

Management effectiveness: Nusa Penida MPA in authority transition

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Abstract. Amidst the race of establishing a new marine protected area in Indonesia, the management unit experiences challenges that may influence its ability to achieve the promise to safeguard conservation targets and achieve management goals. The qualitative method applied in this Nusa Penida MPA case study describes the changes in management effectiveness level over the five years of the governance transition. Data were collected through observation, interviews, review documentation, and archives. This study applied the Indonesia MPA Management Effectiveness Evaluation tool launched in 2012 to measure progress over the observation period. This study showed that the governance transition from district-managed to provincial-managed MPA over 2013–2017 Nusa Penida MPA in the Bali Province influences its management effectiveness performance, particularly its ability to achieve output and outcome of MPA management. We found that MPA personnel capacity to interpret the tool itself, poor record and incomplete information transfer will influence the overall score and follow-up for adaptive management. Furthermore, the evaluation tool could not indicate which management aspect may need further action for improvement by which stakeholder for adaptive management.

Key Words: governance, management effectiveness, marine protected area.

Introduction. Countries that supported the Convention on Biodiversity (CBD) since 2010 have raced to protect biodiversity in terrestrial and marine realms. CBD Aichi Target 11 under the Strategic Plan for Biodiversity 2011-2020 states the call for conserving "at least 10 percent of all coastal and marine areas by 2020" (Secretariat of CBD 2010). The World Park Congress in Sydney 2014 strengthened the case of securing coastal and marine waters covering coastal waters and the high seas and of increasing the coverage, allowing for reversing biodiversity loss trends (Ibrahim et al 2014). The IUCN Congress release stated the need to set an ambitious target to preserve 30% of marine areas by 2030 through binding legislation (Lubchenco & Grorud-Colvert 2015). Along the process, the Sustainable Development Goal set the target to achieve Goal 14 of SDG 14 on Life below Water mission to "conserve and sustainably use the oceans, seas and marine resources for sustainable development" by 2030 (United Nations 2015). Indonesia SDG Goal 14 sets for 32.5 million ha of marine protected area (MPA) or equal to 10 percent of the total marine area of Indonesia (Bappenas 2020; Rusandi et al 2021).

Marine protected area (MPA) has been considered an effective remedy to ecosystem degradation, it sustains fisheries, and provides a home for species acting as a refuge when managed effectively (Halpern 2003; Halpern et al 2010; Edgar et al 2014; Watson et al 2014; Velez et al 2014; Lubchenco & Grorud-Colvert 2015; Boonzaier & Pauly 2016). It is also one of the best investments people can make for the future (Ibrahim et al 2014), as it potentially benefits local communities and impacts positive well-being outcomes (Bennett & Dearden 2014; Ban et al 2019). Furthermore, MPAs which are no-take and well-enforced will have higher total biomass (Edgar et al 2014; Geldmann et al 2015; Lubchenco & Grorud-Colvert 2017; Hilborn 2018). Establishing MPA would require management in place, and over time, the effectiveness of MPA management needs to be monitored, particularly the MPA's ability to achieve its

management objectives (Hockings et al 2000; Pomeroy et al 2005; Hockings et al 2006; Pendleton et al 2018). Earlier studies on protected area management effectiveness in the world showed deficiencies in some management cycle elements, producing low management effectiveness (Burke et al 2011; Jones 2014; Coad et al 2015; Lubchenco & Grorud-Colvert 2017). Inability to define management objectives from the beginning leads to difficulties in measuring progress (Pendleton et al 2018). With limited staff capacity and resources, many MPAs did not meet the standard for effectiveness and equitability (Gill et al 2017). With the growing numbers and coverage of MPA, the quality of MPAs remains questionable (Coad et al 2015; Geldmann et al 2015).

Management effectiveness relates to three aspects to define successful MPA management, namely governance, biophysics, and socioeconomics (Pomeroy et al 2004; Carter et al 2011). The governance aspect plays a pivotal role in determining the context, planning, and input category of management effectiveness framework, while the two others determine management process, output, and outcome (Hockings et al 2000; Hockings et al 2006; Carter et al 2011). Management effectiveness covers three key components, namely design issue which relates to the value of individual sites and its comparative value with other protected area systems, appropriateness or adequacy of the management system and process, and delivery of protected area objectives (Hockings et al 2000; Hockings et al 2006; Cook et al 2014). Evaluation on design issues is linked to context and planning of the management cycle, the appropriateness or adequacy component connects with input and process, while the delivery of objectives lays on output and outcome components (Hockings et al 2000; Hockings et al 2006; Cook et al 2014). Implementation of current policies and regulations affects MPA in achieving the desired outcome (Agardy 2000; Kenchington et al 2003; Arceo & Granados-Barba 2010).

