

## **Test development for knowledge, attitude, and practices on conservation: A tool for developing sustainable protected area buffer zone management**

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### **ABSTRACT**

A survey tool to gather the knowledge, attitude, and practices on conservation of local villagers in Mt. Hamiguitan Range Wildlife Sanctuary in Davao Oriental was developed following the standard scale development procedure. The Mt. Hamiguitan Range Wildlife Sanctuary is a UNESCO and ASEAN Heritage Park. There are 350 individuals who participated in the test development representing the three Local Government Units surrounding Mt. Hamiguitan Range Wildlife Sanctuary. The test consisting of four main domains pertaining to conservation was subjected to internal consistency evaluation and improvement, and factor analysis was used in determining the possible sub-domains. This tool is recommended to establish the baseline data of local villagers living within the buffer zones of MHRWS. This tool can be adopted in other protected areas and natural conservation sites.

**Keywords:** *Mt. Hamiguitan; Test Development; ASEAN; UNESCO; Cronbach's alpha; Factor Analysis; Philippines.*

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### **INTRODUCTION**

The idea of establishing Protected Areas in the Philippines began on February 1, 1932 through Republic Act No. 3915 which provides the establishment of national parks, declaring them as game refuges and for other conservation and protection purposes (La Vina et al. 2010). Since then, several legislations were enacted and on June 29, 1992 the National Integrated Protected Areas System Implementing Rules and Regulations were formulated through the Department of Environment and Natural Resources (DENR) Office Administrative Order No. 1992-25 (IUCN-EPLP No. 81). This marks the beginning of some progressive changes in environmental legislation in the Philippines. The key idea of implementing the protected areas in the Philippines is to establish a system preserving the variety of genes, species, and ecosystems (Philippine Government, 1989).

The Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS) in Davao Oriental Philippines was declared as a protected area in 2004 through RA 9303 and duly inscribed as UNESCO and ASEAN world heritage site in 2014 respectively. Similar with other protected areas in the Philippines, it has a core zone which is a strict protected zone that strictly permits human entry for research purposes, and a buffer zone that borders between the core zone and areas with human habitation.

Buffer zones are important in such a way that it is the first line of protection for protected areas (NIPAS ACT, section 8) but permitting some low impact socio-economic activities (Lynagh & Ulrich 2011). Hence proper management of buffer zones ensures preservation and conservation of our natural resources found within the core zones. One of strategies towards effective conservation efforts is to work closely with communities living within the buffer zones. Considering that the Philippines is a mega diverse hotspot (Heaney and Regalado 2016), it is imperative not to lose more of our already diminishing protected areas due to mismanagement.

Understanding the knowledge, attitude and practices (KAP) on conservation of residents within the buffer zone is vital for creating more sustainable initiatives in conserving a protected area such as MHRWS. Hence, a survey tool was developed following a standard scale development method to provide robust baseline information. This is deemed important since understanding social activities and engaging them towards preservation of protected areas is one of the keys in developing a more sustainable buffer zone management.

In this paper, a KAP assessment tool in the context of MHRWS buffer zone communities was constructed and tested. It was analyzed for robustness with regards to its content validity and reliability. The final test is expected to provide measures of the knowledge, attitude and practices of residents within and near the buffer zones of Mt Hamiguitan. These measures could be useful for management and long term monitoring purposes for sustainable management.

## METHOD

This study approached the test development by using a Scale Development Procedure as outlined below (Hinkin et al. 1997; Morgado et al. 2017). It employs a combination of methods beginning with content validation (Rourke & Anderson 2004; Sproule 2009; Yaghmale 2003) of the initial items followed by obtaining empirical data for testing (DeCoster 1998). The scale reliability analysis uses a combination of reliability and factor analysis.

### *Formulation of test items and content validity*

The items of the questionnaire were formulated and drawn from the following content sources: Buffer Zones Management Plan (DENR – DAO, 2008-26); key-informant-interview with the Protected Area Superintendent of Mt. Hamiguitan Range Wildlife Sanctuary; Focus Group Discussion with the local stakeholders; and in reference with the DENR Socio-economic Assessment and Monitoring Systems (SEAMS). From this, a draft of the questionnaire was constructed and empirically tested to the three Local Government Units surrounding MHRWS, namely Barangay Catmonan in the City of Mati, *Barangay* Tumulite of San Isidro, and *Barangay* Osmeña of Governor Generoso, Davao Oriental, Philippines. A total of 350 individuals participated in the survey test.

