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*Corresponding author: Ahimsa Campos-Arceiz, School of Environmental and Geographical Sciences, The University of Nottingham Malaysia Campus, Jalan Broga, Semenyih, 43500 Selangor, Malaysia; Mindset, Interdisciplinary Centre for Tropical Environmental Studies, The University of Nottingham Malaysia Campus, Jalan Broga, Semenyih, 43500, Selangor, Malaysia
E-mails: ahimsa@camposarceiz.com, ahimsa.camposarceiz@nottingham.edu.my

Reviewing editor:
Serge Wich, Liverpool John Moores University, UK

Additional information is available at the end of the article

ENVIRONMENTAL MANAGEMENT & CONSERVATION | RESEARCH ARTICLE

A multi-stakeholder strategy to identify conservation priorities in Peninsular Malaysia

Kangayatkarasu Nagulendran¹, Rory Padfield^{2,3}, Sheema A. Aziz⁴, A. Aldrie Amir⁵, Abd. Rahim Abd. Rahman⁶, Mohamad A. Latiff⁷, Ahmad Zafir^{5,8}, Aida Ghani Quilter⁹, Ange Tan¹, Sharifuddin Arifah¹⁰, Noor Awang¹¹, Noraini Azhar¹², Perumal Balu¹³, Pek Chuan Gan¹⁴, Ning Hii¹, Mohammad I.H. Reza¹⁵, Rama Iyer Lakshmi Lavanya¹⁶, Teckwyn Lim¹, Shrestha Mahendra¹⁷, Darmaraj Mark Rayan¹⁶, Suzanne McGowan^{1,18,19}, Midori Paxton²⁰, Zakaria Mohamed¹¹, Daim Mohd. Salleh²¹, M. Tajuddin Abdullah²², Nik Aznizan N. Ibrahim²³, Chong Leong Puan¹¹, Gopalasamy Reuben Clements^{1,4,22,24,25,26}, Idris S.M. Mohamed²⁷, Leng Guan Saw²⁸, Kumaran Shashi²⁹, Elagupillay Sivananthan³⁰, Dionysius S.K. Sharma¹⁶, Suksuwan Surin³¹, Ponnusamy Vanitha³², Jamie Wadey¹, Wan Mohd Wan Hasmah³³, Ee Phin Wong¹, Pui May Wong³⁴, Chin Aik Yeap¹³ and Ahimsa Campos-Arceiz^{1,19*}

Abstract: Malaysia, with its rapidly growing economy, exemplifies the tensions between conservation and development faced by many tropical nations. Here we present the results of a multi-stakeholder engagement exercise conducted to (1) define conservation priorities in Peninsular Malaysia and (2) explore differences in perceptions among and within stakeholder groups (i.e. government, academia, NGOs and the private sector). Our data collection involved two workshops and two online surveys where participants identified seven general conservation themes and ranked the top five priority issues within each theme. The themes were: (1) policy and management, (2) legislation and enforcement, (3) finance and resource allocation, (4) knowledge,

ABOUT THE AUTHORS

K. Nagulendran is a PhD candidate at the University of Nottingham Malaysia Campus. His area of research is in biodiversity governance with a special focus on protected area management. Nagulendran has been involved in policy formulation while working for the Government of Malaysia on biodiversity conservation and related matters.

Rory Padfield is a development geographer at Oxford Brookes University working at the interdisciplinary interface of human geography, development studies and environmental studies. This study builds on Rory's research interest in multi-stakeholder engagement exercises and environmental governance in South-East Asia.

Ahimsa Campos-Arceiz is an associate professor in tropical conservation ecology at the University of Nottingham Malaysia Campus. His research focuses mainly on the conservation of Asian megafauna, particularly in the science-based mitigation of human-wildlife conflicts and the ecological function of elephants and other large animals in tropical forests. Ahimsa is increasingly involved in interdisciplinary conservation work.

PUBLIC INTEREST STATEMENT

Malaysia is a biologically megadiverse country that exemplifies the tension between biodiversity conservation and economic development faced by many tropical nations. Here we present the results of a multi-stakeholder exercise to identify conservation priorities in Peninsular Malaysia. We involved several hundred participants from four stakeholder groups—government, academia, NGOs and industry—to produce a list of 35 issues ranked within seven general themes. Besides identifying and ranking conservation priority issues, we identified differences in priority perceptions among and within stakeholder groups (e.g. showing differences between academics and government officers, or between junior and senior government officers) and found a high (94%) level of agreement among the different stakeholder groups. This high level of agreement is important as indicator for policy-makers, practitioners and researchers on the areas to focus to ensure conservation is mainstreamed in the development process.

research and development, (5) socio-economic issues, (6) public awareness and participation and (7) rights of nature. In spite of their very different backgrounds and agendas, the four stakeholder groups showed general agreement in their priority preferences except for two issues. Respondents from government and private sector differed the most from each other in their priority choices while academia and NGO showed the highest degree of similarity. This ranked list of 35 conservation priorities is expected to influence the work of policy-makers and others in Peninsular Malaysia and can be used as a model to identify conservation priorities elsewhere.

Subjects: Conservation - Environment Studies; Biodiversity & Conservation; Environmental Policy

Keywords: governance; priority issues; protected areas; wildlife; stakeholder engagement; science-policy interface; Peninsular Malaysia

1. Introduction

The first objective of the convention on biological diversity (CBD), adopted in 1992, is to conserve the earth's biodiversity. After almost two decades of implementation, the effectiveness of CBD was questioned when the world collectively failed to meet the 2010 Biodiversity Targets to significantly reduce biodiversity loss (Adenle, 2012; Ritter, 2010). This failure prompted CBD Parties to adopt a new set of targets (Aichi Biodiversity Targets) with a renewed mandate to address and halt biodiversity loss by 2020 (CBD Secretariat, 2010). To ensure the Aichi Biodiversity Targets are achieved—in absence of a strict compliance regime—the case has been made for a prioritisation of conservation actions guided by science that is participatory, inclusive and involving a wide set of stakeholders (Armitage, de Loë, & Plummer, 2012; Sutherland & Woodroof, 2009). Indeed, in recent years, prioritisation has become one of the pillars of conservation science (Game, Kareiva, & Possingham, 2013).

Several recent initiatives have attempted to address conservation priorities at global (Sutherland et al., 2009, 2014), regional (Walzer et al., 2013) and national scales (Fleishman et al., 2011; Rudd et al., 2011; Sutherland et al., 2010; Varma et al., 2015), most of them focusing on developed countries in temperate regions (but see Varma et al., 2015). There is therefore a need for conservation prioritisation exercises in developing countries, especially in biodiversity hotspot areas.

Inclusiveness and multi-stakeholder participation are important factors in the identification of conservation priorities since they can generate ownership of the issues and potential solutions (Sutherland et al., 2010) whilst reducing bias from specific stakeholders (Varma et al., 2015). While it is difficult to engage all relevant stakeholders in the process, some diversity can help increase the overall impact of the prioritisation exercise (Sutherland, Fleishman, Mascia, Pretty, & Rudd, 2011).

Engaging different stakeholders in a meaningful manner, however, is difficult because stakeholders bring new ideas and agendas to the exercise shaped by a predisposition to social, cultural and political factors (Sutherland et al., 2011; Wesselink, Buchanan, Georgiadou, & Turnhout, 2013). Stakeholders from various backgrounds and agendas, including different subsets within broad stakeholder groups—e.g. junior vs. senior government officers—are likely to have contrasting perceptions about conservation priorities. Recognising differences in perception and the ways in which perceptions are influenced can be helpful in the overall process of defining conservation priorities and providing potential solutions to facilitate policy response and decision-making.

