MINISTRY OF EDUCATION, YOUTH AND SPORT

BUILD BRIGHT UNIVERSITY

SCHOOL OF DOCTORAL STUDIES

HORM CHANDET

NATURAL RESOURCE MANAGEMENT IN KRATIE AND STUNG TRENG PROVINCES OF CAMBODIA - ITS EFFECT ON COMMUNITY CONSERVATION, SUSTAINABILITY, AND SOCIO-ECONOMIC DEVELOPMENT

THESIS SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

SPECIALIZATION

MANAGEMENT

PHNOM PENH, 2025

MINISTRY OF EDUCATION, YOUTH AND SPORT

BUILD BRIGHT UNIVERSITY

SCHOOL OF DOCTORAL STUDIES

HORM CHANDET

NATURAL RESOURCE MANAGEMENT IN KRATIE AND STUNG TRENG PROVINCES OF CAMBODIA - ITS EFFECT ON COMMUNITY CONSERVATION, SUSTAINABILITY, AND SOCIO-ECONOMIC DEVELOPMENT

THESIS SUBMITTED FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

SPECIALIZATION

MANAGEMENT

UNDER THE GUIDANCE OF

PROF. DR. MANARANJAN BEHERA

PHNOM PENH, 2025

BUILD BRIGHT UNIVERSITY

NATURAL RESOURCE MANAGEMENT IN KRATIE AND STUNG TRENG PROVINCES OF CAMBODIA - ITS EFFECT ON COMMUNITY CONSERVATION, SUSTAINABILITY, AND SOCIO-ECONOMIC DEVELOPMENT

Thesis Approved by Doctoral Research and Evaluation Committee

Thesis Approved by the Doctoral Review Committee

_____	_____
Dr. Dy Davuth, Chairman	**Dr. Manaranjan Behera, Member**
_____	_____
Dr. Kenneth Kee Kia Hiong, Member	**Dr. Rom Ra, Member**
_____	_____
Dr. Meuk Kimsroeun, Members	**Dr. Yean Rithy, Members**
_____	
MoEYS Representative	

_____

Assoc. Prof. Diep Seiha

President, BBU

DECLARATION

I would like to honestly declare that this thesis entitled "Natural Resource Management in Kratie and Stung Treng Provinces of Cambodia – Its Effect on Community Conservation, Sustainability, and Socio-Economic Development" is based on my original research work carried out by using secondary and primary data collected during June 2019 to December 2024. The same has not been submitted either in part or in full for the award of any other degree from any other university.

HORM CHANDET

Place: Kratie Province

Date: ……. 2025

BUILD BRIGHT UNIVERSITY
SCHOOL OF DOCTORAL STUDIES
PHNOM PNEH, CAMBODIA

PROF. DR. MANARANJAN BEHERA

Senior Dean, School of Doctoral Studies &
Faculty of Arts, Humanities, and Languages
E-mail: mbehera04@yahoo.co.in

CERTIFICATE

This is to certify that Mr. Horm Chandet, a candidate for a Ph.D. degree in Management at Build Bright University, has prepared his thesis on "Natural Resource Management in Kratie and Stung Treng Provinces of Cambodia – Its Effect on Community Conservation, Sustainability, and Socio-Economic Development" under my supervision and guidance.

To the best of my knowledge, the present research work contains materials, which have not at any time been submitted for the award of any degree. This thesis deserves meritorious consideration

PROF. DR. MANARANJAN BEHERA

(Supervisor)

ACKNOWLEDGEMENTS

The thesis is submitted for the Degree of Doctor of Philosophy (Ph.D.) in Management. This is the achievement of my hard work, extreme support, and contributions from many key people; without them, this quality work would not have been completed.

Firstly, I would like to express my sincere gratitude to Prof. Dr. Manaranjan Behera, Senior Dean, School of Doctoral Studies & Faculty of Arts, Humanities, and Languages, at Build Bright University, who has effectively guided and supervised me in writing this thesis. His insightful comments, constant and critical feedback, and regular monitoring provided significant value to the writing of this dissertation.

Secondly, I am highly thankful to my dear wife, Kim Vandy, and my beloved daughters, Yanda Julie, Yanda Vannika, and Yanda Socheata who have always inspired me.

Thirdly, I am grateful to Dr. Afful George F., who has been supportive in providing his advice and feedback on my thesis development. I am also thankful to Mr. Mil Kimhoeurn, Mr. Seng Ean, Mr. Tith Sophal, Mr. Phorn Sokmi, and Mr. Horm Channarith for their assistance in field data collection. Their contributions have been instrumental in the success of this research

Finally, I would like to offer my regards to all of those who have supported me in any way during my Ph.D. studies at Build Bright University.

Horm Chandet

TABLE OF CONTENTS

Abstract 1
Chapter I: Introduction **8**
1.1 Background of the Study 8
1.2 Statement of the Problem 15
1.3 Research Questions 27
1.4 Objectives of the Study 28
1.5 Hypotheses of the Study 28
1.6 Significance of the Study 29
1.7 Scope and Limitations of the Study 30
1.8 Lay-Out of the Study 30
Chapter II: Review of Literature **37**
2.1 Conceptual Review 37
2.1.1 Terminologies 37
2.1.2 Community-Based Natural Resource Management 43
2.1.3 Protected Area Management 52
2.1.4 Payment for Ecosystem Services 62
2.2 Empirical Review 68
2.2.1 Role of NRM in Economic Development 68
2.2.2 Effect of Natural Resource Management Approaches 82
2.2.3 Conceptual Framework 94
2.4 Conclusion 97
Chapter III: Research and Methodology **133**
3.1 Type of Analysis 133
3.2 Type and Source of Data 133
3.3 Sample Size 134
3.4 Sampling Method 135
3.5 Data Collection Procedure 137
3.6 Statistical Tools 137
3.7 Reliability Test 138
3.8 Coverage of the Study 139

3.9 Procedure of Analyzing Data 139
Chapter IV: NRM Approaches in the Study Area 142
4.1 General Context 142
4.2 Natural Resources and Conservation Areas in the Study Area 147
4.2.1 The Mekong River Dolphin's Managerial Protection Zones 148
4.2.2 The Mekong Fisheries Biodiversity Conservation and Management Zone 150
4.2.3 Sambo and Prek Prasab Wildlife Sanctuaries 151
4.2.4 Stung Treng Ramsar Site 152
4.2.5 Siem Pang Wildlife Santuary 153
4.3 Natural Resource Management Approaches 155
4.3.1 Protected Area Management 155
4.3.2 Community Protected Area 159
4.3.3 Community Forestry 161
4.3.4 Community Fisheries 162
4.3.5 Indigenous Communal Land Titling 164
4.4 Conclusion 165
Chapter V: Data Presentation and Analysis 170
5.1 Profile of Respondents 170
5.1.1 Gender 170
5.1.2 Age 172
5.1.3 Family Size 174
5.1.4 Ethicity 175
5.1.5 Educational Level 177
5.1.6 Role in Community Natural Resource Management 179
5.2 Natural Resource Management Activities 180
5.3 Knowledge of Community Members on Natural Resource Management 183
5.4 Community Participation in Natural Resource Management 184
5.5 Effectiveness of Natural Resource Management 185
5.5.1 Community Forestry Management 185
5.5.2 Community Fisheries Management 188
5.5.3 Indigenous Communal Land Titling 190
5.5.4 Community-Based Eco-Tourism 193

5.5.5 Wildlife Sanctuary Management 195
5.6 Sustainability of Natural Resource Management 197
5.7 Effect of NRM on Socio-Economic Development 199
5.7.1 House 199
5.7.2 Household Equipment 201
5.7.3 Electricity Supply 203
5.7.4 Income Sources 205
5.7.5 Income Level 207
5.7.6 Expenditure Level 210
5.7.7 Saving 213
5.8 Challenges in Natural Resource Management 215
5.9 Discussion of the findings 218
5.10 Conclusion 229
Chapter VI: Findings, Conclusion, Recommendations, and Scope for Further Research 232
6.1 Key Findings of the Study 232
6.2 Conclusion of the Study 245
6.3 Recommendations 248
6.4 Scope for Further Research 253

LIST OF TABLES

Table 3.1: Total and Sample Numbers of Community Members in the Study Areas.... 136

Table 3.2 Types and Numbers of Officials Surveyed 137

Table 5.1.1.1 Distribution of Community Members (CMs) by Gender 170

Table 5.1.1.2 Distribution of Officials by Gender..... 171

Table 5.1.2.1 Distribution of CMs by Age-group 172

Table 5.1.2.2 Distribution of Officials by Age-group..... 173

Table 5.1.3.1 Distribution of CMs by Family Size 174

Table 5.1.4.1 Distribution of CMs by Ethnicity 175

Table 5.1.4.2 Distribution of Officials by Ethnicity 176

Table 5.1.5.1 Distribution of CMs by Educational Level 177

Table 5.1.5.2 Distribution of Officials by Educational Level 178

Table 5.1.6.1 Distribution of CMs as per their Roles in CNRM..... 179

Table 5.1.6.2 Distribution of Officials as per their Roles in CBNRM 180

Table 5.2.1 Distribution of CMs as per their Views on NRM Activities 181

Table 5.2.2 Distribution of Officials as per their Views on NRM Activities..... 182

Table 5.3.1 Distribution of CMs as per their Knowledge of NRM 183

Table 5.4.1 Distribution of CMs as per their Views on their Participation in NRM..... 184

Table 5.5.1.1 Distribution of CMs' Views on the Effect of CF Management 186

Table 5.5.1.2 Distribution of Officials' Views on the Effect of CF Management..... 187

Table 5.5.2.1 Distribution of CMs' Views on the Effect of CFi Management..... 188

Table 5.5.2.2 Distribution of Officials' Views on the Effect of CFi Management 190

Table 5.5.3.1 Distribution of CMs as per their Views on the Effect of IPCLM..... 191

Table 5.5.3.2 Distribution of Officials as per their Views on the Effect of IPCLM 192

Table 5.5.4.1 Distribution of CMs' Views on the Effect of CBET 193
Table 5.5.4.2 Distribution of Officials' Views on the Effect of CBET 194
Table 5.5.5.1 Distribution of CMs' Views on the Effect of WS Management 196
Table 5.5.5.2 Distribution of Officials' Views on the Effect of WS Management 197
Table 5.6.1 Distribution of CMs's View on the Sustainability of NRM 198
Table 5.6.2 Distribution of Officials' Views on the Sustainability of NRM 199
Table 5.7.1.1 Distribution of CMs' Type of House, Before and After the Project 200
Table 5.7.2.1 Distribution of CMs' Type of Household Equipment
They Possessed Before and After the NRM Project 202
Table 5.7.3.1 Distribution of CMs' Views on the Electricity Supply
Before and After the NRM Project 204
Table 5.7.4.1 Distribution of CMs as per their Views on the
Sources of Income Before and After the NRM Project 206
Table 5.7.5.1 Distribution of CMs as per their Views on the
Annual Income Level Before and After the NRM Project 209
Table 5.7.6.1 Distribution of CMs as per their Views on the
Annual Expense Level Before and After the NRM Project 212
Table 5.7.7.1 Distribution of CMs as per their Views on the
Amount of Saving Before and After the NRM Project 214
Table 5.8.1 Distribution of CMs as per their Views on the
Challenges They Observed Different NRM Activities 216
Table 5.8.2 Distribution of Officials as per Their Views on the
Challenges They Observed Different NRM Activities 217

LIST OF FIGURES

Figure 4.1 Map of Cambodia, and Kratie and Stung Treng Provinces 145

Figure 4.2 Steps for CFi Establishment..... 163

Figure 4.3 Process for Collective Land Registration for Indigenous Community..... 165

Figure 5.1.1.1 Distribution of Community Members (CMs) by Gender 171

Figure 5.1.1.2 Distribution of Officials by Gender 171

Figure 5.1.2.1 Distribution of CMs by Age-group 172

Figure 5.1.2.2 Distribution of Officials by Age-group 173

Figure 5.1.3.1 Distribution of CMs by Family Size 174

Figure 5.1.4.1 Distribution of CMs by Ethnicity 175

Figure 5.1.4.2 Distribution of Officials by Ethnicity 176

Figure 5.1.5.1 Distribution of CMs by Educational Level 177

Figure 5.1.5.2 Distribution of Officials by Educational Level 178

Figure 5.1.6.1 Distribution of CMs as per their Roles in CNRM..... 179

Figure 5.1.6.2 Distribution of Officials as per their Roles in CBNRM 180

Figure 5.2.1 Distribution of CMs as per their Views on NRM Activities..... 181

Figure 5.2.2 Distribution of Officials as per their Views on NRM Activities 182

Figure 5.3.1 Distribution of CMs as per their Knowledge of NRM 183

Figure 5.4.1 Distribution of CMs as per their Views on their Participation in NRM 184

Figure 5.5.1.1 Distribution of CMs' Views on the Effect of CF Management 185

Figure 5.5.1.2 Distribution of Officials' Views on the Effect of CF Management..... 186

Figure 5.5.2.1 Distribution of CMs' Views on the Effect of CFi Management 187

Figure 5.5.2.2 Distribution of Officials' Views on the Effect of CFi Management..... 188

Figure 5.5.3.1 Distribution of CMs as per their Views on the Effect of IPCLM..... 189

Figure 5.5.3.2 Distribution of Officials as per their Views on the Effect of IPCLM 190
Figure 5.5.4.1 Distribution of CMs' Views on the Effect of CBET 191
Figure 5.5.5.2 Distribution of Officials' Views on the Effect of CBET 192
Figure 5.5.6.1 Distribution of CMs' Views on the Effect of WS Management 193
Figure 5.5.6.2 Distribution of Officials' Views on the Effect of WS Management 194
Figure 5.6.1 Distribution of CMs's View on the Sustainability of NRM 198
Figure 5.6.2 Distribution of Officials' Views on the Sustainability of NRM 199
Figure 5.7.1.1 Distribution of CMs' Type of House, Before and After the Project 201
Figure 5.7.2.1 Distribution of CMs' Type of Household Equipment
They Possessed Before and After the NRM Project 203
Figure 5.7.3.1 Distribution of CMs' Electricity Supply Before and After the Project 204
Figure 5.7.4.1 Distribution of CMs' Sources of Income Before and After the Project .. 207
Figure 5.7.5.1 Distribution of CMs as per their Views on the
Annual Income Level Before and After the NRM Project 210
Figure 5.7.6.1 Distribution of CMs as per their Views on the
Annual Expense Level Before and After the NRM Project 213
Figure 5.7.7.1 Distribution of CMs as per their Views on the
Amount of Saving Before and After the NRM Project 215
Figure 5.8.1 Distribution of CMs as per their Views on the
Challenges They Observed Different NRM Activities 216
Figure 5.8.2 Distribution of Officials as per Their Views on the
Challenges They Observed Different NRM Activities 217

LIST OF ABBREVIATIONS

NRM	Natural Resources Management
CF	Community Forestry
CFi	Community Fisheries
CPA	Community Protected Area
ICLT	Indigenous Communal Land Titling
IP	Indigenous People
PA	Protected Area
MoE	Ministry of Environment
PDoE	Provincial Department of Environment
MAFF	Ministry of Agriculture Forestry and Fisheries
PDAFF	Provincial Department of Agriculture Forestry and Fisheries
FA	Forestry Administration
FiA	Fisheries Administration
WWF	World Wide Fund for Nature
FLO	Forests and Livelihood Organization
CBNRM	Community-Based Natural Resource Management
INRM	Integrated Natural Resource Management
CBD	Conservation of Biological Diversity
PA	Protected Area
IUCN	International Union for Conservation of Nature (IUCN)
EBM	Ecosystem-Based Management
CBET	Community-Based Eco-Tourism
CBO	Community-Based Organization

ABSTRACT

Natural resources are a vital source of national wealth worldwide, providing ecosystem services that enhance the quality of human life. Natural Resource Management (NRM) governs the interactions between people and natural landscapes, integrating biodiversity conservation, water management, and the sustainable future of industries. NRM aims to utilize renewable and non-renewable resources effectively and sustainably, in alignment with the principles of sustainable development. It necessitates the involvement of diverse stakeholders at all levels.

NRM combines economics, ecology, and social sciences to assess the "values" or environmental attributes of specific natural areas. Community-Based Natural Resource Management (CBNRM) focuses on the collective management of ecosystems to promote human well-being and entrusts control over ecosystem management to local communities. This approach represents a strategy for enhancing sustainability through transparency, accountability, and broad community engagement in decision-making processes related to natural resource management.

Community-Based Natural Resource Management (CBNRM) has been embraced throughout East and Southern Africa as a rural economic development and natural resource management strategy. It primarily refers to a strategy and evolution of local natural resource management that aims to enhance sustainability through openness, accountability, and widespread community and resource user engagement in decision-making. CBNRM anticipates achieving three aspects of sustainability; 1) The social

institution sustainability, 2) The sustainability of livelihoods, and 3) Natural resource sustainability. The overall framework of the Conservation of Biological Diversity (CBD) is the significant global agreement on biodiversity's sustainable use and conservation.

A protected Area (PA) is defined as a geographic area of land or water that is primarily dedicated to protecting biological diversity, natural resources, and resources with cultural significance. It is managed through legal or other effective means to achieve the long-term conservation of nature, including ecosystem services and cultural values. The PA is of utmost importance for preserving biodiversity in the face of the global crisis of species extinction and losing the universal natural capacity for supporting human habitat. It is the basis for the creation and application of all national and international conservation strategies, set aside to maintain functioning natural ecosystems, maintain ecological processes, and protect biodiversity and species from extinction.

The study aims to assess the effect of the NRM on community conservation, sustainability, and socio-economic development. It was conducted in Kratie and Stung Treng Province. The research questions guiding the study are: (1) What natural resource management approaches and strategies have the government and NGOs executed in Kratie and Stung Treng Provinces? (2) To what extent do conservation practitioners encounter challenges in natural resource management within the study area? (3) How effective is natural resource management in fostering community-based conservation and sustainability in the study area? (4) What socio-economic developments have been observed as a result of natural resource management efforts in the study area?

The specific objectives of the study are (1) To conduct a comprehensive review of the relevant literature of the study, (2) To investigate the natural resource management approaches and strategies that the government and NGOs have executed in the study area, (3) To identify the challenges encountered by the conservation practitioners in natural resource management within the study area, (4) To assess the effectiveness of natural resource management in promoting community-based conservation and sustainability in the study area, (5) To examine the effectiveness of natural resource management on socio-economic development in the study area, and (6) To provide actionable recommendations aimed to enhancing conservation and natural resource management efforts by the government and NGO partners.

The study relied on both primary and secondary data for analysis. Primary data were collected through individual interviews with relevant government and NGO officials and community members living adjacent to the conservation areas. Field data were gathered from 52 NGO and government officials and 359 Community Members (CMs) of Community-Based Organizations (CBOs) in the study area of Kratie and Stung Treng provinces. The data were entered into SPSS to summarize data and information and to present the statistical outcomes. Descriptive statistics, reliability analysis, correlation analysis, and mean comparison analysis were applied for statistical analysis.

The study reveals that Natural Resource Management (NRM) approaches in the study areas include community forestry (CF) and community fisheries (CFi), community-based ecotourism (CBET), Indigenous Communal Land Titling (ICLT), Community Protected Area (CPA), and Protected Area (PA) Management. They are the most common strategies

for sustainable natural resource management and empowering community-led NRM. The study found that these NRM approaches were moderately effective due to various challenges, such as illegal logging, fishing, land encroachment, and hunting in the conservation areas, which emerged as the primary threats to natural resources. However, most Community-Based Organizations (CBOs), such as CF, CFi, CBET, and ICLT, were legally registered and operated according to their management plans. In addition, the local communities could not sustain their work if the government and NGOs no longer supported them because they did not have community financial security or limited capacity, which required continued support. In this regard, a community financial scheme is critically important to sustain community conservation.

The majority of the local inhabitants residing near the conservation areas heavily depended on natural resources, including fish, forests, and non-timber forest products, for their livelihoods. It was observed that most local communities derived significant income from farming (rice and other crops), fishing, livestock rearing, and manual labor. These communities experienced an increase in their incomes compared to the years preceding the project implementation, as they diversified their income sources in recent years. However, their annual expenses rose due to inflation, particularly in agricultural production, such as the purchase of fertilizers for rice farming. Consequently, the communities' annual savings decreased in comparison to previous years.

The hypothesis, $H_0 1$: "Natural Resource Management is not effective in improving the income level of the community members in the study area," is rejected. The Chi-square results show a significant improvement in the income level of the community members

after the implementation of the natural resource management project activities in the study area. Before the project, a considerable percentage of respondents earned between USD 1,000 to USD 3,000 annually, with fewer earning beyond USD 3,000. However, after the project, there was a notable shift towards higher income brackets, particularly between USD 2,500 to USD 4,500 and even higher.

The hypothesis, $H_0$2: "Natural Resource Management is not effective in improving the expense level of the community members in the study area" is accepted. The Chi-square analysis demonstrates a substantial increase in community members' expense levels after the implementation of natural resource management project activities in the study area compared to before the project. Initially, a substantial number had expenses between USD 1,000 to USD 3,000, with fewer exceeding USD 3,000. Post-project, there was a noticeable move towards higher expense brackets, notably between USD 2,000 to USD 3,500.

The hypothesis "Ho 3: Natural Resource Management is not effective in improving the saving amount level of the community members in the study area" is not rejected. The Chi-square results indicate a noteworthy decrease in the saving levels of community members following the implementation of natural resource management project activities in the study area compared to before the project. This decline can be attributed to inflation, resulting in increased expenditures within the communities, particularly in agricultural production, such as expenses on fertilizer and fuel for irrigation generators.

The recommendations for improving natural resource management efforts focus on several key areas. Enhancing the sustainability of Community-Based Organizations (CBOs) through tailored capacity-building programs can empower local communities in resource management and governance, promoting sustainable practices. Additionally, implementing alternative livelihood development models for communities near conservation areas, with an emphasis on value chain development, ensures that those involved in natural resource management are prioritized as beneficiaries. Clarifying management roles by transitioning Community Forest (CF) and Community Fisheries (CFi) areas inside the PA to Community Protected Areas (CPAs) under the Ministry of Environment can streamline governance and improve conservation efforts.

Promoting agroforestry is another vital strategy, as it generates income for communities while enhancing biodiversity and soil health. Strengthening the enforcement of natural resource laws, with active involvement from stakeholders, is crucial for combating illegal activities and protecting ecosystems. Establishing sustainable financing mechanisms, such as community financial schemes and promoting ecotourism, can provide reliable funding for conservation initiatives.

Moreover, increasing the government budget for conservation and enhancing commune investment funds will empower local communities to engage in sustainable practices effectively. Revising the fisheries law to extend the mandate for community fisheries from three to five years can improve long-term planning and management. Encouraging community involvement in government planning processes ensures that local needs are addressed, while engaging the private sector in conservation activities fosters mutually

beneficial partnerships. Finally, enhancing community-based ecotourism initiatives can empower local communities, promote responsible tourism, and support environmental conservation.

Overall, these strategies emphasize the importance of community empowerment, collaboration, and sustainable practices in achieving long-term conservation goals and socioeconomic development. By involving local communities in decision-making and resource management, leveraging their unique knowledge and vested interests in protecting their environments. Integrating capacity-building initiatives and sustainable livelihood models fosters economic resilience and a sense of ownership. Strengthening governance frameworks and law enforcement enhances accountability, ensuring effective conservation efforts. Ultimately, these approaches lead to healthier ecosystems and improved community well-being, creating an equitable balance between development and conservation that benefits both people and the planet for future generations.

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Natural Resources Management (NRM) refers to the efficient and sustainable utilization and protection of renewable and non-renewable natural resources (Freeman, Shiferaw & Swinton, 2009). Natural resources, including land, water, air, minerals, forests, fisheries, and biodiversity, provide ecosystem services to deliver better quality to human life. Natural resources are an essential source of national wealth worldwide, and they are the foundation of human survival, progress, and prosperity. Agricultural crop production mainly requires the interaction between different natural resources such as soil, water, weather, and external inputs like seed fertilizer, energy, management, etc. (Singh, 2016). NRM deals with managing how people and natural landscapes interact. It brings together biodiversity conservation, water management, and the future sustainability of industries. NRM refers to decision-making by individuals and groups about natural resources allocated over time and space (Williams & Patterson, 1996). NRM is also congruent with the concept of sustainable development. It specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources. NRM requires collaboration with a wide range of stakeholders at all levels, all of whose values and interests should be considered. This is called "collaborative NRM," which refers to the efforts of partnerships, consensus groups, community-based collaboration, and alternative groups and networks that work together to safeguard natural resources. Terrestrial and aquatic resource management, watershed

management, community-based conservation, collaborative conservation, community forestry and fisheries, community-based ecosystem management, integrated environmental management, and community-based environmental protection are examples of collaborative approaches (Conley & Moote, 2003).

The management of natural resources is an essential part of economic development (World Bank, 2006). Consequently, well-managed natural resources generate benefits that help maintain and improve livelihoods, increase the quality of life, and contribute to long-term growth (Freeman et al., 2009). Natural resources have the potential to generate a large number of work opportunities. Even though the number of people engaged in traditional extractive industries has continuously decreased due to mechanization and economies of scale worldwide, employment in the renewable energy industry has increased. As a result, it has the potential to continue to grow in the long run (UNEP, 2008). Community-Based Natural Management (CBNRM) is one of the conservation approaches aiming to attain such desirable natural resource management goals while simultaneously advocating for international goals of social justice, environmental health, and economic empowerment (Western & Wright, 1994). In addition, CBNRM programs, policies, and projects combine government decentralization, devolution of common-pool resource responsibility to local communities, and community participation in producing local-level solutions based on community initiatives (Holmberg et al., 1993; Ghai, 1994).

During the late 1980s and early 1990s, the transition from centralized conservation to Community-Based Natural Resource Management (CBNRM) was a hot agenda in

conservation circles worldwide. CBNRM activities were seen to have a good chance of combining. At the same time, biodiversity protection and local development measures are being pursued. However, there are growing concerns about the applicability of CBNRM interventions in various contexts. For example, the majority of the existing literature on CBNRM interventions focuses on the expense of the practical and context-specific features of such initiative elements. Conceptualized as Conservation with Development Projects (Stocking & Perkin, 1992), Community-Based Natural Resource Management (Adams & Hulme, 2010), Integrated Conservation with Development Projects (Barrett & Arcese, 1995), Community Based Conservation (Goldman, 2003), and Collaborative or Joint Management Ventures (Adams & Hulme, 2010), these community conservation efforts have gained popularity in the international conservation and development platform within the past thirty years. In addition, the international conservation community and the international humanitarian community had a strong dislike for centralized conservation. Traditional tactics have failed to conserve the ecosystem, which prompted such contempt. Furthermore, the protected areas were generating "islands surrounded by human poverty and were increasingly vulnerable to encroachments and invasions, according to the report (Marks, 2001). Some academics claimed that centralized conservation measures, such as the 'fences and penalties' interventions, had enormous human costs and eventually led to coercive conservation methods (Dressler et al., 2010).

CBNRM activities should reflect local people's understanding of which natural resource issues are significant in their area (Dean 2007). Nelson (2007) argues that the most successful community-based conservation programs are tailored to the needs of the local

community. As a result, an effective conservation intervention must consider the local community's sociological realities. Furthermore, evidence suggests that these centralised conservation systems have substantial economic costs, as well as low economic benefits due to local community members' underuse of protected areas for sustaining their livelihoods (Leader-Williams & Albon, 1988). Others have claimed that these conservation efforts resulted in the active exclusion of residents from protected areas. As a result, the community members significantly relied on natural resources in the protected zones for their survival; therefore, such a substantial exclusion halted a humanitarian threat (Neumann, 1998). These factors accelerated the change to a more "fair" conservation approach, which took the shape of community conservation at the time.

Furthermore, the political and economic liberalization in many regions of the world throughout the 1980s provided an ideal setting for decentralizing natural resource control and management. It also praised the tourism industry's rise as a path toward development. Community conservation approaches were praised for their win-win benefits. This 'new' conservation method was founded on the belief that natural resource protection and community development aims should be combined (Noe & Kangalawe, 2015). Members of the community would be urged to avoid significantly relying on natural resources for their existence through community conservation. Instead, if local people protect environmental resources, they may reap financial benefits (Goldman, 2003; Benjaminsen & Bryceson, 2012). Such a discourse has supported the idea that pressures on the environment will be alleviated (Reardon & Vosti, 1995).

Moreover, conservation narratives were based on the assumption that community

development should be considered essential to conservation efforts' success (Stocking & Perkin, 1992). The concept is that people who live in communities with much natural flora and wildlife and in areas with much biodiversity must appreciate these places as their own and desire to safeguard them (Twyman, 2000; Brockington, 2004). Tsing, Brosius, and Zerner (1999) assumed that because local people were already relying on and managing natural resources in their dynamic ways, they were in the best position to conserve the environment by combining their local knowledge with the help of external actors.

It is worth noting that community conservation discourse assumes that residents have local conservation expertise and have managed their natural resource use. However, they require external aid in the form of national government agencies, international conservation practitioners, or international non-governmental organizations (NGOs) to help them use local knowledge more effectively. According to Adams and Hulme (2010), the discourse of community conservation has been based on numerous overarching concepts. These principles include the notion that conservation must be 'participatory,' that community members living near protected areas should be considered 'partners,' and that conservation must be based on the belief that the protected areas and the natural flora and fauna they protect should contribute economically to community members and their livelihoods, as well as to the national economy. In summary, the community conservation story acquired rapid adoption in the international policy arena for various reasons. Firstly, community conservation projects fused conservation efforts with the concept of sustainable development, which was gaining traction in the 1980s as

a result of the Brundtland Report (1987). The concept was solidified during the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. Second, this conservation story took on a human aspect, emphasizing the local community's idealization and the significance of assuring community engagement in the simultaneous pursuit of conservation and development. Thirdly, the emphasis on decentralizing conservation efforts and a shift away from top-down development and conservation approaches made community conservation an appealing option. Finally, foreign policymakers found community conservation appealing due to a growing interest in the market economy in the 1980s rather than a concentration on the state economy. Community conservation efforts in this area centered on transforming residents into micro-entrepreneurs by encouraging them to participate in alternative livelihood activities like eco-tourism. Eventually, community members would be able to make a sustainable living while preserving the ecosystem that gives them such a financial benefit (Twyman, 1998; Hutton, Adams, & Murombedzi, 2005, Dressler et al., 2010).

It is worth noting that the community conservation initiative appears in a range of programs. According to Adams & Hulme (2010), such a wide range of tasks is best considered a continuum. On the one hand, community conservation programs have been designed to support and extend community development efforts in the vicinity of national parks. On the other hand, such community conservation projects were created after a protected area was established, such as national parks (considering that some National Parks were established prior to humans migrating to the Parks' buffer zones). These projects aim to address resource usage conflicts with community members who live near

national parks. Projects that are built on collaborative endeavors involving local community members, the state, and, at times, the commercial sector are found in the middle of the continuum. Through public-private partnerships, such 'collaborative management' projects aim to boost conservation activities. For example, initiatives that attempt to promote community development by utilizing wildlife and other natural resources on territory outside of protected areas are at the other extreme of the spectrum. In this case, biodiversity conservation is a byproduct of sustainable biodiversity management and resource use activities. Community-based natural resource management (CBNRM) projects are found at this end of the continuum (Adams & Hulme, 2010). Nature and natural goods are made important to local community members who rely on them for their livelihoods through CBNRM programs, which incorporate them into sources of economic rewards. This is done to prevent community members from viewing CBNRM projects as a way to reclaim their rights and control over natural resource accessibility in order to secure their livelihoods.