There are available methods for measuring management effectiveness based on the International Union Conservation of Nature (IUCN) World Conservation Protected Area Framework, such as the Management Effectiveness Tracking Tool (METT), the WWF Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) (Ervin 2003), the World Bank Scorecard to assess progress in achieving management effectiveness goals for marine protected areas (Staub & Hatzioolos 2004), or the Guide for Improving Marine Protected Area Management Effectiveness in Indonesia (Carter et al 2011). The Indonesia Ministry of Marine Affairs and Fisheries developed a tool for evaluating management effectiveness called Management Effectiveness Evaluation for Marine Protected Area, Coastal, and Small Islands (Efektivitas Pengelolaan Kawasan Konservasi Perairan, Pesisir, dan Pulau-Pulau Kecil/EKKP3K) (Directorate for Conservation of Area and Fish Species 2012).

To evaluate progress over time, MPA authority needs to conduct regular analyses at regular intervals (Stolton et al 2007; Leverington et al 2010). Little is known about regular evaluation on management effectiveness in the South East Asia context (Kamil et al 2017). This study evaluates the management effectiveness progress over the period of authority transfer from district to provincially-managed MPA from 2013 to 2017 and to explore effectiveness progress based on the IUCN WCPA management effectiveness framework components adopted from Hockings et al (2000, 2006) for better-informed protected area management.

Material and Method

Description of the study sites. This study was conducted at Nusa Penida MPA, Klungkung District, Bali Province, Indonesia from November 2016 to December 2017. The MPA is located 15 nautical miles off the coast of Bali Island. The Nusa Penida archipelago consists of Nusa Lembongan, Nusa Ceningan, and Nusa Penida. The three islands can be easily accessed by public transportation from 5 points on the east coast of Bali mainland, which are Sanur, Benoa Port, Kusamba, Tanjung Benoa, and Padang Bai. Prior to 2014, all MPAs located below 12 nautical miles were managed by the district government (Nugraha 2021). The Klungkung District Government proposed the area as a marine protected area in 2010 and the area was officially enacted in 2014 through the Ministry of Marine Affairs and Fisheries Regulation. The MPA was originally a district-

managed MPA that experienced the transition to province-managed MPA due to the Local Government Law No. 23 the year 2014. The establishment process of Nusa Penida MPA has brought the management authority, the Klungkung District Government, to receive the E-KKP3K Award in 2013, with the category Pilot Site, and in 2015 with the category Accelerated Site (KKJI 2015). In addition, the area was assigned as a Blue Economy pilot project in 2015. Nusa Penida MPA covers a total area of 20054 ha (Ministry of Marine Affairs and Fisheries 2014). It has a zoning system in place consisting of Core Zone, Sustainable Fisheries Zone, Utilization Zone, and Other Zones (Figure 1).