Here we present a multi-stakeholder engagement exercise to define conservation priorities in Malaysia, a country rich in biodiversity and a rapidly growing economy that exemplifies the tension between conservation and economic development faced by many tropical countries. Malaysia is part of the Sundaland Biodiversity Hotspot area (Myers et al., 2000) and ranked 12th globally in terms of its National Biodiversity Index (CBD Secretariat, 2015). Its wealth of biodiversity includes 306 species

of mammals, 742 species of birds, 567 species of reptiles and over 15,000 plant species, with over 26% of the tree species being endemic (NRE, 2014). Geographically, Malaysia is divided into Peninsular Malaysia (131,800 km²) in mainland Asia and east Malaysia (198,523 km²) in Borneo, with a population of 30.7 million in 2014, nearly 80% of whom live in Peninsular Malaysia (DoS, 2014; EPU, 2016).

Malaysia, formed in 1963, is a federation of 13 states that became independent from colonial rule in 1957 and practises a political system of parliamentary democracy with a constitutional monarchy. The supreme law of the country is the Federal Constitution, where some subject matters pertaining to natural resource management (e.g. land and forest) fall under the responsibility of each state government (Aiken, 1988; Ling, 2011). In recent decades, Malaysia has experienced rapid economic transformation and is generally considered an example of success in its smooth transition into modern economy (Rasiah, 2011). For example, the distribution of Malaysians below the poverty line has been drastically reduced from 52% in 1957 (Yukio, 1985) to 0.6% in 2014 (EPU, 2016). The process of poverty alleviation and economic development, however, has come with a high environmental cost. In 1940, almost 80% of Peninsular Malaysia was under forest cover but this figure has declined to 44% in 2014 (Aiken & State, 1994; FDP, 2016). As of December 2015, the coverage of terrestrial protected areas (PAs) was about 13.8% of the total land area in Peninsular Malaysia (NRE, 2015). In line with the Aichi Targets of 17% of land coverage by PAs by 2020, the revised National Policy on Biological Diversity (2016–2025) has a target to increase terrestrial PAs to 20% of the country by 2025 (NRE, 2016). At the same time, wildlife has also experienced a serious decline with the loss of Sumatran rhinos (*Dicerorhinus sumatrensis*) and a steady decline of Malayan tigers (e.g. Clements et al., 2010; Havmøller et al., 2015; Hance, 2014).

Malaysia faces important trade-offs in its aim to conserve biodiversity while balancing the need for economic development. Although the country has in place broad policy approaches for the conservation of biodiversity, such as the National Policy on Biological Diversity (1998, revised in 2016), there is a lack of clear priorities for conservation. For example, the lack of funds allocated for the environment and related sectors in the 2016 Federal Budget could be interpreted as low priority or focus on environment and biodiversity sector (WWF Malaysia, 2015). In this context, a prioritisation exercise would be useful to guide conservation policy and practice, optimising the limited available resources, especially if it involves the participation of key stakeholders such as government agencies, non-governmental organisations (NGOs), academics and the private sector.

In this exercise to define conservation priority issues we focus on Peninsular Malaysia since states in east Malaysia (Sabah and Sarawak) have a higher degree of autonomy in managing land, forest and wildlife, and different political economy contexts which might affect conservation priorities (Aiken, 1988; Maidin, 2005). Furthermore, the states in Peninsular Malaysia are more homogenous in terms of their biodiversity governance (NRE, 2009). Through a series of workshops and online surveys, the objectives of our exercise were to: (1) engage relevant stakeholders in the identification of conservation priority issues in Peninsular Malaysia; (2) produce a list of ranked conservation issues; and (3) test differences in priority perception among the stakeholders involved in this exercise.

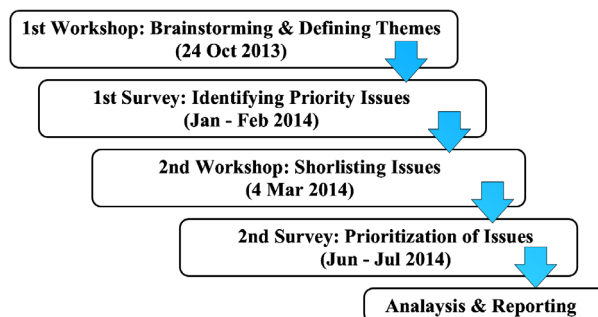
2. Methods

2.1. Stakeholder engagement and data collection

Our data collection involved a series of steps that included two multi-stakeholder workshops and two online surveys (Figure 1). Both workshops were held at the University of Nottingham Malaysia Campus and co-hosted by the Malaysian Ministry of Natural Resources and the Environment (NRE).

In October 2013, a half-day multi-stakeholder workshop was conducted in order to identify the general conservation priority themes relevant for Peninsular Malaysia. A total of 64 participants attended representing four sectors: (1) government agencies at both federal and state level; (2) NGOs; (3) academic and research organisations; and (4) the private sector. The participants were divided into four multi-stakeholder working groups and asked to identify general themes under which to

Figure 1. Process for data collection to generate, prioritise and analyse issues.



categorise high-priority conservation issues in Peninsular Malaysia. Later, the workshop convened into a plenary session whereby the list of general conservation themes produced by the four working groups were compared and openly discussed. The list and wording of the themes were finalised once a consensus amongst the stakeholders was reached. Consensus was achieved by allowing stakeholders in the plenary session to comment on or raise concerns about the themes and their wording via an iterative process and with careful moderation the themes were subsequently refined until there was general agreement amongst the stakeholders.

Based on the themes identified, an online survey was conducted using the online survey platform Qualtrics (www.qualtrics.com). The survey was administered using the snowball sampling strategy (Atkinson & Flint, 2004; Oliver, 2006), i.e. the survey link was circulated to the participants of the workshop, who were also requested to forward it to their relevant networks. Similar approaches have been previously used in other stakeholder consultation processes (Brown et al., 2010; Padfield et al., 2014). The survey described the process in which the conservation themes had been identified and respondents were asked to list as many relevant conservation issues as they considered appropriate under each theme. Respondents had the option of answering the survey anonymously but we requested information on their age, nationality (Malaysian vs. non-Malaysian) and the sector they represented (government, NGO, academia or private sector). The survey also included two questions about the respondents' perception on the current state of wildlife and PA conservation in Peninsular Malaysia. The survey was conducted from January to February 2014 (1 month). From this process a long list of conservation priority issues embedded within a series of conservation themes was obtained.

In March 2014, a second half-day multi-stakeholder workshop was conducted to identify the top five conservation priority issues within each theme. Forty-two participants representing the same four sectors attended and following the approach taken in the first workshop participants were divided into four working groups. Each group was asked to consolidate the issues collected through the online survey and to choose the top five priority issues (without a rank) within each theme.

Finally, we conducted a second online survey using the same platform (www.qualtrics.com). Respondents were requested to rank the top five conservation issues identified within each theme according to their perceived order of priority and to provide the same basic demographic descriptors as in the first survey. We conducted this survey from June to July 2014 (1 month).

2.2. Data analysis

From the first survey, we analysed differences in the perception on the state of wildlife and PA conservation in Peninsular Malaysia based on (a) stakeholder groups (i.e. sectors); (b) age groups (we compared two groups: younger = 21–30 years old vs. older = above 50); and (c) nationality (Malaysians and non-Malaysians).

We created a “priority score” to analyse the results of the prioritisation exercise in the second online survey. For each respondent, the issues within each theme were given a score (4–0) based on the priority given by the respondent (top priority = 4, to lowest priority = 0). The priority score for

each issue within a theme was obtained by adding all the individual scores and dividing them among the number of respondents.