There have been many studies on NRM, biodiversity conservation, and community-based conservation. Nevertheless, the research concerning the impact of natural source protection on socio-economic development required more study to provide a better understanding of the effect of the NRM, aiming to provide recommendations to relevant government agencies, development partners, and Non-Governmental Organisations (NGOs) for strengthening and improvement of the natural resource conservation efforts to achieve the ultimate goals. Therefore, this research mainly aims to address NRM approaches and strategies that have been executed by the government and NGOs and

their effect on community-based conservation, sustainability, and socio-economic development in the study area of Kratie and Stung Treng Provinces that represent the nationwide.

1.2 Statement of the Problem

In developing countries, natural resources are relatively more prevalent and underutilized. This may, to some extent, reflect their underdevelopment; the modest size of the modern sector of the economy makes agriculture and other natural-resource-based economic activities relatively more important. However, there are also some clear examples of countries rich in natural resources but still have not been able to sustain economic growth (Gylfason & Zoega, 2001).

The major environmental problems facing poor farmers in Asia and the Pacific are land and water resource degradation, sedimentation of watercourses, loss of forest resources and biodiversity, and degradation of fisheries. In response to increasing concerns about the degradation of natural resources and the sustainability of agricultural production potentials in many poor regions of the world, many national and international organizations have initiated research and development programs for natural resource management. Efforts in this direction include the design and development of low-cost technological options for integrated management of soil and water resources, the development of ecologically sound cropping systems, and options for the conservation and management of agro-biodiversity and forestry resources (Shiferaw et al., 2005). Moreover, since the issues of sustainability, global warming, natural resource degradation, and livelihood of the rural poor, the sustainable resource management

agenda has been quite popular to balance the ecosystem by sustaining productivity of agriculture and availability of natural resources. Natural resource degradation may also increase the vulnerability of rural households, which may, in turn, increase their overpressure on natural resources (Karamidehkordi, 2012).

Over-exploitation of natural resources by the countries' growing population and economic development resulted in various severe problems. For example, the destruction of vegetation has resulted in land degradation, denudation, soil erosion, landslides, floods, drought, and unbalanced ecosystems. The population growth, poverty, and unclear land use plan are often seen as the causes of natural resource degradation (Heath & Binswanger, 1996). Agriculture and natural resources confront significant challenges in food security and production, environment management, and poverty alleviation in this century. According to the UN (2006), the percentage of the developing world's population living in absolute poverty with an income of less than one dollar a day has dropped from 28 percent (1.2 billion) in 1990 to 19 percent (1.07 billion) in 2002 (United Nations, 2015).

Moreover, the interaction of several factors has limited the capability of agriculture to produce food and has threatened natural resources. Among them, deforestation and land degradation, significantly resulting from human activities, have globally adversely affected the productivity of all agricultural and natural ecosystems such as croplands, rangelands, and forests (Lal, 2010). Loss of soil vegetative cover and topography, especially in developing countries, is one of the main reasons for soil degradation and is intensified by extensive removal of forests, overgrazing rangelands, cultivation in sloping lands, and collecting biomass from ground cover. These activities leave the soil exposed

to rain and wind forces to degradation (Karamidehkordi, 2012). Carbon emissions from terrestrial ecosystems are exacerbated by soil degradation and desertification.

The forest conversion to other land uses vital for the development of policies and measures aiming to reduce the loss of forests and its associated carbon emission (Sandker, Finegold, D'Annunzio & Lindquist, 2017). However, degradation of the forest cover is a major concern that threatens the loss of biodiversity habitats. Deforestation rates by climatic domain have changed dramatically over the past centuries. According to FAO (2006 and 2010) global assessment in 2005 and 2010, the total forest area was estimated to be almost four billion hectares (30 percent of total land). Another wooded land area was 1,376 million ha, and another land with tree cover was estimated at 76 million ha. This forest area corresponds to 0.62 ha per capita unevenly distributed (62 countries mostly located in arid or semi-arid areas had less than 0.1 ha of forest per capita). Despite considerable progress towards conservation and afforestation, trend analysis of forest areas still shows a high rate of deforestation between 1990 and 2020. Since 1990, it is estimated that some 420 million hectares of forest have been lost through conversion to other land uses. However, the rate of deforestation has decreased over the past three decades. Between 2015 and 2020, the rate of deforestation was estimated at 10 million hectares per year, down from 16 million hectares per year in the 1990s. The area of primary forest worldwide has decreased by over 80 million hectares since 1990. More than 100 million hectares of forests are adversely affected by forest fires, pests, diseases, invasive species, drought, and adverse weather events (Dangel, 2016).

On the contrary, population growth and slowly growing economies in the tropics increased

deforestation rates tremendously. The effects of illegal logging on forest ecosystems, the economy, and society are severe, and biodiversity loss has a clear impact on ecosystems. Poor state governance, law enforcement, corruption, and lack of transparency are among the main factors that contribute to weak forest governance in the Asia-Pacific region. Moreover, past efforts on sustainable agriculture and natural resources have been inadequate compared to the scale of deforestation and land degradation. Therefore, balancing the ecosystem and managing the challenges requires sustainable natural resource management and agricultural strategies at global, national and local levels by engaging with multi-stakeholders.

Socio-economic development is the process of social and economic improvement in society. Socio-economic development is measured with indicators, such as GDP, life expectancy, literacy, and employment levels. Socio-economic development of the disadvantaged groups is a comprehensive area and needs to be understood regarding different frameworks. Social, political, biological, science and technology, language, and literature are the main areas that need to be developed to empower disadvantaged groups. Within the socio-economic framework, development is referred to improvement within the lifestyles of the individuals through improved education, incomes, skill development, and employment. It is the process of economic and social transformation based on cultural and environmental factors. Therefore, it can be understood as the process of social and economic development within the society (Amaral et al., 2013). The nature of socio-economic development is determined by development processes or development targets. Generally, those processes are internally ordered sequences of

change in states of affairs or stages. Some states determine other states that follow them (Hojnicki, 2010). The fundamental development challenge is to reduce poverty and improve the quality of life of a growing number of Cambodians. There are several population trends and characteristics, which to varying degrees prevent obstacles to development. The most important is the relatively high rate of population growth. Current rates of high mortality and high fertility are among the most basic barriers to poverty reduction and threaten to erode the gains made in other ways.

The strong dependence of these populations on natural resources for their livelihoods leads to a complex relationship between conservation and human development. The four common perspectives on this relationship include; 1) socio-economic development and conservation are separate policy realms, 2) socio-economic development is a critical constraint on conservation, 3) conservation efforts should not compromise socio-economic development, and 4) socio-economic development depends upon conservation. Despite sound reasoning and evidence to support each of these perspectives, research is increasingly citing evidence to support the final statement that the future of biodiversity conservation and the socio-economic needs of rural communities are intricately connected. The Millennium Ecosystem Assessment (2005) provides a compelling argument to explain the dependence of human well-being on the services provided by nature, suggesting that threats to natural assets must be addressed as part of an effective strategy for human development. Explanations for this linkage often refer to the fundamental dependence of humans on services derived from natural ecosystems, expressing an increasing concern for the potential health and welfare impacts of

continued ecosystem degradation. Ecosystems provide provisioning, regulating, cultural and supportive services, which are particularly important for rural communities who often rely directly on these services for their livelihood. Links between biodiversity conservation and human well-being include food security, health improvements, income generation, reduced vulnerability to climate and resource changes, ecosystem services, and cultural value. The emphasis in recent literature on these linkages suggests a momentum towards approaching environmental conservation and human development in an integrated way (Riehl, Zerriffi & Naidoo, 2015). Nature resources are the natural capital out of which other forms of capital are made, and they critically contribute to fiscal revenue, income, and poverty reduction in the countries. Moreover, sectors related to natural resources use provide jobs and are often the basis of livelihoods in poorer communities. Natural resources generally form the backbone of rural economies in low and middle-income countries. If managed wisely through sound policies and institutions, it can be used to generate growth that benefits the most vulnerable parts of the population (OECD, 2008).

NRM handles how people and natural landscapes interact. It connects land use planning, water management, and biodiversity conservation in such a way as to safeguard the future of industries like agriculture, mining, tourism, fisheries, and forestry. This is because the concept of NRM overlaps that of sustainable development concerning land management and environmental preservation. There are various NRM approaches executed by different countries, civil societies, national and international NGOs, and development partners, but it has been recognized that regional and CBNRM, adaptive management of NRM, and integrated NRM are the effective biological natural resource

management and development. Moreover, these efforts must involve all relevant actors, including communities, local authorities, private sectors, and government agencies from the national to sub-national level (Yusuf, 2014). Previous analyses of community-based resource management initiatives have determined that local communities can often undertake conservation more effectively and cost-efficiently than a centralized government agency because of their knowledge and direct dependence on the land being protected. A key principle underlying these community-based initiatives is to align long-term conservation with the short-term needs of local people, ensuring that community members gain some benefit for their participation in conservation efforts (Riehl, Zerriffi & Naidoo, 2015b). CBNRM involves the formation of local communities, which is a long-term conservation approach of natural resources. Its initiatives have determined that, because of their knowledge and direct dependence on the land being protected, local communities can often undertake conservation more effectively and cost-efficiently than a centralized government agency. The main principle underlying these community-based initiatives is to support long-term conservation, ensuring that community members also benefit from their participation in conservation efforts. It is analyzed that NRM is highly connected to the socio-economic and well-being of local communities. The strong dependence of these populations on natural resources for their livelihoods leads to a complex relationship between conservation and human development. Sustainable natural resource management lies at the heart of delivering poverty reduction for these people. Therefore, conservation practitioners always consider the relationship between socio-economic development and conservation (Riehl et al., 2015).

Agricultural production worldwide mostly depends on the soil, providing the most critical source of livelihood for most rural people in the developing world (Singh, 2016). Water is essential for sustaining human populations and, indeed, all species. It is also a critical input in agricultural and industrial production and processing and an important sink for discharging waste. Fish is an essential biological resource that accounts for 20 percent of the animal-derived protein consumption in low-income countries and about 13 percent in developed countries. With the increasing intensification of food production, aquaculture is becoming an important source of income and livelihood in many parts. Forest resources, including agroforestry and tree crops, provide a source of livelihood for over 1.6 billion people worldwide. Forests also contain at least 80 percent of the remaining global biodiversity. They help protect water resources, and they are a significant carbon sink mitigating climate change. Biodiversity enables animal and crop improvement projects that maintain and increase productivity. Properly managed natural resources provide an essential foundation for reducing poverty and promoting sustainable growth (Shiferaw, Bank, Freeman, Bank & Swinton, 2005). Among developing countries, natural resources are relatively more prevalent. This may reflect their underdevelopment: the modest size of the modern economic sector makes agriculture and other natural-resource-based economic activity relatively more important. But there are also clear examples of countries that are genuinely rich in terms of natural resources but still have not been able to sustain economic growth (Gylfason & Zoega, 2001)

Cambodia is one of the developing countries rich in natural resources in ASEAN. It has one of the highest levels of forest cover in Southeast Asia, with about 10.7 million

hectares of forest in 2006, or 58.9 percent of Cambodia's land area (RGC, UNDP, FAO, and UNEP 2010). About 40 percent of Cambodia's forests have some level of protection as Protection Areas or Protected Forests (FA, 2011). However, there are still enormous pressures on forest resources, and the rate of deforestation is high. From the 1980s to the 1990s, the rate of deforestation was around two percent annually (or 200,000 ha/year). From 2002 to 2006, it was 0.8 percent (75,000 ha/year) (Cedillo, 2011). Forest resources have been under pressure both for logging and for land conversion. These have become highly contentious issues in Cambodia, particularly concerning granting Economic Land Concessions (ELCs). By early 2009, the Ministry of Agriculture Forestry and Fisheries reported that 65 economic land concessions, totaling about one million ha – almost 10 percent of forest lands – had been granted for agro-industrial development and permanent mono-cropping of rubber plantations (www.twgaw.org, viewed in September 2009). Yet, the granting of ELCs without in-depth studies of land suitability and broad consultation with local people can create serious social and environmental impacts (WWF, 2009). This has already been identified as one of the main causes of social conflict in rural areas. As the Government observes, "The anarchy in illegal land possession, illegal claim of State land and protected areas as privately owned, and unlawful logging, are still taking place" (RGC, 2010).

The government of Cambodia identified that fisheries significantly contribute to the national goals of environmental protection, conservation of biodiversity, socio-economic development, good governance, and poverty alleviation (Chung, 2009). The fisheries sector is a significant contributor to food and nutrition security in Cambodia, and fish has

long been critical to all Cambodians. It is a significant source of protein, minerals, and vitamins. It has become an integral part of the diet in Cambodia (Nam & Bunthang, 2011). For many years, the fisheries sector has contributed significantly to the employment and livelihoods of the poor, to food security, and to GDP and foreign exchange balance. Up to six million people of Cambodia are seasonally employed in the fisheries sector. Moreover, the fisheries sector contributes considerably to domestic food security, providing over 81.5 percent of the animal protein in the national diet and forming a critical source of essential vitamins and micro-nutrients. In addition, fisheries production is estimated to be worth around US$200-300 million per year at the point of landing, and fisheries harvesting, processing, and trade contribute 8-12 percent of GDP. The value of fish exports has been estimated to be as high as US$100 million per year (Chung, 2009). However, the fisheries resources are under pressure from human activities such as unsustainable fishing activities. More than 150 types of fishing gear are known from Cambodia. The largest gears are barrage traps, fish bag nets, shrimp bag nets, and arrow-shaped bamboo fence traps. These gears are non-selective and target fish that migrate and tend to catch fish to produce a high-quality market product. The gears that are classified as small scale include gill nets, cast nets, oblong traps, drum traps, slit traps, scooping baskets, folded cone traps, vertical vase traps, and long hooked lines (Statistics, 2009)—illegal fishing results from poor governance and management of the fisheries resources. Conflicts over fishing rights are common, and in fishing areas, households depending on fishing for livelihood and subsistence have often lost out to politically and economically more powerful users. The government promotes co-management to

encourage people to become more directly involved with management of their fisheries.

Integrated Natural Resource Management (INRM) is the primary approach to ensure the conservation and sustainable use of biodiversity, natural resources, and ecosystems in Cambodia. The intervention intends to generate multiple landscape benefits, including effective conservation of globally threatened species and high conservation forests, improving the management of natural resources, and ensuring ecosystem services. INRM specifically objects to improving the management of conservation areas by ensuring their financial stability, enhancing the productivity of agricultural lands, and improving local livelihoods, all while utilizing water catchments (UNDP Cambodia). Moreover, Community-Based Natural Resource Management (CBNRM) is one of the most comment strategies that have been executed in both provinces of Kratie and Stung Treng by Local and international NGOs, the Ministry of Environment, and the Ministry of Agriculture Forestry and Fisheries, and the Ministry of Rural Development. Most CBNMR approaches in Cambodia include Community Forestry (CF), Community Fisheries (CFi), Collective Land Titling (CLT), and Community Protected Area (CPA). These CBNRM approaches are indicated in the government legal frameworks (CBNRM in Cambodia, 2006). Local people are expected to participate in CBNRM projects, including CF, CF, CPA, and CLT, a long-term conservation strategy to promote conservation and management outcomes of the natural resources. It is accepted by the NGOs and government agencies that communities need to be involved in the design and management of the PA, CF, CFI, and CLT and that the protection of biodiversity resources can only occur with the provision of alternatives local livelihood options to reduce threats such as land clearing for agriculture and

harvesting of wild foods and animals (Cascio & Beilin, 2010).

Kratie and Stung Treng provinces in northeastern Cambodia are rich in high values of natural resources. The main conservation areas in the provinces, namely, Dolphin Conservation and Management Zones, Ramsar Site, the Mekong Fisheries Biodiversity Conservation, and Management Area, Sambo and Prek Prasab Wildlife Sanctuaries, CPAs, CLTs, CFs, and CFis. They are homes for critical biodiversity values such as Mekong river dolphin, hog deer, bird species, and forest and fisheries biodiversity. In addition to these critical values, the landscape provides vital ecosystem services for the livelihood of local communities dependent on these aquatic and terrestrial biodiversities. However, the local communities in these areas are under increasing pressure from internal and external stakeholders and their economic interests. These pressures include illegal logging, fishing, land encroachment, hunting and mining, and unplanned economic development, including allocating economic land concession and other infrastructure. In addition, there is an enormous concern about the proposed hydropower dam in Sambo District, which experts and communities have viewed that the dam will significantly destroy fisheries biodiversity in the Mekong River. Local communities living in the areas will be relocated and resulting in affecting people's livelihoods. These pressures result in serious environmental impacts, including declining fish stock, water quality, forest cover, bank erosion, water quality, and decreasing of biodiversity values in the landscape, and affecting livelihoods of local communities. To address the threats, the government ministries, including the Ministry of Agriculture Forestry and Fisheries (MAFF), the Ministry of Environment, the Ministry of Rural Development, and local and international NGOs

such as World Wild Fund for Nature (WWF), World Fish, Wildlife Conservation Society (WCS), BirdLife International, Forest and Livelihood Organization (FLO), Cambodia Environment Preservation Association (CEPA), Northeastern Rural Development (NRD), My Village, Save Cambodia's Wildlife (SCW), Development and Partnership in Action (DPA), RECOFTC, and Kampuchea Women Welfare Action (KWWA), operate various approaches including CBNRM and Protected Area (PA) management and community development. The interventions of the CBNRM include CFs, CFis, CLTs, CPA development (registration, development, and implementation of the management plans). The CBNRM approach is mainly linked with alternative livelihood development. Moreover, the government ministries and NGOs also have concrete actions to manage the PAs, such as establishing the PAs, zoning, demarcation of the PAs, community awareness and education, law enforcement, and patrolling.

1.3 Research Questions

The following research questions are used to guide the research study:

i. What natural resource management approaches and strategies have the government and NGOs executed in Kratie and Stung Treng Provinces?
ii. To what extent do conservation practitioners encounter challenges in natural resource management within the study area?
iii. How effective is natural resource management in fostering community-based conservation and sustainability in the study area?
iv. What are the socio-economic developments that have taken place due to natural resource management in the study area?

1.4 Objectives of the Study

The study's main objective was to assess the effect of natural resource management on community conservation, sustainability, and socio-economic development. However, to address this specific goal, the research has focused on the following objectives:

i. To conduct a comprehensive review of the relevant literature of the study
ii. To investigate the natural resource management approaches and strategies that the government and NGOs have executed in the study area
iii. To identify the challenges encountered by the conservation practitioners in natural resource management within the study area
iv. To assess the effectiveness of natural resource management in promoting community-based conservation and sustainability in the study area
v. To examine the effectiveness of natural resource management on socio-economic development in the study area
vi. To provide actionable recommendations aimed to enhancing conservation and natural resource management efforts by the government and NGO partners.

1.5 Hypotheses of the Study

The study has tested the following null hypotheses:

$H_0$1: Natural Resource Management is not effective in improving the income level of the community members in the study area.

$H_0$2: Natural Resource Management is not effective in improving the expense level of the community members in the study area.

H_o3: Natural Resource Management is not effective in improving the saving amount level of the community members in the study area.

1.6 Significance of the Study

The nature and content of the research would be best of benefit to academics who work in international development, government, non-government organizations involved in NRM and participatory projects, and aid agencies in Cambodia and other developing countries. More importantly, the study would significantly contribute to the development of Cambodia by providing the best inputs and recommendations from the findings to conservation and development practitioners, local and international NGOs, and development partners to strengthen and improve their efforts in the conservation and management of natural resources. On the other hand, the study would also extremely supply the relevant government ministries and departments with alternative approaches that are workable to promote sustainable conservation and management of natural resources. It would also be valuable for decisions and policymakers. The study would also help academic students in the area of natural resource conservation and management practices. The study results would be disseminated to all relevant government departments, and local and international NGOs operating to protect the natural resources in Kratie and Stung Treng Provinces. Hence, government departments and NGOs can employ best practices and approaches to accomplish their commitments effectively and efficiently in biodiversity and natural resource conservation and management. Moreover, the local communities in Kratie and Stung Treng provinces would be better empowered

and inspired towards community-led natural resource conservation. The study also would benefit students and researchers who undertake similar researches in the future.

1.7 Scope and Limitation of the Study

The study was executed in communes and districts with rich natural resources in Kratie and Stung Treng Provinces. The research was restricted to the selected correspondence categories such as relevant identified provincial departments, provincial administrations, district administration, commune and village chiefs, and members of CBOs, including CF, CFi, CBET, and ILCT in the target provinces. In addition, the research has solicited the views of only community members, commune and village chiefs, managers of local international NGOs, and government officials involved in NRM in the areas of study.

1.8 Layout of the Study

The study is comprised of six chapters as follows:

Chapter I: Introduction: The first chapter includes the background of the study, statement of the problem, research questions, study objectives, hypotheses, significance, scope, and limitations of the study.

Chapter II: Review of Literature: A detailed review of both conceptual and empirical literature is carried out in the second chapter. The chapter includes literature relating to the definitions of natural resource management, community conservation, sustainability, and socio-economic development. More focus is made on natural resource management approaches and their significance in socio-economic development.

Chapter III: Research Methodology: In the third chapter, the detailed research methodology of the study is presented. This chapter includes the types of analysis, types, and sources of data, sample size, sampling, data collection procedure, statistical tools, coverage of the study, and the procedure of analyzing data.

Chapter IV: Natural Resource Management Approaches in the Study Areas: The fourth chapter discusses natural resource management approaches and strategies implemented in the study area.

Chapter V: Data Presentation and Analysis: The chapter analyzes the effectiveness of natural resource management in community conservation, sustainability, and socio-economic development in the study area.

Chapter VI: Findings, Conclusion, Recommendations, and Scope for Further Research: The last chapter summarizes the main findings of the study, and provides appropriate recommendations for enhancing the effectiveness of NRM in the study area.

References:

Amaral, G. et al. (2013). *Journal of Petrology*, *369*(1), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004

Adams, W. M., & Hulme, D. 2010. If community conservation is the answer in Africa, what is the question? *Oryx, 35*(3), 193 – 200.

Barrett, C. B., & Arcese, P. (1995). Are integrated conservation-development projects (ICDPs) sustainable? On the conservation of large mammals in Sub-Saharan Africa. *World Development, 23*(7), 1073-1084.

Benjaminsen, T., A., & Bryceson, I. (2012). Conservation, green/blue grabbing and accumulation by dispossession in Tanzania. *The Journal of Peasant Studies, 39*(2), 335 – 355.

Brockington, D. (2004). Community conservation, inequality and injustice: Myths of power in PA management. *Conservation and Society, 2*(2), 411- 432.

Brundtland, G. et al. (1987). *Our common future: Report of the 1987 World Commission on environment and development.* Oxford, Oxford University Press.

Cedillo, A. (2011). Climate change and forestry in Cambodia. *Cambodia Human Development Report 2011*, 1–9.

Chung, O. (2009). Fishing for the future. *Taiwan Review*, *59*(7), 4–11. https://doi.org/10.4337/9781788119368.00015

Commitment, G. (n.d.). *Environment and Natural Resource Management IFAD' s*.

Community-Based Natural Resource Management in Cambodia (2006).(January),1–103.

Conley, A., & Moote, M. A. (2003). *Evaluating Collaborative Natural Resource Management*. 371–386. https://doi.org/10.1080/08941920390190032

Dangel, U. (2016). The world's forests. *In Turning Point in Timber Construction*. https://doi.org/10.1515/9783035608632-002

Dean, E. (2007). *Beyond community: "Global" conservation networks and "local"*

organization in Tanzania and Zanzibar. Ph.D. The University of Arizona.

Dressler, W. et al. (2010). From hope to crisis and back again? A critical history of the global CBNRM narrative. *Environmental Conservation, 37*(1), 5 – 15.

FAO (2006). *Global forest resources assessment 2005: Progress towards sustainable forest management.* Rome: Forestry Department, Food and Agriculture Organization of the United Nations.

FAO (2010). *Global forest resources assessment 2010, Main Report.* Rome: Forestry Department, Food and Agriculture Organization of The United Nations.

Forestry Administration (FA) (2010). *Cambodia National Forest Programme 2010-2030. FA: Phnom Penh.*

FA, Ministry of Environment (MoE), Food and Agriculture Organization (FAO), & UN Development Programme (UNDP) (2010). *Development of REDD+ Readiness Roadmap for Cambodia.* FA, MoE, FAO and UNDP: Phnom Penh.

Freeman, H. A., Shiferaw, B., & Swinton, S. M. (2009). Assessing the impacts of natural resource management interventions in agriculture: Concepts, issues and challenges. *Natural Resource Management in Agriculture: Methods for Assessing Economic and Environmental Impacts*, 3–16. https://doi.org/10.1079/9780851998282.0003

Ghai, D. (1994). Development and environment: Sustaining people and nature. *Development and Change, 25*(1).

Goldman, M. (2003). Partitioned nature, privileged knowledge: Community-based conservation in Tanzania. *Development and Change, 34*(5), 833 – 862.

Gylfason, T., & Zoega, G. (2001). *Natural Resources and Economic Growth : The Role of Investment*, (June), 7–15.

Heath, J., & Binswanger, H. (1996). Natural resource degradation effects of poverty and population growth are largely policy-induced: The case of Colombia. *Environment and Development Economics*, *1*(1), 65–84.

https://doi.org/10.1017/s1355770x00000383

Hojnicki, Z. B. C. (2010). *Socio-Economic Development and Its Axiological Aspects*. *29*(2). https://doi.org/10.2478/v10117-010-0010-9.A

Holmberg, J., Thomson, K., & Timberlake, L. (1993). *Facing the future.* London: Earthscan.

Hutton, J., Adams, W. M., & Murombedzi, J. C. (2005). Back to the barriers? Changing narratives in biodiversity conservation. *Forum for Development Studies, 32*(2), 341 – 370.

Karamidehkordi, E. (2012). Sustainable natural resource management, a global challenge of this century. *Sustainable Natural Resources Management*. https://doi.org/10.5772/35035

Lal, R. (2010). Managing soils and ecosystems for mitigating anthropogenic carbon emissions and advancing global food security. *BioScience*, *60*(9), 708–721. https://doi.org/10.1525/bio.2010.60.9.8

Leader-Williams, N., & Albon, S. (1988). Allocation of resources for conservation. *Natur*e, 336(6199): 533 – 535.

Lo Cascio, A., & Beilin, R. (2010). Of biodiversity and boundaries: A case study of community-based natural resource management practice in the Cardamom Mountains, Cambodia. *Environmental Conservation*, *37*(3), 347–355. https://doi.org/10.1017/S0376892910000548

Marks, S. (2001). Back to the future: Some unintended consequences of Zambia's communitybased wildlife program (ADMADE). *Africatoday,* 120 – 141.

Nam, S., & Bunthang, T. (2011). Fisheries resources in Cambodia : Implications for food security, and human nutrition. *IFReDI*.

Nelson, F., Nshala R., & Rodgers, W.A. (2007). The evolution and reform of Tanzanian wildlife management. *Conservation and Society, 5*(2), 232 – 261.

Neumann, R. P. (1998). *Imposing wilderness: Struggles over livelihood and nature*

preservation in Africa. Berkeley: University of California Press.

Noe, C., & Kangalawe, R. Y. M. (2015). Wildlife protection, community participation in conservation, and (dis) empowerment in Southern Tanzania. *Conservation and Society, 13*(3), 244- 253.

Reardon, T., & Vosti, S. A. (1995). Links between rural poverty and the environment in developing countries: Asset categories and investment poverty. *World Development, 23,* 1495–1506.

Riehl, B., Zerriffi, H., & Naidoo, R. (2015). Effects of community-based natural resource management on household welfare in Namibia. *PLoS One*, *10*(5). https://doi.org/10.1371/journal.pone.0125531

Royal Government of Cambodia (RGC) (2010). *National Strategic Development Plan 2009-2013 (updated version). RGC: Phnom Penh.*

Sandker, M., Finegold, Y., D'Annunzio, R., & Lindquist, E. (2017). Global deforestation patterns: Comparing recent and past forest loss processes through a spatially explicit analysis. *International Forestry Review*, *19*(3), 350–368. https://doi.org/10.1505/146554817821865081

Shiferaw, B., Bank, W., Freeman, A., Bank, W., & Swinton, S. (2005). Natural resource management in agriculture: Methods for assessing economic and environmental impac*ts. In Natural resource management in agriculture: Methods for assessing economic and environmental impacts. In Natural resource management in agriculture: methods for assessing economic and environmental impacts. https://doi.org/10.1079/9780851998282.0000*

Singh, V. K. (2016). *Natural resources management : An overview natural resources management : : An Overview*. (October).

Statistics, P. I. (2009). Part I Statistics and main indicators FAO Fisheries statistics. *FAO*, (2005).

Stocking, M., & Perkin, S. (1992). Conservation-with-development: An application of the

concept in the Usambara Mountains, Tanzania. *Transactions of the Institute of British Geographers, 17*(3), 337 – 349.

Tsing, A. L., Brosius, P. J., & Zerner, C. (1999). Assessing community-based natural resource management. *Ambio, 28*(2), 197 – 198.

Twyman, C. (1998). Rethinking community resource management: Managing resources of managing people in western Botswana? *Third World Quarterly, 19*(4), 745 – 770.

Twyman, C. (2000). Participatory conservation? Community-based natural resource management in Botswana. *The Geographical Journal, 166*(4), 323 – 335.

United Nations (2015). *The millennium development goals report.* https://doi.org/978-92-1-101320-7

United Nations Environment Programme (UNEP) (2008). *Green Jobs: Towards decent work in a sustainable, low-carbon world.* Report produced by the Worldwatch Institute for the United Nations Environment Programme.

Williams, M. (2006). Deforesting the earth: From prehistory to global crisis. Reviewed by William Meyer*, Annals of the Association of American Geographers 96:* 674–675.

Williams, D. R., & Patterson, M. E. (1996). Environmental meaning and ecosystem management: Perspectives from environmental psychology and human geography. *Society & Natural Resources*, *9*(5), 507-521.

Western, D., & Wright, M. (1994). *Natural connections: Perspectives in community-based conservation.* Washington, DC: Island Press.

World Bank (2006). *Where is the wealth of nations: Measuring capital for the 21st century.* The World Bank, Washington, DC.

WWF (2009). *Land suitability evaluation for sustainable agricultural developments in Pechreada District, Mondulkiri Province.* WWF: Phnom Penh

Yusuf, H. K. (2014). *Ecologically Sustainable Natural Resource Management (NRM) for National Development*. *5*(May), 7–10.

CHAPTER II

REVIEW OF LITERATURE

This chapter reviews the natural resource management practice and its relation in community conservation and socio-economic development and concepts of natural resource management and socio-economic development. The review intensely discusses the history and practices of natural resource management in general and its contribution to socio-economic development. This would help promote awareness of the complexity in natural resource conservation and management executing their development commitments in Cambodia to readers, particularly managers of public and private sectors and academic students. The review includes terminologies of natural resource management, socio-economic development, and practice and evolution of natural resource conservation and management.

2.1 Conceptual Review

2.1.1 Terminologies

Natural resources such as forests, fisheries, water, land, and biodiversity play a critical role in local livelihoods, especially for locals (Bromley and Cernea 1989). Natural Resources Management refers to the sustainable use and protection of significant natural resources, for instance, land, water, air, minerals, forests, fisheries, and biodiversity. These resources provide ecosystem services that deliver better quality to human life. Natural resources are an essential source of national wealth around the world, and they are the foundation of human survival, progress, and prosperity. Agricultural crop

production mainly requires the effect of interaction between different natural resources such as soil, water, weather, and external inputs like seed fertilizer, energy, management, etc.; (V. K. Singh, 2016).