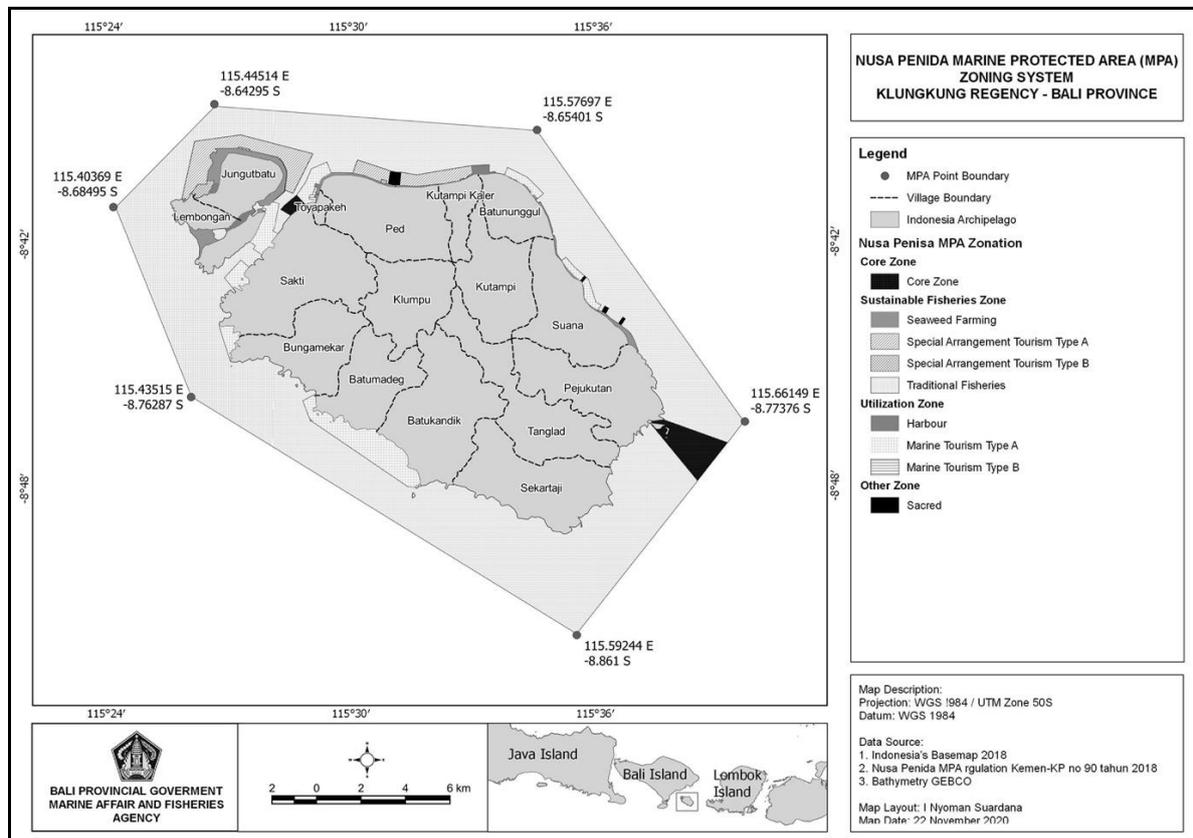


Figure 1. Map of Nusa Penida Marine Protected Area in Klungkung District, Bali Province, Indonesia.

Method. We conducted a qualitative descriptive case study research on MPA management effectiveness status over a five-year period in the Nusa Penida MPA. The triangulation data analysis, including document review and analysis, direct observation, and manual measuring instruments using EKKP3K were involved in this study. We made use of secondary data resources including local and national decrees, white papers, publications, technical and activity reports produced by MPA management units, and primary partners produced in 2013-2017. There were 17 evaluation criteria in EKKP3K, which translated into 74 questions. The tool development included the adoption of the scorecard method and included five MPA stages of initiation, establishment, managed minimally, managed optimally, and managed effectively and functional. The EKKP3K questionnaires are clustered into five levels of color-coded rating from the lowest to highest as follows: level 1 (red), level 2 (yellow), level 3 (green), level 4 (blue), and level 5 (gold) with each stage having 8, 11, 21, 28, and 6 questions, respectively (Table 1). E-KKP3K performed on a building blocks system to achieve the next level; a hundred percent mark should be gained at one level. The building blocks system limits the recognition on MPA management effectiveness achievements, unless the lesser level achieves 100 percent mark (Directorate for Conservation of Area and Fish Species 2012).

Table 1

Level of the conservation area and total questions per level in EKKP3K (Directorate for Conservation of Area and Fish Species 2012)

<i>Level</i>	<i>Stage</i>	<i>Number of questions</i>
Red (1)	Conservation Area Initiated	8
Yellow (2)	Conservation Area Established	11
Green (3)	Conservation Area Managed Minimally	21
Blue (4)	Conservation Area Managed Optimally	28
Gold (5)	Self-reliant Conservation Area	6

Analysis of MPA management performance effectiveness status. Credible and available publications related to Nusa Penida MPA establishment and management that served as verification were collated, recorded, and indexed. There were two steps to analyze MPA management effectiveness in this study. The first one was to use Indonesia EKKP3K tool launched in 2012. Data analysis included answering the total of 74 questions for 17 criteria of the EKKP3K through mini-workshops with the management unit, and verifying answers with an assigned list of documents and publications indexed from 2013 to 2017 to determine management effectiveness status of the study area before, during, and after the transition period. Score per level is the percentage of total 'Yes' responses of the level questions in each group. Attaining a 100 percent mark per level means answering all questions with 'Yes' responses. For each question answered with 'Yes,' means of verification should be provided and recorded. To calculate a value per block of one level, the following equation was applied (Directorate for Conservation of Area and Fish Species, 2012):

$$E\% = Y/QE \times 100\%$$

Where: E - percentage value per level being evaluated; Y - total 'Yes' answers recorded; QE - number of questions at the level being evaluated.