From the second survey, we first tested for differences in (d) priority scores across all issues within each theme; and then for differences in perceived priorities (priority scores) among different groups of respondents by: (e) stakeholder groups, (f) age groups (as before in two groups: younger (21–30 years old) vs. older (above 50)) and (g) seniority categories among government officers (senior = those above 25 years of working experience vs. junior = those below 10 years of working experience).

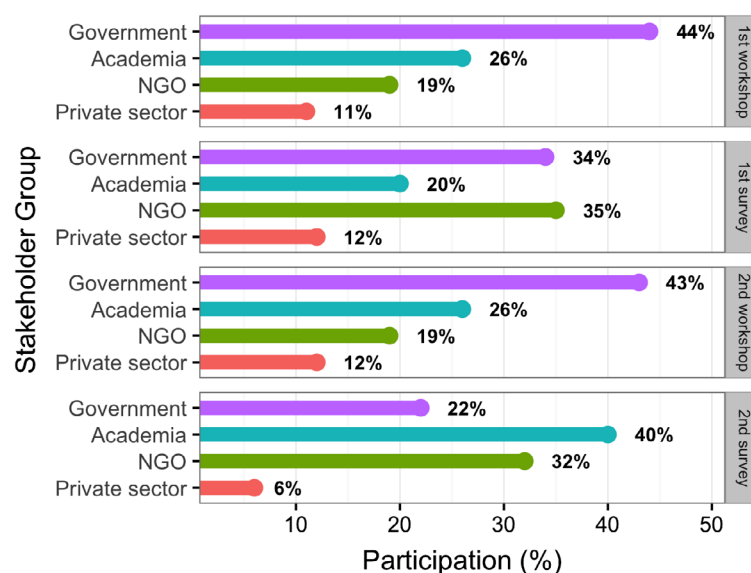
We used Kruskal–Wallis H test to analyse (a), (d) and (e); and Mann–Whitney U test on (b), (c), (f) and (g). To control for potential Type 1 error, we applied the Bonferroni correction procedure, where the appropriate significant level (α) level was calculated by dividing α by the number of comparisons (where there were more than two comparisons). Moreover, we calculated the coefficient of variation (CV) to measure dispersion in priority scores within issues and themes. All tests were conducted on IBM SPSS Statistics Version 22.

To visually represent stakeholder agreement/disagreement on conservation priorities, we used a stakeholder similarity index and radar plots. The stakeholder similarity index was developed by computing the average priority scores for each issue by the different stakeholder groups and calculating the difference in average priority score between two stakeholder groups. This was repeated by pairing all the different combinations of stakeholder groups. We also mapped the ranked priority issue under each theme with the relevant Aichi target.

3. Results

The first and second workshop had 64 and 42 participants, respectively. The distribution of participants by stakeholder groups was very similar in both workshops, with government officers making the largest group (43–44% of attendants) and the private sector the smallest (11–12%; Figure 2). The two online surveys also received a high response rate with 150 and 123 complete responses, although the distribution of respondents by stakeholder group was rather different between surveys and different to the representation in the workshops (Figure 2). In both online surveys, the respondents were predominantly Malaysian (84% of respondents in the first survey and 86% in the second). In terms of age distribution, the most common group was 31–40 years of age (36% in the first survey and 37% in the second survey), followed by 41–50 years old (24%) in the first survey and by the

Figure 2. Distribution of participants and respondents by sector for both workshops and online surveys. Number of participants/respondents = 64, 152, 42, 123, respectively.



51–60 years old (23%) in the second. In both surveys, the highest number of respondents came from the 0–5 years of experience group (24% in the first survey and 19% in the second survey), followed by 6–10 years (21%) in the first survey; and by the 6–10 years (18%) and above 30 years (18%) groups in the second survey. In both surveys there was a relatively even gender balance with 45% of female respondents in both surveys.

3.1. Perception on current management of PAs and wildlife

In terms of the perception of the current conservation state of PAs in Peninsular Malaysia, 46% of respondents ranked it as “very poor” or “poor” and 35% ranked it as “fair” (Figure 3). Sixty-one per cent of respondents ranked the current status of wildlife conservation in Peninsular Malaysia as “very poor” or “poor” and about 20% ranked it “fair” (Figure 3). The perception on the current management of PAs and wildlife varied by stakeholder group (PA: $H = 27.5$, $p = 0.000$; wildlife: $H = 35.6$, $p = 0.000$) and nationality (PA: $U = 498$, $z = -3.039$, $p = 0.002$; wildlife: $U = 559.5$, $z = -2.572$, $p = 0.01$). Different age groups on the other hand had only statistically marginal differences in their perception (PA: $H = 9.5$, $p = 0.05$; wildlife: $H = 8.5$, $p = 0.076$). By stakeholder group, government officers had a much more positive perception of the current status of the management of PAs and wildlife (Figure 3). After removing government officers from the analyses, there was no difference in the perception of the other three groups (PA: $H = 0.59$, $p = 0.74$; wildlife: $H = 0.35$, $p = 0.84$; Figure 3). Participants with different years of working experience also did not differ in their perception (PA: $H = 3.28$, $p = 0.77$; wildlife: $H = 3.15$, $p = 0.79$).

3.2. Conservation themes and priority issues

The participants in the first workshop identified seven general conservation themes: (1) policy and management; (2) legislation and enforcement; (3) finance and resource allocation; (4) knowledge and research and development (R&D); (5) socio-economic issues; (6) public awareness and participation; and (7) rights of nature (including heritage).

The respondents to the first online survey identified a total of 1,151 conservation issues. By themes, 23% of the issues corresponded to “public awareness and participation”, 18.5% to “policy and management”, 16% to “legislation and enforcement”, 12.5% to “finance and resource allocation”, 12% to “knowledge and R&D”, 11% to “socioeconomy” and 7% to “the rights of nature”. The top five priority issues within each theme and their priority scores from the second online survey as well as the corresponding Aichi Targets are shown in Table 1. Priority scores ranged from 3.14 to 0.94, with a CV of 0.30 across all issues. By themes, the lowest dispersion was for “finance and resource allocation”, “knowledge and R&D” and “public awareness and participation” (CV = 0.17 in all cases) and the highest for “socio-economy” and “rights of nature” (CV = 0.38 in both cases; Figure 4).

Figure 3. Perception on the status of PAs and wildlife management in Malaysia.

Note: PAs: Protected areas.