Natural Resource Management (NRM) manages how people and natural landscapes interact. It brings together biodiversity conservation, water management, and the future sustainability of industries. NRM refers to decision-making by individuals and groups about natural resources allocated over time and space (Williams & Patterson, 1996). NRM is also congruent with the concept of sustainable development. It specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources. NRM aims to efficiently and sustainably utilize renewable and non-renewable natural resources. Sustainable development is one of the means of human development that require resources to fulfill the need of the human in a sustainable way (Shiferaw, Bank, Freeman, Bank, & Swinton, 2005). Therefore, the growing population is over-exploiting natural resources resulting in various severe problems. As most natural resources are nonrenewable and depleting in nature, the use of the natural resource must be well managed (Ilyas, Arisaputra, Utami, Bakar, & Arifin, 2019).

NRM requires participation with many relevant stakeholders from all levels, which values and interests should be integrated. This collaborative effort is called collaborative NRM, which refers to partnerships, consensus groups, community-based collaborative, and alternative efforts that jointly protect the natural resources. These collaborative approaches include terrestrial and aquatic resource management, watershed

management, community-based conservation, collaborative conservation, community forestry and fisheries, community-based ecosystem management, integrated environmental management, and community-based environmental protection (Conley & Moote, 2003). Consequently, NRM is a collective action requiring diverse actors – governments, farmers, businesses, communities, and NGOs to integrate their activities to improve the condition of natural resources. Using contemporary approaches to governance, various actors in NRM have the potential to engage with and value a greater variety of knowledge (Lockwood, Davidson, Curtis, Stratford, & Griffith, 2010). Promoting conservation and sustainable natural resource management requires a critical role of human and social factors. The recognition that natural resources management involves managing people's behavior toward natural resources, at least in part, has sometimes given rise to considerable confusion and apprehension among those practitioners. Human behavior is highly complex, and the behaviors that affect the sustainability of natural resources may involve many actors and efforts and take place over long periods. So many social factors are usually involved that it is hard for communities or outsiders to know how to solve problems and work toward sustainability (Byers, n.d.). Effective natural resource governance requires democratic and mutually supportive central and local institutions. Decentralization involves the transfer of powers from the central government to lower-level actors and institutions. Governance arrangement including the design guideline and other principle is critically important to support the sustainable natural resource use and management. The principles can be used to direct the design of governance institutions that are legitimate, transparent, accountable, inclusive and fair

and that also exhibit functional and structural integration, capability and adaptability. However, although the governance principles have been developed for diverse contexts, but the practices for sustainable natural resource governance are so far limited (Lockwood et al., 2010).

Integrated natural resource management (INRM) refers to the responsible and broad-based management of the land, water, forest, and biological resources base, including genes required to maintain agricultural output and avoid degradation of prospective productivity (CGIAR-INRM-Group, 1999). In recent years, it is observed that protected area management has shifted from a species-based conservation approach to a livelihoods-based landscape approach. The change in the conservation paradigm has been gradual and included acceptance of communities as an integral part of national-level conservation initiatives, together with the integration of many global conventions and directives. Most global conventions facilitate scaling up conservation across more significant landscapes involves cooperation at various levels (Chettri, Gurung, Shakya, & Sharma, 2007). Over time, it has become increasingly evident that successful conservation efforts must go beyond safeguarding a single species or a defined area. Biodiversity conservation must take a holistic approach by involving a multi-scaled approach that considers a diverse range of interconnected plant, animal, and insect species and includes both reserve and non-reserve areas. Moreover, it considers the needs and interests of the people who rely on these areas for their livelihoods and considers the entire landscape, including physical and biological factors. Protected areas have grown in number and size in many countries. Nevertheless, they cannot live in

isolation as islands to fulfill their mission (Secretariat of the CBD 2004).

Landscape management entails taking an integrated approach, defined by ecosystems rather than borders, considering both conservation and sustainable use of biological diversity components, and placing people and their sociocultural resources at the center of the conservation framework. This strategy has been endorsed for tying conservation to sustainability, integrating communities in decision-making, and wisely harnessing biodiversity to ensure effective management (Chettri et al., 2007). Transboundary landscape management is a developing idea in biological diversity conservation. Conservation entails simply maintaining a species or habitat inside a defined area. (Hamilton and McMillan 2004). As an approach, it falls under the overall framework of the CBD – the significant global agreement on the sustainable use and conservation of biological diversity. The CBD has three main goals: 1) conservation of biological diversity, 2) sustainable use of its components, and 3) fair and equitable sharing of benefits arising from genetic resources.

Development is referred to enhancement within the living conditions of the individuals as a result of improved education, incomes, skill development, and career opportunities. It is a cultural and environmental-based process of economic and social transformation. As a result, it can be thought of as the process of societal social, and economic growth (Science, 2011). Socio-Economic Development is the process of social and economic transformation in a society based on cultural and environmental factors. It refers to the changes of lifestyles of the individuals through education, incomes, skill development, and employment. The areas that need to be developed to empower the vulnerable groups

are social, biological, skill, political, science, technology, and literature (Kapur, n.d.). Social and economic are relatively defined in the development process. They are the inter-related elements in which there is no purely social or economic development possible(Amaral et al., 2013).

The socio-economic aspect of natural resource management has several dimensions, including ecological and economic aspects. At present economic aspects as defined by humans for their interests seem to override the ecological consideration while utilizing the available natural resources for short or longer-term benefits. Sustainable use of biodiversity has significant links to human wellbeing and poverty reduction. Natural resources account for a considerable amount of most countries' wealth, typically more than the wealth reflected in generated capital, making natural resource management a critical aspect of economic development (World Bank, 2006). Moreover, several governments have witnessed a considerable increase in natural resource earnings because of the surge in commodity prices. Natural resources such as oil, gas, minerals, and timber are likely to play a more prominent role in resource-rich economies. As demand from fast-rising economies grows, non-renewable resource supplies dwindle. Natural capital-rich countries can generate considerable current revenue from resources, unsurprising. Natural resources can play a critical role in poverty reduction initiatives in wealthy countries. The poor, particularly the rural poor, rely on natural resources directly for their survival. As a result, initiatives that improve natural resource management can have an immediate and significant influence on poverty reduction (OECD, 2008). Natural resources and healthy ecosystems provide a "safety net" for the poor, especially during

economic hardship, by supplying food in the form of plant and animal fauna, good soils for subsistence cultivation, and fuel wood. To benefit from such "safety nets," the poor must access resources. It should be included in resource management decision-making, gaining a stake in resource sustainability, and preventing common tragedy. Furthermore, natural resource earnings can be used to invest in education and job training, thereby contributing to human capital growth. For example, countries can use a share of the extra earnings from the sale of natural resources to fund pro-poor policies and projects, mainly when commodity prices are high. Ecosystem services are the services provided by the functioning of natural systems that we often take for granted but that provide much of the necessary foundation for the economy and society (OECD, 2011).

2.1.2 Community-Based Natural Resource Management

Community-Based Natural Resource Management (CBNRM) has several definitions. It is similar to the definitions of sustainability, which include both process and strategy. CBNRM mainly refers to an approach and evolution of natural resource management to the local level and seeks to support sustainability through transparency, accountability, and broad participation of community members and resource users in decision-making (Zanetell & Knuth 2004, Soeftestad 2006). Also, it is a co-management approach to empower local communities to actively participate in the long-term conservation and management of natural resources by encouraging and empowering local people to exercise their rights to manage natural resources (Anderson & Metha 2013). CBNRM models have been advocated as a dual strategy for poverty alleviation and biodiversity protection (Berkes, 2004; Balint & Mashinya, 2008). According to Armitage (2005),

CBNRM is generally viewed as an approach to address environmental and social-economic objectives and balance the exploitation and conservation of valued ecosystem components. It requires some degree of devolution of decision-making power and authority over natural resources to communities and community-based organizations. This approach seeks to encourage better resource management outcomes with the full participation of communities and resource consumers in decision-making activities and to incorporate local authorities and institutions, customary practices, and knowledge systems in management, regulatory, and enforcement processes. Likewise, CBNRM focuses on the collective management of ecosystems to promote human well-being and devolve authority for ecosystem management to the local community level. Therefore, it requires strong investments in local institutions and governance structures (C Fabricius & Collins, 2007). It is a way in which conservation and local development have been reconciled is through a range of approaches under the umbrella of CBNRM. Kellert et al. (2000) explain that the certain characteristics of CBNRM pattern 1) a commitment to involve community members and local institutions in the management and conservation of natural resources; 2) an interest in devolving power and authority from the central state government to more local communities, 3) a desire to link and reconcile the objectives of socio-economic development and environmental conservation and protection, 4) a tendency to defend and legitimize local and indigenous resource and property rights, and 5) a belief in the desirability of including traditional values and ecological knowledge in modern resource management. There is no single approach to designing or implementing the CBNRM program. Conceptually, the CBNRM approach is

based on the argument involving local communities in managing local natural resources and appreciating their knowledge and needs. Agrawal and Ostrom (2001) laid foundational theories emphasizing collective action and local governance, which have been reinforced by recent studies. For instance, Keng et al. (2017) demonstrate that community forestry initiatives in Cambodia not only enhance biodiversity but also provide economic benefits to local communities. This dual focus on ecological and economic outcomes is essential for sustainable development. More equitable and sustainable resource management practices and outcomes will occur (Armitage, 2005; Berkes, 2004; Turner, 2004). The focus, therefore, is on devolution to local communities of rights over use, management, and decision-making, as well as the factors necessary for the capacity to utilize these rights, and on providing economic incentives for sustainable use (Measham & Lumbasi, 2013; Roe & Nelson, 2009). CBNRM requires strong investments in capacity development and the development of local institutions and governance structures.

In East Africa, where biodiversity and wildlife populations have been declining (Craigie et al., 2010; Western, Russell, & Cuthil, 2009), the community people often face challenges with their livelihoods (Salerno, Borgerhoff Mulder, Grote, Ghiselli, & Packer, 2016). Community-based wildlife conservation models have been considered and implemented as a strategy to balance the trade-off between wildlife conservation and development (Naidoo et al., 2016). The CBNRM approach has been subject to considerable criticism in East Africa and elsewhere, specifically concerning their socio-economic contributions and poor governance (Fabricius, 2004; Magome & Fabricius, 2004; Bluwstein et al., 2016;

Brehony et al., 2018). While the constructive criticism may improve issues related to benefit sharing and local involvement in governance over natural resources, the research on the ecological effectiveness of community-based conservation models is an equally vital component to guide adaptive management and policy (Lee & Bond, 2018; Lindenmayer & Likens, 2010; Ogutu et al., 2017). Governance has been identified as one of the key drivers of CBNRM (Bohensky & Lynam, 2005), and many donors are now concentrating intensely on the governance and adaptive co-management components of project implementation. Though governance is inherent in the management component of CBNRM, it postulates that certain aspects of governance are essential to defend CBNRM against unexpected changes and conflicts. This is especially relevant in the early stages of CBNRM initiatives (Salafsky et al., 2001; Olsson et al., 2004)

CBNRM is a popular approach to promote biological conservation and socioeconomic development. The CBNRM models include community forestry, community fisheries, community protected area, community wildlife management, indigenous community, and other participatory community groups on conservation. The community groups are called community-based organization that is both formally and informally established for community natural resource protection purpose (Mehta, Ebbin, Lichtenfeld, H, & Sa, 2000). CBNRM is also founded upon the idea of creating an economic value for specific natural resources that enhances the desire to conserve them, and with financial benefits from their sustainable use flowing to local communities who, being on the frontline, are those who are doing the conserving. However, linking these two areas together within CBNRM creates complexity as it cannot separate the practical process from issues of

value, equity, and social justice, further complicating implementation and monitoring and evaluating the projects (Jones, 2009). From the 1980s, community development and natural resource management have become closely connected. Twyman (2000) indicates that in the present, participatory and community-based approaches are heralded as the panacea to natural resource management initiatives worldwide. CBNRM has been a fixture on the southern African conservation landscape for the past 25–30 years. It has been adopted to achieve rural economic development and natural resource management (Dressler et al., 2010). Underpinning the introduction of local-level conservation and development programs in the region was a growing awareness that the alienation of rural communities through the formation of exclusionary protected areas and state control of resources, particularly wildlife, was creating resentment and resistance among local communities (Ndumeya, 2019; Nelson, 2010). CBNRM was built on the foundation that for rural communities to carry the costs of living with wildlife, they needed to benefit from it (Getz et al., 1999). This premise highlights the degree to which CBNRM was externally imposed and driven by conservation scientists, who were focusing on conservation as the ultimate goal, in collocation to the primary expectations of the target communities, who saw CBNRM as a means to increased development (Agrawal & Gibson, 1999; Swatuk, 2005). Many CBNRM initiatives tend to recognize the need for various vantage points and seek to incorporate the disciplines of environmental economics, conservation biology, ecology, organizational management and leadership, political science, sociology, and environmental education. Collaboration between experts from these disciplines with each other, as well as with non-experts and members of other constituency groups, has been

instrumental to developing effective CBNRM initiatives (Child & Lyman 2005; Borrini-Feyerabend & others 2004). Preventing the potential challenges, multiple levels of coordination are required, and primarily, operational-level mechanisms, in the form of rules or institutions, that specify members' rights and duties, must be established to coordinate people's activities to address the issues of overusing or underinvesting in a resource. Furthermore, the formulation and enforcement of these rules rely on coordination at the collective-choice level (Schlager & Ostrom, 1992). Consequently, coordination is an integral feature of common-pool resource management. Moreover, incentives to invest in the resource are created by ensuring that others will cooperate with the agreed-upon rules (Pretty, 2003). Additionally, natural resources' multiple uses and users require coordination to absorb risks associated with the economy, climate, or political shocks (Meinzen-Dick, 2009; Pretty & Ward, 2001).

CBNRM programs must also ensure that tenure rights and responsibilities over land and resources empower communities (Barber et al., 2004; Pathak, 2006). Several examples demonstrate that the "lack of clear tenure rights discourages responsible stewardship" This tenet is especially important for evolving relationships with First Nations and indigenous communities (USAID, 2009). According to Lee (2000), limited legal mechanisms for protecting sites of special significance put pressure on indigenous communities that wish to protect significant areas but do not have access to land ownership to do so. At the same time, most countries have developed national biodiversity strategies and action plans that contain elements that acknowledge indigenous peoples and local communities as legitimate stakeholders in conservation. A

key reason for the success of many CBNRM initiatives is a progressive policy environment and the development of a national CBNRM policy (Schuerholz & Baldus, 2007) that empowers local communities in the management and utilization of renewable resources within CBNRM areas and the retention of revenues. According to Ribot (2002), environmental legislation must secure tenure rights and the transfer of decision-making authority to local institutions for communities to invest in decentralization reforms. Examples from Ghana, Ethiopia, Mali, Senegal, South Africa, and Uganda demonstrate constitutional clauses in environmental legislation that ensure some degree of government decentralization over resource management, "providing leverage for lawmakers to establish and maintain decentralized governance arrangements (Ribot, 2002, p. 16). Therefore, environmental legislation must enable the development of community ownership of natural resources. Other ecosystem management initiatives, such as management of fish and crayfish in the Lake Racken catchment in Sweden, were successful in part due to new laws that redefined the management area for local fishing associations and devolved management responsibility to local fishing associations (Olsson, P., Folke, C., & Berkes, F., 2004). In Namibia and many other countries in sub-Saharan Africa, CBNRM is applied to different resources simultaneously. However, these resources are regulated by specific legislation and often fall under the control of different ministries. However, the various environmental resources, including water, wildlife, and forests, are intertwined in people's daily lives (Bollig and Menestrey Schwieger, 2014). Given the inter-connectedness of resources in daily use, we introduce and further explore a holistic framework for analyzing the social-ecological consequences of environmental

policies and change. This strategy allows us to avoid singling out specific resources, both politically and analytically.

It argues that CBNRM initiatives emphasize sustainability; therefore, incentives to promote livelihoods of community members are critically important in ensuring successful conservation outcomes and long-term natural resource protection (Child, 2004; Hulme & Murphree, 2001; Long, 2004; Mbaiwa, 2004). These benefits are anticipated to advantage behavior change of the local people towards natural resource protection, which the people have willing to participate in conservation activities (Hulme & Murphree, 2001; Scanlon & Kull, 2009). Brooks et al. (2013) indicated that community-based conservation promoted the idea that long-term conservation success required engaging with and providing benefits for local communities. Theoretically, CBNRM offers two types of advantages to communities that participate: economic benefits, such as employment or dividends from tourism profits, and non-economic benefits, such as community capacity building and strengthening social networks (Ashley & LaFranchi, 1997). Proponents of CBNRM argue that benefits must outweigh the costs of conservation, particularly losses from human-wildlife conflict (Thakadu, 2005). However, (Nkhata, Breen, & Mosimane, 2012) find that the relationship between expected benefits and conservation behavior is complex. For example, perceptions that benefits are being unfairly distributed may cause people to opt out of CBNRM programs even when economic gains occur (Silva & Mosimane, 2012). Thus, benefit distribution mechanisms and the factors associated with their success merit more attention when examining CBNRM programs.

Relatively few studies explore the relationship between local governance institutions and

benefit-sharing systems. Also, there are some gaps in benefit-sharing policy research and stress the importance of understanding different forms of benefit-sharing arrangements in communities. Therefore, local governance regulates and facilitates access to benefits as it responds to community expectations and demands (Nkhata, Breen, et al., 2012). However, local governance institutions in community-based conservation continue to be fragile and sensitive to internal and external change in the community (Balint & Mashinya, 2006). Thus their capability to develop benefit-sharing systems remains limited. This could be attributed to weak enforcement of the benefit-sharing policy directive and incapable (or unwilling) local governance structures. This suggests the need for more government assistance and oversight to bring about the benefit-sharing systems mandated by conservancy constitutions. Policies must set the principles for understanding and directing benefit-sharing systems towards a particular outcome that addresses community expectations (Nkhata, Breen, et al., 2012). For example, in developing countries where rural communities are faced with the challenges of poverty and high unemployment, the benefit-sharing system must address these social challenges to enhance the conservation of natural resources. Policy guidelines would inform local governance institutions when developing the benefit-sharing systems rather than leaving communities without support (Igoe & Croucher, 2007).

To conclude, CBNRM anticipates achieving three aspects of sustainability, including natural resources, social institution sustainability, and livelihood sustainability. The dimensions of social institution sustainability are community participation in conservation, equity and sense of community ownership, social coherence, and encouraging diversity

in the communities. Livelihood sustainability includes economic and indirect benefits, for example, in education and health, where infrastructure was built to ensure that the communities have access to their basic needs to foster a good quality of life in the communities. In addition, natural resource sustainability is maintaining biodiversity and wildlife (Milupi, Somers, & Ferguson, 2017).

2.1.3 Protected Area Management

A Protected Area (PA) is defined as a geographical space of land and sea mainly dedicated to the protection of biological diversity and of natural and associated cultural resources and managed through legal or other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN, 1994). The term "protected area" is, therefore, shorthand for a sometimes bewildering array of land and water designations, of which some of the best known are a national park, nature reserve, wilderness area, wildlife management area, and landscape protected area but can also include such approaches as conserved community areas. More importantly, the term embraces a wide range of different management approaches, from highly protected sites where few if any people are allowed to enter, through parks where the emphasis is on conservation, but visitors are welcome, to much less restrictive approaches where conservation is integrated into the traditional (and sometimes not so traditional) human lifestyles or even takes place alongside limited sustainable resource extraction. Some protected areas ban activities like food-collecting, hunting, or extraction of natural resources. In contrast, it is an accepted and even a necessary part of management for others. The approaches taken in terrestrial, inland water, and marine

protected areas may also differ significantly, and these differences are spelled out in the guidelines (Gerdes, Alpers, & Pauli, 2008). The PA is crucial importance for preserving biodiversity in the face of the global crisis of extinction of species and losing the universal natural capacity for supporting human habitat (Rana et al., 2010; Dudley 2008), and it is a foundation for the development and implementation of all national and international conservation strategies, set aside to maintain functioning natural ecosystems, to maintain ecological processes, and protect biodiversity and species from becoming extinction (Bastmeijer & Van Hengel, 2009). Furthermore, PA is crucial for guaranteeing a healthy society that provides diversity of life by preserving the species and habitats. It also helps the survival of living creatures, each of which is a product of millions of years of evolution on the earth (Secretariat of the Convention on Biological Diversity, 2008). A principal objective of PA is to conserve nature by eliminating, minimizing, or reducing human pressures and threats operating within their boundaries. According to PA guidelines (Thomas & Middleton, 2003), The PA can be categorized into six types, according to their management objectives:

Category I Protected area managed mainly for science or wilderness protection I. a) Strict Nature Reserves: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use, and impacts are controlled and limited to ensure the protection of the conservation values. and I. b) Wilderness Areas: Usually large unmodified or slightly modified areas, retaining their natural character and influence,

without permanent or significant human habitation, protected and managed to preserve their natural condition.

Category II Protected area managed mainly for ecosystem protection and recreation (National Park): Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational, and visitor opportunities.

Category III Protected area managed mainly for conservation of specific natural features (Natural Monument): Areas set aside to protect a specific natural monument, such as a landform, sea mount, marine cavern, geological features such as a cave, or a living feature such as an ancient grove.

Category IV Protected area managed mainly for conservation through management intervention: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category.

Category V Protected area managed mainly for landscape/seascape conservation and recreation (Protected Landscape/Seascape):

Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural, and scenic value, safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

Category VI Protected area managed mainly for the sustainable use of natural ecosystems (Managed Resource Protected Area): Areas that conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable

To effectively manage category implementation, IUCN defined four governance types with a description of who holds authority and responsibility for the protected area (WCPA, 2012):

1) Governance by the government: Federal or national ministry/ agency in charge; sub-national ministry/agency in charge; government-delegated management (e.g., to NGO)
2) Shared governance: Collaborative management (various degrees of influence); joint management (pluralist management board; transboundary management (various levels across international borders)
3) Private governance: By individual owner; by non-profit organizations (NGOs, universities, cooperatives); by for-profit organizations (individuals or corporate)
4) Governance by indigenous peoples and local communities: Indigenous peoples' conserved areas and territories; conserved community areas – declared and run by local communities

The establishment of the PAs is a keystone of global conservation strategies, and over the last decades' many PAs have been designated. Their number has been significantly increased worldwide (Dearden, Bennett, & Johnston, 2005). The establishment of PAs

further marginalized poor communities living around PA, leading to a widespread lack of community support for conservation (Matiku, 2008). PAs are widely recognized as one of the most effective ways to conserve biodiversity and reduce the loss of forests and other natural habitats (Watson et al., 2014; Woodley et al., 2019; MacKinnon et al., 2020). While countries have made progress in expanding coverage, especially in terrestrial ecosystems, freshwater habitats are still much less well represented in protected area networks. In addition, many designated marine protected areas (MPAs) have little or no adequate protection or management. Indeed, it is estimated that at present, only 2.7 percent of the ocean is highly protected, with many MPAs subject to unsustainable fishing and other extractive uses (Sala et al., 2021). Well-managed MPAs are an effective tool for restoring ocean biodiversity and ecosystem services; a substantial increase in ocean protection could provide multiple benefits, boost fishery yields and secure marine carbon stocks, and protect marine biodiversity (Sala et al., 2021). The PAs and MPAs require well-managed to maintain the habitats and species sustainably. While strengthening the management of PAs is essential, the recognition and support of other effective area-based conservation measures (OECMs) are essential to achieving more ambitious conservation targets by 2030. The CBD adoption of criteria on OECMs in 2018 provides an excellent opportunity to recognize areas under a wide range of governance and management regimes, including government, private sector, Indigenous Peoples, and communities, which deliver effectively in situ conservation of intact ecosystems and important biodiversity (IUCN/WCPA, 2019). Potential OECMs may include some Indigenous and Community Conserved Areas (ICCAs) and Locally Managed Marine Areas

(LMMAs) and areas managed by the government and the private sector. While OEMs do not need a primary conservation objective, they must deliver effective long-term conservation of critical biodiversity (IUCN/WCPA, 2019).

Conflicts between livelihood and conservation objectives have been the agenda of many discussions over the last two decades to plan and promote long-term conservation in the protected area (Nyaupane & Poudel, 2011; Salafsky & Wollenberg, 2000; Stone & Rogerson, 2011). Thereby, appropriate management of protected areas requires a full understanding of the existing conditions, accurate implementation, planning, and regular supervision. Sometimes there is a need to develop some changes in the management of a protected area if required (Nolte et al., 2010). It is widely recognized that the protected area is not only to conserve biological and cultural diversity, but it also has important social and economic functions. These include protecting watersheds, soil, coastlines, forestry, and fisheries resources, providing natural products for consumption in a sustainable way, and supporting tourism and recreation. Many protected areas are also home to people with traditional cultures and knowledge. These crucial assets also require protection. Since most protected areas have multiple objectives, it is critically important to develop management plans for the PAs to guide the management of the PAs (Thomas & Middleton, 2003). Assessments at the global and regional level have shown that the most effective places to conserve biodiversity are protected areas (Ocampo-Penuela et al. 2016; Newmark et al. 2017; Pimm et al. 2018). The protected areas have undergone a pronounced expansion in the past few decades, geographically and conceptually. The collective decisions of governments, publicly funded bodies, and local communities have

created the rapid growth of protected areas throughout the world (UNEP–WCMC, 2014); land and sea management has seldom changed so quickly over such a large area. At the same time, as many natural ecosystems fragment (Sanderson, E. W. et al., 2002), the expectations placed on protected areas by a growing diversity of stakeholders have dramatically increased. Protected areas are now created not only to conserve iconic landscapes and seascapes and to provide habitat for endangered wildlife but also to contribute to the livelihood of local communities, to bolster national economies through tourism revenues, to replenish fisheries, and to play a crucial part in the mitigation of, and adaptation to, climate change, among many other functions (Stolton, S. & Dudley, 2010). Importantly, these new demands are in addition to, rather than as a replacement for, earlier motivations, necessitating trade-offs between competing objectives (White, C., Halpern, B. S. & Kappel, C. V, 2012). Although the expanded role of protected areas may have fuelled their establishment, their constantly changing focus makes them vulnerable to accusations of failure to achieve one or more of these objectives.

In recognition of their increasing importance in a world facing dramatic ecological changes and biodiversity loss (Tittensor et al. 2014), the Convention on Biological Diversity (CBD) established 20 Aichi Biodiversity Targets (www.cbd.int/sp/targets/) organized under five Strategic Goals (CBD 2011). Under the goal, C to "improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity," Aichi Target 11 sets out ambitious PA targets: " . . . by 2020, at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively

and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape" (CBD 2011). The fifth Global Biodiversity Outlook, based on 2019 data, reported that 15 percent of land areas and almost 8 percent of the ocean were under designated protected areas (CBD, 2020). Since 2010 there has been a remarkable expansion of protected areas – more than 21 million square kilometers of new and expanded terrestrial and marine sites; thus 42 percent of the current coverage, an area equivalent to almost three times the land mass of Australia, has been added in the last decade (UNEPWCMC 2021).

The global conservation community has conducted thousands of assessments of protected area management effectiveness (PAME) to measure the conservation impact of PA management interventions. PAME assessments are conducted by PA managers, officers, and other stakeholders to improve PA management. Most PAME methodologies include a systematic and comparable evaluation of PA values and/or key taxa threats. This provides a basis for more coordinated efforts and targeted investment to reduce threats and enhance conservation outcomes in PAs. Assessors provide an overview of terrestrial PAs' threats, using data collected as part of PAME evaluations in 1,961 PAs from 149 countries (Leverington et al., 2010). Following Salafsky et al. (2008), assessors defined threats as any human activity or processes that cause destruction, degradation, or impairment of biodiversity targets. We assess the main types of threats affecting PAs, their impact, and their occurrence by region and biome. Finally, they use a Cumulative Link Mixed Model (CLMM) to investigate which environmental and socioeconomic factors

correlate with more highly threatened PAs. Finally, we discuss PA management and international policy needs, intending to improve conservation responses on the ground. In India, the government officially protects 5% of its area, while approximately 15% of the global land is protected (Dinerstein et al., 2017). Nevertheless, the conservation challenges in India differ from other large countries, such as the USA, Brazil, and China. In these countries, large protected areas are situated in sparsely populated regions with relatively low biodiversity (Pimm et al., 2018). Instead, many millions of people live within a few kilometers of protected areas in India. Perhaps 4 million reside within them (Narain et al. 2005), although the figure is uncertain, with no updates this century. Protected areas in India have played a critical role in conservation success (Karanth et al., 2010; Walston et al., 2016). For example, more than 85% of the world's one-horned rhinos (Rhinoceros unicornis) and more than 70% of the world's tigers live in India, largely a consequence of the efficient functioning of India's Tiger Reserves (Jhala et al., 2015; Talukdar et al., 2008; Walston et al., 2016).

The COVID-19 pandemic is a global issue that jeopardizes society and the environment. It is caused by the SARS-CoV-2 virus (Zhou et al., 2020), which is changing almost everything. It is first and foremost a profound human tragedy, which has already killed hundreds of thousands of people and altered the lives of billions. It has dramatic impacts on the global economy (Maliszewska et al., 2020; McKibbin & Fernando, 2020). It has thrown many assumptions about our future into doubt. It has created a collective moment for contemplation about the future. We are only just beginning to understand its implications for humanity and our relationship with nature. The origins of most zoonotic

disease pandemics and epidemics, such as COVID-19, lie in a breakdown in that relationship, arising from unsustainable exploitation of the natural world (Patz et al., 2004). Therefore, the implications of this unprecedented event and its human responses are profound. People raise necessary questions about how humanity impacts nature through the destruction of ecosystems, the unsustainable consumption of wildlife, and the illegal wildlife trade. It is now well recognized that the exploitation of wild species and wild places, deforestation, uncontrolled expansion of agriculture, intensification of farming, and infrastructure development has increased and modified the interface between people and wildlife, and thus created a 'perfect storm' for the spillover of diseases from wildlife to people (Plowright et al., 2017; Faust et al., 2018). Protected and conserved areas safeguard nature while at the same time providing food and water security, disaster risk reduction, climate mitigation and adaptation, and innumerable cultural, spiritual, and health values (Dudley et al., 2010). Despite growing recognition of these benefits, they are often undervalued and not sufficiently supported by the policy and resources needed for effective conservation. How protected and conserved areas are treated during and after the COVID-19 pandemic will have major implications for nature and humanity's reliance on nature; they should be a central part of the move towards greener economies. One Health approach recognizes that the health of humans, animals, and ecosystems are interconnected. It applies a coordinated, collaborative, multidisciplinary, transboundary, and cross-sectoral approach to address risks that originate at the animal-human–ecosystem interface. It is progressively urgent to adopt the One Health approach as the accelerating human footprint on the natural world

increases the risks of further zoonotic disease spillover. Well-managed networks of protected and conserved areas, both terrestrial and seascapes, should be crucial for the One Health approach. Moreover, as countries plan to reinvigorate their economies at post-COVID-19, it is encouraged to implement the One Health approach, thereby ensuring an economic recovery that avoids further environmental degradation, reduces the risk of further zoonotic outbreaks, and helps build a more resilient future (Aguirre et al., 2002).