The second step was to group those 74 questions of EKKP3K into six management cycle elements of the IUCN-WCPA management effectiveness framework (Hockings et al 2000; Hockings et al 2006), namely (1) design, (2) planning, (3) input, (4) process, (5) output, and (6) outcome. Guiding questions to group EKKP3K questions applied key components of design, appropriateness, and results (Hockings et al 2000; Hockings et al 2006; Cook et al 2014). After grouping questions, the same responses from EKKP3K were applied to the new groups, using lists of verification documents available. A similar process was applied to calculate the percentage value of each element of the management cycle. Value per element in percentage is the total 'Yes' answers recorded compared to the total count of element questions. The result of this data analysis is presented in a spider web diagram.

Results and Discussion

Marine, coastal and small islands management effectiveness evaluation (EKKP3K). The Head of Klungkung District initiated the process for establishing Nusa Penida marine waters as a marine protected area through District Regulation No. 12/2010 (Klungkung District Government 2010). The organizational structure for Nusa Penida MPA management unit was officiated in 2014 and the unit was assigned as a regional technical implementing unit under Klungkung District Government, by the Klungkung District Head Decree No. 31/2014 (Head of Klungkung District 2014a). Following official key steps stipulated in the Ministry of Marine Affairs and Fisheries Decree No. 02/2009, the area was officially enacted as a marine protected area in 2014. The review process in this research included revisiting each question of the EKKP3K and checking supporting documents that served as means of verification. Referring to MMAF EKKP3K data published on the website and from the review process, the highest rank of

management effectiveness level of Nusa Penida over the period of 2013 to 2017 was on level 3 green, or categorized as minimally managed MPA.

Based on the EKKP3K guideline, the MPA management unit may conduct self-evaluation to evaluate its management effectiveness (Directorate for Conservation of Area and Fish Species 2012). In the review process, we found several differences in indicator questions per level especially in 2013-2015 (Table 1). The differences in detail were at indicator questions related to human resources training and competency, socioeconomic condition of target communities, and participation. When EKKP3K was exercised firstly in 2013, it came with no detailed description on what kind of information each question aimed. It was only in 2014 that the supplementary document to the EKKP3K guideline was published (Lubis et al 2014). Given that EKKP3K Supplement, which provided a detailed explanation, was produced only in 2014 (Lubis et al 2014), misinterpretation of providing the answer to EKKP3K may influence the overall result.

The review process showed that in 2013, there were 8 questions with all 'Yes' answers on the level 1 red questions, which made 100% value for the level, and 11 questions with all 'Yes' answers (Table 2). With level 1 and level 2 having 100% value, Nusa Penida MPA management in 2013 reached a 100% value of established MPA or level 2 yellow. There were 7 criteria indicators that signified the achievement, namely the presence of: (1) proposal document for establishing an MPA, (2) document of identification and inventory of biodiversity and socioeconomic values of Nusa Penida marine area, (3) legal decree of the local authority, Head of Klungkung District, for reserving the area as a marine protected area, (4) assignment of management unit structure and appointment of management unit personnel, (5) draft zoning and management plan, (6) facilities and infrastructure to support the management of the area, (7) funding allocation from the local authority to support the establishment and management of the area stated at local authority midterm or strategic plan and budget.

Table 2
EKKP3K assessment result on Nusa Penida MPA from 2013-2017 in percentage per level

Level	QE	2013		2014		2015		2016		2017		
		E0	E1									
Red (1)	Initiated	8	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Yellow (2)	Established	11	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Green (3)	Managed minimally	21	80%	81%	80%	100%	100%	100%	100%	100%	100%	100%
Blue (4)	Managed optimally	28	71%	64%	71%	68%	75%	79%	75%	75%	79%	79%
Gold (5)	Self-reliant	6	33%	33%	33%	33%	0	0	0	0	0	0

Note: TQE - number of questions; E0 - original data from MMAF website; E1 - review process.