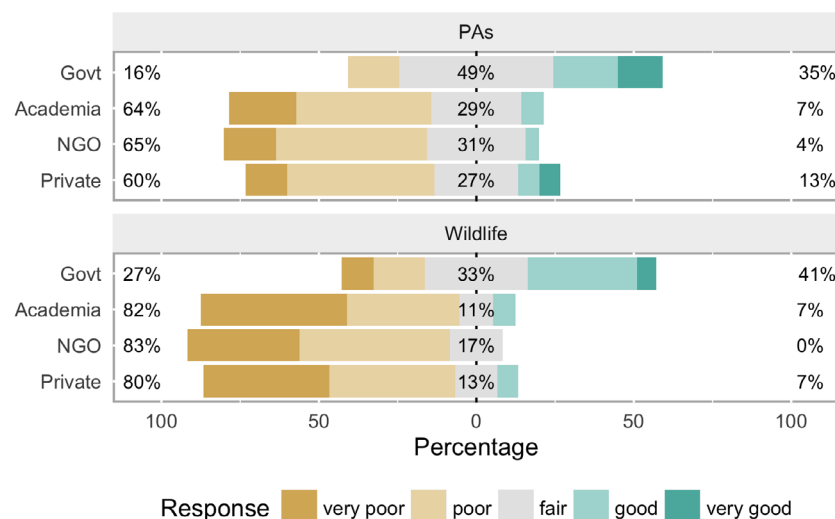


Table 1. Issues under each theme and their ranking

	Theme and issues	PS	CV	R	AT
1	<i>Policy and management</i>				
1.1	There is a lack of strong national leadership on sustainable development which limits the effective implementation of consistent policies and necessary championing of biodiversity issues	2.66	0.13	1	1, 17
1.2	The existing policy framework for conservation and management of PAs and wildlife is sound but there is ineffectiveness in the current implementation and monitoring of these policies	2.52	0.13	2	17, 5, 6, 12
1.3	There are inconsistent and conflicting policies between the Federal and State authorities and a lack of effective inter-agency coordination, including federal-state coordination mechanisms to manage PAs and wildlife	2.18	0.34	3	
1.4	There is currently an absence of a "National Framework / System" to standardise PAs management practices in Malaysia	1.69	0.13	4	11
1.5	Economic value of biodiversity and ecosystem services (natural capital accounting) has not been taken into account in meeting current economic development goals	0.95	0.13	5	2
	<i>Theme's CV</i>	0.31			
2	<i>Laws and enforcement</i>				
2.1	There is a lack of enforcement of legal instruments and laws, including insufficient human resources to perform enforcement duties	3.14	0.13	1	20
2.2	The Malaysian Judiciary does not view environmental crimes as serious as other forms of crime, which results in light and inadequate sentences	2.27	0.16	2	1
2.3	The enforcement of PAs and wildlife issues is currently too compartmentalised due to jurisdiction boundaries and a lack of joint operations among agencies	1.85	0.12	3	17
2.4	There is a lack of training for enforcement, prosecuting / investigating officers and judges	1.60	0.14	4	
2.5	The general public perceive conservation agencies to be inefficient and susceptible to corruption	1.13	0.36	5	17, 1
	<i>Theme's CV</i>	0.34			
3	<i>Socio-economic issues</i>				
3.1	There is a lack of consultation and participation of Indigenous and Local Communities (ILCs) in PAs and wildlife management which raises conflict, such as the use of resources by ILCs	2.90	0.10	1	18, 19, 11
3.2	There is considerable pressure for development which exacerbates encroachment into PAs and wildlife poaching	2.84	0.11	2	1-11
3.3.	Access and Benefit Sharing Rights to Genetic Resources (ABS) as provided for by the Convention on Biological Diversity (and Nagoya Protocol) has not been fully implemented and there is lack of understanding on ABS among all stakeholders especially ILCs	2.02	0.29	3	16, 18
3.4	Though Malaysia is promoting tourism including eco-tourism in a big scale, ILCs do not receive adequate benefits from this activity to supplement their income	1.41	0.19	4	18
3.5	Eco-tourism and other socio-economic activities in PAs have led to the erosion of indigenous culture and local value systems of ILCs	0.94	0.44	5	18, 1, 11

(Continued)

Table 1. (Continued)

	Theme and issues	PS	CV	R	AT
	<i>Theme's CV</i>	0.39			
4	<i>Funds and resource allocation</i>				
4.1	There is a lack of funds from both the Federal and State Governments to manage PA and wildlife	2.68	0.11	1	20, 11
4.2	There is a lack of effective usage of resources in managing PAs which are governed by different actors (i.e. State, Federal, NGOs and Communities)	1.90	0.23	2	
4.3	Policies/laws formulated for PAs and wildlife lack resource mobilisation plan/strategy to ensure effective implementation	1.89	0.11	3	17, 20
4.4	There is a lack of adaptive management approaches and strategies to increase the effectiveness of managing PA and wildlife, especially considering the limited resources	1.83	0.20	4	17, 5, 6, 11
4.5	The use of alternative and innovative funding schemes, such as Payment for Ecosystem Services (PES) and Reducing Emissions from Deforestation and Forest Degradation plus (REDD+) programmes have not been fully implemented	1.69	0.26	5	2, 14, 15
	<i>Theme's CV</i>	0.17			
5	<i>Knowledge and R&D</i>				
5.1	Knowledge sharing and interaction between researchers and other stakeholder groups is lacking and uncoordinated which leads to weak science-policy interface	2.49	0.15	1	19, 5, 6, 12, 13
5.2	There is a lack of collaboration amongst research institutes, universities and agencies for continuous training and capacity building	2.15	0.09	2	
5.3	There is a lack of concerted effort to make research in PAs and wildlife attractive and complimented by clear career paths	2.07	0.07	3	
5.4	There is a shortage of local researchers in PAs, wildlife and in basic biodiversity sciences	1.80	0.08	4	
5.5	There is a decline in quality and application of research findings to conserve and manage PAs and wildlife	1.49	0.14	5	
	<i>Theme's CV</i>	0.17			
6	<i>Rights of nature including heritage</i>				
6.1	There is a lack of a country wide holistic approach in the protection, preservation and documentation of traditional knowledge and cultural practices which protect rights of nature and the sustainable use of biodiversity	2.74	0.12	1	18
6.2	Natural heritage, inter-generational issues, sustainability and the overall well-being of the people have not been successfully incorporated into the country's planning processes	2.58	0.10	2	18, 2, 13
6.3	Formal and informal education systems lack the emphasis on the "value-system" to respect and recognise the rights of nature	2.57	0.09	3	1
6.4	The National Heritage Act 2005 has not been explored to designate PAs and endangered species	1.11	0.31	4	12, 11
6.5	There is a lack of using religious influence as a means to drive and instil the message of "rights of nature"	1.01	0.12	5	1, 18
	<i>Theme's CV</i>	0.39			
7	<i>Public awareness and participation</i>				
7.1	There is a general overall lethargy and lack of passion for biodiversity or environmental related issues among Malaysians	2.55	0.22	1	1, 5, 6, 11, 12
7.2	There is no dedicated and passionate personality/icon on championing and promoting PAs and wildlife conservation	2.22	0.16	2	

(Continued)

Table 1. (Continued)

	Theme and issues	PS	CV	R	AT
7.3	Officers in charge of CEPA (Communication, Education, Participation and Awareness) lack proper training and capacity building programmes to execute their job effectively	1.81	0.12	3	19
7.4	A lack of trust between different stakeholders has led to a lack of public engagement and participation in relation to PA and wildlife issues	1.76	0.15	4	17, 5, 6, 1
7.5	There are limited funds to undertake a consolidated, holistic and effective approach on CEPA with regards to PAs and wildlife	1.66	0.29	5	20, 1, 11, 12
	Theme's CV	0.17			

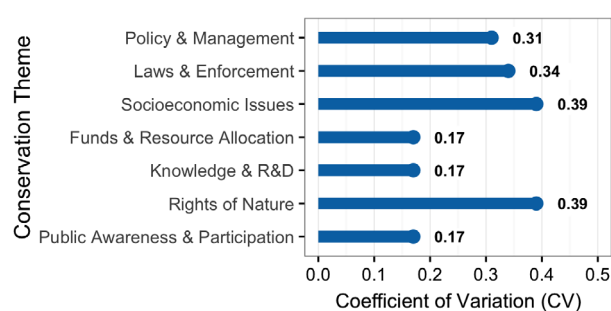
Summary of Aichi biodiversity targets (2011–2020)

Target	Target summary
	People aware about the value of biodiversity
	Biodiversity values incorporated in national plans and accounting
	Incentives and subsidies harmful to biodiversity eliminated
	Sustainable production and consumption
	Loss of natural habitat halved
	Fish harvested sustainably within ecological limits
	Agriculture, aquaculture & forestry are sustainable
	Pollution and excess nutrients do not harm biodiversity
	Invasive alien species & their pathways managed
	Anthropogenic pressure on reefs & other ecosystem minimised
	At least 17% terrestrial PA and 11% marine PA
	Extinction prevented and conservation status improved
	Genetic diversity plants and domesticated animal & cultural valuable species safeguarded
	Essential ecosystem services safeguarded
	Restoration of biodiversity for mitigation and adaptation to climate change
	Nagoya Protocol in force with national implementation
	NBSAP updated through participatory approach
	TK of ILC respected & participation of ILCs at all levels
	Knowledge and science base of biodiversity improved and shared widely
	Resource mobilisation for effective implementation of these targets

Notes: PS—priority score, CV—coefficient of variation, R—rank, AT—relevant Aichi targets.