2.1.4 Payment for Ecosystem Services

The term "ecosystem" has been defined in many ways. It can be defined as "a dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit" (Moll & Petit, 1994). Ecosystem services refer to the benefits human populations derive from ecosystems. Seven different urban ecosystems have been identified: street trees, lawns: parks, urban forests; cultivated land; wetlands; lakes: sea, and streams. These systems generate a range of ecosystem services. Urban ecosystem services contribute to the quality of urban life even if urban citizens are still dependent on global ecosystem services for their survival. The quality of life for urban citizens is improved by locally generated services, e.g., air quality and noise levels that cannot be improved with the help of distant ecosystems (Bolund & Hunhammar, 1999). Biodiversity is frequently employed as a measure of ecosystem health and the supply of ecosystem services, with conservation priorities set accordingly (United Nations Environment Programme: UNEP, 2010; Norris et al., 2011). As a result, it's crucial to evaluate biodiversity's significance in providing ecosystem services across a

wide range of environments. Ecosystem services benefit from ecosystems (Millennium Ecosystem Assessment: MA, 2005; Boyd & Banzhaf, 2007). They are typically divided into three categories: 'supporting services' (soil formation, primary productivity, and nutrient cycling), 'provisioning services' (fresh water supply, food, fiber, timber, and fuel products, bio-chemical or genetic resources), and 'regulating services' (equable climate, porosity, and biodiversity). Natural ecosystems provide a variety of critical items to human society, including seafood, game animals, feed, fuelwood, timber, and pharmaceuticals. These items are essential and well-known aspects of the economy. Natural ecosystems also provide essential life-support functions without which human civilizations would perish. This has been underappreciated until recently (Daily et al., 1997). Humanity is rapidly urbanizing, with more than 60% of the global population anticipated to reside in cities by 2030. (UN, 1997). Nevertheless, even as humanity becomes more urbanized, we remain as reliant on nature as ever. Cities, for example, are reliant on the extensive hinterlands that provide input and manage the city's output. According to a survey of the 29 major towns in the Baltic Sea region, ecosystem support areas claimed by the cities were at least 500–1000 times greater than the cities themselves (Folke et al., 1997). Thereby, well-managed of natural ecosystems is critically required.

Ecosystem Management (EM) emphasizes ecological interactions within an ecosystem over human activities, implying that entire ecosystems may be understood, controlled, and managed (Kappel et al. 2006). On the other hand, Ecosystem-Based Management (EBM) is an integrated, science-based approach to the management of natural resources that aims to "sustain the health, resilience, and diversity of ecosystems while allowing for

sustainable use by humans of the goods and services they provide" (Kappel et al. 2006). EBM's goals include learning how these biophysical and socioeconomic spheres interact. It also includes understanding the linkages among activities and social and ecological system components by using institutional and scientific ways of managing multiple human activities within entire ecosystems (Kappel et al., 2006). EBM has emerged as a holistic approach to NRM, focusing on managing ecosystems rather than individual resources. A recent study by Ban et al. (2019) highlights the effectiveness of EBM in marine environments, showing that it enhances biodiversity conservation while supporting fisheries management. This approach underscores the interconnectedness of various ecosystem components, advocating for collaborative management strategies.

Understanding how humans interact with ecosystems is important because natural resource use and management decisions are made in a social context (Savory, 1988). The ecosystem approach is increasingly advocated for the conservation and management of both terrestrial and marine systems in this broader context. This issue is addressed in several studies published in Conservation Biology. Ecosystem management, according to Grumbine (1994), is neither a science nor a continuation of conventional resource management, it provides a fundamental shift in perspective on how humans may work with nature, including the significance of reframing environmental values, fostering cooperation, and assessing success (Yaffee, 1999). The ecosystem approach is increasingly recognizing the interwoven elements of socio-ecological systems, broadening the scope of community-based conservation to include social capital (Berkes 2004; Pretty & Smith 2004), including accounting for indigenous knowledge systems, stewards of

biodiversity and ecological services, leadership, and teams, institutions and governance, and conservation scenario planning in the face of an uncertain future (Dew 2005; Folke et al. 2005).

The CBD's ecosystem approach is a strategy for integrating the management of land, water, and living resources to promote conservation and equitable usage. As a result, it promotes community participation in effectively managing species and environments (UNEP, 2000). Wetlands are one of the most valuable ecosystems on the planet. Although the value of wetlands in protecting fish and wildlife has been known for a century, some other benefits have only recently been identified. Wetlands are sometimes described as the kidneys of the landscape because they act as receivers for downstream water and waste from natural and human sources. Wetlands are also known as nature's supermarkets because they support an extensive food chain and rich biodiversity. They play an essential role in the landscape by providing unique habitats for various animals and plants. Now we are concerned about the health of the entire planet. Some describe wetlands as important global carbon sinks and climate stabilizers (Mitsch, Bernal, & Hernandez, 2015). Costanza et al. (1997) Wetlands, particularly marshes and inland floods, used an estimation team of the ecosystem, which demonstrated that wetlands, particularly people, are worthy of lakes, rivers, forests, etc meadows. The coastal strength of coastal power was higher than that of the wetlands of the interior and coastal areas in 1997. With the publication of the Millennium Ecosystem Assessment (2005) came an alternative classification for ecosystem services, where the services are described as providing, regulating, cultural, and support. (1) Provision of ecosystem services, including

products from ecosystems, such as food, water, timber, fibers, or genetic resources. (3) Cultural ecosystem services include the benefits that people derive from ecosystems related to spiritual enrichment, recreation, ecotourism, aesthetics, education, formal and informal education, inspiration, and cultural heritage. (4) Supporting ecosystem services include the underlying ecosystem nutrient cycling and primary productivity, which, in turn, can lead to the other three services listed above.

Payments for Ecosystem Services (PES) are a relatively incentive-based approach to natural resource management and ecosystem stewardship. Users of ecosystem services compensate landowners who protect, enhance, or restore ecosystem services through their land management and land use decisions (Engel, Pagiola, & Wunder, 2008). According to Jack et al. (2008), the PES approach is based on a theoretically simple proposition: pay individuals or communities that raise levels of desired ecosystem services. PES provides a market-based method to achieving environmental results by allowing economic externalities to be internalized, a topic that has long been recognized and addressed in the field of environmental economics (Turner & Daily, 2008). PES schemes are primarily used for carbon sequestration, water-related services, and biodiversity conservation around the world (Carroll & Jenkins, 2010). Over 280 PES-type programs were active or in development by the early 2000s (Landell-Mills & Porras, 2002), with significant expansion in subsequent years. Designing tools that can protect biodiversity and the ecosystem services on which human society fundamentally depends is one of the most significant political challenges of the Anthropocene. In traditional conservation strategies, such as protected areas and community protection, innovative

tools such as payment for ecosystem services (PES) programs are increasingly promoted to incentivize conservation and sustainable management of resources (Pascual et al., 2014). The PES scheme is at the center of the contemporary conservation agenda. It is supported by donors (e.g., the Norwegian government, the World Bank), intergovernmental political institutions (e.g., the Convention on Biological Diversity), and governments. (e.g., Costa Rica, Mexico, Ecuador, South Africa), Vietnam, China), the private sector (e.g., Danone Water, Kenya Ecotourism), and non-governmental conservation organizations (e.g., Conservation International, World Wildlife Fund). While existing markets and regulatory frameworks largely ignore public ecosystem values, such as carbon sequestration and water regulation, PES programs create new mechanisms to integrate these values into decision-making (Ferraro and Kiss 2002). They do this by creating new relationships between beneficiaries of ecosystem services and service providers responsible for ostensibly conservation actions. Notably, PES programs often rely on service provision to finance new incentives (payments and non-financial benefits) to compensate land managers for the costs of providing ecosystem services. The market logic behind these efforts to save ecosystem services through sales (McAfee 1999) is widely known for its potential to recruit and maintain high levels of hedge funds. For example, the United Nations' Reduced Emissions from Deforestation and Forest Degradation (REDD +) program has proposed raising hundreds of millions of dollars through the PES program to reduce emissions from forests.

2.2 Empirical Review

2.2.1 Role of NRM in Economic Development

Natural resources are an important source of national wealth around the world, and they hold a key factor for human development and sustainability. Humans have always depended on biological resources to provide life's necessities and amenities: food, fuel, shelter, medicine, recreation, spiritual instruction, solace, and aesthetic pleasure. People make decisions about how to use the natural resources in their environment in the context of their values (Gylfason & Zoega, 2001). Natural resources support the foundation of humans' activities. There is a huge amount of natural resource consumption as a matter of routine without much cognizance of depleting natural resources and the future negative impact. Over the past decades of industrial activity, the countries have acted to protect their interests by investing in and securing their supplies of natural resources that support economic growth (George, Schillebeeckx, & Liak, 2018). In addition, the interaction of several factors has limited the capability of agriculture and has threatened natural resources. As a result, the urban population and consumers are growing, the pressure on natural resources is increasing, and limited public support is available to natural resource management. Factors such as deforestation, land degradation, and water scarcity, especially due to human activities, have adversely affected the productivity of all agricultural and natural ecosystems. Natural resources degradation may also increase the vulnerability of rural households, which may, in turn, increase their overpressure on natural resources. Therefore, sustainable agriculture and Natural Resource Management (NRM) through multi-paradigmatic approaches can be utilized to

better understand and manage these complexities, which involve and link different paradigms of social actors or their knowledge. This systemic linkage depends on the willingness of these stakeholders (Kaswamila, n.d.). It is increasingly recognized that the management of natural resources can contribute significantly to poverty reduction and human welfare (World Bank, 2003).

The role of natural resources in contributing to economic growth and development has been controversial in recent literature. Findings on the negative impact of resource abundance on development dynamics question the idea of resource-based development. As Auty points out, "since the 1960s, resource-rich developing countries have performed worse than resource-deprived economies" (Auty, 1998). The economic explanation for the poor performance of many resource-rich countries explores the root of the problem as an inherent characteristic of the resource sector. Due to the low elasticity of global demand, assuming that resource-based activities are inferior to manufacturing leads to a deterioration in the long-term trend of relative prices, lack of technical strength, and its vulnerability to the boom-bust cycle. Political explanations for low performance will be the source of the problem that is positioned on the inherent characteristics of resource wealth. This characteristic generates sufficient income, thereby reducing the motivation to promote internal development. In addition, government actors participate in rent-seeking and avoid accountability pressure when the national budget is based on resource export revenue rather than internal taxation. Contrary to the numerous examples of the developing countries with economic resources, some of the 4,444 wealthiest countries globally, such as Australia, Canada, Finland, Sweden, and the United States, have

developed and used mineral industries as their platform. For broader industrial development (Wright and Czelusta, 2002), this means that the abundance of resources and wealth does not necessarily harm economic development. Therefore, the answer to why some countries with resources perform well while others do not have to be embedded in the random variable between resource endowments and economic performance.

There is a close relationship between the environment and poverty reduction. Since the Rio Earth Summit in 1992, the importance of a healthy environment for sustainable livelihoods has been widely recognized, especially among the rural poor in Africa, Asia, and Latin America (UN, 1992). Although the number of people directly dependent on natural resources has decreased over the past two decades, millions of rural poor remain directly dependent on natural resources (DFID et al. 2002). For example, the current estimates indicate that up to 1 billion people are affected by erosion and land degradation due to deforestation. The lack of firewood costs poor households time and money. More and more women and children have to travel long distances to find firewood (DFID et al., 2002). In some African countries, women-headed households are particularly disadvantaged because they do not have access to productive resources or because they are denied ownership of resources such as land (Sola, 2001). The 2005 Millennium Ecosystem Assessment results confirm that the burden of environmental degradation affects the poor and that continued degradation will increase the number of poor people (MEA, 2004).

NRM combines economics, ecology, and the social sciences to obtain "values" or environmental attributes of specific natural sites; different interpretations of the term "value" continue to confuse. There have been valuable critiques of how "value" approaches have been used in the NRM domain and some of the challenges (Reser & Bentrupperbäumer 2005). In business operation, the changing business environment and increased competition have compelled many businesses to follow accepted norms and standards, which include general business regulations and social norms and standards in environmental protection (Habek and Wolniak 2015). Businesses have adopted various voluntary environmental management initiatives all around the world since the mid-1990s. Implementing the International Organization for Standardization (ISO) 14001 standard (He et al. 2015; Habek 2014) produced by ISO, a non-governmental organization based in Geneva, Switzerland, is one of the most significant practices. The ISO 14000 series of standards was developed in response to a need identified during the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. The main goal of the new set of criteria was to encourage businesses to enhance environmental quality in a methodical way (Bansal and Bogner 2002). Overall, ISO 14001 compliance allows businesses to identify and control their environmental impacts, continuously improve their environmental performance, and follow a systematic approach to achieving environmental goals (McGuire 2014). Environmental scientists, conservationists, social scientists, and environmental philosophers have created environmental value typologies to better understand society's meanings and values on natural resources. Values toward natural resources, for example, have been studied using

notions that deal with people's ties to locations (Preston, 2003).

The goal of biodiversity conservation is to protect people and other species (Mascia et al., 2003). Environmental economics, for example, can help conservation biologists and policymakers understand why species are endangered, the opportunity costs of protecting them, and the economic incentives for conservation (Shogren et al. 1999). According to scientists, economic criteria should be included in the design and implementation of conservation strategies (MEA 2005), and many institutional programs, such as the Convention on Biological Diversity (CBD) or the Natural Resource Management program, also recognize the necessity of understanding the economic value of biodiversity for conservation policymaking.

Forest biological diversity is a broad term that refers to all life forms found within forested areas and the ecological roles they perform. As such, forest biological diversity encompasses not just trees but also the multitude of plants, animals, and microorganisms that inhabit forest areas and their associated genetic diversity**.** Forests provide habitats for 80 percent of amphibian species, 75 percent of bird species, and 68 percent of mammals. About 60 percent of all vascular plants are found in tropical forests (Vié, Hilton-Taylor, & Stuart, 2009). Forests and trees develop landscapes and protect ecosystems and production systems. Forest genetic resources can be defined as the heritable materials important to ensure the continued productivity, services, adaptation, and evolutionary processes of forests and trees. Besides enabling improved wood production, adequate use and management of forest genetic resources can enhance the production of fruits, nuts, vegetables, and other food products from trees and shrubs managed in

the forest or agricultural lands. These products contribute to the food intake of people in rural and urban areas. Along with the increasing urban populations, there is a growing demand for food products from trees and shrubs over time. Therefore, efforts in breeding and domestication need to be adequately supported to improve the quality and quantity of production and ensure sustainable management of the forest resources better. Conservation and sustainable management of forest genetic resources are critically important for enhancing the production of food derived from forest plants, including woody species (Resources & Equation, n.d.). Extractive industries (e.g., mining, fishing, and forestry) directly impact the natural environment.

Consequently, there is a pressing need for companies engaged in these sectors to incorporate socially and environmentally responsible practices into their core business strategies. Adopting CR practices in the forestry sector legitimizes forest companies by demonstrating their commitment to sustainability. It also minimizes the risks of public criticism, a lack of transparency, and a loss of market share in some markets (Jenkins and Smith 1999). Forests have always provided many services to humanity, from cultural and religious significance to a wide range of economic and environmental services. More recently, increasing societal expectations regarding the use of forest resources and the growing trend towards consolidation and globalization of the forest industry have been powerful drivers of corporate responsibility in the forestry sector (Panwar et al., 2006). Corporate responsibility is a constantly evolving concept that implies a necessary adaptation process for businesses. The practices toward a more outstanding balance among environmental, social, and economic responsibilities(Vidal & Kozak, 2008). The

current notion that environmental protection is interconnected with social well-being and economic development was introduced as a guiding principle for society as a whole in the early 1990s and began to be adapted to the private sector during the mid-1990s (Loew et al., 2004). Like sustainability, current CR practices are often categorized into three dimensions of responsibility: economic, social, and environmental. As these dimensions coincide with most proposed definitions of sustainability, CR has therefore been viewed as a tool to implement sustainable practices into business activities (Karna et al., 2003). The forestry sector has made some strides towards more responsible practices, but there is still room for improvement. Sharma and Henriques (2005) found that forest companies have gone beyond the initial requirements of sustainability performance (i.e., pollution control and eco-efficiency), but still have barely begun to make fundamental changes in their business models. Brearton et al. (2005) studied Canadian companies according to their CR performance. The forestry sector received an average rating, which means that the sector has generally demonstrated progress, but CR work is incomplete. The highest scores in the forest industry were obtained in the corporate governance area, followed by the environment. The lowest scores were in the areas of community and society. Problems that still need to be addressed include consultation at the community level, emissions from pulp mills and manufacturing operations, and the lack of policies, programs, or systems to address human rights in operations in developing countries (Brearton et al., 2005).

From ancient times, fishing has been a major food source for humanity and a provider of employment and economic benefits. Globally, most people involved in small-scale

fisheries and related activities are from developing countries (Allison & Ellis 2001). With massive numbers of people's livelihoods relying on fisheries, the importance of sustainable small-scale fisheries should be recognized (Pauly 1997; Allison 2001). Today, commercial fishing continues as a major economic sector in many countries. In addition to the large worldwide value of the catch, approximately 36 million people (15 million full-time, and 13 million part-time, and 8 million occasional) are employed in capture and cultural fisheries(Lackey, 2005). Approximately 80–90 million people, most of them in developing countries, depend on fish for their main daily source of protein(De Young, Charles, & Hjort, 2009). Therefore, it is important that fishing grounds maintain their productivity in the presence of major disturbances caused by intense stresses and large changes (Conway 1985). More recently, economic objectives have increased in importance, at least in some countries, with maximum economic yield being a key management objective. Economists are increasingly playing a direct role in fisheries management and policy formulation (Dichmont et al., 2010). The increasing adoption of ecologically sustainable development (ESD) principles for fisheries management globally has required consideration of the natural, economic, and social environment in which fishing is undertaken (Chesson et al., 1999; Garcia and Cochrane, 2005; Liu et al., 2005). ESD requires integrated management of social development, economic growth, and environmental protection. For that reason, to achieve this, national plans need to include goals and objectives for each of the components to guide national rules, regulations, and laws to achieve them (Jabareen, 2008).

Agriculture and natural resources are observed to be not only the circumstances of food

production, but they are the main resources of small-scale rural livelihoods. National resources are observed as natural capitals of rural households and communities' livelihoods in Sustainable Rural Livelihood (Christo Fabricius, 2013). Despite the importance, the interaction of several factors has limited the capability of agriculture and has threatened natural resources. As a result, the urban population and consumers are growing, so the pressure on natural resources increases and limited public support is available to natural resource management. Factors such as deforestation, land degradation, and water scarcity significantly resulting from human activities have adversely affected the productivity of all agricultural and natural ecosystems (Karamidehkordi, 2012). NRM in agriculture refers to human administration and sustainable consumption of biophysical resources to produce food, feed, fiber, and fuel. Production in this sense entailed direct husbandry, including such activities as aquaculture and planted forests, but did not include hunting, fishing, and gathering of uncultivated species. Natural resources of interest include all those affected by the production process (e.g., soil, water, biodiversity, fish, and forests). Crop production is the resultant effect of interaction between different natural resources such as soil, water, weather, and external inputs like seed fertilizer, energy, management, etc. (A. K. Singh, Singh, & Roy, 2009). Degradation of natural resources has actual economic, social, and human costs with substantial impacts on national economies. It also directly threatens the long-term growth of agricultural productivity, food security, and quality of life, particularly in developing countries. Investments in agricultural research have resulted in dramatic increases in food production generated from higher-yielding crop varieties with improved

resistance to pests and diseases, mainly in areas of high agricultural potential in developing countries. Therefore, well-managed natural resources provide the basis for maintaining and improving livelihoods, improving quality of life, and contributing to sustainable growth(Freeman, Shiferaw, & Swinton, 2009) .

Promoting sustainable agricultural production is critical to improving soil quality while reducing erosion, Stalinization, and other forms of degradation to achieve greater resilience to drought, better fertilizer efficiency, and reduced greenhouse gas emissions. It minimizes pesticides and herbicides by applying integrated pest management, crop rotation, and crop diversification and employing environmental management systems to ensure proper treatment of solid waste, manure, and waste water. Moreover, ensuring the safe storage, application, and disposal of agricultural chemicals and maintaining habitats to support wildlife and conserve biodiversity. For that reason, there is a need to develop agricultural techniques that are ecologically sound, economically viable, and socially responsible. Activities should focus on environmental sustainability across agricultural supply chains and multi-use landscapes. Sustainable agriculture in the context of development helps achieve production efficiency, protect ecosystem functions, enhance resilience to climate change, ensure healthy communities, and satisfy basic needs (V. K. Singh, 2016). Well-managed natural resources generate flows of benefits that provide the basis for maintaining and improving livelihoods, improving quality of life, and contributing to sustainable growth. Agricultural production worldwide mostly depends on the soil, providing the most important source of livelihood for most rural people in the developing world. Water is essential for sustaining human populations and, indeed, all

species. It is also a key input in agricultural and industrial production and processing and an important sink for discharging waste. Fish are a vital biological resource that accounts for 20% of animal-derived protein consumption in low-income countries (Shiferaw et al., 2005).

South Asia is home to nearly 1.74 billion people in 2015 and is projected to grow to 2.04 billion in 2030 and 2.29 billion in 2050 (United Nations, 2019). Despite the decline in population growth, an additional 300 million people will be added to the region by 2030, posing a serious challenge to achieving the Sustainable Development Goals (SDGs). In South Asia, nearly 22% of the world's population resides, and out of that population, more than 50% are engaged in agriculture (UNESCAP, 2016). Agriculture is the major source of livelihood for about 70% of rural people in the developing countries of Asia and Africa (Mashnik et al., 2017). An estimated 1.4 billion people live and work in the vast, diverse, and risk-prone rainfed areas in the south, where their farming operations cannot benefit much from mainstream agricultural technologies. Their systems are usually located in heterogeneous environments too marginal for intensive agriculture and remote from markets and institutions.

Additionally, about 60%–80% of agricultural lands in these areas belong to the dry land system, which faces several challenges such as degradation, water scarcity, and poor agricultural productivity (de Araujo et al., 2021). Likewise, to benefit the vulnerable people more directly, an NRM approach must focus on poverty reduction, food security and self-reliance; ecological management of productive resources; empowerment of rural communities; and establishment of supportive policies. Moreover, the NRM strategy

should also emphasize improving whole farming systems at the field or watershed level rather than the yield of specific commodities (Altieri, 2002). The role of agriculture in structural transformation has been demonstrated in many Asian countries through the green revolution, which began in the 1960s and spread rapidly throughout the 1970s and 1980s, especially in densely populated and irrigated areas. In recent decades, the unprecedented fall in global poverty in Asia reflects a large contribution from this successful agricultural transformation (Chen & Ravallion, 2004). Also, it is argued that sustainable agriculture requires the better preservation of natural resources. There have been debates about how to define and measure sustainable agricultural systems. It is widely agreed that there are different dimensions of sustainability ranging from the biophysical dimensions to economic and social dimensions. The biophysical dimensions of sustainability relate to the long-term maintenance or enhancement of the productive capacity of the resource base, and economic and social dimensions relate to the long-term economic viability of farming and rural communities (Byerlee & Murgai, 2001).

The State of the World's Biodiversity for Food and Agriculture (FAO, 2019) provides a global assessment of the state of all components of biodiversity of relevance to food and agriculture (crop and livestock production, forestry, fisheries, and aquaculture). It complements the global assessments of the genetic resources of forest, plants (crops), animals (livestock), and aquatic species (farmed species and their wild relatives within national jurisdiction). Consequently, the combination of poverty elimination and biodiversity conservation goals has been approached in various ways. By the start of the 21st century, a remarkable international agreement on the urgency of global poverty

elimination had made the relation between biodiversity conservation and poverty reduction an important element of debate about conservation policy. Likewise, the relationship between conservation and development cannot be ignored and protected are management has a fundamental role in sustainable development. To enhance the sustainable use of natural resources and involve the communities in the management process, conservation projects can achieve better results and higher conservation impact in the long term (Adams et al., 2004).

PA tourism has been promoted to facilitate linkages between biodiversity conservation and community livelihood (Mbaiwa, 2008; Sebele, 2010; Strickland-Murnro, Allison, & Moore, 2010), based on the idea that conservation and development can be accomplished at the same time (Mbaiwa, 2008; Sebele, 2010; Strickland-Murnro, Allison, & Moore, 2010). Despite the potential significance of tourism in developing linkages, the research shows that PAs frequently fail to generate positive links with local communities, as communities were evicted from their locality to make way for PAs and subsequently host tourism attractions aimed at outsiders (Brockington, Duffy, & Igoe, 2008). Initiating PAs for the protection of animals and the enjoyment of foreigners has been viewed as an alien concept that is not supported by residents (Strickland-Munro & Moore, 2013). There is a growing recognition that, if PAs are to remain feasible in the future, local communities must be given a greater role in their management, and their livelihood issues must be sufficiently addressed (Hughes, 2013). Due to the fast growth in wildlife and nature-based tourism, several nations see PA tourism as a significant foundation of revenues while local communities view it as a prospect to improve their livelihood conditions

(Mustika, Birtles, Everingham, & Marsh, 2013). The sustainability of PAs is widely acknowledged as dependent on due attendance to their social, economic, and cultural context through interventions such as integrated conservation and development programs (ICDP). The ICDP intervention was a response to the establishment of PAs, particularly in developing countries where the needs of local people were ignored and marginalized, and they were denied access to resources, leading to a widespread lack of community support for conservation. ICDP aims to reconcile the management of PAs with social and economic needs (Ghimire, 1994; Sanderson, 2005; Wells & Brandon, 1992).

The World Wide Fund for Nature (WWF) first proposed the concept of ICDP in the mid-1980s to accommodate both conservation and development; these are practice-oriented and target developing countries (Barrett et al. 1995). The concept of the INRM approach was introduced as adaptive management for forestry, fisheries, and wildlife conservation and management, which is frequently linked with ecotourism (Ochola et al. 2013); these are analysis-oriented and target more developed countries with strong local community participation and involvement (Pilien & Walpole, 2003). Both approaches aim to balance economic development and natural resource conservation. ICDP is a common approach to linking social development and conservation goals (Hughes & Flintan, 2001), and it has become very popular, and millions of dollars have been spent on funding ICD projects by International organizations. The conservation parties began to recognize the ethical rights of people living close to protected areas as they are the ones paying the price of conservation because their livelihoods depend on natural resources (Brandon & Wells, 1992). ICD projects aim to address conservation and rural development objectives with

a win-win strategy. However, there are very limited reports available to show whether these objectives have been met, and it lacks an evidence base that makes it difficult for policymakers and practitioners to target funds for ICD projects proven to be successful (Brandon & Wells, 1992).

Moreover, livelihood development is one of the ICD approaches that have an actual relationship with natural resource management. According to Anani (1999), the sustainable rural livelihoods framework is the most recent development strategy to analyze the linkage between livelihoods and natural resource use which has been widely discussed in recent years. Livelihoods are defined as the assets, activities, and access determining the living gained by individuals or households. Three broad livelihood strategies have been discussed: intensification or extensification of existing productive activity; diversification by adopting additional productive activities; and migration to develop productive activity elsewhere. It is important to note that these are not exclusive and may be combined in practice. Further, the three broad strategies include those not based on natural resource use as well as those that use natural resources and allow an exploration of the interplay between them. Two important issues in analyzing the role of particular assets in livelihood strategies are those of sequencing and substitution(Woodhouse, Howlett, & Rigby, 2000).

2.2.2 Effects and Natural Resource Management Approaches

Protected Area management and CBNRM are the most common strategies for natural resource management. Conservation benefit, social equity, and economic return are the components of triple-bottom-line conservation outcomes that are frequently used to

assess the performance of conservation efforts (Halpern et al., 2013). However, the feasibility of producing such triple-bottom-line solutions and the potential interactions and tradeoffs among the three components have yet to be shown. Halpern et al. (2013) also discovered that achieving efficient conservation outcomes can be hampered by social equity. However, they stressed the importance of more research into how the relationship between social equity and conservation success influences these trade-offs, particularly in light of the many different types of equity. Outcome equity refers to the distribution of costs and benefits of the outcome of the conservation intervention (e.g., a protected area plan) to different socio-economic groups and across space. For example, a protected area plan can disproportionately impact different socioeconomic groups, such as industry sectors (Adams et al., 2010). Nature and natural goods are made important to local community members who rely on them for their livelihoods through CBNRM programs, which incorporate them into sources of economic return. This is done to prevent community members from viewing CBNRM activities as a way to reclaim their rights and control over natural resource accessibility to secure their livelihoods (Dressler et al., 2010). Garland (2008) offers an insightful critique of CBNRM initiatives in Africa, arguing that wildlife conservation on the continent has evolved into a productive process aimed at extracting value from the African ecosystem, which then transforms into capital with the ability to generate additional value for the global community. According to certain studies, CBNRM tactics have been utilized to legitimize stakeholders' goals. Local communities are rarely, if ever, included among these stakeholders. Instead, rent-seeking state officials, international environmentalists, and multinational tourist firms profit from

wildlife conservation and other natural resources (Homewood, 2004; Swatuk, 2005; Hausser, 2011). However, CBNRM projects have been praised for their goals of providing economic and social benefits to local populations living in protected area buffer zones. According to Benjaminsen and Bryceson (2012), the introduction of CBNRM projects as a win-win strategy only served to allow conservation programs to gain traction in rural areas. Once these techniques are in place, it is easy to create favorable conditions for the continued eviction of community members from such valuable land (Noe & Kangalawe, 2015).

As a result of the experiences in Southern Zimbabwe, the Integrated Natural Resource Management (INRM) approach has evolved into a value-driven, community-based learning process in which local people and external service providers share ideas and learn together. The implemented strategies include 1) Strengthening the collective capacity of local communities, institutions, and collective action, 2) Improving local people's ability to adapt and produce new and relevant innovations by enabling them to learn through experimenting, combining their existing knowledge and practices with new ideas in an action learning mode. 3) Enhancing collective learning through action & social learning and sharing, 4) Negotiating the management of natural resources and related services, policies, etc., through stakeholder platforms of communities, service providers, and other key players. These INRM processes are guided by core outcomes, namely; the full ownership of the community to control over their resources, self-reliance of local communities, sharing and co-operation, inclusivity of all stakeholders, an equal partnership between farmers, and sustainable development through the negotiation of

interests among these relevant actors, and sustainable natural resource conservation (Hagmann, Chuma, Murwira, Connolly, & Ficarelli, 2002). CBNRM projects in Zanzibar, such as the establishment of Community Forests Management Areas (CoFMAs), are thought to be useful in terms of preserving forests while also providing alternative livelihood options to local populations. However, there is some evidence that this is not the case in actuality. CoFMAs are a type of conservation plan that is based on colonial policies and institutions (Garland, 2008). Furthermore, external actors have had a significant impact on the creation and implementation of CoFMAs (international NGOs, international funding organizations, and international conservationists). Furthermore, the state still holds significant control over the management and decision-making regarding conservation efforts in the isles. CBNRM activities should reflect local people's understanding of which natural resource concerns are significant in their local context. Nelson (2007) argues that the most successful community-based conservation programs have been those that have been tailored to the requirements of local communities. As a result, taking into account the social reality of local people is a requirement for successful conservation intervention.

CBNRM has been embraced throughout East and Southern Africa as a rural economic development and natural resource management strategy. After almost a decade of deployment in Botswana, particularly in the Okavango Delta, its success and long-term viability are still unknown (Mbaiwa, 2004). The notion of sustainable development is used to discuss the success and sustainability of CBNRM in the Okavango Delta. Three broad concerns underpin this concept: economic efficiency, social equality, and environmental

sustainability (WCED, 1987). Munasinghe and McNeely (1995) define economic efficiency as the most efficient use of natural resources. Within the restrictions of the current capital, the goal is to produce the maximum output to achieve a good standard of living for the people (Paehlke, 1999). As a result, economic efficiency should explain how economic gains are shared among CBNRM members and throughout the Okavango Delta tourism industry as a whole. According to social equality, all user groups should have equal access to resources. This aims to provide fairness in the distribution of expenses, benefits, decision-making, and management, which should, in theory, eliminate poverty (UNCED, 1992). CBNRM in the Okavango Delta has succeeded in income generation, creating jobs, and establishing local community institutions to ensure local participation in natural resource protection, tourism development, determining the economic value of natural resources. The high economic value put on natural resources, particularly wildlife, has resulted in positive attitudes toward natural resource conservation, particularly wildlife conservation. Although there have been socioeconomic, political, and conservation benefits achieved through the implementation of CBNRM, the program's sustainability remains in doubt. The successful implementation of CBNRM in the Okavango Delta requires skills for all stakeholders in the CBNRM process. These abilities include participatory planning, a tourism commercial enterprise and marketing, entrepreneurship and managerial skills, etc. Communities should be in charge of community mobilization and organizing, which should be guided by their aims and ideas. As a result, communities should feel full ownership of their CBNRM project operations, rather than believing that the government, a non-governmental organization, or the private sector should be in

charge. The sustainability of CBNRM should in this case make rural communities have a sense of ownership of the natural resources (Mbaiwa, 2004).