Green level or managed minimally status was earned by Nusa Penida management in 2014. The achievement was marked by the legalization of the Nusa Penida marine area as a marine protected area with the category Marine Park by the Indonesia Ministry of Marine Affairs and Fisheries Decree No. 24/2014. Criteria to achieve green level includes getting approval for the proposed zoning and management plan through Head of Klungkung District No. 137/04/H2O/2014 (Klungkung District Head 2014b), developing standard operating procedures (SOP) for conducting management activities in the area such as SOP surveillance, SOP coral and fish monitoring, SOP infrastructure and maintenance, and implementing the zoning and management plan. The local management authority budget allocated for Nusa Penida Technical Implementation Unit was used to build office facilities, land transportation vehicles, operational costs, and conduct public consultation and socialization to the local community in and around Nusa Penida MPA.

For 2015 to 2017, the EKKP3K status of Nusa Penida MPA remained at the green level. Regular activities conducted in MPA included annual reef health and fish

monitoring, monthly surveillance, outreach and awareness, infrastructure maintenance, partnership formalization. Although the Local Government Law No. 23/2014 had come into implementation right away in 2014, there was no change in day-to-day MPA operation until mid-2016. Progress on management effectiveness in the blue level (79%) in 2015 occurred on the indicator related to SOP for conducting mariculture activities in the MPA, budget allocation for MPA management on the Klungkung District Strategic Plan 2015, research and education activities started to be implemented in MPA. The district-owned assets transfer process, which includes personnel, budget, and infrastructures to the provincial level was limited at a maximum of 2 years since the Local Government Law had been issued. In 2016, the EKKP3K blue level score decreased to 75% with the removal of Nusa Penida MPA management allocation from Klungkung District budget plan; at the provincial level, the asset transfer process had not been ready yet. Only until November 2017 the new structure for managing MPA in Bali was in place as stated in the Bali Governor Decree No. 87/2017.

The EKKP3K tool was not sufficiently agile to describe the current management situation (Farhum et al 2021). It only provides 'Yes' and 'No' options for indicator questions based on the evidence required without limiting the document's validity period. Furthermore, the EKKP3K result does not describe management priority issues. The practice of EKKP3K Awards was designed as an incentive for the MPA management unit (KKJI 2015). In contrary, the EKKP3K Award system did not provide detail recommendations for MPA management improvement in the following years. It is important to have a clear guideline for assessing MPA management effectiveness, which will help the management unit further make adaptations to its interventions (Bennett & Dearden 2014; Yuliana et al 2016; Maghfiroh et al 2020). In addition, the tool does not clearly show what management authorities needs to be responsible in improving the future MPA's management effectiveness.

Management cycle and effectiveness elements. To explore the detailed progress of Nusa Penida MPA, we clustered indicators questions of the EKKP3K into management effectiveness elements. Design issues consist of two elements, namely context and planning (Hockings et al 2000; Hockings et al 2006). The context element deals with the status and value of the site and the overall protected area systems, threats to the area, opportunities available, stakeholders of the area, and political aspects. Of the EKKP3K questions, there were 8 questions related to the context element; among others, baseline data collection on both biophysics and socioeconomics to identify threats, opportunities in the future management of the site, stakeholders identification and consultation to establish marine protected area, site designation as conservation area based on wider network design such as marine spatial planning. The planning element relates to legislation and policy, design of marine protected area systems, reserve design, and management planning that relates to conservation objectives (Hockings et al 2000; Hockings et al 2006; Jones et al 2019). Following the clustering process, we found that there were 13 questions grouped as planning elements that in general related to the legal proposal for MPA establishment containing detailed data and information collected from baseline biophysics and socioeconomic survey, availability of design and planning of the MPA, and availability of budget and financing plan. On the input element, we found 17 questions of EKKP3K related to human resources capacity, financial aspect, and governance aspect of MPA establishment and management. Process elements were identified in 22 questions covering management process including enforcement activities, protocols and/or procedures of implementation for managing the area, outreach and awareness activities, partnership works, and community empowerment (Table 3).

Table 3

Grouping of EKKP3K questions into management effectiveness framework elements

<i>Component</i>	<i>Element</i>	<i>Number of questions</i>
Design issues	Context – where are we now?	8
	Planning – where do we want to be?	13
Appropriateness of management system and processes	Input – What do we need?	17
	Process – How do we go about it?	22
Delivery of protected area objectives	Output – What were the results?	5
	Outcome – What did we achieve?	9
Total questions		74

Note: the source is an adaptation from Hockings et al (2000, 2006).