### *Components of the test*

The survey tool is composed of the participants' profile and scale questionnaire on KAP. There are four (4) major domains namely *knowledge*, *attitude*, and *practices on MHRWS and Buffer Zones* and *general knowledge on conservation* using the Likert Scale: 5 - Strongly Agree, 4 – Agree, 3 - Neither Agree or Disagree, 2 – Disagree, and 1– Strongly Disagree. The knowledge on MHRWS consists of 14 initial items focusing local stakeholders' general knowledge on MHRWS. The attitude domain consisted of 20 initial items containing items on views, practices with 14 items, and knowledge on conservation with 10 items. Scores on these four domains or themes will be useful in establishing the baseline information for crafting the Buffer Zones management. Understanding these themes will be used in developing more specific activities towards conservation of MHRWS.

*Scale reliability analysis and internal consistency*

The constructed assessment tool was subjected to internal consistency evaluation using Cronbach’s Alpha (Gleim & Gleim 2003; Taber 2016) and item-total correlations. In this process, an item that did not pass the high level of internal consistency criterion ( $\geq 0.80$  Cronbach’s Alpha) was removed (Tavakol & Dennick 2011). The pilot survey was a one-shot approach, hence the impracticality of item revision. The final items of each domain were subjected to factor analysis to determine possible subdomains.

**RESULTS AND DISCUSSION**

The survey was conducted in the three LGUs straddled by MHRWS namely, Governor Generoso, City of Mati, and San Isidro. Majority of the respondents are from Governor Generoso with 43.40%, followed by San Isidro 35.40%, and the City of Mati with 21.10%. As reflected in Table 1, majority of the respondents came from Governor Generoso due to a larger number of households located within the buffer zone of MHRWS and the proposed expansion of MHRWS.

Table 1. Demographic profile of respondents

<b>A. Distribution of respondents by Local Government Unit (LGU)</b>		
LGU	Frequency	Percentage
Governor Generoso	152	43.40
Mati City	74	21.10
San Isidro	124	35.40
Total	350	100.00
<b>B. Distribution of respondents by Sex</b>		
Female	182	52.00
Male	168	48.00
Total	350	100.00
<b>C. Distribution of respondents by Age Group</b>		
16 to 30	74	21.10
31 to 45	98	28.00
46 to 60	120	34.30
61 to 75	52	14.90
75 to 90	6	1.70
Total	350	100.00
<b>D. Distribution of respondents by Civil Status</b>		
Single	60	17.10
Married	263	75.10
Widow/er	10	2.90
Separated/Annulled	1	0.30
Common Law/Live-in	16	4.60
Total	350	100.00

More than half of the respondents are female with 52% while 42% are males where 75% are married. The highest age group ranges from 46-60 accounting to 34.30%, followed by 31-45 with 28.00% and ages 16-30 with 21.10% all of which are living within MHRWS for more than 10 years.

*Scale reliability development*

The succeeding tables present the process and results of the reliability test of the major themes using Cronbach’s Alpha.

Table 2. Scale reliability analysis for **knowledge** domain.

Procedure	Cronbach's Alpha	Interpretation and Action
Step 1: All 14 initial items were included	0.766	Acceptable internal consistency Remove Item 10 as suggested by Item-Total Correlations
Step 2: Remove Item 10	0.844	Good internal consistency Remove Item 9 as suggested by Item-Total Correlations
Step 3: Remove Item 9	0.854	Good internal consistency Remove Item 11
Step 4: Remove Item 11	0.870	Good internal consistency Remove Item 13
Step 5: Remove Item 13	0.872	Best internal consistency No further removal
Step 6: Apply factor analysis on remaining items		Subdomain 1: Item 1 to Item 8 (Knowledge on MHRWS & BZ) Subdomain 2: Item 12 and Item 14 (knowledge on technical terms) No items below 0.50 Coefficient
Step 7: Final Items	0.872	Ten (10) Items retained: Item 1 to Item 8, Item 12 and Item 14

From the 14 initial items on *knowledge*, it went through 5 internal consistency iterations until the highest possible coefficient was achieved. Within this process, 4 items were removed (items 9, 10, 11, and 13) producing the final 10 items with the highest internal consistency coefficient of 0.872. Factor analysis on the 10 items revealed two (2) subdomains identified as: (1) *Knowledge on MHRWS and Buffer Zone* reflected by items 1 to 8, and (2) *Knowledge on Technical Terms* on items 12 and 14.