In the South Asian region, Nepal is a leader in community-based natural resource management. Natural resource management projects require public engagement, according to government policy. The participatory approach has empowered local people to make active decisions and responsibilities at the local level in natural resource management. It has supported the integration of vast rural communities into the development process. It also empowered women to exercise their rights and obligations by actively engaging in community development. The establishment and execution of forest policies and initiatives based on community-based decentralization have altered the natural resource management and community mobilization landscape in rural areas. The livelihoods of upland impoverished communities and cooperation among national and local organizations and different users of watershed resources appear to be urgently needed. The current policies and programs aim to empower rural underprivileged groups, notably women and poor communities. Local people are the primary leaders of natural resources. They should be encouraged to undertake responsibility in a participatory, integrated, and long-term manner(Tiwari, Bajracharya, & Sitaula, 2009).

Sustainable Forest Management (SFM) is recognized in Southeast Asia. Since the late 1980s, there has been a marked increase in the number of instruments available to achieve SFM. The implementation of SFM tools is becoming more common at all levels of the government level, as part of forestry legislation, and the level of forest management units. Despite decades of efforts to enhance forest management in Southeast Asia, there

is still a long way to implement sustainable forest management (SFM) across a substantial portion of the region's productive forests. Continued rapid forest loss from the timber estate suggests that Southeast Asian governments no longer see forestry in natural forests as a major source of revenue. The majority of the easily accessible timber has been harvested, and many timber concessions are currently in their second or third logging cycle. Output forestry in natural forests is increasingly being valued over more intensive production in fast-growing plantations (FAO, 2006). The key to the success of SFM in Southeast Asia is continued support for the several positive developments discussed here. Nongovernmental organizations (NGOs) play an increasingly essential role in advancing the SFM implementation. While some NGOs continue to oppose any economic exploitation of forests, many others actively support the timber industry and improve management. In collaboration with research organizations, NGOs should continue to contribute technical expertise to the development of more specific codes of practice and improved tools for monitoring SFM implementation and the implementation of objective monitoring programs themselves. In addition, NGOs also play an essential role in raising demand for sustainably managed timber products, directly influencing markets or pushing governments to regulate the import of unsustainable timber products (Dennis, Meijaard, Nasi, & Gustafsson, 2008).

Coastal communities benefit from various ecosystem services and benefits, including the availability of protein-rich food sources, economic benefits from tourism and commercial fishing, and socio-cultural benefits from recreational possibilities and open space. These services are used to sustain local economies and the health and well-being of coastal

communities, both directly and indirectly (Costanza et al., 1997; Fleming et al., 2015). However, demand for these marine ecosystem services is growing, as is the awareness that much of the maritime environment is deteriorating (Costanza et al., 2014; Steffen et al., 2015). Many conservation management approaches, particularly in poor and middle-income countries, have addressed the dual need to support environmental conservation and human well-being (Coulthard et al., 2011). Although intentional interventions to sustainably manage marine and coastal resources have become more widespread in recent years (Botsford et al., 2009), the amount of evidence on their success in conservation and human well-being has lacked documentation (Woodhouse et al., 2015). Nature conservation is widely thought to be compatible with sustainable development is a win-win situation (Bennett et al., 2015). Understanding which marine conservation and resource management measures have influenced environmental and human well-being outcomes in SE Asian environments. Global reviews of Marine Protected Area (MPA) (Ban et al., 2019) and fisheries management (Evans et al., 2011) impacts suggest a regional concentration of marine conservation and resource management interventions in Southeast Asia, necessitating a focus on the available evidence across a variety of interventions in this region. Until recently, the extent of the evidence on the success of nature conservation or natural resource management in both conservation and human well-being sectors has lacked documentation (Eales et al., 2021).

CBNRM initiatives in Cambodia typically intend to protect water, fisheries, forestry, ecosystem goods, and services. Specific types of community-based organizations (CBOs) include community fisheries (CFi) to conservation fish stocks and breeding grounds,

community forestry (CF) for forest protection and restoration, farmer water user communities (FWUCs) for the operation and management of irrigation schemes, and community-based ecotourism (CBET) for the protection of ecosystem services such as forests and wildlife. Many challenges to the successful implementation of CBNRM have developed since its beginning, hindering CBO operations. The common problems identified in many CBNRM projects include a lack of cooperation among diverse stakeholders with different interests (Shackleton 2002; Diepart 2015); lagging registration of community lands owing to the awarding of economic land concessions; ineffective application and enforcement of environmental policies and laws; and the capacity building needs of grassroots stakeholders (Learning Institute 2009). As a result, effective natural resource management is critical for improving rural livelihood security. According to the previous studies, here are a few successes of the CBNRM implementation.

Tmatboey Community-based Eco-tourism (CBET): The primary roles of the community are to manage the tourism site, generate revenue from tourism, and raise funds from donors, report illegal activities to the authorities, participate in law enforcement. The CBET incorporated many institutions and stakeholders for the development of this ecotourism. The private sector also played a crucial role in tourism advertising and booking. Indirectly involved organizations include the Wildlife Conservation Society, which works to support both the Forestry Administration and Ministry of the Environment in managing the sanctuary, and the protected area authorities responsible for enforcing land rights and the tourism agreement (UNDP 2012). In addition, people in the area participate

in three key conservation activities: conserving ibis nesting resin trees, reporting and monitoring endangered species, and farming rice in compliance with conservation rules. The tree owners receive a yearly payment of USD10-13 in exchange for protecting ibis nests. Likewise meanwhile, Forest resource collectors receive an annual payment of roughly USD7 in exchange for not selling endangered species' eggs instead of reporting and monitoring nests until the eggs hatch. Ecotourism revenue provides the funds to pay them. Rice farmers who want to sell their rice under the "Ibis Rice" brand must follow conservation guidelines, including the local land use plan and no-hunting laws. They can then achieve a better price for their rice by joining a marketing association that includes a village marketing network and Sansom Mlup Prey's help (UNDP 2012; SMP 2015). Additionally, women regarded as particularly vulnerable can earn money by selling things, hosting guests, or cooking (UNDP 2012). Another crucial part is sharing local knowledge. Finally, the initiative has established a community-to-community paradigm for knowledge exchange, which has resulted in the development of ecotourism trainers and trust and support.

Phlov Touk and Rolus farmer water user communities (FWUCs): According to Sam et al. (2015) and Nang et al. (2014), Phlov Touk and Rolus projects were developed with support from NGOs and the provincial government. The communities share similarities in irrigation service fee collection, self-sufficiency, and private-sector engagement. Irrigation service fees (ISF) can be collected by both FWUC committees, albeit fee collection in Roluos appeared to be slightly lower than in Phlov Touk. The involvement of the private sector in water services has benefited both initiatives. It is highly effective so far. Because

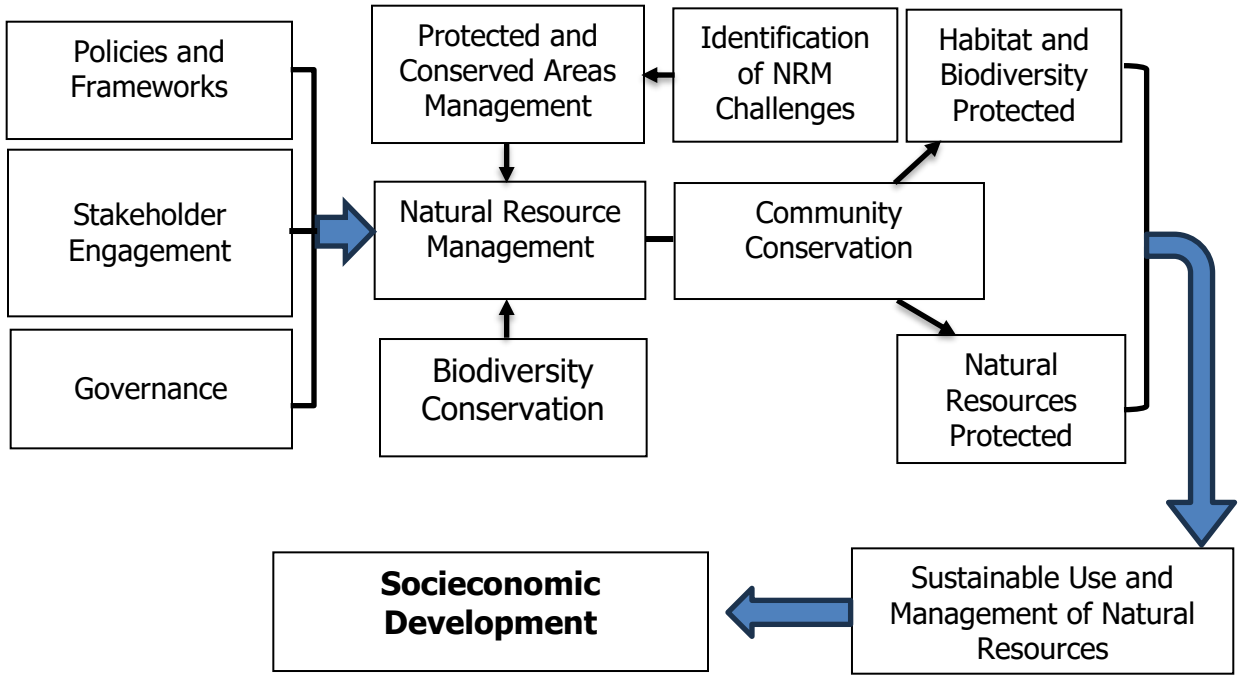
it lacks adequate pump capacity to meet irrigation needs, Roluos FWUC has enlisted the help of two private companies. The companies constructed a canal and erected a water pump after receiving approval from the provincial government. People had to start paying for the service, even though they already paid for water from their FWUC, albeit at a lower rate. Plov Touk FWUC contracts pumping companies to reduce the committee's workload, with good results. The provincial government and departments play a key role in mediating upstream-downstream conflicts within FWUCs. Some provide technical and financial support for operation and maintenance. However, schemes like Plov Touk that can collect enough ISF can afford to pay for their own O&M, alleviating the pressure on provincial water resources and meteorology departments. The success of Plov Touk FWUC is perhaps the most interesting. Market access and clear leadership are the two factors that stand out. Farmers are motivated and excited about cultivating rice and producing surpluses because of the easy access to markets over the border in Vietnam. They seek agricultural practices from Vietnam and other countries on their own, with no help from the Provincial Department of Agriculture. They also understand the significance of ISF and O&M in maintaining the water supply. According to the FWUC committee, leadership is essential because a charismatic leader can better attract support and govern the community. However, one requirement must be present for the leader to be motivated, and that condition is the benefit. The leader will continue to perform effectively as long as he or she sees a reward. The Roluos plan demonstrates how important motivation is for effective water management, and O&M. Farmers manage water carefully to avoid losing a drop since they must pay the ISF. Some people purchase water from

private water firms due to limited scheme capacity. They are active in this matter because they can grow two rice crops a year and thus boost their average income. In addition, every member is required to participate in their FWUCs. Contributing to O&M, paying ISF, providing feedback to the committee, and reporting any rule violations are all examples of acceptable behavior. The ISF collects transparently, with budget reports provided among all members, albeit some members may not be aware of this, and the members believe that the reporting is still unclear.

WWF-Cambodia and Fisheries Administration of the Ministry of Agriculture Forestry and Fisheries and other stakeholders have been trying to protect the Mekong River Dolphin in Cambodia. The conservation activities include awareness outreach and education, alternative livelihood development and eco-tourism, dolphin population research and monitoring, and law enforcement (Limsong, Chhith, Ath, & Thomas, 2017). The Irrawaddy dolphin is found around the coasts of the tropical and subtropical Indian and West Pacific oceans, where muddy brackish water in river mouths and freshwater is found. This species can be found in three river systems: the Mahakam in Indonesia, the Ayeyarwady in Myanmar, and the Mekong River in Cambodia and the southern portion of Lao PDR; they can also be found in two inland freshwater lakes, Songkla in Thailand and Chilika in India (Beasley, 2009). The Irrawaddy dolphin in the Mekong River was listed as "Critically Endangered" on the IUCN Red List in 2004 (Smith & Beasley, 2004), and was listed as one of the 58 threatened species under the Cambodian Government's sub-decree on "Determination of Types of Fisheries and Endangered Fisheries Product" in 2009. It is also an Appendix I species under the CITES (Convention on International Trade in

Endangered Species of Wild Fauna and Flora). As a result of the conservation efforts, the dolphin population was increased from 80 individuals in 2015 to 92 individuals in 2017, which was the first-ever increase of the Mekong River Dolphin population. In 2020, WWF-Cambodia and FiA released another technical report. The population of the Irrawaddy dolphin in the Mekong River was estimated at 89 individuals, with a 95% confidence interval of 78-102, which concluded that the population is stabilized (Eam et al., 2020).

2.3 Conceptual Framework



The conceptual framework for Natural Resource Management (NRM) underscores the necessity of an integrated approach that connects various components to foster sustainable resource use and conservation. At its core, this framework highlights the importance of collaboration among policies, governance, and stakeholder engagement,

recognizing that effective NRM cannot be achieved in isolation.

Policies and frameworks are vital, providing a structured approach to sustainability and responsible resource management. Government strategies, guidelines, and relevant laws establish clear objectives and regulate activities, facilitating cooperation among stakeholders such as governments, communities, and industries. These regulations are designed to tackle challenges like overexploitation, habitat degradation, and climate change. Additionally, they promote the integration of scientific research and traditional knowledge, which is essential for developing adaptive management strategies that can respond to evolving environmental conditions.

Effective governance is the backbone of successful NRM, establishing the policies and frameworks that guide management practices. Strong governance structures foster transparency, accountability, and inclusivity, ensuring that diverse stakeholder voices—from local communities to governmental bodies and NGOs—are acknowledged and valued. This inclusivity is crucial; when stakeholders feel engaged in decision-making, they are more likely to support and comply with management strategies, enhancing the effectiveness of conservation efforts.

Stakeholder engagement is highlighted as a key theme, where fostering collaboration and open communication allows NRM to benefit from the local knowledge and insights stakeholders offer. This enhances the legitimacy of management decisions and strengthens community commitment to conservation. Economic incentives play a central role; when communities experience tangible benefits from sustainable practices—such as

through eco-tourism or responsible agriculture—they are more inclined to invest in and support these initiatives, creating a positive feedback loop that reinforces effective conservation.

Protected and conserved area management focuses on the strategic stewardship of designated regions, such as national parks and wildlife reserves, to preserve biodiversity and ecosystems. This management was developed based on the identified challenges, and it involves legal frameworks, policies, and community engagement to set clear objectives and regulations. Key strategies include habitat restoration, species protection, and sustainable tourism, alongside ongoing monitoring and adaptive management to address challenges like climate change. The ultimate aim is to balance ecological integrity with the socio-economic needs of local communities, ensuring that these vital resources are preserved for future generations.

Ecosystem-based management (EBM) is another cornerstone of this framework, acknowledging the complexity and interconnectivity of natural systems. This perspective is essential for maintaining ecological integrity, which supports habitat protection and biodiversity. Understanding these interdependencies allows management practices to adapt and remain resilient in the face of challenges like climate change.

The ultimate goal of this conceptual framework is to enhance the protection of habitats and biodiversity. By effectively managing protected and conserved areas, NRM strategies can help preserve vital ecosystems and species, benefiting both the environment and the communities that depend on these resources for their livelihoods. The framework also

emphasizes economic benefits, as they are pivotal in motivating sustainable practices. Responsible management of natural resources can yield significant financial returns for communities, improving livelihoods and fostering a sense of ownership and stewardship. When individuals recognize that their economic well-being is linked to the health of their environment, they are more likely to embrace sustainable practices and advocate for conservation.

In summary, the conceptual framework for Natural Resource Management illustrates the multifaceted nature of managing natural resources. By weaving together governance, stakeholder engagement, economic benefits, and ecosystem health, it provides a comprehensive roadmap for fostering sustainable practices. This holistic perspective is essential for addressing the complex challenges ahead in natural resource management, ultimately aiming to protect our planet's invaluable resources for future generations while enhancing economic development.

2.4 Conclusion

CBNRM is one of the integrated natural resources management (INRM) approaches, and it is the most popular conservation method that is used worldwide it is a conservation strategy that involves multi-stakeholders to participate in NRM. Moreover, CBNRM focuses on the collective management of ecosystems to promote human well-being and aims to decentralize authority for ecosystem management to the local community level CBNRM programs, policies, and projects combine government decentralization, devolution of

common pool resource responsibility to local communities, and community participation to produce local-level solutions based on community ideas.

Biodiversity protection necessitates the establishment of protected areas. They are the cornerstones of nearly all national and international conservation programs, set aside to sustain functioning natural ecosystems, operate as refuges for species, and maintain ecological processes that would otherwise perish in the most intensively managed landscapes and seascapes. Today, they are frequently the only hope we have of preventing the extinction of many threatened or endemic species. PA management is guided by the IUCN protected area guideline that clearly addresses PA management categories that used to categorize protected areas based on their management objectives. International organizations like as the United Nations and many national governments recognize the categories as the global standard for designating and recording protected areas, and they are rapidly being adopted into official legislation

References:

Adams, W. M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., … Wolmer, W. (2004). *Biodiversity conservation and the eradication of poverty. Science, 306(5699), 1146–1149. https://doi.org/10.1126/science.1097920*

Allison, E. H. & Ellis, F. (2001). *The livelihoods approach and management of small-scale fisheries. Marine Policy, 25 (5): 377-388.*

Agrawal, A., & Ostrom, E. (2001). Collective actions, property rights, and decentralization in resource use in India and Nepal. *Political Sociology, 29(4), 485–514*.

Allison, E. H. (2001). *Big laws, small catches: Global ocean governance and the fisheries crisis. Journal of International Development, 13 (7): 933-950.*

Adams, W.M. and Hulme, D. (2001). *If community conservation is the answer in Africa, what is the question? Oryx. 35(3), pp.193-200.*

Adams V, Pressey R, and Naidoo R. (2010). *Opportunity costs: Who pays for conservation? Biol Conserv 143: 439–48.*

Agrawal, A., & Gibson, C. C. (1999). *Enchantment and disenchantment: The role of community in natural resource conservation. World Development, 27(4), 629–649.*

Aguirre, A.A., Ostfeld, R.S., Tabor, G.M., House, C. and Pearl, M.C. (Eds.) (2002). *Conservation medicine: ecological health in practice. Oxford. Oxford University Press. Allen, T., Murray, K.A., Zambrana-Torrelio.*

Anderson, Jon, and Shreya Mehta. 2013. *A Global Assessment of Community Based Natural Resource Management: Addressing the Critical Challenges of the Rural Sector. New York: USAID.*

Armitage, D. (2005). *Adaptive Capacity and Community-Based Natural Resource Management. Environmental Management. 35(6), pp.703-715.*

Ashley, C., & LaFranchi, C. (1997). *Livelihood strategies of rural households in Caprivi: implications for conservancies and natural resource management: Directorate of Environmental Affairs, Ministry of Environment and Tourism Windhoek, Namibia.*

Auty, Richard M. (1998). *Resource Abundance and Economic Development. Improving the Performance of Research-Rich Countries. Helsinki: UNU World Institute for Development Economics Research.*

Altieri, M. A. (2002). *Miguel A. Altieri ∗. 1971, 1–24.*

Amaral, G., Bushee, J., Cordani, U. G., KAWASHITA, K., Reynolds, J. H., ALMEIDA, F. F. M. D. E., … Junho, M. do C. B. (2013). *Journal of Petrology, 369(1), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004*

Anani, K. (1999). *Sustainable governance of livelihoods in rural Africa: A place-based response to globalism in Africa. Development (Basingstoke), 42(2), 57–63. https://doi.org/10.1057/palgrave.development.1110037*

Balint, P. J., & Mashinya, J. (2006). *The decline of a model community-based conservation project: Governance,capacity, and devolution in Mahenye, Zimbabwe. Geoforum, 37(5), 805-815. http://dx.doi.org/10.1016/j.geoforum.2005.01.011*

Balint, P. J., & Mashinya, J. (2008). *Campfire during Zimbabwe's national crisis: Local impacts and broader implications for community-based wildlife management.*

Society and Natural Resources, 21(9), 783-796. http://dx.doi.org/10.1080/08941920701681961

Bansal, P., Bogner, W.C. (2002): Deciding on ISO 14001: *economics, institutions, and context. Long Range Plan. 35, 269–290*

Ban, N.C., Gurney, G.G., Marshall, N.A., Whitney, C.K., Mills, M., Gelcich, S., et al. (2019). *Well-being outcomes of marine protected areas. Nat. Sustain. 2 (6), 524.*

Barber, C. V., Miller, K. R., & Boness, M. (Eds.). (2004). *Chapter 3: Parks and people in a world of changes: Governance, participation and equity. In Securing protected areas in the face of global change. Issues and strategies. Gland, Switzerland: IUCN.*

Barrett, C.B., and Arcese, P. (1995). *"Are Integrated Conservation-Development Projects (ICDPs) Sustainable? On the Conservation of Large Mammals in Sub-Saharan Africa?" World Development, Vol. 23, No. 7, 1073-1084. https://doi.org/10.1016/0305-750X(95)00031-7.*

Ban, N. C., et al. (2019). A social-ecological approach to marine management: *The case of ecosystem-based management. Marine Policy, 100, 15–25.*

Beasley, I., Marsh, H., Jefferson, T. A., & Arnold, P. (2009). *Conserving Dolphins in the Mekong River. The Complex Challenge of Competing Interests. The Mekong, 363–387. https://doi.org/10.1016/B978-0-12-374026-7.00015-2*

Bohensky, E. & Lynam, T. (2005). *Evaluating responses in complex adaptive systems: insights on water management from the Southern African Millennium Ecosystem*

Assessment (SAfMA). Ecology Society, 10(1), 11. Available at: http://www. ecologyandsociety.org/vol10/iss1/art11/.

BREARTON, S., GROSS, R., and RANNEY, K. (2005). *Corporate social responsibility: 2nd annual ranking. Report on Business Magazine, 37-68.*

Berkes, F. (2004). *Rethinking community-based conservation. Conservation Biology. 18(3), pp.621-630.*

Berkes, F. (2007). *Community-based conservation in a globalized world. Proceedings of the National Academy of Sciences of the United States of America, 104(39), 15188–15193. https ://doi.org/10.1073/ pnas.07020 98104*

Bennett, N. (2015). *Win-win or trade-offs?: the study of conservation and development at local, national and global scales. In: Bennett, N., Roth, R. (Eds.), The conservation social sciences: what?, how? and why?: a report for conservation organizations, foundations, practitioners, agencies and researchers University of Victoria. Canada, Victoria, British Columbia, pp. 44–49.*

Benjaminsen. T., A. & Bryceson, I. (2012). *Conservation, green/blue grabbing and accumulation by dispossession in Tanzania. The Journal of Peasant Studies. 39(2): 335 – 355.*

Blaikie, P. (2006). *Is small really beautiful? Community-based natural resource management in Malawi and Botswana. World Development. 34(11), pp.1942-1957.*

Bluwstein, J., Moyo, F., & Kicheleri, R. (2016). *Austere conservation: Understanding conflicts over resource governance in Tanzanian wildlife management areas. Conservation and Society, 14(3), 218–231. https ://doi.org/10.4103/0972-4923.191156*

Bollig, M., Menestrey Schwieger, D. (2014). *Fragmentation, cooperation and power: institutional dynamics in natural resource governance in North-Western Namibia. Human Ecol. 42 (2), 167–181.*

Borrini-Feyerabend, G., M. Pimbert, M. T. Farvar, A. Kothari, Y. Renard. 2004. *Sharing Power. Learning-by doing in Co-Management of Natural Resources throughout the World. IIED AND IUCN.CEESP/CMWG, Cenesta, Tehran*

Botsford, L.W., Brumbaugh, D.R., Grimes, C., Kellner, J.B., Largier, J., O'Farrell, M.R., et al. (2009). *Connectivity, sustainability, and yield: bridging the gap between conventional fisheries management and marine protected areas. Rev. Fish Biol. Fish. 19 (1), 69–95*

Boyd, J. & Banzhaf, S. (2007). *What are ecosystem services? The need for standardized environmental accounting units. Ecological Economics 63, 616-626.*

Brehony, P., Bluwstein, J., Lund, J. F., & Tyrrell, P. (2018). *Bringing back complex socio-ecological realities to the study of CBNRM impacts: A response to Lee and Bond (2018). Journal of Mammalogy, 99(6), 1539–1542. https ://doi.org/10.1093/jmamm al/gyy118*

Brockington, D., Duffy, R., & Igoe, J. (2008). *Nature unbound: Conservation, capitalism and the future of protected areas. London: Earthscan.*

Brooks, J., Waylen K. A., Mulder, M. B. (2013): *Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioural, ecological, and economic outcomes. – Environmental Evidence 2:2*

Bromley, D. W., & Cernea, M. M. (1989). *The management of common property natural resources: Some conceptual and operational fallacies (Vol. 57). World Bank Publications.*

Bastmeijer, K., & Van Hengel, S. (2009). *The role of the protected area concept in protecting the world's largest natural reserve: Antarctica. Utrecht Law Review, 5(1), 61. https://doi.org/10.18352/ulr.95*

Bolund, P., & Hunhammar, S. (1999). *Ecosystem services in urban areas. Ecological Economics, 29(2), 293–301. https://doi.org/10.1016/S0921-8009(99)00013-0*

Brandon, K. E., & Wells, M. (1992). *Planning for people and parks: Design dilemmas. World Development, 20(4), 557–570. https://doi.org/10.1016/0305-750X(92)90044-V*

Byerlee, D., & Murgai, R. (2001). *Sense and sustainability revisited: The limits of total factor productivity measures of sustainable agricultural systems. Agricultural Economics, 26(3), 227–236. https://doi.org/10.1016/S0169-5150(00)00131-6*

Byers, B. A. (n.d.). *Understanding and Influencing Behaviors in Conservation and Natural Resources Management Understanding and Influencing Behaviors in Conservation and Natural Resources Management.*

Chesson, J., Clayton, H., Whitworth, B. (1999). *Evaluation of fisheries-management systems with respect to sustainable development. ICES J. Mar. Sci. 56, 980e984.*

Child, B. (2004). *Parks in Transition:"Biodiversity, Rural Development and the Bottom Line". London: Earthscan.*

Child, B. and M. Lyman (eds). (2005). *Natural resources as community assets. Sand County Foundation and The Aspen Institute, Madison, WI.*

CGIAR-INRM-Group (1999): *Integrated Natural Resource Management. The Bilderberg Consensus.* Summary Report of the INRM workshop held at Bilderberg, The Netherlands, 3-5 September 1999. *(http://www.inrm.cgiar.org)*

Cook, R., Karesh, W. and Osofsky, S. (2004). *One world, one health: building interdisciplinary bridges to health in a globalized world. Wildlife Conservation Society, Bronx, New York, USA*

http://www.oneworldonehealth.org/sept2004/owoh_sept04.html

Convention on Biological Diversity (2010). *Decision X/2, 'Strategic Plan for Biodiversity 2011–2020)'. Montreal: Convention on Biological Diversity.*

Convention on Biological Diversity (2020). *Update of the zero draft of the post-2020 global biodiversity framework. Montreal: Convention on Biological Diversity.*

Costanza R, d'Arge R, De Groot R, Farber S, Grasso M, Hannon B, Limburg K, Naeem S, O'Neill RV, Paruelo J, et al. 1997. *The value of the world's ecosystem services and natural capital. Nature. 387:253–260. doi:10.1038/387253a0*

Costanza, R., de Groot, R., Sutton, P., Van der Ploeg, S., Anderson, S.J., Kubiszewski, I., et al. (2014). *Changes in the global value of ecosystem services. Global Environ. Change 26, 152–158.*

Coulthard, S., Johnson, D., McGregor, J.A. (2011). *Poverty, sustainability and human wellbeing: a social wellbeing approach to the global fisheries crisis. Global Environ. Change 21 (2), 453–463.*

Craigie, I. D., Baillie, J. E. M., Balmford, A., Carbone, C., Collen, B., Green, R. E., & Hutton, J. M. (2010). *Large mammal population declines in Africa's protected areas. Biological Conservation, 143(9), 2221–2228. https ://doi.org/10.1016/j.biocon.2010.06.007*

Chen, S., & Ravallion, M. (2004). *How have the world's poorest fared since the early 1980s? World Bank Research Observer, 19(2), 141–169. https://doi.org/10.1093/wbro/lkh020*

Chettri, N., Gurung, J., Shakya, B., & Sharma, E. (2007). *The Landscape Approach in Biodiversity Conservation: A Regional Cooperation Framework for Implementation of the Convention on Biological Diversity in the Kangchenjunga Landscape. Framework, 40. Retrieved from http://lib.icimod.org/record/7871*

Conley, A., & Moote, M. A. (2003). *Evaluating Collaborative Natural Resource Management. 371–386. https://doi.org/10.1080/08941920390190032*

Daily, G. C., Alexander, S., Ehrlich, P. R., Goulder, L., Lubchenco, J., Matson, P., … Woodwell, G. (1997). *Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems, Issues in Ecology [Issues Ecol.], Vol. 1, No. 2, pp. 1-18. Ecology, 1(2), 1–18.*

De Young, C., Charles, A., & Hjort, A. (2009). *FISHERIES MANAGEMENT 2. The ecosystem approach to fisheries 2.2 The human dimension of the ecosystem*

approach to fisheries. In FAO. Technical Guidelines for Responsible Fisheries (Vol. 4). Retrieved from http://www.fao.org/docrep/012/i1146e/i1146e00.htm

Dearden, P., Bennett, M., & Johnston, J. (2005). *Trends in global protected area governance, 1992-2002. Environmental Management, 36(1), 89–100. https://doi.org/10.1007/s00267-004-0131-9*

Dennis, R. A., Meijaard, E., Nasi, R., & Gustafsson, L. (2008). *Biodiversity conservation in Southeast Asian timber concessions: A critical evaluation of policy mechanisms and guidelines. Ecology and Society, 13(1). https://doi.org/10.5751/ES-02427-130125*

Diepart, Jean-Christophe. (2015). *Learning for Resilience: Insights from Cambodia's Rural Communities. Phnom Penh: The Learning Institute.*

Drew, J. A. (2005). *Use of traditional ecological knowledge in marine conservation. Conservation Biology 19:1286–1293.*

Dressler, W., Bücher, B., Schoon, M., Brockington, D., Hayes, T., Kull, C. A., Mccarthy, J. & Shrestha, K. (2010). *From hope to crisis and back again? A critical history of the global CBNRM narrative. Environmental Conservation. 37(1): 5 – 15.*

Dudley N., Stolton S., Belokurov A., Krueger L., Lopoukhine N., MacKinnon K., Sandwith T. and Sekhran N. (Eds.) (2010). *Natural solutions: protected areas helping people cope with climate change. Gland, Switzerland; Washington DC & New York, USA: IUCN-WCPA, TNC, UNDP, WCS, The World Bank, WWF.*

Department For International Development, United Kingdom (DFID) Directorate General for Development, European Commission (EC) United Nations Development

Programme (UNDP). (2002). *Linking Poverty Reduction and Environmental Management Policy Challenges and Opportunities. The International Bank for Reconstruction and Development/ the World Bank, Washington, DC.*

Dichmont, C.M., Pascoe, S., Kompas, T., Punt, A.E., Deng, R. (2010). *On implementing maximum economic yield in commercial fisheries. Proc. Natl. Acad. Sci.107,16e21.*

Dinerstein, E., Olson, D., Joshi, A., Vynne, C., Burgess, N.D., Wikramanayake, E., Hahn, N., Palminteri, S., Hedao, P., Noss, R., Hansen, M., Locke, H., Ellis, E.C., Jones, B., Barber, C.V., Hayes, R., Kormos, C., Martin, V., Crist, E., Sechrest, W., Price, L., Baillie, J.E.M., Weeden, D., Suckling, K., Davis, C., Sizer, N., Moore, R., Thau, D., Birch, T., Potapov, P., Turubanova, S., Tyukavina, A., de Souza, N., Pintea, L., Brito, J.C., Llewellyn, O.A., Miller, A.G., Patzelt, A., Ghazanfar, S.A., Timberlake, J., Klöser, H., Shennan-Farpón, Y., Kindt, R., Lillesø, J.-P.B., van Breugel, P., Graudal, L., Voge, M., Al-Shammari, K.F., Saleem, M. (2017). *An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. BioScience 67, 534–545. doi:10.1093/biosci/bix014*

Engel, S., Pagiola, S., Wunder, S. (2008). *Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics, 65, 663-674.*

Evans, L., Cherrett, N., Pemsl, D. (2011). *Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. J. Environ. Manage. 92 (8), 1938–1949.*

Eales, J., Bethel, A., Fullam, J., Olmesdahl, S., Wulandari, P., & Garside, R. (2021). *What is the evidence documenting the effects of marine or coastal nature conservation or natural resource management activities on human well-being in South East Asia? A systematic map. Environment International, 151(January), 106397. https://doi.org/10.1016/j.envint.2021.106397*

Eam, S., Phay, S., Hang, S., Tan, S., Lor, K., Det, C., and Phorn, S. (2020). *The Monitoring of Irrawaddy Dolphin Population in the Mekong River: The Long-Term Population Monitoring based on Mark-Resight Models. FiA/WWF- Cambodia Technical Report.*

Fabricius, C, & Collins, S. (2007). *Community-based natural resource management : governing the commons. 2, 83–97. https://doi.org/10.2166/wp.2007.132*

Fabricius, Christo. (2013). *Rights Resources and Rural Development. In Rights Resources and Rural Development. https://doi.org/10.4324/9781849772433*

Freeman, H. A., Shiferaw, B., & Swinton, S. M. (2009). *Assessing the impacts of natural resource management interventions in agriculture: concepts, issues and challenges. Natural Resource Management in Agriculture: Methods for Assessing Economic and Environmental Impacts, 3–16. https://doi.org/10.1079/9780851998282.0003*

FAO & WRI. (2019). *The road to restoration: a guide to identifying priorities and indicators for monitoring forest and landscape restoration, by Kathleen Buckingham, Sabin Ray, Carolina Gallo Granizo, Lucas Toh, Fred Stolle, Faustine*

Zoveda, Katie Reytar, Rene Zamora, Peter Ndunda, Florence Landsberg, Marcelo Matsumoto & John Brandt. Washington, DC, USA.