To further explore the composition of the management effectiveness element, we grouped the questions into themes and EKKP3K level. We found that on the initiation level, there were five context elements and 3 planning element questions, while in the established level, there were questions on planning and input. In the green level of minimal management, there was a range of questions on context, planning, input, and process (Table 4).

Of the total 74 EKKP3K indicator questions, process questions were marked as the most frequent indicator that appeared in level 3 green (8 questions) and level 4 blue (14 questions). The second most frequent element was input, with 17 questions that appeared in level 2 yellow (9 questions), level 3 green (5 questions), and level 4 blue (3 questions). When considering steps in establishing MPA in Indonesia, context, planning, and input element majority fall under echelon 2, and process elements fall under MPA management unit responsibility. This reflected that EKKP3K emphasized more on management unit performance (Directorate for Conservation of Area and Fish Species 2012).

Table 4

EKKP3K questions grouping and management effectiveness level

<i>Level</i>	<i>Context</i>	<i>Planning</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>	<i>Outcome</i>	<i>QE</i>
Red (1) Initiated	5	3	0	0	0	0	8
Yellow (2) Established	0	2	9	0	0	0	11
Green (3) Managed minimally	2	6	5	8	0	0	21
Blue (4) Managed optimally	1	2	3	14	5	3	28
Gold (5) Gold	0	0	0	0	0	6	6
Total QME	8	13	17	22	5	9	74

Note: QE - total questions per level of EKKP3K; QME - total questions per management effectiveness element.

Nusa Penida MPA management effectiveness evaluation results showed a substantial increase in planning and process elements; from 2013 to 2015, each element increased by 23 points (Table 5). A substantial decrease of 23 points occurred on the outcome element. Based on the data verification process, in 2015, there were no mechanisms for collecting retribution from visitors to the area. With the transfer process from district to provincial, no more district regional budget was allocated for Nusa Penida MPA operations nor for a provincial regional budget. On the input element, there was a minor increase of 6 points, which was related to personnel competency. It was reported that in 2017, Nusa Penida MPA personnel participated in a series of MPA competency trainings and some qualified as competent (CTC 2017).

Table 5

Management effectiveness element and progress from 2013 to 2017

Elements	QME	2013		2014		2015		2016		2017	
		Count	%								
Context	8	8	100	8	100	8	100	8	100	8	100
Planning	13	10	77	12	92	13	100	12	92	13	100
Input	17	15	88	15	88	15	88	15	88	16	94
Process	22	15	68	18	82	20	91	20	91	20	91
Output	5	4	80	4	80	4	80	4	80	3	60
Outcome	9	4	44	4	44	2	22	2	22	2	22

Note: QME - total questions per management effectiveness element.

Looking in-depth into the input element, over the observation period, there were changes in the composition of personnel assigned for the MPA establishment and management processes. In the first observation year, only one person was officially assigned to lead the MPA management unit, followed by two more administrative staff in 2014. More staff was added in the following years to finally reach a total of 16 personnel for the Nusa Penida MPA management unit in 2017. A commonly identified problem in managing MPA is staff capacity, which includes staff numbers and competency in conducting, among others, enforcement, outreach, and resource monitoring of the MPA (Bennett & Dearden 2014; Gill et al 2017; Mascia et al 2017). Input elements over 2013-2016 remained stable at 88% and only increased in 2017 with the capacity-building intervention provided by the partner through training and professional certification (CTC 2017). In the transition period 2016-2017, the Nusa Penida MPA management unit still conducted routine patrols with less frequency, and ecological monitoring jointly with a local partner by a resource sharing mechanism (CTC 2017). Less patrolling of the area led to more violations to the zoning system in MPA, which will further decrease MPA management effectiveness (Cinner et al 2014; Edgar et al 2014; Gill et al 2017). Figure 2 presents the assessment of the context, planning, input, output and outcome elements in the 2013-2017 period in Nusa Penida MPA.