For full details for these Targets: <https://www.cbd.int/sp/targets/>.

Figure 4. Coefficients of variation (CV) of priority scores for the different conservation issues identified within each general theme.



3.3. Priority ranking of issues across themes

The respondents to the second survey showed clear priorities among the top five issues of most themes (priority scores in Table 1)—within themes, the priority scores of the different issues were statistically different ($p \leq 0.007$) in all cases except for “finance and resource allocation” ($H = 7.6$, $p = 0.107$) and “public awareness and participation” ($H = 5.9$, $p = 0.207$). Nevertheless, the *lack of funds from both the Federal and State governments* was voted as the top priority issue for “finance and resource allocation” and the *general overall lethargy and lack of passion for biodiversity issues among Malaysians* was ranked as highest priority for “public awareness and participation”.

3.4. Differences across stakeholder groups

The four stakeholder groups showed little differences in their priority preferences and their priority scores were significantly different in just two of the 35 issues: issue 3.3 under “socio-economy” (regarding access and benefits sharing rights to genetic resources, $H = 35.6$, $p = 0.003$) and 7.1 under “public awareness and participation” (public’s lethargy and lack of participation, $H = 14.8$, $p = 0.002$; Table 1). α level was set to 0.0125 by applying the Bonferroni correction.

The radar plot (Figure 5) illustrates priority preferences across stakeholder groups. In general, respondents from the government and private sector differed the most from each other in their priority choices, followed by NGO vs. government and academic vs. private sector (Figure 5). Academia and NGO respondents showed the highest similarity index, with very close agreement in “policy and management” (0.14), “socio-economy” (0.16) and “knowledge and R&D” (0.16), among others (Figure 5). In “knowledge and R&D”, there was a general high level of agreement among stakeholders but respondents from the private sector differed above all other groups (Figure 5).

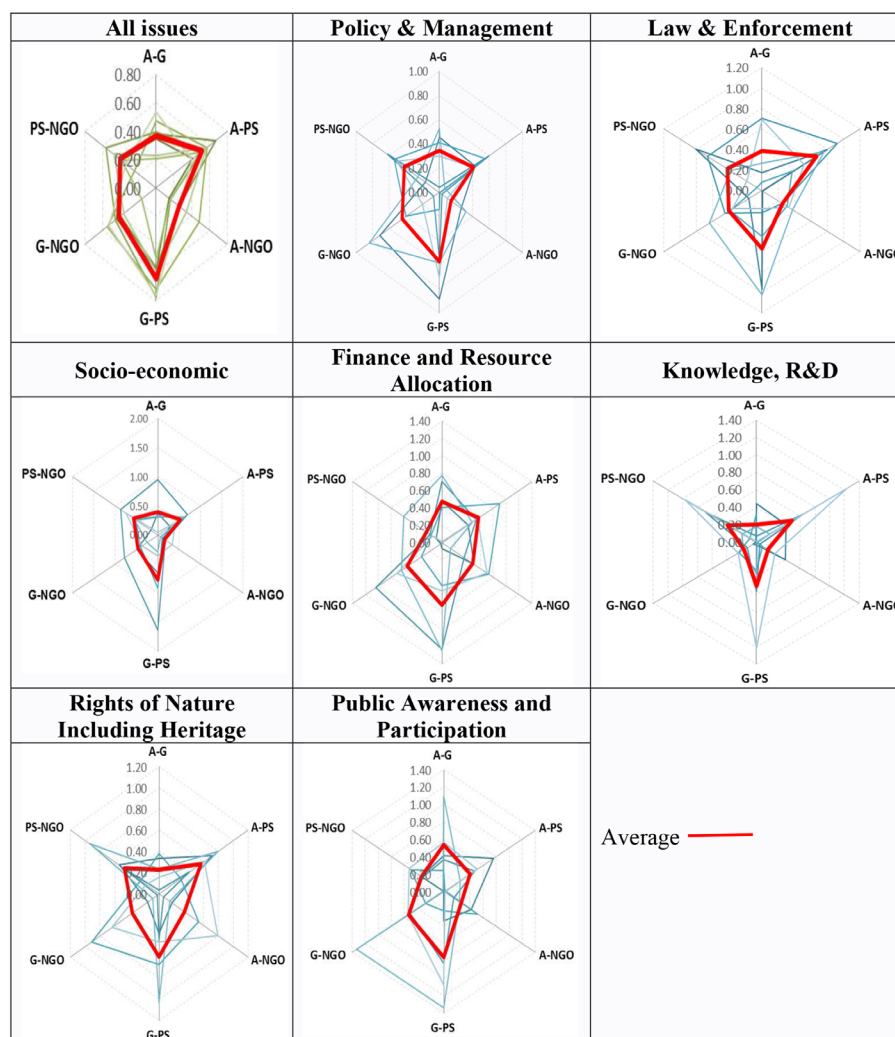
3.5. Differences by nationality, age and seniority

Malaysians and non-Malaysians differed in their priority scores of just two of the 35 issues: issue 2.4 under law and enforcement (lack of training for enforcement, prosecuting /investigating officers and judges, $U = 624$, $z = -2.120$, $p = 0.034$) and issue 4.2 under finance and resource allocation (ineffective use of resources to manage PAs, $U = 491$, $z = -3.085$, $p = 0.002$). Non-Malaysians gave higher priority to the issue of pressure for development and ineffective use of resources for conservation.

Younger and older participants differed in their priority scores of just three issues: issue 2.5 (perception that conservation agencies are inefficient and susceptible to corruption, $U = 201$, $z = -2.501$, $p = 0.012$), 4.3 (lack of resource mobilisation for policy and law implementation, $U = 199$, $z = -2.496$, $p = 0.013$) and 6.4 (underutilisation of the National Heritage Act, $U = 221$, $z = -2.122$, $p = 0.034$). Older participants gave higher priority to the issues of indigenous and local communities (ILCs) not receiving adequate benefit from tourism and the National Heritage Act 2005 not being explored to designate PAs and protect endangered species. Younger participants, in line with the overall survey results, gave a higher priority to the lack resource mobilisation plan/strategy to ensure effective implementation of policies.

Figure 5. Star chart highlighting the relationship among stakeholders by comparing the similarity index.

Note: Lower values represent higher similarity.



Among the government officials, senior and junior officials differed in their priority scores of six out of 35 issues (issues 1.1, 2.2, 4.4, 5.5, 6.1 and 6.3; Table 1). Junior officials, consistent with the overall survey results, stressed the lack of effective leadership, inadequate penalties and the lack of emphasis on the value and rights of nature in the current education system. Conversely, senior officials ranked a lack of leadership as the lowest priority in the policy and management theme and concurred with the overall survey results in that there is a lack of protection, preservation and documentation of traditional knowledge and cultural practices.

4. Discussion

The lack of clear science-based inputs to identify conservation priorities is often a hurdle to enable effective conservation (Wilson et al., 2007). Here, we were able to effectively engage a broad spectrum of stakeholders—including the “powerful and influential” stakeholders (Padfield et al., 2014; Sutherland et al., 2010)—to identify 7 themes and 35 conservation priority issues for Peninsular Malaysia. Additionally, we managed to rank the issues under each theme, which we feel will be useful to advise decision-makers and other stakeholders more effectively than by just providing a menu of issues. Below we discuss each of the seven themes, highlighting their relevance within the frame of the Aichi Targets, as well as levels of agreement among different stakeholder groups involved in the prioritisation exercise.