Fabricius, C. (2004). *The fundamentals of community-based natural resource management. In Rights, Resources and Rural Development: Community-based Natural Resource Management in Southern Africa. Fabricius, C., Koch, E., Magome, H. & Turner, S. (eds). Earthscan, London, pp. 3–43.*

Halpern, B.S., Klein, C.J., Brown, C.J., et al. (2013). *Achieving the triple bottom line in the face of inherent tradeoffs among social equity, economic return and conservation. Proc Natl Acad Sci doi:10.107.*

Food and Agriculture Organization. (2006). *Global forest resources assessment 2005. Progress towards sustainable forest management. FAO Forest Paper 147. Food and Agricultural Organization, Rome, Italy. Available online at: http://www.fao.org/forestry/ site/fra2005/en/.*

Faust, C.L., McCallum, H.I., Bloomfield, L.S.P., Gottdenker, N., Gillespie, T.R., Torney, C.J., Dobson, A.P. and Plowright, R.K. (2018). *Pathogen spillover during land conversion. Ecology Letters, 21 (4): 461–483. doi:10.1111/ele.12904.*

Ferraro PJ, Kiss A. 2002. *Direct payments to conserve biodiversity. Science 298: 1718–1719.*

Folke, C., Jansson, A° ., Larsson, J., Costanza, R. (1997). *Ecosystem appropriation of cities. Ambio 26 (3), 167–172.*

Folke, C., T. Hahn, P. Olsson, and J. Norberg. (2005). *Adaptive governance of social-ecological systems. Annual Review of Environment and Resources 30:441–473.*

Fleming, L., Depledge, M., McDonough, N., White, M., Pahl, S., Austen, M., et al. (2015). *The oceans and human health. Oxford Research Encyclopedia of Environmental. Science.*

Garcia, S.M., Cochrane, K.L. (2005). *Ecosystem approach to fisheries: a review of implementation guidelines. ICES J. Mar. Sci. J. Conseil 62, 311e318.*

Garland, E. (2008). *The elephant in the room: Confronting the colonial character of wildlife conservation in Africa. African Studies Review. 51(3): 51 – 74.*

Getz, W. M., Fortmann, L., Cumming, D., Du Toit, J., Hilty, J., Martin, R., … Westphal, M. I. (1999). *Sustaining natural and human capital: Villagers and scientists. Science, 283(5409), 855–1856.*

Ghimire, K. (1994). *Parks and people: Livelihood issues in national parks management in Thailand and Madagascar. Development and Change, 25(1), 195_229.*

Grumbine, R. E. (1994). *What is ecosystem management? Conservation Biology 8:27–38.*

George, G., Schillebeeckx, S. J. D., & Liak, T. L. (2018). *The management of natural resources: An overview and research agenda. Managing Natural Resources: Organizational Strategy, Behaviour and Dynamics, 1–32. https://doi.org/10.4337/9781786435729.00009*

Gerdes, A. B. M., Alpers, G. W., & Pauli, P. (2008). *When spiders appear suddenly: Spider-phobic patients are distracted by task-irrelevant spiders. In Behaviour Research and Therapy (Vol. 46). https://doi.org/10.1016/j.brat.2007.10.010*

Gylfason, T., & Zoega, G. (2001). *Natural Resources and Economic Growth : The Role of Investment. (June), 7–15.*

Hagmann, J., Chuma, E., Murwira, K., Connolly, M., & Ficarelli, P. (2002). *Success factors in integrated natural resource management R&D: Lessons from practice. Ecology and Society, 5(2). https://doi.org/10.5751/es-00298-050229*

Hughes, R., & Flintan, F. (2001). *Integrating Conservation and Development Experience : a Review and Bibliography of the ICDP Literature. International Institute for Environment and Development, 3(3), 24 p. Retrieved from http://iodeweb1.vliz.be/odin/handle/1834/805?language=en*

Ha˛bek, P., Wolniak, R.: Assessing the quality of corporate social responsibility reports: the case of reporting practices in selected European Union member states. Qual. Quant. (2015). *doi:10.1007/s11135-014- 0155-z*

Hamilton, L.; McMillan, L. (2004) *Guidelines for Planning and Managing Mountain Protected Areas. Gland (Switzerland) and Cambridge (UK): IUCN*

He, W., Liu, Ch., Lu, J., Cao, J.: *Impacts of ISO 14001 adoption on firm performance: evidence from China. China Econ. Rev. 32, 43–56 (2015)*

Homewood, K. (2004). *Policy, environment and development in African rangelands. Environmental Science &Policy. 7: 125 – 143.*

Hughes, K. (2013). *Measuring the impact of viewing wildlife: Do positive intentions equate to longterm changes in conservation behaviour? Journal of Sustainable Tourism, 21(1), 42_59.*

Hulme, D., & Murphree, M. (2001). *African wildlife and livelihoods: the promise and performance of community conservation: James Currey Ltd.*

Igoe, J., & Croucher, B. (2007). *Conservation, commerce, and communities: the story of community-based wildlife management areas in Tanzania's northern tourist circuit. Conservation and Society, 5(4), 534.*

Ilyas, A., Arisaputra, M. I., Utami, D., Bakar, M., & Arifin, A. (2019). *Natural resource management for sustainable development in managing environmental permit. IOP Conference Series: Earth and Environmental Science, 343(1). https://doi.org/10.1088/1755-1315/343/1/012064*

IUCN/WCPA. (2019). *Guidelines for Recognising and Reporting Other Effective Area based Conservation Measures. Switzerland. IUCN.*

JENKINS, M. B. and SMITH, E. T. (1999). *The business of sustainable forestry – strategies for an industry in transition. Washington, DC: Island Press.*

Jabareen, Y. (2008). *A new conceptual framework for sustainable development. Environ. Dev. Sustain. 10, 179e192.*

Jack, B.K., Kousky, C., Sims, K. (2008). *Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. PNAS, 150 (28), 9465-9470.*

Jhala, Y. V., Qureshi, Q., Gopal, R., 2015. *The status of tigers in India 2014. New Delhi & Dehradun.*

Jones, M.A. (2009). *Trying to make sense of it all: Dealing with the complexities of community-based natural resource management. In: Mukamuri, B.B., et al. eds.*

Beyond Proprietorship: Murphree's Laws on Community-Based Natural Resource Management in Southern Africa. Harare, Zimbabwe: Weaver Press.

Karanth, K.K., Nichols, J.D., Karanth, K.U., Hines, J.E., Christensen, N.L. (2010). *The shrinking ark: patterns of large mammal extinctions in India. Proc. R. Soc. B Biol. Sci. 277, 1971–1979.*

Kärnä, J., Hansen, E., & Juslin, H. (2003). *Social responsibility in environmental marketing planning. European journal of marketing*

Kellert, S.R., Mehta, J.N., Ebbin, S.A. and Lichtenfeld, L.L. (2000). *Community natural resource management: Promise, rhetoric, and reality. Society & Natural Resources. 13(8), pp.705-715.*

Kapur, R. (n.d.). *Socio-Economic Development and Empowerment of Disadvantaged Groups.*

Karamidehkordi, E. (2012). *Sustainable Natural Resource Management, a Global Challenge of This Century. Sustainable Natural Resources Management, (January 2012). https://doi.org/10.5772/35035*

Kaswamila, A. (n.d.). *SUSTAINABLE NATURAL Edited by Abiud Kaswamila.*

Lackey, R. T. (2005). *Fisheries: History, Science, and Management. Water Encyclopedia, (December). https://doi.org/10.1002/047147844x.sw249*

Limsong, H. E. S., Chhith, M., Ath, S., & Thomas, P. (2017). *Report of the International Workshop on the Conservation of Irrawaddy Dolphins in the Mekong River 1 Ministry of Agriculture, Forestry and Fisheries (MAFF) Royal Government of Cambodia.*

Lockwood, M., Davidson, J., Curtis, A., Stratford, E., & Griffith, R. (2010). *Governance principles for natural resource management. Society and Natural Resources, 23(10), 986–1001. https://doi.org/10.1080/08941920802178214*

Lee, Ellen. (2000). *Cultural connections to the land- a Canadian example. IUCN Parks, 10(2), 3-12.*

Lee, D. E., & Bond, M. L. (2016). *Precision, accuracy, and costs of survey methods for giraffe Giraffa camelopardalis. Journal of Mammalogy, 97(3), 940–948. https ://doi.org/10.1093/jmamm al/gyw025*

Leverington, F., Costa, K. L., Courrau, J., Pavese, H., Nolte, C., Marr, M., … Hockings, M. (2010). *Management effectiveness evaluation in protected areas – a global study. The University of Queensland, Brisbane, Australia.*

Lindenmayer, D. B., & Likens, G. E. (2010). *The science and application of ecological monitoring. Biological Conservation, 143(6), 1317–1328. https ://doi.org/10.1016/j.biocon.2010.02.013*

Liu, W.H., Ou, C.H., Ting, K.H. (2005). *Sustainable coastal fishery development indicator system: a case of Gungliau, Taiwan. Mar. Policy 29, 199e210.*

Loew, T., Ankele, K., Braun, S., and Clausen, J. 2004. *Signifi cance of CSR debate for sustainability and the requirements for companies: summary. Munster, Berlin: Future e.V. and Institute for Ecological Economy Research GmbH (IÖW).*

Mascia,M. B., J. P. Brosius, T. A. Dobson, B. C. Forbes, L. Horowitz,M. A. McKean, and N. J. Turner. (2003). *Conservation and social sciences. Conservation Biology 17:649–650.*

Long, S. A. (2004). *Livelihoods and CBNRM in Namibia: the findings of the WILD Project: final technical report of the Wildlife Integration for Livelihood Diversification Project (WILD). Wildlife Integration for Livelihood Diversification Project.*

Maliszewska M., Matoo A. and van der Mensbrugghe D. (2020). *The potential impact of COVID-19 on GDP and trade: a preliminary assessment. Policy Research Working Paper 9211. Washington, DC, USA: World Bank Group.*

MacKinnon, K., Richardson, K. and MacKinnon, J. (2020). *Protected and other conserved areas: ensuring the future of forest biodiversity in a changing climate. The International Forestry Review 22 (SI): 93–103.*

McGuire, W. 2014). *The effect of ISO 14001 on environmental regulatory compliance in China. Ecol. Econ. 105, 254–264*

Magome, H. & Fabricius, C. (2004). *Reconciling biodiversity conservation with rural development: the Holy Grail of CBNRM, Rights, Resources and Rural Development: Community-based Natural Resource Management in Southern Africa. Fabricius, C., Koch, E., Magome, H. & Turner, S. (eds). Earthscan, London, pp. 93–114.*

Matiku, P. (2008). *Poverty and mortality indicators: Data for the poverty-conservation debate. Oryx, 42(1), 43_59.*

McAfee K. 1999. *Selling nature to save it? Biodiversity and green developmentalism. Environment and Planning D 17: 133–154.*

Mbaiwa, J. E. (2004). *The socio-economic benefits and challenges of a community-based safari hunting tourism in the Okavango Delta. Botswana. Journal of Tourism Studies, 15(2), 37-50.*

Mbaiwa, J.E. (2008). *Tourism development, rural livelihoods, and conservation in the Okavango Delta (An unpublished PhD dissertation). Texas A & M University, Texas.*

McKibbin W. and Fernando R. (2020). *The economic impact of COVID-19. In: R. Baldwin and B. Weder di Mauro (Eds), Economics in the time of COVID-19 (pp. 45–52). London, UK: Centre for Economic Policy Research.*

Measham, T.G. and Lumbasi, J.A. (2013). *Success Factors for Community-Based Natural Resource Management (CBNRM): Lessons from Kenya and Australia. Environmental Management. 52(3), pp.649-659.*

Meinzen-Dick, R. (2009). *Coordination in Natural Resources Management. In: J. Kirsten, A. Dorward, C. Poulton and R. Vink, ed., Institutional Economics Perspectives on African*

Millennium Ecosystem Assessment (2004). *Ecosystems and human well-being: synthesis. Island Press, Washington, D.C.*

Millenium Ecosystem Assessment (2005) Ecosystems and human well-being: *Synthesis Millennium Ecosystem Assessment. Island Press, Washington DC.*

Mitsch WJ, Gosselink JG. (2015). *Wetlands. 5th ed. Hoboken, NJ: John Wiley & Sons, Inc.*

Moll, G., Petit, J. (1994). *The urban ecosystem: putting nature back in the picture. Urban Forests Oct:Nov, 8–15.*

Munasinghe, M. and McNeely, J. (1995). *Key concepts and terminology of sustainable development. In: Munasinghe, M. and Shearer, W. (eds.), Defining and Measuring Sustainability: The Biological Foundations, The International Bank for Reconstruction and Development/The World Bank, Washington, 19-46.*

Mustika, P., Birtles, A., Everingham, Y., & Marsh, H. (2013). *The human dimensions of wildlife tourism in a developing country: Watching spinner dolphins at Lovina, Bali, Indonesia. Journal of Sustainable Tourism, 21(2), 229_251.*

Mbaiwa, J. E. (2004). *THE S UCCESS AND S USTAINABILITY OF C OMMUNITY -B ASED N ATURAL R ESOURCE M ANAGEMENT IN THE O KAVANGO D ELTA , B OTSWANA. 86, 44–53.*

Mehta, J. A. I. N., Ebbin, S. A., Lichtenfeld, L. L., H, N., & Sa, U. (2000). *Community Natural Resource Management : Promise , Rhetoric , and Reality. 705–715.*

Milupi, I. D., Somers, M. J., & Ferguson, W. (2017). *A review of community-based natural resource management*. Applied Ecology and Environmental *Research, 15(4), 1121–1143. https://doi.org/10.15666/aeer/1504_11211143*

Mitsch, W. J., Bernal, B., & Hernandez, M. E. (2015). *Ecosystem services of wetlands. International Journal of Biodiversity Science, Ecosystem Services and Management, 11(1), 1–4. https://doi.org/10.1080/21513732.2015.1006250*

Nang Phirun., Sam Sreymom, Ouch Chhuong. and Lonn Pichdara. (2014). *Adaptation Capacity of Rural People in the Main Agro-Ecological Zones in Cambodia. Working Paper Series No. 93. Phnom Penh: CDRI.*

Narain, S., Panwar, H.S., Gadgil, M., Thapar, V., Singh, S. (2005). *Joining the Dots: The Report 761 of the Tiger Task Force. New Delhi.*

Ndumeya, N. (2019). *Nature, conservation and conflict in Eastern Zimbabwe: Chirinda Forest, 1980–2000. Journal of Southern African Studies, 45(2), 253–271.*

Nelson, F., Nshala R. & Rodgers, W.A. (2007). *The evolution and reform of Tanzanian wildlife management. Conservation and Society. 5(2):232 – 261.*

Nelson, F. (2010). *Democratizing natural resource governance: Searching for institutional change. In F. Nelson (Ed.), Community rights, conservation and contested land (pp. 310–333). Abingdon, Oxon: Earthscan, IUCN.*

Newmark, W.D., Jenkins, C.N., Pimm, S.L., McNeally, P.B., Halley, J.M. (2017). *Targeted habitat restoration can reduce extinction rates in fragmented forests. Proc. Natl. Acad. Sci.114, 9635–9640.*

Naidoo, R., Weaver, L. C., Diggle, R. W., Matongo, G., Stuart-Hill, G., & Thouless, C. (2016). *Complementary benefits of tourism and hunting to communal conservancies in Namibia. Conservation Biology, 30(3), https ://doi.org/10.1111/cobi.12643*

Nkhata, B. A., Mosimane, A., Downsborough, L., Breen, C., & Roux, D. J. (2012). *A Typology of Benefit Sharing Arrangements for the Governance of Social-*

Ecological Systems in Developing Countries. Ecology and Society, 17(1), 17. http://dx.doi.org/10.5751/ES-04662-170117

Noe, C. & Kangalawe, R. Y. M. (2015). *Wildlife protection, community participation in conservation, and (dis) empowerment in Southern Tanzania. Conservation and Society. 13(3): 244- 253.*

Norris, K., Bailey, M. et al. (2011) *Chapter 4: Biodiversity in the Context of Ecosystem Services. In: The UK National Ecosystem Assessment Technical Report, UK National Ecosystem Assessment, UNEP-WCMC, Cambridge, UK.*

Nyaupane, G. P., & Poudel, S. (2011). *Linkages among biodiversity, livelihood, and tourism. Annals of Tourism Research, 38(4), 1344_1366.*

Ocampo-Peñuela, N., Jenkins, C.N., Vijay, V., Li, B.V., Pimm, S.L. (2016). *Incorporating explicit geospatial data shows more species at risk of extinction than the current Red List. Sci. Adv. 2, e1601367.*

Ochola, W.O., Sanginga, P.C. and Bekalo, I. (2013). *Managing Natural Resources for Development in Africa: A Resource Book. Univ. of Nairobi Press, Nairobi, Kenya.*

OECD. (2008). *Natural Resources and Pro-Poor Growth. Paris: Organisation for Economic Co-operation and Development (OECD).*

OECD. (2011). *Economic Significant of Natural Resources: Key points for reformers in Eastern Europe, Caucasus and Central Asia: Organisation for Economic Co-operation and Development (OECD).*

Ogutu, J. O., Kuloba, B., Piepho, H.-P., & Kanga, E. (2017). *Wildlife population dynamics in human-dominated landscapes under community- based*

conservation: The example of Nakuru wildlife conservancy, Kenya. PLoS ONE, 12(1), e0169730. https ://doi.org/10.1371/journ al.pone.0169730

Olsson, P., Folke, C., & Berkes, F. (2004). *Adaptive comanagement for building resilience in social ecological systems. Environmental Management, 34(1), 75-90. doi: 10.1007/s00267-003-0101-7*

Olsson, P., Folke, C. & Hahn, T. (2004). *Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. Ecology and Society, 9(4), 2.*

Paehlke, R. (1999): *Towards defining, measuring and achieving sustainability: tools and strategies for environmental valuation. In: Becker, E. and Jahn, T. (eds.), Sustainability and the Social Sciences, Zed Books, London.*

Pathak, Neema. (2006). *Community conserved areas in South Asia. IUCN Parks, 16(1), 56-62.*

Pimm, S. L., Jenkins, C. N., Li, B. V. (2018). *How to protect half of Earth to ensure it protects sufficient biodiversity. Sci. Adv. 4, eaat2616.*

Plowright, R.K., Parrish, C., McCallum, H., Hudson, P.J., Ko, A., Graham, A. and Loyd-Smith, J. (2017). *Pathways to zoonotic spillover. Nature Reviews Microbiology, 15(8): 502–510. doi:10.1038/nrmicro.2017.45*

Preston, S. M. (2003). *Landscape values and planning: the case of Ontario's Niagara escarpment. Ph.D. Dissertation. University of Waterloo, Ontario, Canada.*

Pretty, J. (2003). *Social Capital and the Collective Management of Resources. Science, 302(5652), pp.1912-1914.*

Pretty, J., and D. Smith. 2004. *Social capital in biodiversity conservation and management. Conservation Biology 18:631–638.*

Pauly, D. (1997). *Small-scale fisheries in the tropics: Marginality, marginalization, and some implications for fisheries management. Global Trends: Fisheries Management. American Fisheries Society Symposium. 40-49.*

Pretty, J. and Ward, H. (2001). *Social Capital and the Environment. World Development, 29(2), pp.209-227.*

Panwar, R., Rinne, T., Hansen, E., and Juslin, H. 2006. *Corporate responsibility. Forest Products Journal, 56(2), 4.*

Pascual, U., Phelps, J., Garmendia, E., Brown, K., Corbera, E., Martin, A., … Muradian, R. (2014). *Social equity matters in payments for ecosystem services. BioScience, 64(11), 1027–1036. https://doi.org/10.1093/biosci/biu146*

Pilien, J., & Walpole, P. (2003). *Moving from open access extraction to new participatory levels of accountable management Malampaya Sound, Palawan, the Philippines. Natural Resource Conflict Management Case Studies: An Analysis of Power, Participation and Protected Areas, 251–268.*

Rana, M. P., Sohel, M. S. I., Mukul, S. A., Chowdhury, M. S. H., Akhter, S., Koike, M. (2010): *Implications of ecotourism development in protected areas: a study from Rema Kalenga Wildlife Sanctuary, Bangladesh – iForest(3) : 23-29*

Reser, JP & Bentrupperbaumer, JM. (2005). `*What and where are environmental values? Assessing the impacts of current diversity of use of 'environmental' and*

'World Heritage' values', Journal of Environmental Psychology, vol. 25, pp. 125-146.

Ribot, Jesse C. (2002). *Democratic decentralization of natural resources: Institutionalizing popular participation. World Resources*

Roe, D. and Nelson, F. (2009). *The origins and evolution of community-based natural resource management in Africa. In: Roe, D., et al. eds. Community management of natural resources in Africa: Impacts, experiences and future directions. [Online]. London, UK: IIED. Available from: http://pubs.iied.org/pdfs/17503IIED.pdf*

RajuandThakuria. (2010). *Socio-economicaspectsofNRM (1).pdf. (n.d.).*

Resources, S. N., & Equation, N. (n.d.). *No Title.*

Science, S. (2011). *Socio-Economic Develop_Ment and Empowerment of Disadvantaged Groups. 220–244.*

Singh, A. K., Singh, V. K., & Roy, S. K. (2009). *Natural Resources Management : An Overview. (September 2009), 1–20.*

Singh, V. K. (2016). Natural Resources Management : *An Overview Natural Resources Management : An Overview. (October).*

Salafsky, N., Cauley, H., Balachander, G., Cordes, B., Parks, J., Margoluis, S., Bhatt, S., Encarnacion, C., Russell, D. & Margoluis, R. (2001). *A systematic test of an enterprise strategy for community-based biodiversity conservation. Conservation Biology, 15, 1585–1595.*

Salafsky, N., & Wollenberg, E. (2000). *Linking livelihoods and conservation: A conceptual framework and scale for assessing the integral of human needs and biodiversity. World Development, 28(8), 1421_1438.*

Salafsky, N., Salzer, D., Stattersfield, A. J., Hilton-Taylor, C., Neugarten, R., Butchart, S. H. M., … Wilkie, D. (2008). *A standard lexicon for biodiversity conservation: Unified classifications of threats and actions. Conservation Biology, 22, 897–911.*

Sala, E., Mayorga, J., Bradley, D., Cabral, R.B., Atwood, T.B., Auber, A., Cheung, W., Costello, C. et al. (2021). *Protecting the global ocean for biodiversity, food and climate. Nature 592: 397–402. https://doi.org/10.1038/s41586-021-03371-z*

Salerno, J., Borgerhoff Mulder, M., Grote, M. N., Ghiselli, M., & Packer, C. (2016). *Household livelihoods and conflict with wildlife in community- based conservation areas across northern Tanzania. Oryx, 50(4), 702–712. https ://doi.org/10.1017/s0030 60531 5000393*

Sam Sreymom with Ouch Chhuong. (2015). *Agricultural Technological Practices and Gaps for Climate Change Adaptation. CDRI Working Paper Series No. 100. Phnom Penh: CDRI.*

Singh, A. K., Singh, V. K., & Roy, S. K. (2009). *Natural Resources Management : An Overview. (September 2009), 1–20.*

Sanderson, E. W. et al. (2002). *The human footprint and the last of the wild. Bioscience 52, 891–904*

Sanderson, S. (2005). *Poverty and conservation: The new century's "peasant question". World Development, 33(2), 323_332.*

Scanlon, L. J., & Kull, C. A. (2009). *Untangling the links between wildlife benefits and community-based conservation at Torra Conservancy, Namibia. Development Southern Africa, 26(1), 75-93.http://dx.doi.org/10.1080/03768350802640107*

Sebele, L.S. (2010). *Community-based tourism ventures, benefits and challenges: Khama Rhino Sanctuary Trust, Central District, Botswana. Tourism Management, 31(1), 136_146.*

Secretariat of the CBD (2004) *Biodiversity Issues for Consideration in Planning, Establishment and Management of Protected Area Sites and Networks, CBD Technical Series No 15. Montreal: SCBD*

Secretariat of the Convention on Biological Diversity. (2008): *Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. – Technical Series (36).*

Shiferaw, B. and Freeman, H.A. (eds) (2003) *Methods for Assessing the Impacts of Natural Resource Management Research. A Summary of the Proceedings of an International Workshop, 6–7 December 2002, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India, 136 pp.*

Shogren, J. F., et al. 1999. *Why economics matters for endangered species protection. Conservation Biology 13:1257–1261.*

Silva, J. A., & Mosimane, A. W. (2012). *Conservation-Based Rural Development in Namibia: A Mixed Methods Assessment of Economic Benefits. The Journal of Environment & Development. http://dx.doi.org/10.1177/1070496512469193*

Stone, M.T., & Rogerson, C. (2011). *Community-based natural resource management and tourism: Nata Bird Sanctuary, Botswana. Tourism Review International, 15, 159_169.*

Strickland-Munro, J., Allison, H., & Moore, S. (2010). *Using resilience concepts to investigate the impacts of protected area tourism on communities. Annals of Tourism Research, 37(2), 499_519.*

Strickland-Munro, J., & Moore, S. (2013). *Indigenous involvement and benefits from tourism in protected areas: A study of Purnululu National Parkand Warmun Community, Australia. Journal of Sustainable Tourism, 12(1), 26_41.*

Swatuk, L. A. (2005). *From "project" to "context": Community based natural resource management in Botswana. Global Environmental Politics, 5(3), 95–124.*

Schuerholz, G., & Baldus, R. D. (2007). *Community based wildlife management in support of transfrontier conservation: the Selous-Niassa and Kawango Upper Zambezi challenges. Parks, Peace and Partnerships Conference 2007.*

Shackleton, Sheona, B. Campbell, E. Wollenberg and D. Edmunds. 2002. *Devolution andCommunity-based Natural Resource Management: Creating Space for Local People to Participate and Benefit? ODI Natural Resource Perspectives No. 76. London: ODI.*

SHARMA, S. and HENRIQUES, I. 2005. *Stakeholder influences on sustainability practices in the Canadian forest products industry. Strategic Management Journal, 26(2), 159.*

Schlager, E. and Ostrom, E. (1992). *Property-Rights Regimes and Natural Resources: A Conceptual Analysis. Land Economics, 68(3), p.249.*

SMP (Sansom Mlup Prey). 2015. *Ibis Rice Project. http://programs.wcs.org/smpcambodia/ About/Partnership-and-Funding.aspx.*

Stolton, S. & Dudley, N. (2010). *Arguments for Protected Areas: Multiple Benefits for Conservation and Us.*

Soeftestad, L. T. (ed.). (2006). *The Community-Based Natural Resource Management Network, Newsletter. Issues 1-25 (0nline) URL:http://www.cbnrm.net/index.html.*

Sola, L. (2001). *Impact of poverty on the environment in Southern Africa, Retrieved November 5, 2005, from http://www.sarpn.org.za.*

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., Ludwig, C. (2015). *The trajectory of the Anthropocene: the great acceleration. Anthropocene Rev. 2 (1), 81–98*

Talukdar, B.K., Emslie, R., Bist, S.S., Choudhury, A., Ellis, S., Bonal, S.B., Malakar, C.M., Talukdar, B.N., Barua, B.N. (2008). *Rhinoceros unicornis [WWW Document]. URLhttp://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19496A8928657.en. (accessed 7.20.18).*

Thakadu, O. (2005). *Success factors in community based natural resources management in northern Botswana: Lessons from practice. Paper presented at the Natural resources forum. http://dx.doi.org/10.1111/j.1477-8947.2005.00130.x*

Tittensor DP, et al. (2014). *A mid-term analysis of progress toward international biodiversity targets. Science 346:241–244.*

Turner, S. (2004). *A crisis in CBNRM? Affirming the commons in southern Africa. In: 10th IASCP Conference, Oaxaca.*

Twyman, C. (2000): *Participatory conservation? Community-based natural resource management in Botswana, The Geographical Journal, 166, 323-335.*

Thomas, L., & Middleton, J. (2003). *Guidelines for Management Planning of Protected Areas. In Guidelines for Management Planning of Protected Areas. https://doi.org/10.2305/iucn.ch.2003.pag.10.en*

Tiwari, K. R., Bajracharya, R. M., & Sitaula, B. K. (2009). *Natural Resource and Watershed Management in South Asia: A Comparative Evaluation with Special References to Nepal. Journal of Agriculture and Environment, 9, 72–89. https://doi.org/10.3126/aej.v9i0.2120*

UNCED. (1992). *United Nations Conference on Environment and Development Report, United Nations, New York.*

UNDP (United Nations Development Programme). (2012). *"Tmatboey Community Protected Area Committee, Cambodia." Equator Initiative Case Study Series. New York:UNDP UNEP–WCMC.(2014) World Database on Protected Areas http://www.wdpa.org.*

United States Agency for International Development (USAID) (Africa Bureau). (2009). *Chapter 2: Community-based natural resource management (CBNRM). In Environmental guidelines for small scale activities in Africa. Retrieved from*

Environmentally Sound Design and Management Capacity Building for Partners and Programs in Africa (ENCAP): http://www.encapafrica.org/EGSSAA/cbnrm.pdf

United Nations. (1992). *AGENDA 21. United Nations Conference on Environment and Development Rio de Janerio, Brazil, 3 to 14 June 1992.*

UN. (1997). Urban and Rural Areas 1996. *UN, New York United Nations publications (ST:ESA:SER.a:166), Sales No. E97.XIII.3, 1997.*

United Nations Environment Programme (2010) *Analysis of the assessment landscape for biodiversity and ecosystem service, Executive summary. Third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science- policy platform on biodiversity and ecosystem services. Busan, Republic of Korea, 7–11 June 2010.*

United Nations Environment Programme. (2000). *Decisions adopted by the conference of the parties to the Convention on Biological Diversity at its fifth meeting Nairobi, 15-26 May 2000 UNEP/CBD/COP/5/23 Annex III. Retrieved January 7th, 2006 from www.cbd.int/doc/meetings/cop/cop-05/official/cop-05-23-en.doc.*

UNEP-WCMC and IUCN. (2021). *Protected Planet: The World Database on Protected Areas (WDPA). On line, February 2021, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.*

Vidal, N. G., & Kozak, R. A. (2008). The recent evolution of corporate responsibility practices in the forestry sector. International Forestry Review, 10(1), 1–13. https://doi.org/10.1505/ifor.10.1.1

Vie, J.-C., Hilton-Taylor, C. & Stuart, S.N. eds. 2009. *Wildlife in a changing world: an*

analysis of the 2008 IUCN Red List of Threatened Species. Gland, Switzerland, IUCN.