Table 3. Scale reliability analysis for **attitude** domain.

Procedure	Cronbach's Alpha	Interpretation and Action
Step 1: All 20 initial items were included	0.807	Acceptable internal consistency Remove Item 13 as suggested by Item-Total Correlations
Step 2: Remove Item 13	0.825	Remove Item 14
Step 3: Remove Item 14	0.849	Remove Item 16
Step 4: Remove Item 16	0.858	Remove Item 17
Step 5: Remove Item 17	0.873	Remove Item 12
Step 6: Remove Item 12	0.881	Remove Item 15
Step 7: Remove Item 15	0.888	Remove Item 19
Step 8: Remove Item 19	0.892	Remove Item 20
Step 9: Remove Item 20	0.895	Remove Item 18
Step 10: Remove Item 18	0.898	Remove Item 1
Step 10: Remove Item 1	0.901	Remove Item 2
Step 11: Remove Item 2	0.906	Best internal consistency No further removal
Step 12: Apply factor analysis on remaining items		Subdomain 1: 3,4,5 (Recognizing Authority) Subdomain 2: 6,7,8,9,10,11 (Involvement)
Step 13: Final Items	0.906	Nine (9) Items retained: Item 3 to Item 11

For the *attitude* theme, 20 items were initially constructed and included in the analysis. These items were subjected to 11 internal consistency iterations where 11 items were removed (items 1, 2,13,14,16,17,12,15,19,20,18) producing the final 9-item scale with 0.906 Cronbach’s Alpha. Applying factor analysis on the final 9 items revealed two (2) subdomains identified as: (1) *Recognizing Authority* reflected by items 3,4,5, and (2) *Involvement* composed of items 6,7,8,9,10, and 11.

Table 4. Scale reliability analysis for **practices** on MHRWS domain.

Procedure	Cronbach’s Alpha	Interpretation and Action
Step 1: All 14 initial items were included	0.850	Good internal consistency Remove Item 6 as suggested by Item-Total Correlations
Step 2: Remove Item 6	0.853	Remove Item 13
Step 3: Remove Item 13	0.857	Remove Item 14 or 15; prioritize item 14 since it creates greater variance in scale score than Item 15
Step 4: Remove Item 14	0.861	Remove Item 15
Step 5: Remove Item 15	0.868	Best internal consistency No further removal
Step 6: Apply Factor Analysis on remaining items		Subdomain 1: 2,3,4*,5 (Destructive Practices) Subdomain 2: 1,11,12,16 (Extraction and Use) Subdomain 3: 7,8 (Household and Economic Source) *Remove Item 4 as it does not share the subdomain theme and has the lowest factor loading
Step 7: Final Items	0.858	Nine (9) items retained: Items 1, 2, 3, 5, 7, 8, 11, 12, 16; Cronbach’s Alpha reduced after removal of Item 4.

Table 4 reflects the iteration flow of achieving the final items for the *practices* theme on MHRWS. The initial 14 items underwent 4 iterations removing items 6, 13, 14, and 15 producing 10 final items. The final 10 items were subjected to factor analysis resulting to 3 subdomains identified as: (1) *Destructive practices* as reflected by items 2,3,4,5; (2) *Extraction and Use* by items 1,11,12,16; and (3) *Household and Economic Source* characterized by items 7 and 8.

Table 5. Scale reliability analysis for **conservation knowledge** on MHRWS domain.

Procedure	Cronbach’s Alpha	Interpretation and Action
Step 1: All 10 initial items were included	0.932	Very good internal consistency Item-Total Correlation suggests no removal of items
Step 2: Factor Analysis		Unidimensional
Step 3: Final Items	0.932	All 10 items included

All items for *conservation knowledge* on MHRWS domain were retained having internal consistency coefficient of 0.932. This means that all initial items developed for this domain are successful indicators to measure knowledge on conservation on MHRWS. This forms the final section of the survey tool.

### **Final questionnaire**

Integrating all the final items of each domain after internal consistency evaluation using Cronbach's Alpha and Item-total correlations, the final questionnaire for Knowledge, Attitude, and Practices on Conservation for the local stakeholders of Mt. Hamiguitan Range Wildlife Sanctuary, Davao Oriental Philippines is presented below. The Filipino translation used in the questionnaire is provided in italicized text.