4.1. Policy and management

Policy and management form the core for biodiversity governance yet this study has shown that management of PA and wildlife in Peninsular Malaysia is perceived to be inadequate (Figure 3). The issues highlighted in this study—*lack of leadership, ineffective implementation, conflicting policies*—are highly influenced by the “Malaysia Plans”, five-year national-level policies established after the country’s independence in 1957. The first four Malaysia Plans (1966–1985), had a predominant focus on economic development and poverty eradication, with low consideration of environmental sustainability (EPU, 2013). In the Fifth Malaysia Plan (1986–1990) a new chapter was dedicated to the environment (EPU, 1985). However, the focus on actual conservation activities was limited; instead Malaysia prioritised investment in the prevention and mitigation of natural disasters, such as floods and landslides (Murad, 2013; NRE, 2009).

Leadership and political will (issue 1.1) are essential for the effective conservation of biodiversity. In Nepal, for example, high-level political commitment has been key in the successful curbing of poaching, even though the country is far more limited in resources than many other developing countries (Martin, Martin, & Vigne, 2013). Yet, Malaysia’s federal system of government leads to jurisdictional conflicts that often compromise conservation efforts (issue 1.3). According to Malaysia’s constitution, states should obtain their revenue from the exploitation of land-based resources, such as timber and minerals. While the exploitation of natural resources was highly profitable in the 1950s and 1960s, in the last two decades states have increasingly resorted to the overexploitation of land resources, such as logging and the conversion of forests into oil palm and rubber plantations (Padfield et al., 2016). Furthermore, dependence on land resources leads states to be particularly reluctant to relinquish land for conservation in the form of protected areas. Wildlife, conversely, is managed by the federal government. Wildlife conservation policies—designed at federal level—face serious implementation challenges due to the incapacity of the federal government to influence land management issues, including PAs management, where the state governments have overall authority. This issue was further highlighted by our respondents in the need for a National PA framework (issue 1.4) to align and streamline the management of PAs by different actors.

4.2. Laws and enforcement

Weak enforcement of policies and laws due to lack of capacity by the implementing agencies have hampered conservation efforts in Peninsular Malaysia (issue 2.1). This can be observed in PAs managed by state governments. The Royal Belum State Park (1,175 km²) in northern Peninsular Malaysia, for example, is managed by the Perak State Parks Corporation, with a team of just eight rangers (Rayan & Linkie, 2015). Tropical PAs are recommended to have between 3 (Bruner, Gullison, Rice, & da Fonseca, 2001) and 10 (Rambaldi, 2000) rangers per 100 km²; accordingly, Royal Belum State Park would require a minimum fivefold increase in the number of rangers.

Enhancing the enforcement capacity and training for enforcement, prosecuting and investigating officers and judges were also identified as high priorities (issues 2.2 and 2.4). The new Wildlife Conservation Act 2010 establishes fines of up to RM500,000 (approx. USD120,000) and/or imprisonment of 10 years for wildlife-related crimes (Government of Malaysia, 2010), compared with maximum fine of up to RM15,000 (approx. USD3,600) or five years jail in the repealed 1972 Protection of Wildlife Act (Government of Malaysia, 1972). In spite of this increase in penalties, wildlife crime is not perceived as a serious crime in court and offenders have been discharged with much lower penalties or jail sentences than what the act would allow (Christy, 2012).

Corruption is an important driver of biodiversity loss in tropical countries leading to high economic losses for the nation (Laurance, 2004). Corruption within Malaysian conservation agencies was also identified as an important issue (issue 2.5) although ranked at the lowest priority in this theme. The Malaysian Anti-Corruption Commission (MACC) revealed that in Sarawak State alone, more than USD15 million were lost to illegal loggers from May to August 2014 (Othman, 2014). In 2015, a former district forestry officer from the northern state of Perak was found guilty of accepting bribes from timber contractors and ordered to return his extraordinary wealth of more than USD670,000 to the government (The Star, 2015).

4.3. Socio-economic issues

Interestingly, the majority of the socio-economic issues identified in this exercise focused on ILCs. At present ILCs are rarely involved in the management of PAs and wildlife in Peninsular Malaysia (Aziz, Clements, Rayan, & Sankar, 2013). Our participants identified access and benefit sharing (ABS) to genetic resources and ecotourism as ways to integrate and benefit ILCs (issues 3.1, 3.3 and 3.4). Ecotourism was also considered a *problem* for ILCs due to the potential negative impact on their culture (issue 3.5). Ecotourism initiatives involving and affecting ILCs should consult them to respect cultural norms and ensure meaningful benefits for these communities (Johnston, 2014).

4.4. Funding and resource allocation

The lack of funds, ineffective use of resources, absence of resource mobilisation and the potential of innovative funding initiatives were raised as issues under this theme. Malaysia has been ranked as the seventh most underfunded out of 198 countries for biodiversity conservation, and one of four countries to be both in the bottom quartile of relative conservation funding and in the top quartile of threatened biodiversity (Waldron et al., 2013). In Malaysia, the public budget remains the primary mechanism for financing conservation. In 2013, only 0.15% of the total federal government budget (RM249 billion or ~USD59 billion; EPU, 2016) was allocated to the two key agencies directly involved in protecting terrestrial biodiversity—the Department of Forestry and the Department of Wildlife and National Parks (DWNP, 2014; FDPM, 2016).

While Malaysia has policy documents in place, the agencies entrusted to implement them are crippled by a lack of resources, including funds, manpower and equipment (issues 4.1 & 4.2) (MNF for Rio+10, 2003). To complement Malaysia's newly revised policy on biodiversity, it is envisaged that a resource mobilisation plan will be adopted to ensure that the new policy is implementable (UNDP, 2012). Additionally, Malaysia has not sufficiently embraced alternative funding for conservation, such as payment for ecosystem services (PES) and reducing emissions from deforestation and forest degradation plus (REDD+; issue 4.5).

4.5. Knowledge and research and development

Our results highlight the need for better and stronger collaboration and cooperation amongst research institutes, universities, governments and other agencies and to foster a science-policy interface (issues 5.1 and 5.2). Research organisations in Malaysia tend to work in isolation from policy matters as reflected by Hansen et al. (2015), who highlighted the disconnect between universities, government and industry on the topic of sustainable palm oil. The shortage of local scientists in fundamental sciences (issue 5.4) and lack of clear career prospects in conservation science (issue 5.3) were also highlighted. While Malaysia's R&D expenditure has been growing steadily from 0.5% of the GDP in 2000 to 1.13 in 2012, the emphasis has been on applied research such as biotechnology (MASTIC, 2015).

4.6. Rights of nature (including heritage)

The need to document traditional knowledge was identified as a priority (issue 6.1), which in turn can be capitalised to better manage biodiversity (Norini, Lim, Latif, & Nagulendran, 2013). Malaysia has a National Heritage Act of 2005 that has not been sufficiently used to protect PAs and important flora and fauna (issue 6.4). Importantly, the National Heritage Act can help overcome jurisdiction and constitutional limitations. Participants also highlighted the important and powerful role religion can play in Malaysia's conservation efforts (issue 6.5). In the state of Terengganu, for example, Islamic sermons infused with turtle conservation themes increased concern for turtles among mosque-goers (Clements et al., 2009). Muslim clerics in Terengganu have recently issued a "fatwa" against illegal hunting of animals in general (Actman, 2015).

