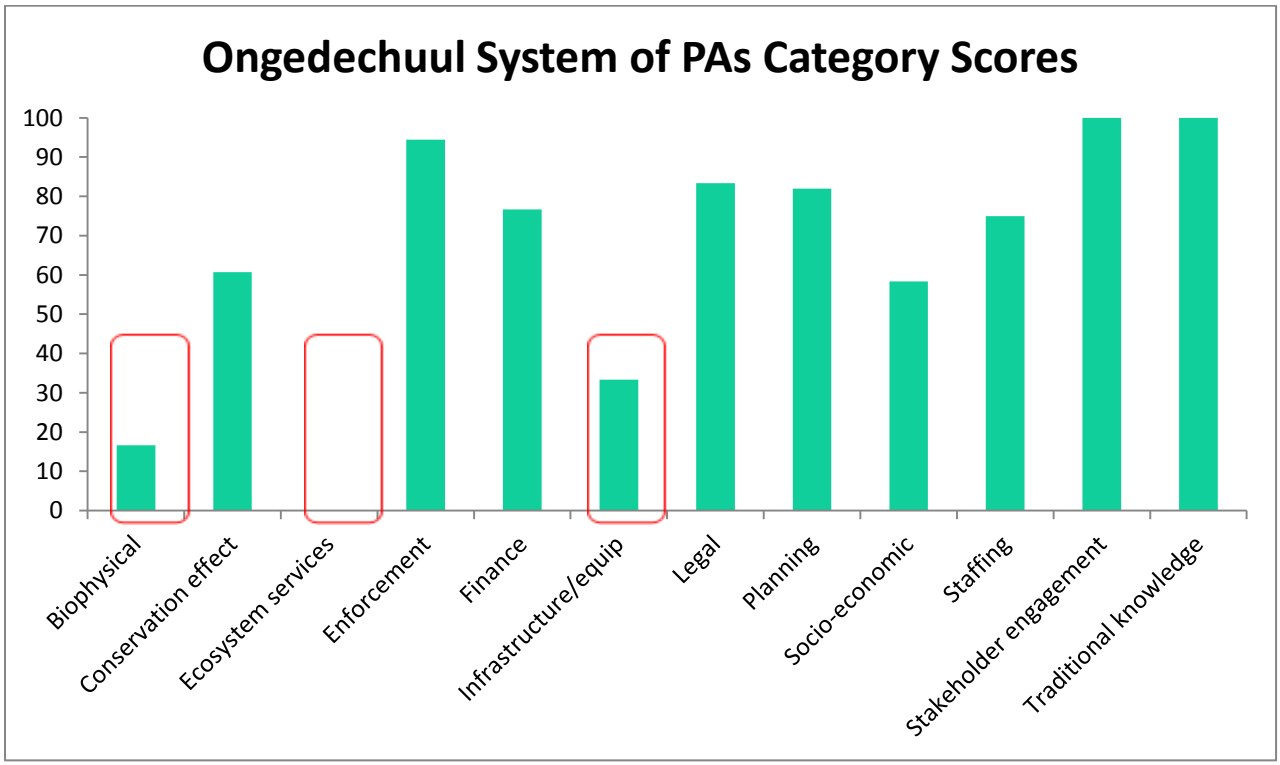


Figure 48. This Figure shows the management level scores for each category of the Ongedechuul System of Pas in Palau