## **1. Knowledge domain**

### **1.1 Knowledge on MHRWS and Buffer Zone**

1. The acronym MHRWS stands for Mt. Hamiguitan Range Wildlife Sanctuary.

*Ang kahulugan ng MHRWS ay Mt. Hamiguitan Range Wildlife Sanctuary.*

2. The MHRWS is a protected area, an area that needs to be preserve for the next generation.

*Ang MHRWS ay isang protected area, lugar na hindi dapat galawin dahil ito ay pinapangalagaan para sa susunod na henerasyon.*

3. MHRWS consists of the 3 Local Government Units namely, City of Mati, Governor Generoso, and San Isidro.

*Ang MHRWS ay binubuo ng tatlong LGU: City of Mati, Governor Generoso at San Isidro.*

4. The Department of Environment and Natural Resources office is the government agency responsible for the protection and welfare of MHRWS. *Ang ahensya ng gobyerno na unang responsable sa pangangalaga sa MHRWS ay ang Department of Environment and Natural Resources.*

5. The welfare of MHRWS rely on its Protected Area Management Board (PAMB).

*Ang kapakanan ng MHRWS ay nakasalalay sa Protected Area Management Board (PAMB).*

6. The PAMB consists of different sectors in our community that seek the welfare of MHRWS.

*Ang PAMB ay binubuo ng ibat-ibang sector sa lipunan na nangangalaga para sa kapakanan ng MHRWS.*

7. As one of the Protected Area, MHRWS has also areas open for low-impact socio-economic activities or Multiple Use Zone/Buffer Zone

*Bilang isang Protected Area, ang MHRWS ay mayroon ding lugar na pwedeng gamitin para sa pangkabuhayan ng mga mamayan o Multiple Use Zone/Buffer Zone.*

8. The usage of buffer zone in a protected area should follow the guidelines provided by the DENR Memorandum Circular no. 16, "Guidelines on the establishment and management of buffer zones for protected area".

*Ang pag gamit sa buffer zone ay mayroong palatuntunan base sa binuong DENR Memorandum Circular no. 16, "Guidelines on the establishment and management of buffer zones for protected area".*

### **1.2 Knowledge on technical terms**

9. The term 'endemic' refers to species found only in the Philippines.

*Ang terminong "endemic" ay ukol sa mga bagay na dito lang sa Pilipinas makikita.*

10. The term 'Threatened Species' refers to species with declining population. *Ang terminong Threatened species ay mga halamang hayop o halaman na nauubos na ang populasyon.*

## **2. Attitude domain**

### **2.1 Recognizing authority**

1. I report to authorities if I saw somebody cutting trees within MHRWS. *Ipinapaalam ko sa kinauukulan kung may nakita akong nagpuputol ng kahoy sa loob ng MHRWS.*

2. I report to authorities when I saw someone poaching from MHRWS. *Ipinapaalam ko agad sa kinauukulan kung may nakita akong nangunguha ng hayop sa luob ng MHRWS.*

3. I report to authority or to the DENR if I have plans to farm a land within the buffer zone of MHRWS.

*Ipinapaalam ko sa DENR kung may plano akong gawing sakahan sa buffer zone ng MHRWS.*

## 2.2 Involvement in conservation initiatives

4. I am involved in the government protection initiatives for MHRWS.  
*Kasali ako sa ating gobyerno ukol sa pag proteksyon ng MHRWS.*
5. I tell stories to my children about the importance of MHRWS.  
*Kinukwento ko sa aking mga anak o kasamahan sa bahay ukol sa kahalagahan ng MHRWS.*
6. I joined government programs on proper management of the buffer zones of MHRWS.  
*Sumasali ako sa mga programa ng ating gobyerno ukol sa wastong pamamahala sa buffer zone ng MHRWS.*
7. It is best if my family have knowledge on buffer zone management in MHRWS.  
*Mas makabubuti sa akin at sa aking pamilya kung may alam kami ukol sa pamamahala sa MHRWS.*
8. We can avoid illegal logging inside MHRWS if we have knowledge on its Buffer Zone Management.  
*Mas maiiwasan ko at ng aking pamilya ang pag Illegal logging sa MHRWS kung may alam kami ukol sa pamamahala ng Buffer Zone.*
9. We can avoid poaching inside MHRWS if we have knowledge on its buffer zone management.  
*Mas maiiwasan ko at ng aking pamilya ang pag poaching sa MHRWS kung may alam kami ukol sa pamamahala ng Buffer Zone.*