4.7. Public awareness and participation

Despite a recent study suggesting that Malaysians in urban areas may be willing to pay for forest protection (Vincent et al., 2014), the apathy towards biodiversity and environmental issues among Malaysian was the top priority (issue 7.1) under this theme. Similar attitudes towards environmental issues have been reported in other countries (e.g. Curry, Ansolabehere, & Herzog, 2007). Our participants highlighted the lack of high-profile and widely recognisable champions or icons for conservation (issue 7.2). This may be influenced by the fear of being labelled as an activist with anti-government sentiments. For example, the NGO Friends of the Earth Malaysia claim that activists have been arrested due to their objection to the building of the world's largest rare earth refinery in Malaysia by an Australian company (SAM, 2014).

4.8. The relevance to Aichi targets

We cross-referred and mapped out the 7 themes and 35 conservation issues with the Aichi Biodiversity Targets (Table 1). Priority issues identified in our study under “policy and management” and “laws and enforcement” relate mainly to policy coherence (Target 17), resource mobilisation (Target 20) and increasing PAs (Target 11). The “socioeconomic” and “right of nature” issues link to a wide range of the Aichi Targets, especially Target 18 on traditional knowledge and participation of ILCs and Target 16 on Nagoya Protocol on ABS. Addressing issues related to “funding and resource allocation” will assist in meeting Aichi’s Target 2 on the need to incorporate the value of biodiversity in national plans as well as Target 20. “Knowledge and R&D” issues will help achieve Aichi Target 19 on improving knowledge base, as well as Targets 12 and 13 on preventing extinction on known species and safe guarding genetic erosion of cultivated plants and domesticated animals as well as culturally valuable species. Issues in the “public awareness and participation” theme relate to a number of Aichi Targets, including Targets 1 (awareness) and 4 (participation of different stakeholders in sustainable use of natural resources; Table 1). Cross referencing our issues with the Aichi Targets shows the interlinkage nature of some of these issues, where one issue addresses one or more targets. This ranked priority issues will assist Malaysia in focusing actions (Marques et al., 2014) as stipulated in the revised National Biodiversity Policy (2016–2025) to meet its Aichi Targets.

4.9. Priority differences among stakeholders

To our best knowledge, this is the first study to explicitly compare inter-stakeholder differences in national conservation priorities. The high level of concordance in the ranking of issues within themes is a positive sign, since it indicates that priorities can be agreed between stakeholders with different agendas. In particular, we found the private sector to differ the most among the four groups of stakeholders (Figure 5). Differences can likely be explained by the fact that the private sector is focused predominantly on business and economic profit as compared with conservation. Similarly, other studies (Padfield, Tham, Costes, & Smith, 2016; van den Burg & Bogaardt, 2014) reveal that businesses are unlikely to incorporate biodiversity conservation in their overall business plan unless there is pressure from actors within the supply chain.

4.10. Other factors affecting conservation priorities

We found that nationality (Malaysians vs. non-Malaysians), age and seniority (among government officials) of respondents had minimal impact on the way they prioritised the different conservation issues. Non-Malaysians only differed from Malaysians in their higher prioritisation in the lack of training for enforcement, prosecuting /investigating officers and judges and the lack of effective use of resources. Younger respondents ranked higher the need of an effective resource mobilisation strategy to complement policies and laws that are formulated for better implementation.

Interestingly, junior government officials indicated a lack of effective leadership as their top priority in the theme “policy and management”, while senior government officials ranked this issue as the lowest priority. Leadership in public sector, including at state level, plays a central role in facilitating bottom-up communication to enhance efficiency and innovation (Borins, 2002; Elagupillay, 2004). Compared to their seniors, junior government officials also stressed the need to recognise the rights of nature in formal and informal education systems.

4.11. Limitations

Although we were able to engage a wide range of individuals and organisations, not all stakeholder groups were equally willing or available to participate. In all the stages of our study, the private sector was less engaged than the other groups (Figure 2) as it has happened in previous similar initiatives in Malaysia (Padfield et al., 2014). Furthermore, not all relevant stakeholder groups were invited to participate in this prioritisation exercise. Farmers, indigenous communities and poachers were not involved and their views are likely to differ compared with those of the four groups involved. Overall, the stakeholder reach of our surveys cannot be accurately quantified since we employed a snowball approach to circulate the online survey. It is possible that both surveys reached a wide audience yet some may have chosen not to participate.

An important limitation of our approach is that the resulting 35 priority conservation issues are not always as distinct from each other as we had expected. For example, issues 1.3 and 6.2 contain multiple issues within one; and issues 5.1 and 5.2 have a high level of overlap making it difficult to distinguish between them. We attribute this to an intrinsic limitation of the group thinking used in our approach. In the second workshop, we asked participants to consolidate issues and choose the top five within each theme. In this process the participants tried to capture as much information as possible within five issues, which resulted in a lack of clarity and distinctness, and the overlap among some of the issues. For similar exercises in the future we recommend to specify very clearly the need to maintain distinctiveness across issues, even if that means that many issues do not make the final cut. We also recommend allocating more time to the second workshop to allow the revision and polishing of resulting issues while still retaining the group views on them.

5. Conclusion

Stakeholder engagement in the identification of priority issues was an effective approach that enabled a wide range of stakeholders to participate in an open, transparent, inclusive and participatory manner to generate a list of 35 conservation priority issues within 7 general themes for Peninsular Malaysia. We found a generally high level of concordance among the different stakeholders involved. The resulting list of ranked priority issues will enable policy-makers and other stakeholders to prioritise policy implementation as well as address Aichi Targets. In order to facilitate the uptake of these findings by policy-makers, the general media and other stakeholders, the results should also be translated into more accessible formats, such as policy summaries and articles in national magazines and newspapers (Walsh, Dicks, & Sutherland, 2014). The results of this study were presented to Malaysian policy-makers and partially incorporated in the “pursuing green growth for sustainability and resilience” section of the 11th Malaysia Plan (2016–2020; EPU, 2015). This exercise can also be used as a model to identify conservation priorities in other countries.

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Author details

Kangayatkarsu Nagulendran¹
E-mail: nagu_mybiod@yahoo.com
Rory Padfield^{2,3}
E-mail: rorypadfield@gmail.com