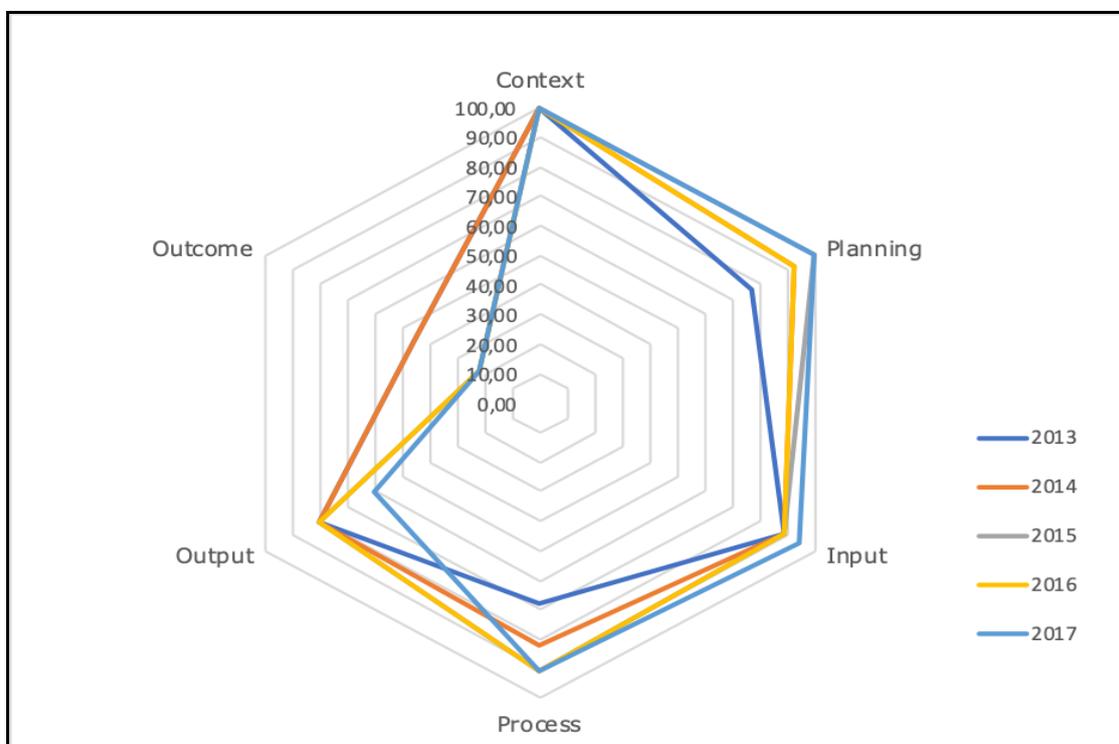


Figure 2. Assessment of context, planning, input, process, output, and outcome elements of Nusa Penida MPA from 2013 to 2017.

Over the period 2013 to 2017, Nusa Penida MPA management achieved the highest score in ensuring the importance and value proposition of the area, engaging key stakeholders and local community from the beginning (context), and comprehensive design and planning following standard guidelines with set target conservation (planning). Taking notes on the benefit of MPA for socioeconomic aspects (Mascia et al 2010), further studies need to be conducted in the area. MPA management processes increase prominently from 2013 to 2015, but not so much change later in 2017. On the outcome element, Nusa Penida MPA management effectiveness element was the most defective compared to other elements. Strategy to improve this element may require Nusa Penida MPA management unit to work with echelon 1 at the provincial level and ministerial level to ensure future improvement.

Conclusions. Regular practice to measure MPA management effectiveness has been implemented in Nusa Penida MPA. The EKKP3K management effectiveness evaluation showed that Nusa Penida MPA achieved its prime management in 2015, one year after it was enacted as a marine protected area, proven with an EKKP3K score of 100% on three levels of management stages, achieving level 3 green or minimally managed. The output of the management process remained stable until 2016. Assets transferred from district level to provincial level influenced uncertainty in operational budget and organizational structure. It took three years for the authority transfer process in Nusa Penida to take place, impacting the operationalization of MPA, decreasing the ability to deliver output, and outcome. In the absence of a clear line of authority, personnel resiliency and a solid local partner influence the overall management effectiveness. The application of the EKKP3K tool requires the team's ability to interpret indicator questions well and provide valid evidence. Failure to do this may affect the overall results. The EKKP3K building-block system limits information on the progress performance of mainly the management unit of one MPA. Grouping the EKKP3K indicator questions into the management cycle can be an alternative to evaluate progress on management effectiveness and further guide on which Echelon to reach out for adaptive management.

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Conflict of Interest. The authors declare that there is no conflict of interest.

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