## 3. Practices domain

### 3.1 Destructive Practices

1. I used 'Kaingin' in preparing my land in my farm.  
*Gumagamit ako ng "Kaingin" para sa land preparation ng aking pagsasaka.*
2. I used chemical (ex. Round Up) in land preparation for farming.  
*Gumagamit ako ng chemical (ex. Round Up) para sa paghahanda ng lupang sakahan.*
3. I used chemicals to hasten the growth of plants in my farm.  
*Gumagamit ako ng chemical para sa pagpabilis laki ng aking mga sinasakang pananim.*

### 3.2 Extraction and Use

5. I am presently farming in MHRWS.  
*Ako ay kasalukuyang nag sasaka sa MHRWS.*
6. I took my family's daily needs in MHRWS.  
*Kinukuha ko sa MHRWS ang pang-araw2x na pagkain ng aking pamilya.*
7. I and my family members are washing our clothes in the river within or near MHRWS.  
*Naglalaba ako o kasamahan ko sa aking pamilya sa ilog malapit sa MHRWS.*
8. I took medicinal plants in MHRWS.  
*Kinukuha ko sa MHRWS ang mga halaman na maaring pang gamot sa mga karamdaman.*

### 3.3 Household and Economic Source

9. I took plants which I turned to charcoal for my family's daily consumption. *Kumukuha ako ng mga halamang kahoy na ginagawa kong uling para lamang sa aming bahay.*
10. I took plants which I turned to charcoal to be sold in the market or traders. *Kumukuha ako ng mga halamang kahoy na ginagawa kong uling para ebenta.*

## 4. Knowledge on conservation

1. Cutting of trees affects the quality of water in the rivers.  
*Ang pagputol ng mga kahoy ay makakaapekto sa kalidad ng tubig sa ilog.*
2. Cutting of trees affects the quantity of water in the rivers.  
*Ang pagputol ng mga kahoy ay makakaapekto sa dami ng tubig sa ilog.*
3. Poaching is one of the reasons of species decline in our protected area.  
*Ang illegal na pagkuha ng mga yamang hayop at kahoy sa loob ng protected area ay isang dahilan sa pagka ubos ng mga ito.*
4. Protected Area is meant to preserve both the biodiversity and culture in a specific area.

*Ang Protected Area ay inilalaan para ma protektahan ang kalikasan at kultura sa isang lugar.*

5. Conversion of fertile lands into monocropping like banana plantations will lead to species loss and desertification.

*Ang monocrop kagaya na lamang ng banana plantations ay mag resulta ng pagkawala ng ating yamang kalikasan o mag resusulta sa pagka deserto ng lugar.*

6. Throwing of garbage into the river and ocean causes poisoning of fish and other creatures.

*Ang pagtapon ng mga basura sa ilog at dagat ay makakalason sa mga isda at iba pang uri ng hayop o halaman.*

7. Illegal logging causes species extinction.

*Ang illegal na pagpuputol ng kahoy ay mag resulta sa pagkawala n gating mga yamang hayop at halaman.*

8. Less knowledge of environmental laws would lead to unsustainable ways of living.

*Kaunting kaalaman lamang ukol sa mga batas pangkalikasan ay mag reresulta sa hindi sustinableng pamumuhay.*

9. Household wastes (ex. paint thinners, detergents) causes environmental problems.

*Mga basura na galing sa bahay (kagaya ng paint thinner, sabon) ay makakasira sa kalikasan.*

10. Weak implementation of environmental laws would lead to environmental destruction.

*Ang mahinang implementasyon sa mga batas pangkalikasan ay magbubunga ng pagkasira ng ating kalikasan.*

## CONCLUSION AND RECOMMENDATIONS

Developing a tool to assess knowledge, attitude and practices conservation for protected areas is deemed necessary to establish scientific basis in developing a sustainable buffer zone management program. In this paper, a survey tool for KAP on conservation was constructed through a standard scale development procedure with high internal consistency. The final test form is suitable for use among the communities in MHRWS for long-term monitoring of changes in KAP on conservation. Therefore, we recommend the utilization of this tool to establish the baseline KAP data of communities in the buffer zones of MHRWS. This can also be revised and adopted to survey the KAP of local communities in protected areas similar in characteristics to MHRWS as long as the instrument is contextualized.

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