Watson, J.E., Dudley, N., Segan, D.B. and Hockings, M. (2014). *The performance and potential of protected areas. Nature 515 (7525): 67–73.*

Walston, J., Stokes, E., Hedges, S., 2016*. The importance of Asia's protected areas for safeguarding commercially high value species, in: Joppa, L.N., Baillie, J.E.M., Robinson, J.G. (Eds.), Protected areas: Are They Safeguardng Biodiversity? Wiley-Blackwell, pp. 190–207.*

WCPA, I. (2012). The International Journal of Protected Areas and Conservation. *Parks*, *18*(1).

World Commission on Environment and Development, (WCED). (1987). *Our Common Future, Oxford University Press, London.*

Woodhouse, E., Homewood, K.M., Beauchamp, E., Clements, T., McCabe, J.T., Wilkie, D., et al., 2015. *Guiding principles for evaluating the impacts of conservation interventions on human well-being. Phil. Trans. R Soc. B. 370 (1681), 20150103.*

Woodhouse, P., Howlett, D., & Rigby, D. (2000). *Sustainability Indicators for Natural Resource Management & Policy A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods. Economic Policy, (January 2000), 1–39.*

Wells, M., & Brandon, K. (1992). *People and parks: Linking protected area management with local communities. Washington, DC: The World Bank.*

Western, D., Russell, S., & Cuthil, I. (2009). *The status of wildlife in protected areas compared to non-protected areas of Kenya. PLoS ONE, 4(7), e6140. https ://doi.org/10.1371/journ al.pone.0006140*

White, C., Halpern, B. S. & Kappel, C. V. (2012). *Ecosystem service tradeoff analysis reveals the value of marine spatial planning for multiple ocean uses. Proc. Natl Acad. Sci. USA 109, 4696–4701.*

Williams, D. R., & Patterson, M. E. (1996). *Environmental meaning and ecosystem management: Perspectives from environmental psychology and human geography. Society & Natural Resources, 9(5), 507-521.*

Woodley, S., Locke, H., Laffoley, D., MacKinnon, K., Sandwith, T. and Smart, J. (2019). *A review of evidence for area-based conservation targets for the post-2020 global biodiversity framework. PARKS 25(2): 31–46.*

World Bank. (2003). *The CGIAR at 31: an independent meta-evaluation of the CGIAR. Volume 1: overview report. Operations Evaluation Department. World Bank, Washington, D.C., USA.*

World Bank. (2006). *Where is the Wealth of Nations: Measuring Capital for the 21st Century. The World Bank. Washington, DC.*

Wright, Gavin, and Jesse Czelusta. (2002). *"Exorcising the Resource Curse: Minerals as a Knowledge Industry, Past and Present", Economics Working Paper, Stanford University. Retrieved from: http://www-econ.stanford.edu/faculty/workp/swp02008.pdf*

Yaffee, S. L. (1999). *Three faces of ecosystem management. Conservation Biology 13:713–725.*

Zanetell, B. A. and B. A. Knuth. (2004). *Participation Rhetoric or Community-Based Management Reality?: Influences on Willingness to Participate in a Venezuelan Freshwater Fishery. World Development 32:793-807.*

Zhou P., Yang X., Wang X., Hu B., Zhang W., Si H., Zhu Y., Li B., Huang C., Chen H., … Shi Z. (2020). *A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature, 579: 270–273. doi: 10.1038/s41586-020-2012-7.*

CHAPTER III
RESEARCH METHODOLOGY

This chapter covers research methodologies and procedures, including the type of analysis, type and source of data, sample size and sampling method, data collection and procedure, statistical tools, coverage of the study, and procedure of analyzing data. The study has used these research methodologies to address the objectives and hypotheses of the study.

3.1 Type of Analysis

The study has executed both quantitative and qualitative analysis. Both analyses have been carried out to analyze the effectiveness of the government departments and NGOs' interventions in natural resource conservation in Kratie and Stung Treng provinces and assess the effectiveness in the conservation and sustainability of natural resources. Moreover, analyses have been made to learn the effect of community conservation, sustainability, and socio-economic impact of NRM in the study areas.

3.2 Type and Source of Data

The study has relied on both primary and secondary data for analysis. The primary data have been collected through individual interviews with the provincial government and NGOs officials who actively involving in natural resource management in Kratie and Stung Treng provinces on their practices, knowledge, and involvement in natural resource management. Moreover, primary data have been collected from members of Community-Based Organizations (CBOs) and local authorities on socio-economic development, and

the effectiveness of conservation and sustainability of natural resources in the communities in the provinces. The relevant published and unpublished secondary data have been collected from national and international journals, books, reports, and resources of government and NGOs including development partners, and the Ministry of Interior.

3.3 Sample Size

The research has been conducted in Kratie and Stung Treng provinces, Cambodia (mostly along the Upper Mekong River in Cambodia). The key informants for this study were: officials of the Department of Agriculture, Forestry and Fisheries (PDAFF); Forestry Administration Cantonment (FAC) and Fisheries Administration Cantonment (FiAC), Provincial Department of Environment (PDoE); and the Provincial Department of Rural Development (PDRD); local and international NGOs actively operating in the provinces; commune and village chiefs; and the members of the Community-Based Organizations (CBOs), namely, Community Forestry (CF), Community Fisheries (CFi), Indigenous People Community, and Community-Based Eco-Tourism (CBET). The formula to calculate the sample size (Yamane, 1967) of the families in the study area is:

$$\mathbf{n = \frac{N}{1 + Ne^2} = \frac{3530}{1 + 3530 \times (0.05)^2} = 359 \text{ families}}$$

e = Margin of errors = 5% = 0.05

N = Total number of families

n = Sample number of families

3.4 Sampling Method

In total, there are 16 selected villages where the study has been confined. In the selected districts, communes and villages are under the concentration of natural resource management activities being implemented and supported by the government and national and international NGOs. The defined geographic areas for the study consist of high biodiversity hotspots which are critically important for the economy of the local communities and Cambodia as a whole. Kratie and Stung Treng are the richest provinces in natural resources, in northeastern Cambodia. The government of Cambodia has designated many conservation areas in both provinces, namely; Dolphin Conservation and Management Zones, the Mekong Fisheries Biodiversity Conservation and Management Area, Sambo and Prek Prasab Wildlife Sanctuaries, Ramsar Site, and other community forestry and fisheries areas. They are homes for critical biodiversity values such as the Mekong River dolphin, hog deer, eld's deer, bird species, forest, and fisheries biodiversity. In addition to these critical values, the landscape provides vital ecosystem services for the livelihood of local communities dependent on these aquatic and terrestrial biodiversities. There are approximately 50,000 local people, of which up to 10 percent belong to indigenous groups (Phnoung, Kuoy, and others) benefit from these critical ecosystem services. There are two districts are selected per province of Kratie and Stung Treng, and each district consists of two communes with a total of eight communes and two villages in each commune with a total of 16 villages in both Provinces. The reason for selecting these two provinces for the study is because they have similar ecosystem values and issues. A systematic random sampling method has been used to select the

families from the villages where NRM activities have been undertaken. The details of the total and sample number of community members to be surveyed in Kratie and Stung Treng provinces are as below:

Table 3.1: Total and Sample Numbers of Community Members in the Study Areas

Districts	Communes	Villages	Total # of Families	% to Total	Sample # of Families	Sampling Interval
Kratie Province						
1) Sambo	1-O Krasang	1-O Krasang Village	64	2	7	9
		2-Kampong Khboeung	157	4	16	10
	2-O Kork	3-Punchea	147	4	15	10
		4-O Kork	32	1	3	11
2) Chetr Borey	3-Thmey	5-Prasat Srot Sro Ngeh	551	16	56	10
		6-Thmey	388	11	39	10
	4-Sambok	7-Kampi	190	5	19	10
		8-Sambok	662	19	67	10
Stung Treng Province						
3) Siem Bok	5) Mreahs	9-Thboung Khla	362	10	37	10
		10-Koh Chrem	114	3	12	10
	6) Koh Salay	11-O Chrolang	85	2	9	9
		12-Phchul	172	5	17	10
4) Thala Borewath	7) Phrea Rumkel	13-Anlung Svay	220	6	22	10
		14-Koh Rongor	61	2	6	10
	8) O Svay	15-O Svay	211	6	21	10
		16-Koh Phnaov	114	3	12	10
Total samples			**3530**	**100**	**359**	10

Source: National Institute of Statistics, 2019 and Own Estimate.

Table 3.2: Types and Numbers of Officials Surveyed

No.	Officials	Kratie	Stung Treng	Total
1	Government officials in Kratie and Stung Treng (Provincial, District, Commune, and Village)	22	22	44
14	Non-Governmental Organizations-NGOs (Local and international)	4	4	8
Total Officials		**26**	**26**	**52**

Source: Own Estimate.

3.5 Data Collection Procedure

The primary and secondary data collection have been conducted as per the research questions, and a separate questionnaire for each category of the respondents was developed and used to collect primary data from the identified samples, while desk review for secondary data gathering has been made using the existing resources collected from different sources. Direct personal interviews were made with the managers of the NGOs, provincial deputy governors, district governors, commune chiefs, village chiefs, and members of the Community-Based Organizations in the selected communities in the two districts of Kratie, and two districts in Stung Treng Province.

3.6 Statistical Tools

Once, primary data are collected through the questionnaires, data processing and analysis have been done through Statistical Package for the Social Sciences (SPSS) and Microsoft Excel. Simple calculations such as tables, graphs, averages, and percentages are developed to analyze the data. To test the null hypothesis, the Chi-square (X^2) test is used. The formula is given below:

$$X^2 = \sum_{i=1}^{m} \sum_{j=1}^{n} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

d.f. = (r – 1) (c – 1)

Where, O_{ij} = Observed frequency in the i^{th} row and j^{th} column

E_{ij} = Expected frequency in the i^{th} row and j^{th} column

d.f. = Degrees of freedom

r = Number of rows

c = Number of columns

i = 1, 2, …, m (rows)

j = 1, 2, …, n (columns)

3.7 Reliability Test

To ensure the reliability of the research methodology in the study, a comprehensive approach was taken to assess the consistency and stability of the data collection procedures and instruments used. In the mixed methods approach involving both quantitative and qualitative analyses, Cronbach's alpha was utilized for the quantitative component to evaluate internal consistency, while measures like inter-coder reliability were considered for enhancing the credibility of qualitative findings. Data collection procedures were reviewed for standardization and uniformity, emphasizing consistent administration of surveys and interviews. Validation of the sample size calculation method (Yamane, 1967) ensured adequate representation of the population, while systematic random sampling methods were verified for selecting families from study villages.

Statistical tools such as SPSS and Excel were employed for data processing and analysis, aligning with research objectives and hypotheses. Detailed documentation of data collection procedures and transparent reporting throughout the research process contributed to enhancing the reliability and reproducibility of the study findings.

3.8 Coverage of the Study

The research has been confined mostly to the Upper Mekong River of Kratie and Stung Treng provinces in Cambodia, in which two districts of each province, two communes of each selected district, and two villages of each selected commune were surveyed. In total, 16 villages, eight communes, and four districts were covered in the study, and 359 community members were surveyed. Further, 52 officials (provincial government officials and NGOs, commune chiefs, village chiefs) were also be solicited in the study. The selected correspondence categories such as relevant identified provincial departments, provincial administrations, district administration, commune and village chiefs, and members of community-based organizations including community forestry, community fisheries, community-based eco-tourism, community-based enterprises, and indigenous communities in Kratie and Stung Treng Provinces. The research has solicited the views of only community members, commune and village chiefs, managers of local and international NGOs, and government officials involved in natural resource management in the areas of study.

3.9 Procedure of Analyzing Data

After the collection of relevant secondary and primary data, SPSS and Excel were used to process and analyze the data to learn the information including the percentage of

income, perception of communities on natural resource management, community participation in community conservation, and livelihoods of local communities. Necessary tables and figures were developed to demonstrate the analyzed data. Moreover, the statistical calculations including average and percentage were used to analyze and interpret the data.

References

National Institute of Statistics (2019). General Population Census of the Kingdom of Cambodia 2019. *Ministry of Planning Kingdom of Cambodia*, (June 2019), 1–50. Retrieved from http://www.nis.gov.kh/nis/Census2019/Provisional Population Census 2019_English_FINAL.pdf

Yamane, Taro (1967). Statistics: An Introductory Analysis, 2nd Ed., New York: Harper and Row.

CHAPTER IV

NATURAL RESOURCE MANAGEMENT APPROACHES IN THE STUDY AREA

The chapter mainly analyzed the general context of Cambodia and the study area on the status of biodiversity values, conservation areas as critical habitats including wildlife sanctuaries, community forestry, community fisheries, communal land titling, community protected areas, and other conservation zones that have been legally developed and legally registered by the government of Cambodia, with financial support from NGOs and development partners. It also illustrates the government policies and frameworks that support the protection and management of natural resources. The chapter specifically addresses the conservation approaches that the government of Cambodia, NGOs, and development partners have executed to promote sustainable conservation and management of natural resources.

4.1 General Context

Cambodia is located in Southeast Asia, spanning the Mekong River between Thailand and Vietnam. Cambodia's northeast border is with Laos, while its southern border is with the Gulf of Thailand. Cambodia has a total area of 181,035 km2 with a total population of 15,288,489 people (National Institute of Statistics, 2019). In northeastern Cambodia, the most significant areas of lowlands are the extensive flat sandstone plains and rolling terrain. These plains made up of Upper Mesozoic continental and marine deposits. Scattered flat-topped sandstone hills and rounded andesite or basalt hills break up the landscape. A wide alluvial plains surround Tonle Sap and the Mekong River, forming a

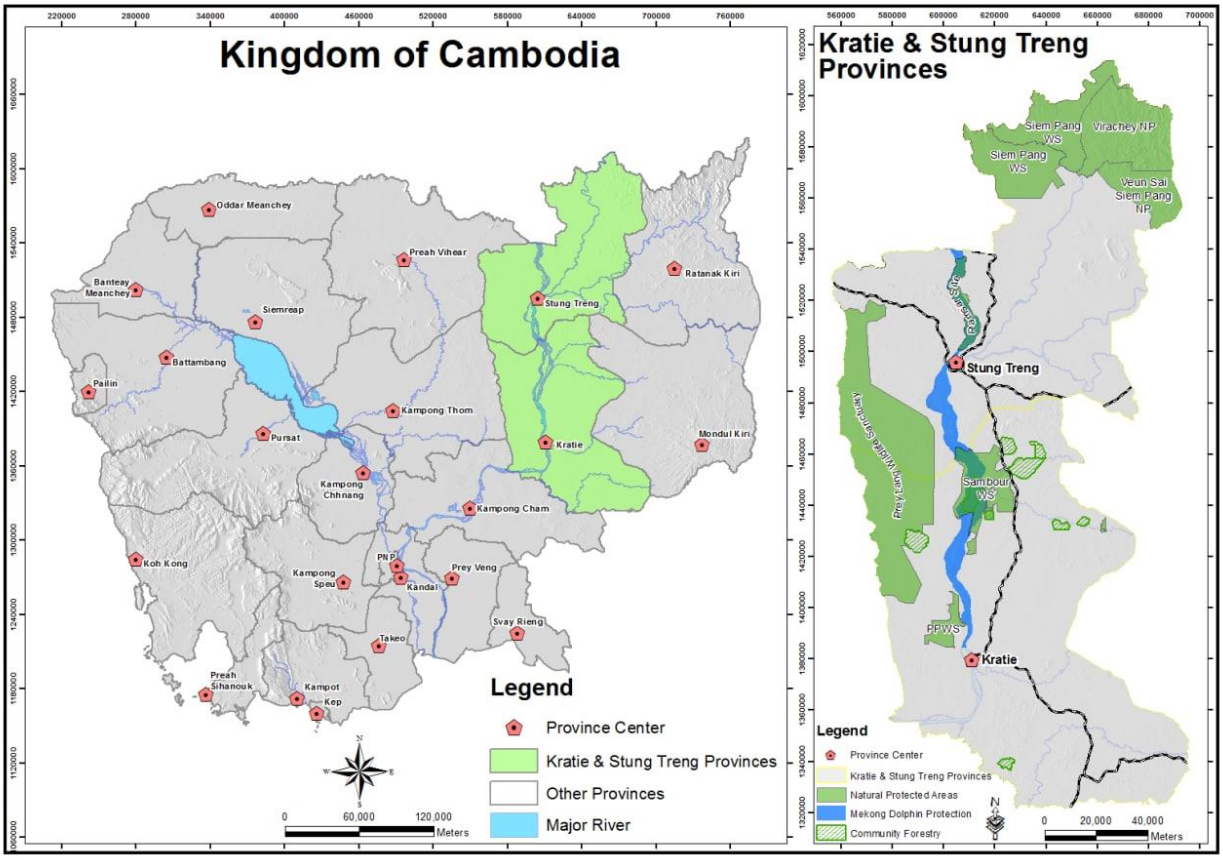
second physiographic unit with yearly floods and sediment deposition. The Battambang plain in western Cambodia, with its fertile soils, and the basaltic areas near Kompong Cham in eastern Cambodia are also the lowland areas. Together, these lowland regions cover more than 75 percent of Cambodia (National Biodiversity Status Report, 2016). The Mekong River runs through Cambodia from north to south, cutting the country in half. The Mekong runs southward through northeastern Cambodia until it is abruptly redirected westward by basalt rocks near Kompong Cham. One-quarter of the Mekong's flow originates in China's and Tibet's mountains.

In contrast, the other half originates in neighboring Laos, Thailand, and Vietnam. The Sekong, Sesan, and Srepok Rivers are Mekong tributaries that drain northeastern Cambodia and parts of Laos and Vietnam. Much of northern Cambodia is drained by the Stung Sen and Stung Chinit rivers, which feed into Tonle Sap. Tonle Sap has a total drainage basin area of 67,600 km2 (Pantulu 1986). Cambodia is part of the Indo Burma hotspot (Myers et al., 2000). It is home to four of the world's top ecoregions (Olson & Dinerstein, 1998). Because it has the greatest remaining examples of environments that once covered most Indochina and Thailand and still contain nearly entire species assemblages, albeit at greatly lower densities, the country is of global conservation importance (Loucks et al 2009). Freshwater fish species in Cambodia are diverse due to the variety of river, lake, and high estuary ecosystems that support a rich diversity, the true scope of which has only recently begun to be understood; additionally, geological changes in the ways rivers drain in Cambodia have helped to increase fish diversity by isolating and rejoining fish species (Rainboth 1996). Because most Cambodians live near

freshwater, the freshwater fishery has long been the most important source of protein. Freshwater fish are better understood than marine fish. Cambodia is a home for over 850 species of fish have been recorded (Ashwell, 1997), and more than a hundred species of terrestrial animals, which the IUCN (2000) classified 49 mammal taxa as Globally Threatened, Near-threatened, or Data Deficient.

Kratie and Stung Treng Provinces are located in northeastern Cambodia. The two provinces have similar geographical areas and socioeconomic statuses. Stung Treng Province shares the border with Loa PDR, while Kratie has a border with Vietnam. Kratie has 11,094 km^2 (National Institute of Statistics, 2019), with a total population of 429,908 (Kratie Provincial Administration, 2020). Stung Treng province comprises 11,092 km^2 with a total population of 159,565 (National Institute of Statistics, 2019). Kratie and Stung Treng are home of indigenous people, including Phnong, Kouy, Stieng, Mil, Kroal, Thmorn, and Khaonh. Kratie comprises 49,882 indigenous people, with 12 percent of the total population in the province (Kratie Provincial Administration, 2020). Stung Treng has 10,720 indigenous people, with seven percent of the total population in the province (Stung Treng Provincial Administration, 2019). The primary occupation of the people in the province is agriculture, including rice farming, long-crop, short-crop, vegetable, fishing, livestock, and None-Timber Forest Production (NTFP). The percentage of people in Kratie province having primary occupation as agriculture was 79.5 while Stung Treng province comprised 82.5 percent of the total population.

Figure 4.1: Map of Cambodia and Kratie and Stung Treng Provinces



The Upper Mekong River in Kratie and Stung Treng probvinces, Cambodia is a beautiful landscape for ecotourism, because it consists of diverse freshwater habitats, and riches hight values of the natural resources including flooded forest, terrestrial forest, islands, freshwater, birds, hog deer, eld deer, fish biodiversity and dolphins..etc. The government and NGOs have supported community-based ecotourism development by building capacity and improving ecotourism-related skills so that ecotourism services can be organized and managed in an efficient and quality manner, generating additional household incomes while also contributing to the sustainable management of natural resources in the Mekong (Dehaene, 2020). CBET is tourism where the tourist locations

are handled by the community. Tourist visits are frequently advertised and organized by private travel companies and government-protected regions in general tourism, with most revenues going to private companies and government entities. CBET, on the other hand, is managed and administered by the community, with local people making management decisions and earnings going directly to the community (Khanal & Babar, 2007). Ecotourism has grown in importance as a source of income for locals employed and trained to manage and provide ecotourism activities such as homestays, leading tourists to observe animals and local culture, transportation and food services, and other hospitality (Dehaene, 2020).

The government has officially developed the CBETs in Kratie and Stung Treng with financial support from NGOs and development partners. These CBETs, including 1) Preah Romkel CBET site: Located in Thalaborivat district, Stung Treng province. It is very close to the Lao border. The CBET site at Preah Rumkel was established in 2007. Preah Rumkel CBET was established in 2007. Preah Rumkel is a small village located alongside the Mekong River, featuring calm, beautiful spots for watching Irrawaddy dolphins, wildlife, birds, and a view of the flooded forests. In addition, visitors can try the famous sticky rice wine, which is only available at Preah Rumkel community. It is on the way to the great Mekong Falls, which leaves a big impression on every visitor (Ministry of Tourism, Cambodia - Official Website). 2) O'svay CBET site: Located in Stung Treng town and was established in 2007, it can be considered by its rich biodiversity starting from flooded forests, Mekong Islands, and river beaches to a variety of different bird species. Tourists can enjoy hiking through the flooded forests and getting to know the fish biodiversity and

culture of local people. 3) Koh Pdao CBET Site: Koh Pdao is well known for its still existing freshwater dolphins living in the Mekong River, and it is located in the island, Sambo district, Kratie province. Tourists can observe Irrawaddy dolphins while admiring the picturesque surroundings of the Mekong River, island, and flooded forest. Beautiful sunsets will convert the river into a golden banner in the late afternoon. Furthermore, tourists can assist communities by participating in constructing fish and frog ponds, building chicken and duck fences, farming, and more (Ministry of Tourism, Cambodia - Official Website). There are more CBETs in Kratie and Stung Treng that are under development.

4.2 Natural Resources and Conservation Areas in the Study Area

Kratie and Stung Treng Provinces have similar biodiversity values, for instance, wetlands, fisheries species, Irrawaddy dolphin, flooded and terrestrial forests, critical bird species, and other resources. Moreover, the conservation areas are geographically related, such as the Mekong River Dolphin's Managerial Projection Zones located along the Mekong River from Kratie to Stung Treng Provinces and the Cambodia-Lao PDR border. The Mekong Fisheries Biodiversity Conservation and Management Zone is located from Kratie to the border of Stung Treng province. The two areas have a characteristic landscape which is the Mekong River. With extensive "flooded forests" and freshwater wetlands, the Mekong river corridor is of global significance to both people and nature. In addition, there is a complex of freshwater ecosystems, including wetlands, sandy, and rocky riverine habitats. The benthic structure of the Mekong River is of extensive complexity, including several deep pools along the 180 km stretch of the Mekong within the Kratie

and Stung Treng provinces. This unique habitat hosts one of the world's most diverse and prolific freshwater ecosystems (WWF-Cambodia 2020). Current estimates of the biota in the areas include 411 inland fish species, 37 species of mammals, 281 species of birds, 52 species of reptiles and amphibians, and 674 vascular plants. Fish: globally threatened mega fish species (Bodyweight > 30kg) found in this section of the Mekong include Mekong giant catfish, Giant barb, Isok barb, Giant salmon carp, the Mekong giant stingray, and mammals which is the critically endangered Irrawaddy dolphin. Moreover, Kratie and Stung provinces consist of terrestrial forest areas designated by the government as community forestry, community protected areas, wildlife sanctuaries, and the Mekong host rare populations of hog deer and Eld's deer. Birds, including giant ibis, White-shouldered Ibis, red vulture, lesser adjutant, river tern, lesser fish eagle, grey-headed eagle, and Reptiles Amphibians, which is Cantor's giant softshell turtle (Timmins & Seng, 2007).

4.2.1 The Mekong River Dolphin's Managerial Protection Zones

The Government of Cambodia issued the sub-degree on creating the Mekong River Dolphin's Managerial Projection Zones on 25 September 2012. The Sub-Decree aims to protect and conserve the Critically Endangered Mekong River Dolphins by reducing the mortality rate to the minimum level. Also, to keep the Mekong River dolphin ecotourism development conducted by local communities without negatively impacting dolphin population

sustainability for rural socioeconomic development and poverty reduction. The Mekong River dolphin managerial protection zone extends 180 km of the northern stretch of the Mekong River from the borderline between the Kingdom of Cambodia and Lao PDR (The Government of Cambodia 2012). The conservation zone is under the Ministry of Agriculture, Forestry, and Fisheries mandate with relevant ministries, government institutions, and sub-national-level administration in Kratie and Stung provinces.

Irrawaddy dolphins *Orcaella brevirostris* occur throughout Asia in coastal areas associated with muddy brackish water at river mouths and freshwater regions. Freshwater Irrawaddy dolphins are found in three main rivers: the Mahakam in Indonesia, Ayeyarwady in Myanmar, and Mekong in Cambodia and southern Lao PDR), as well as two inland lakes: Songkhla in Thailand and Chilika in India. Dolphins in the Mekong River are found only from the Khone waterfalls at the international border of Cambodia and Lao PDR to Kratie province in Cambodia. This species occurs around 190 kms along the Mekong River. The Mekong Irrawaddy dolphin has been classified as critically endangered in the IUCN's red list since 2004 (Smith and Beasley 2004). The Irrawaddy dolphin in the Mekong River was classified as "Critically Endangered" on the Red List of the IUCN (International Union for Conservation of Nature) in 2004 and ranked as one of the 58 threatened species under the Cambodian government's sub-decree on "Determination of Types of Fisheries and Endangered Fisheries Product" in 2009. The population of the Irrawaddy dolphin in the Mekong River is estimated at 89 individuals in 2020 (Eam et al., 2020).

4.2.2 The Mekong Fisheries Biodiversity Conservation and Management Zone

In 2013, the Minister of Agriculture, Forestry and Fisheries (MAFF), the Government of Cambodia, officially designated a 56 km remote section of the Mekong Mainstream

referred to as Mekong Flooded Forest as the Mekong Fisheries Biodiversity Conservation and Management Zone. The Central Section is situated between Kratie and Steung Treng towns in northeastern Cambodia. The area has diverse habitats, including tall riverine forests, waterways, and islands that support a range of species that have virtually disappeared from Southeast Asia. The official designation of this area for management and conservation provides an opportunity to recover many globally significant animal and plant species (MAFF, 2013). The 'Central Section represents one of the most intact examples of a large lowland riverine ecosystem in Southeast Asia. It is documented the irreplaceable significance of the landscapes for threatened biodiversity representative of both the Mekong River and the Lower Mekong Dry Forest Ecoregions (Bezuijen et al., 2008). These include the largest population of freshwater dolphins (Irrawaddy dolphin Orcaella brevirostris) in South East Asia, critical nesting sites for Cantor's giant softshell turtle Pelochelys cantorii, high levels of freshwater fish diversity, and one of the largest global populations of white shouldered ibis Pseudibis davisoni, and hog deer Axis porcinis, Eld's deer Recurvus elddi, and giant ibis Thaumatibis gigantea largely (Timmins & Seng, 2007). The site was poorly known until 2006 and 2007, when

research teams from the Fisheries Administration and Forestry Administration of the MAFF and the World Wide Fund for Nature (WWF) conducted biological area surveys.

4.2.3 The Sambo and Prek Prasab Wildlife Sanctuaries

On 5 October 2018, the Government of Cambodia issued the Sub-Degrees on creating Sambo Prek Prasab Wildlife Sanctuaries. Sambo Wildlife Sanctuary (SWS) has a total area of 50,093 hectares, situated in Sambo district, Kratie province. Prek Prasab Wildlife Sanctuary consists of an area of 12,770 hectares straddling Sambor and Prek Prasab districts, Kratie province. The two sanctuaries are under the management mandate of the Ministry of Environment (Government of Cambodia 2018).

The sanctuaries support the most intact forests and riverine habitats in the area with the lowest human densities. According to a BINCO survey, the hog deer (Axis porcinus annamiticus) in the area has been confirmed. The black giant squirrel (Trachypithecus germaini) and the Indochinese Silvered Langur (Trachypithecus germaini) were among the other large mammal species observed (Ratufa bicolor). There were 220 bird species identified, including four globally threatened and eleven near-threatened species.

Wintering Manchurian Reed-Warblers (Acrocephalus tangorum), White-shouldered Ibis (Pseudibis davisoni), and Cambodia's fourth record of Green-backed Flycatcher were among the notable bird sightings (Ficedula elisae). Surveys of amphibians and reptiles revealed just a small amount of information (Survey, 2018). Moreover, in Sambo Wildlife Sanctuary, 223 native fish species were recorded during surveys in 2006-2007 (Timmins & Seng, 2007). MoE, in partnership with relevant ministries and NGOs, has been working together to manage the sanctuaries, with participation from local communities and authorities.