ORCID ID: <http://orcid.org/0000-0002-1659-6932>

Sheema A. Aziz⁴

E-mail: sheema@rimbaresearch.org

A. Aldrie Amir⁵

E-mail: aldrie@ukm.edu.my

ORCID ID: <http://orcid.org/0000-0002-9184-0317>

Abd. Rahim Abd. Rahman⁶

E-mail: drarar@forestry.gov.my

Mohamad A. Latiff⁷

E-mail: latiff@ukm.edu.my

Ahmad Zafir^{5,8}

E-mail: ahmad.zafir@gmail.com

Aida Ghani Quilter⁹

E-mail: nur.aida.ghani@sime-darby.com

Ange Tan¹

E-mail: angetan6176@gmail.com

Sharifuddin Arifah¹⁰

E-mail: arifah.sharifuddin@mdec.com.my

Noor Awang¹¹

E-mail: awangnoor@upm.edu.my

Noraini Azhar¹²
 E-mail: azhar_noraini@epu.gov.my
 Perumal Balu¹³
 E-mail: hod.conservation@mns.org.my
 Pek Chuan Gan¹⁴
 E-mail: pek.chuan.gan@undp.org
 ORCID ID: <http://orcid.org/0000-0001-7291-0220>
 Ning Hii¹
 E-mail: ningster.is@gmail.com
 Mohammad I.H. Reza¹⁵
 E-mail: reza@ukm.edu.my
 ORCID ID: <http://orcid.org/0000-0002-3943-5306>
 Rama Iyer Lakshmi Lavanya¹⁶
 E-mail: llrama@wwf.org.my
 Teckwyn Lim¹
 E-mail: TeckWyn.Lim@nottingham.edu.my
 Shrestha Mahendra¹⁷
 E-mail: ShresthaM@si.edu
 Darmaraj Mark Rayan¹⁶
 E-mail: mdarmaraj@wwf.org.my
 Suzanne McGowan^{1,18,19}
 E-mail: suzanne.mcgowan@nottingham.ac.uk
 Midori Paxton²⁰
 E-mail: midori.paxton@undp.org
 Zakaria Mohamed¹¹
 E-mail: mzakaria@upm.edu.my
 Daim Mohd. Salleh²¹
 E-mail: mohdsa054@salam.uitm.edu.my
 M. Tajuddin Abdullah²²
 E-mail: mohd.tajuddin@umt.edu.my
 Nik Aznizan N. Ibrahim²³
 E-mail: aznizan@mpob.gov.my
 Chong Leong Puan¹¹
 E-mail: clpuan@yahoo.com
 ORCID ID: <http://orcid.org/0000-0002-4708-1915>
 Gopalasamy Reuben Clements^{1,4,22,24,25,26}
 E-mail: reuben@rimbaresearch.org
 Idris S.M. Mohamed²⁷
 E-mail: alammsia@yahoo.com
 Leng Guan Saw²⁸
 E-mail: sawlg55@gmail.com
 Kumaran Shashi²⁹
 E-mail: shashi.kumaran@gmail.com
 Elagupillay Sivananthan³⁰
 E-mail: sivawild@gmail.com
 Dionysius S.K. Sharma¹⁶
 E-mail: dsharma@wwf.org.my
 Suksuwan Surin³¹
 E-mail: Surin@proforest.net
 Ponnusamy Vanitha³²
 E-mail: Vanitha.Ponnusamy@nottingham.edu.my
 ORCID ID: <http://orcid.org/0000-0002-2601-9880>
 Jamie Wadey¹
 E-mail: Jamie.Wadey@nottingham.edu.my
 Wan Mohd Wan Hasmah³³
 E-mail: whasmah11@gmail.com
 Ee Phin Wong¹
 E-mail: eephin@gmail.com
 ORCID ID: <http://orcid.org/0000-0003-3931-1175>
 Pui May Wong³⁴
 E-mail: wongpuimay@hotmail.com
 Chin Aik Yeap¹³
 E-mail: hornbills@mns.org.my

Ahimsa Campos-Arceiz^{1,19}
 E-mails: ahimsa@camposarceiz.com, ahimsa.camposarceiz@nottingham.edu.my

ORCID ID: <http://orcid.org/0000-0002-4657-4216>

¹ School of Environmental and Geographical Sciences, The University of Nottingham Malaysia Campus, Jalan Broga, Semenyih 43500 Selangor, Malaysia.

² Malaysia Japan International Institute of Technology, Universiti Teknologi Malaysia, Kuala Lumpur 54100, Malaysia.

³ Faculty of Humanities and Social Sciences, Oxford Brookes University, Headington Campus, Gipsy Lane, Oxford OX3 0BP, UK.

⁴ Rimba, 22-3A Casa Kiara 11, Jalan Kiara 5, Mont Kiara, Kuala Lumpur 50480, Malaysia.

⁵ Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, Bangi 43600, Selangor, Malaysia.

⁶ Forestry Department of Peninsular Malaysia, Jalan Sultan Salahuddin, Kuala Lumpur 50660, Malaysia.

⁷ Universiti Kebangsaan Malaysia, 43600 UKM, Bangi Selangor, Malaysia.

⁸ Faculty of Life Science, University of Science Malaysia, Minden 11800, Pulau Pinang, Malaysia.

⁹ Sime Darby Plantation Sdn. Bhd., Level 3A, Main Block, Plantation Tower, No. 2 Jalan PJU 1A/7, Ara Damansara, Petaling Jaya 47301, Selangor, Malaysia.

¹⁰ Stakeholder Engagement Division, Multimedia Development Corporation, Sdn. Bhd. 2360, Persiaran APEC, Cyberjaya 63000, Selangor, Malaysia.

¹¹ Faculty of Forestry, Universiti Putra Malaysia, UPM Serdang 43400, Selangor, Malaysia.

¹² Prime Minister's Department, Economic Planning Unit, Blok B5 & Blok B6, Federal Government Administrative Centre, Putrajaya 62502, Malaysia.

¹³ Malaysian Nature Society (MNS), JKR 641 Jalan Kelantan, Bukit Persekutuan, 50480 Kuala Lumpur, Malaysia.

¹⁴ United Nations Development Programme, Wisma UN Block C, Kompleks Pejabat Damansara, Jalan Dungun, Damansara Heights, Kuala Lumpur 50490, Malaysia.

¹⁵ Southeast Asia Disaster Prevention Research Initiative (SEADPRI), Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, Bangi 43600, Selangor, Malaysia.

¹⁶ WWF-Malaysia, No. 1 Jalan PJS 5/28A, Petaling Jaya Commercial Centre, Petaling Jaya 46150, Selangor, Malaysia.

¹⁷ Smithsonian Conservation Biology Institute, National Zoological Park, MRC 5503, P.O. Box 37012, Washington, DC 20013-7012, USA.

¹⁸ School of Geography, University of Nottingham, University Park, Nottingham NG72RD, UK.

¹⁹ Mindset, Interdisciplinary Centre for Tropical Environmental Studies, The University of Nottingham Malaysia Campus, Jalan Broga, Semenyih 43500 Selangor, Malaysia.

²⁰ United Nations Development Programme - Global Environmental Finance Unit, Bureau for Policy and Programme Support, 304 East 45th Street, New York, NY 10017, USA.

²¹ Center for Biodiversity and Sustainable Development, Universiti Teknologi MARA, Shah Alam 40450, Selangor, Malaysia.

²² University Malaysia Terengganu, Kuala Terengganu 21030, Terengganu, Malaysia.

²³ Conservation & Biodiversity Centre, Malaysian Palm Oil Board, No.6 Persiaran Institusi, Bandar Baru Bangi, Kajang 43000, Selangor, Malaysia.

²⁴ Woodland Park Zoo, 5500 Phinney Ave N, Seattle, WA 98103, USA.

- ²⁵ Panthera, 8 West 40th Street, 18th Floor, NY 10018, USA.
 - ²⁶ Faculty of Science, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, Subang Jaya 47500, Selangor, Malaysia.
 - ²⁷ Sahabat Alam Malaysia, 258 Jalan Air Itam, 10460 Penang, Malaysia.
 - ²⁸ Forest Research Institute Malaysia (FRIM), Kepong 52109, Selangor, Malaysia.
 - ²⁹ Research Institute for Environment and Livelihoods, Charles Darwin University, Darwin, NT 0909, Australia.
 - ³⁰ Department of Wildlife and National Parks Malaysia, KM10 Jalan Cheras, Kuala Lumpur 56100, Malaysia.
 - ³¹ Proforest Southeast Asia, MBE Desa Sri Hartamas, No. 30G, Jalan 25/70 A, Kuala Lumpur 50480, Malaysia.
 - ³² Nottingham University Business School, University of Nottingham Malaysia Campus, Jalan Broga, Semenyih 43500, Selangor, Malaysia.
 - ³³ Ministry of Natural Resources and Environment, Level 12, Wisma Sumber Asli, Putrajaya 62574, Malaysia.
 - ³⁴ Malaysian Conservation Alliance for Tigers (MYCAT), Unit 3, Ground Floor, Jalan SS23/11, Taman SEA, Petaling Jaya 47400, Selangor, Malaysia.
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