4.2.4 Stung Treng Ramsar Site

A stretch of the upper Mekong River north of Stung Treng town was designated a Ramsar Site in Cambodia's Stung Treng Province in 1999. The site is nearly 40 kilometers long and covers an area of roughly 14,600 hectares. The area has few remaining portions with high-quality riverine and riparian habitats historically typical in this Mekong region. The site has many deep pools, produced and maintained by the scouring action of wet season floods, which provide vital habitat for a wide range of fish species. Many people in both settled and migratory communities depend upon the site's biodiversity to support their livelihoods. At least 130 species of fish and globally threatened species, including Irrawaddy dolphin, Green Peafowl, White-shouldered Ibis, Lesser Adjutant, Eld's Deer, Mekong Wagtail, Long-tailed Macaque, Asiatic Softshell Turtle, have been recorded (Allen et al., 2008). The site's biodiversity is critical to the livelihoods of local communities, both settled and migratory. It is economically significant locally, nationally, and regionally. Many of the site's species and products (such as food, skins, and medicinal goods) are

exported to neighboring countries (Boonratana et al., 2005). The area has a variety of growing pressures on the fishery resource, including overfishing by residents and non-resident fishers, and other factors such as land-use change, hydrological flow changes caused by climate change, and dam disruption of fish migrations (Allen et al., 2008). The Ministry of Environment collaborates with relevant ministries, development partners, and NGOs to jointly promote sustainable management of the natural resources in the Ramsar Site. These activities, namely, alternative livelihood development of local communities living in the site and adjacent to the site, community engagement, law enforcement to protect natural resources, awareness outreach and education, and ecotourism.

4.2.5 Siem Pang Wildlife Sanctuary

The government sub-decree established Siem Pang and Siem Pang Kang Lech wildlife sanctuaries in 2016. In 2019, the Cambodian government combined the Western Siem Pang Wildlife Sanctuary and the Siem Pang Wildlife Sanctuary into one protected area known as "Siem Pang Wildlife Sanctuary" in Stung Treng province; the newly defined

area of 133,707.73 ha spans the communes of Santepheap, Thma Keo, and Prek Meas. The PA contains a largely dry, sparse forest. At the same time, the remainder of the area has thick forest and grass fields, all of which are part of the lower Mekong's dry ecological tropical forest. The protected area is essential for conservation since it is part of valuable biodiversity in the Indochina region. The area is home to vultures, adjutants, elephants, bantengs, sarus cranes, Eld's Deer, Sun Bear, and other species (Dara, 2019). The PA has critical habitats of critical biodiversity values, including intact forest characteristic of central Indochina's native vegetation covers 90 percent of Western Siem Pang. Half is dry dipterocarp forest, and 40 percent is denser semi-evergreen forest; the rest is degraded semi-evergreen forest (five percent), deforested land (three percent), and water (two percent). The forest is open in some areas but deep in others, with a grassy understory. A variety of lakes and periodically wet meadows (locally known as trapaengs) are scattered throughout the forest and are vital to the site's biodiversity. The Sekong River, a significant Mekong feeder river, runs through the area, sustaining huge riverine forest areas (BirdLife, 2021).

Western Siem Pang Forest with 'trapaeng' wetland. Photo by Jonathan C. Eames.

4.3 Natural Resource Management Approaches

Community Protected Area (CPA), Community Forestry (CF) and Fisheries (CFi), and Communal Land Titling (CLT) are the community-based natural resource management approaches which the government, NGOs, and development partners have been promoting in Cambodia to sustain natural resource management undertaken by the communities themselves.

4.3.1 Protected Area Management

According to the Law on Protected Area, 2008, Protected Area (PA) is classified in eight categories, 1) national park, 2) wildlife sanctuary – wildlife preservation and protection, 3) protected landscape – protected scenic view areas to be maintained as scenic spots for leisure and tourism, 4) multi-purpose-use management area – accessible areas for economic development and leisure activities with the assurance of natural stability of water, forestry, wildlife and fishery resources, 5) biosphere reserve – an area of biodiversity conservation and support of sustainable development and activities. This reserve, Tonle Sap, is close to Battambang and Kampong Thom provinces. Its inclusion as a special entity in the law demonstrates its importance for Cambodia, 6) natural heritage site – natural or semi-natural sites unique in the ecosystem, beauty or cultural value, 7) marine park – coastal areas with plants, wildlife, and fish, with historical or cultural value, and 8) Ramsar site – areas recognized for the importance of their wetlands and surrounding environment, including wildlife, habitats, and ecosystems (RGC, 2008). A PA is a designated region that has been given additional protection to help the long-term conservation of species, nature, ecosystems, and cultures. The International Union

created the Protected Area Management Categories System for Conservation of Nature (IUCN). It encompasses over 12 percent of the world's land surface (Dudley, 2008).

The Government of Cambodia has several protected areas, known as wildlife sanctuaries, national parks, and Ramsar sites. According to Protected Area Law, 2008 there are eight categories of the protected area, 1) National park, 2) Wildlife sanctuary, 3) Protected landscape, 4) Multiple use area, 5) Ramsar site, 6) Biosphere reserve, 7) Natural heritage site, and 8) Marine park. These protected areas are defined by sub-degree. The management of the protected area must ensure that local communities, indigenous ethnic minorities, and the general public have equal access to decision-making on the long-term management and protection of biodiversity. Once the government designates the PA, the organization and functioning of the Nature Protection and Conservation Administration in each protected area shall be determined by the Prakas (Declaration) of the Ministry of Environment. This arrangement includes 1) Creating strategic strategies, action plans, and technical recommendations for protecting the places, 2) Making recommendations for the creation and alteration of any protected area as directed by the Royal Government of Cambodia or following regional and international conventions, protocols, and agreements, 3) Develop rules and processes for enforcing this law effectively, 4) Investigate, control, and prosecute natural resource violations in protected regions, and file a complaint in court, 5) Encourage public participation in the conservation and protection of natural resources inside protected areas by providing education and information, and 6) Formalize agreements on community-based protected area development plans. In practice, after PA is designated, the MoE collaborates with sub-

national authorities and NGO partners to manage the PA; the key activities for managing the PAs include; Law Enforcement: led by MoE rangers with the engagement of local communities. The rangers must be trained in patrolling techniques and law enforcement. The necessary materials and equipment are provided to rangers for patrolling purposes. Awareness outreach promotes communities' knowledge of relevant laws and the importance of species conservation, aiming for communities' behavior change and enhancing communities' participation in conservation activities in the PA. Alternative livelihood development is one of the components of increasing communities' incomes, targeting communities' participation in PA management and conservation. Communities living inside and adjacent to the conservation area are the project's main beneficiaries. Biodiversity research and monitoring are important components that assess the values of the biodiversity, document and inlustrate the conservation impacts, for instance, the increase or decrease of the target species and healthy or degradation of the habitats. To develop zonation and demarcation, the MoE issued a guideline for PA Zoning for the Protected Areas indicating the process and procedure for zoning of the PA (MoE, 2017a). According to the law on PA 2008, the PA should be divided into four zones; 1) Core Zone: high-conservation-value management area(s) comprising threatened and critically endangered species and fragile ecosystems. Access to the zone is restricted to Nature Conservation and Protection Administration officials and researchers who conduct nature and scientific studies to preserve and protect biological resources and the natural environment, except for national security and defense sectors, with prior permission from the Ministry of Environment, 2) Conservation Zone: next to the core zone, management

area(s) with high conservation values, including natural resources, ecosystems, watershed areas, and natural landscape. With the exception of national security and defense sectors, access to the zone is only permitted with the prior authorization of the Nature Conservation and Protection Administration in the area. The small-scale community uses of non-timber forest products (NTFPs) to sustain local ethnic minorities' livelihoods may be permitted under stringent conditions, as long as they do not have a significant negative impact on biodiversity in the zone; 3) Sustainable Use Zone: high-value management area(s) for national economic development and management, as well as conservation of the protected area(s) without affecting the natural characteristics of the natural resources. This zone should be administered to help the local people and indigenous ethnic minorities improve their living conditions. In response to a request from the MoE, the Royal Government of Cambodia may permit development and investment activities in this zone after consulting with relevant ministries and institutions, local authorities, and local communities following applicable laws and procedures; and 4) Community Zone: management area(s) for local communities and indigenous ethnic minorities' socioeconomic development, which may include existing residential lands, paddy fields, field gardens, or shifting agriculture (Chamkar). Following the Land Law, issuing a land title or license to use land in this zone requires prior approval from the Ministry of Environment. This management area does not include the APSARA authorities and other authorities authorized by the Royal Government and the management area(s) to which the responsibilities have been assigned.

4.3.2 Community Protected Area

The Ministry of Environment is required under the PA Law of 2008 to release a guideline titled Guidelines on Procedures and Processes for Preparing Community Protected Areas (CPAs) through a Prakas or Proclamation (RGC, 2008). CPAs were introduced by the RGC in 1999 as an official Prakas (Declaration) to improve conservation, land use, and livelihoods development. Before the PAs were established, many community people living in or near Protected Areas relied on collecting non-timber forest products (NTFPs) for their daily needs (CPADO, 2004). People continued to use the forests for their daily necessities after the foundation of PAs, just as they did previously. However, as the world's population has grown and people have moved from place to place, there has been an increase in demand for forests. In contrast, the number of resources available has declined. Illegal activities such as forest clearing for the production of charcoal, removing forest for the extension of farmland, land encroachment, and hunting have continued to rise. Rangers struggled to control and patrol the PAs. Indeed, the government also lacks the funds and resources to offer proper protection. They have grown increasingly concerned about forest and biodiversity degradation. Therefore, in May 2003, Cambodia's Ministry of Environment's Department of Nature Conservation and Protection issued a proclamation encouraging community organizations to administer in previously created protected areas. This declaration was the first step in Cambodia's establishment of a participatory management policy for protected areas. The purpose of establishing community-protected areas is to gain community and stakeholder participation in the development, management, monitoring, and assessment of protected areas. Community

Protected Regions (CPAs) are an attempt to produce a win-win situation for both managers and resource users in these areas, with the goals of biodiversity conservation, livelihood subsistence, and cultural and spiritual values preservation (CPADO, 2004).

CPAs can be developed in four different ways. Zoning can be used to organize them. A community protected area can be divided into four zones: a core zone, where only park rangers and researchers are permitted; a conservation zone, where the park director controls entry; a sustainable use zone, where natural resource use is agreed upon; and a community protected area zone, where land ownership is granted to the community. Second, they can be divided into agricultural, residential, community-protected areas, and conservation land through participatory land-use planning. Third, some forests or fisheries are assigned to the local population to administer and organize inside protected areas. Finally, CPAs can be organized around sustainable livelihood development. Local populations establish alternate forms of income rather than relying solely on natural resources (RGC, 2008). Different programs and groups operating in diverse protected areas have encouraged and assisted these techniques. As we wait to discover which strategy works best, there is no single conventional organization method. The community management committee is elected with input from the community and institutions concerned, including the local government. Communities create bylaws for their members to follow when it comes to using community-protected spaces after being elected. The organization and role of CPA management, decision making, benefit-sharing principles, the use of natural resources, what is banned, fine levy, and financial management are all addressed in the bylaws. The Ministry of the Environment and several community

committees have also formed agreements on how the communities will maintain the forest in a sustainable manner. Then, the Ministry of the Environment releases a proclamation establishing community-protected areas (MOE, 2017).

4.3.3 Community Forestry (CF)

It is an area of state forest where the cantonment of the Forest Administration and local communities or an organized group of people have agreed to manage and use the forest sustainably. CF is developed under the CF establishment guideline. Local communities can apply to the FA to have a community forest recognized. CF is defined as a community that voluntarily forms a group under a Community Forest Agreement to conduct development activities and utilize community forest resources sustainably, according to the sub-decree (RGC, 2003). The Forest Law of 2002 gives rural communities the legal authority to use and manage forests through community forestry. The Community Forest Maintenance Sub-Decree of 2003 establishes guidelines for the establishment, management, and usage of community forests in Cambodia (RGC, 2002). Steps for establishing a CF include starting community forestry establishment, development of CF committee bylaw, CF boundary identification and demarcation, development CF regulation, development CF agreement, developing of CF management plan, and implementation of CF management plan. Several activities under each step require full participation from local communities. There are 46 CFs, equal to 65,707 ha in Kratie, and 26 CFs, equal to 60,223 ha in Stung Treng province (WWF, 2021).

4.3.4 Community Fisheries (CFi)

Fisheries in Cambodia are mostly small-scale, and they cover practically all of the country's inland waters. Millions of rural people rely heavily on fishing and fishery-related industries for their livelihoods. With the amended legal framework from the Cambodian government in 2001, small-scale fishermen were awarded new user rights to fish in their exclusive fishing zones, improving their livelihood and encouraging involvement in sustainable fisheries management (Lieng et al., 2018). The Law on Fisheries (RGC, 2006), the sub-decree on community fisheries, and CFi's internal norms and regulations regulate the community fisheries' fishing rights (RGC, 2005). CFi has roles and responsibilities under the aforesaid law, sub-decree, regulations, and regulation to participate in managing, conserving, and using fishery resources for their subsistence needs in a sustainable manner. It must adhere to the bylaws and community fishing area management plan, as well as fisheries legislation and other instruments. According to the bylaws, all CFi members have equal rights in the sustainable exploitation of three fisheries resources. CFi formulates and adopts the bylaws. With the approval of the government, CFi is assigned responsibility for managing the community's fishing resources. The Fisheries Administration, which represents the government, has signed the agreement for a communal fishing area. CFishall create a community fishing area management plan, as well as a suitable strategy and mechanisms/methods for effectively monitoring and implementing the plan. Community fisheries members, the local government, and the Fisheries Administration must all contribute to developing and adopting the community fishing area management plan. Demography, socioeconomic factors, and the quality of

fishery resources are all described in the community fishing area management plan. It establishes the conservation area and actions and the quantity and types of fishing gear that are permitted, management action measures, and an aquaculture development plan (Lieng et al., 2018). There are 66 CFis, equal to 57,369 ha in Kratie province, and 55 CFis, equal 38,396.50 ha in Stung Treng province.

There are nine steps to creating a Community Fishery, according to the Prakas: Step 1: Assemble a team of founders. Step 2: Evaluate the needs of the CFi location. Step 3: Become a member of CFi. Step 4) Create a vision statement, bylaws, and internal regulations for the CFI. Elect the Community Fishery Committee (Step 5) 6) Draw a map of local fishing spots. Step 7) Create an agreement for a community fishing area. Step 8) Register the Community Fishery, and Step 9) Create a Management Plan for the Community Fishing Area (MAFF, 2007).

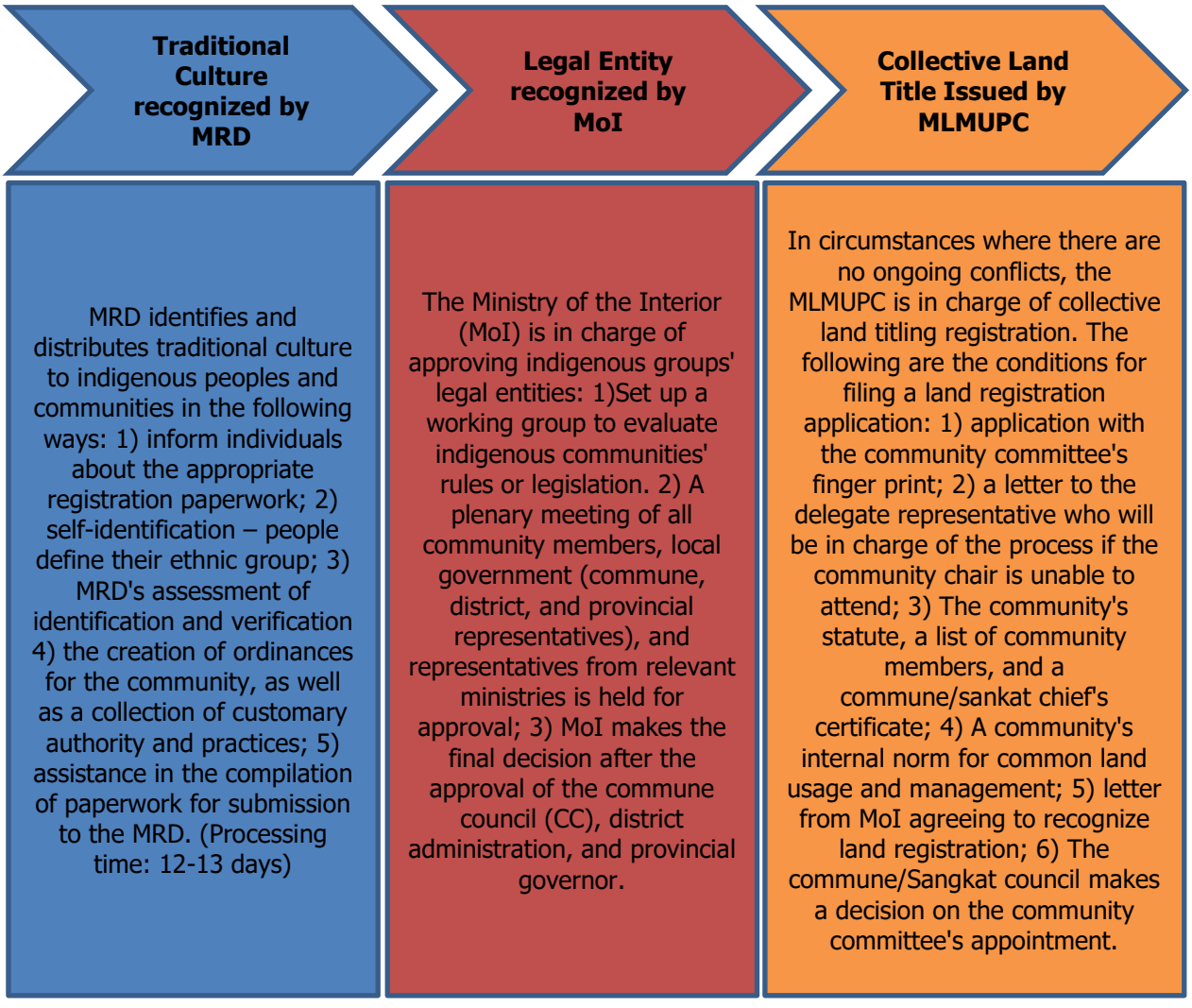
Figure 4.2: Steps for Community Fisheries Establishment (FiA, 2018).

4.3.5 Indigenous Communal Land Titling (ICLT)

In Cambodia, 23 indigenous groups (about 200,000 people) live in the country's remote northeastern provinces, mainly in Ratanakiri, Mondulkiri, Kratie, and Steung Treng, which account for 59 percent, 49 percent, 12 percent, and 10 percent of the total population of the four provinces, respectively (NIS, 2017). Their livelihoods heavily rely on natural resources, especially forest products surrounding their communities. Cambodia's Constitution guarantees all Cambodians the same formal rights (Nun, Chea, Moh, & Htay, 2016). At the same time, the 2001 Land Law provides indigenous peoples with a unique opportunity to exercise their rights through collective indigenous land titles. Other significant measures have also been developed to protect indigenous peoples' rights to land title (NGOF, 2006). These policies and legal instruments include, but are not limited to: (i) the 2009 National Policy on Indigenous Peoples' Development; and (ii) the sub-decree on the procedure for indigenous groups' land registration. CLT is a method of recognizing indigenous people's land tenure practices in Cambodia as protected under the 1993 constitution. It is also guaranteed by articles 23 to 28 of the 2001 Land Law, which require other relevant ministries to establish required rules, and Sub-Decree 83 of the Procedures for Registration of Indigenous Communities' Land. CLT aims to protect indigenous peoples' culture, customs, legacy, and land tenure practices. The 2001 Land Law does not expressly state whether woods rich in natural resources and biodiversity are eligible for CLT registration (2001 Land Law). In 2007, Cambodia signed the United Nations Declaration on Indigenous Rights, which expressly provides Indigenous communities sovereignty over land they have held "because of customary ownership" to

use or develop as they see fit. Two years later, the government formalized Indigenous peoples' rights to retain their ancestral lands and the procedures. In addition, indigenous land titles frequently include a stipulation to maintain a portion of the forest, usually associated with the community as ancestral burial sites and spiritually significant spaces (Olsen, 2021).

Figure 4.3: Process for Collective Land Registration for Indigenous Communities (Nun, Chea, Moh, & Htay, 2016)



The government agencies, including the MoE, MAFF, MRD, and MLMUPC, have been working with relevant development partners and NGOs to support the development and management of the natural resources. The government has designated PAs and several community forestries, fisheries, protected areas, and indigenous communities for communal land in both provinces. CBNRM is the typical approach for biodiversity conservation and natural resource management. The government policies and other legal frameworks encourage community participation for sustainable consumption and management of natural resources. CBNRM has long been recognized as a critical approach to the collaborative use and management of natural resources. CBNRM is characterized as a co-management initiative to actively empower local communities to participate in natural resource protection and sustainable management. It is a strategy for encouraging and empowering rural communities to manage their water, fish, forests, and wildlife with knowledge, rights, and authority. Moreover, it is a method through which communities receive access to and use rights to, or ownership of, natural resources; collaborate and participate in resource management transparently and collaboratively; and reap financial and other benefits from stewardship

4.4 Conclusion

The government of Cambodia, in collaboration with NGOs, employs diverse approaches to natural resource management. These approaches include CBNRM and the management of protected and conservation areas. The government has developed comprehensive guidelines, frameworks, and policies to support the establishment and implementation of these approaches.

CBNRM encompasses a range of initiatives aimed at empowering local communities and promoting the sustainable use and protection of their resources. These initiatives include Community Forestry, Community Fisheries, Community Protected Areas, Community-Based Eco-Tourism, and Indigenous Collective Land Titling. Community-based organizations play a crucial role in facilitating CBNRM activities. Through CBNRM, communities gain the right to manage and conserve their local resources, ensuring the long-term sustainability of these valuable assets. CBNRM has proven to be the most common and effective strategy in promoting sustainable natural resource management in Cambodia.

PA management is another critical approach employed to safeguard biodiversity and their habitats. This involves the establishment and maintenance of various types of protected areas, including Wildlife Sanctuaries, Rasmar Sites, and National Parks. The government legally registers the creation of PAs through government sub-decrees, ensuring their official recognition and protection. To ensure the effectiveness of PAs, a range of activities are implemented. These include strategic zoning to designate different levels of protection and usage within the areas, adequate staffing with trained rangers and technical personnel, strict law enforcement and patrolling to combat illegal activities, infrastructure development to support conservation efforts and visitor access, comprehensive awareness campaigns to engage local communities and raise public understanding, and community-based development initiatives to improve livelihoods and ensure the involvement of local stakeholders.

References:

Allen, D. et al. (2008). *Integrating people in conservation planning: an integrated assessment of the biodiversity, livelihood, and economic implications of the proposed special management zones in the Stung Treng Ramsar Site, Cambodia*. 101 pp. Retrieved from http://intranet.iucn.org/webfiles/doc/SpeciesProg/FBU/StungTreng_IWA_Technical Report_lowrest.pdf

Khanal, B. R., & Babar, J. T. (2007). *Community-based ecotourism for sustainable tourism development in the Mekong Region, policy brief*. CUTS Hanoi Resource Centre, 2–8.

Royal Government of Cambodia, National Council for Sustainable Development/Ministry of Environment, Phnom Penh, Cambodia (2016). *Cambodia's Biodiversity Status Report Update 2015.*

National Institute of Statistics (2019). *General Population Census of the Kingdom of Cambodia 2019.* Ministry of Planning Kingdom of Cambodia, (June 2019), 1–50. Retrieved from http://www.nis.gov.kh/nis/Census2019/Provisional Population Census 2019_English_FINAL.pdf

Nun, M., Chea, A. M., Moh, M. M. W., & Htay, M. (2016). *Collective land registration of indigenous communities in Ratanakiri province.* Retrieved from https://www.pic.org.kh/images/2016Research/20170523 Collective Land Registration_Ratanakiri province_Eng.pdf

Sreymom, S., Channimol, K., Kyungwoo, K., Molideth, S., & Raksa, S. (2016). *Common pool resources and climate change adaptation: community-based natural resource management in Cambodia (No. 109). CDRI Working Paper Series.*

Bezuijen, M. R., Timmins, R., & Seng, T. (2007). Biological Surveys of the Mekong River Kratie and Stung Treng Towns, North-east Cambodia, 2006-2007. *WWF Greater Mekong-Cambodia Country Programme, Phnom Penh.*

The Royal Government of Cambodia (2012). *The Sub-degree on the Creation of the Mekong River Dolphin's Managerial Protection Zones (No. 155 អនក្រ.បក).*

The Royal Government of Cambodia (2018). *The Sub-degree on designating the Prek Prasab Wildlife Sanctuaries (No. 128 អនក្រ.បក).*

The Royal Government of Cambodia (2018). *The Sub-degree on designating the Sambo Wildlife Sanctuaries (No. 129 អនក្រ.បក)*

Ministry of Agriculture Forestry and Fisheries (2013). *Proclamation on the creation of the Mekong fisheries biodiversity conservation and management zone (No. 126 ប្រក)*

They Royal Government of Cambodia (2003). *Sub-decree on Community Forest Management, Article 3 (No. 79 អនក្រ.បក)*

They Royal Government of Cambodia (2005). *Sub-decree on Community Fisheries Management (No. 80 អនក្រ.បក)*

They Royal Government of Cambodia (2007). *Proclamation on Community Fisheries Guidline (No. 316 អនក្រ.បក)*

The Kingdom of Cambodia (2002). *Law on Forestry (នស/រកម/0802/016)*

The Kingdom of Cambodia (2002). *Law on Fisheries (នស/រកម/0506/011)*

The Kingdom of Cambodia (2008). *Law on Protected Area (នស/រកម/0208/007)*

CHAPTER V

DATA PRESENTATION AND ANALYSIS

This chapter analyzes and discusses the effect of natural resource management on community conservation and socioeconomic development. The field data was collected among the 52 NGOs and government officials and 359 Community Members (CMs) of Community-Based Organizations (CBOs) in the study area of Kratie and Stung Treng provinces. The data were entered into the SPSS to summarize data and information and present the statistical outcomes. Descriptive statistics, reliable analysis, correlation analysis, and mean comparison analysis were applied for statistical analysis. Tables, bar charts, and pipe charts are used to present the study's information and interpret and test the hypotheses.

5.1 Profile of the Respondents

5.1.1 Gender

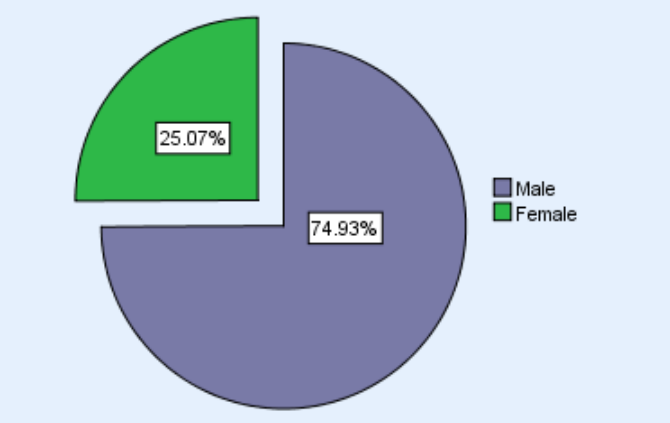
Of the 359 Community Members (CMs) surveyed, 74.9 percent were males, and 25.1 percent were females. So, the views presented in the research were male-dominated (Table 5.1.1.1 and Figure 5.1.1.1).

Table 5.1.1.1: Distribution of CMs by Gender

Sl. No.	Gender	Number	Percent
1	Male	269	74.9
2	Female	90	25.1
Total		359	100

Source: Own Survey.

Figure 5.1.1.1: Percentage of CMs by Gender



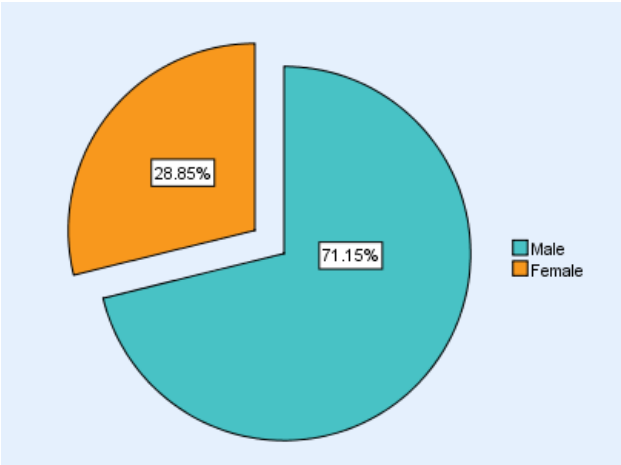
Among the 52 officials who were village chiefs, commune councils, provincial department officials, and NGO officials surveyed, 71.2 percent were males, and 28.8 percent were females. So, the views presented in the research were male-dominated (Table 5.1.1.2 and Figure 5.1.1.2).

Table 5.1.1.2: Distribution of Officials by Gender

Sl. No.	Gender	Number	Percent
1	Male	37	71.2
2	Female	15	28.8
Total		52	100

Source: Own Survey.

Figure 5.1.1.2: Percentage of Officials by Gender



5.1.2 Age

Table 5.1.2.1 and Figure 5.1.2.1 show the distribution of the community members by age group who were interviewed during the data collection. Overall, most respondents were between 35-44 years old. 35.7 percent of the respondents' age group was between 35-44 years old, followed by 28.4 percent of the respondents aged between 45-54, 15.6 percent of the respondents aged between 25-34, 11.7 percent of the respondents aged between 55-64, 5 percent of the respondents aged between 65-74, and the lowest respondents with 3.6 percent aged 18-24 (Table 5.1.2.1 and Figure 5.1.2.1).

Table 5.1.2.1: Distribution of CMs by Age-group

Sl. No	Age group (In Years)	Frequency	Percent
1	18-24	13	3.6
2	25-34	56	15.6
3	35-44	128	35.7
4	45-54	102	28.4
5	55-64	42	11.7
6	65-74	18	5.0
Total		359	100

Source: Own Survey.

Figure 5.1.2.1: Percentage of CMs by Age-group

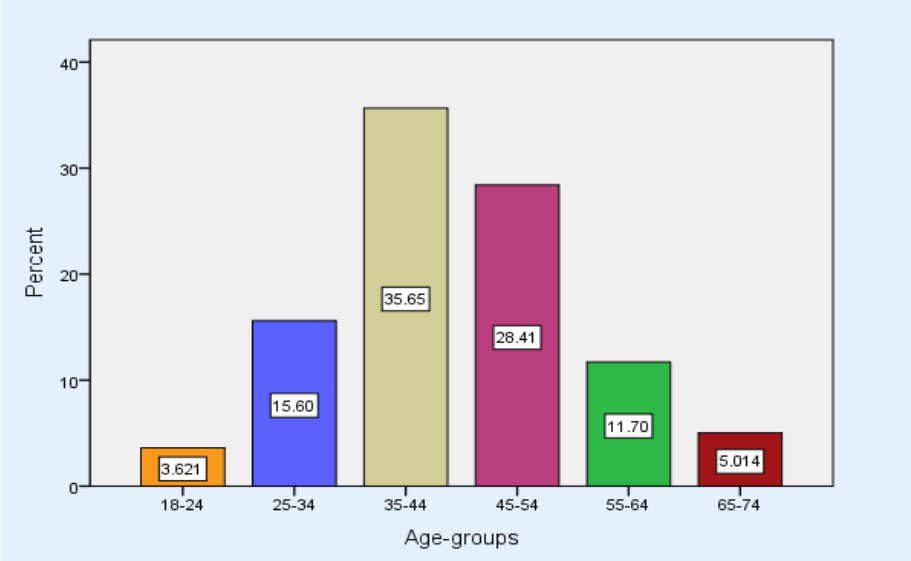


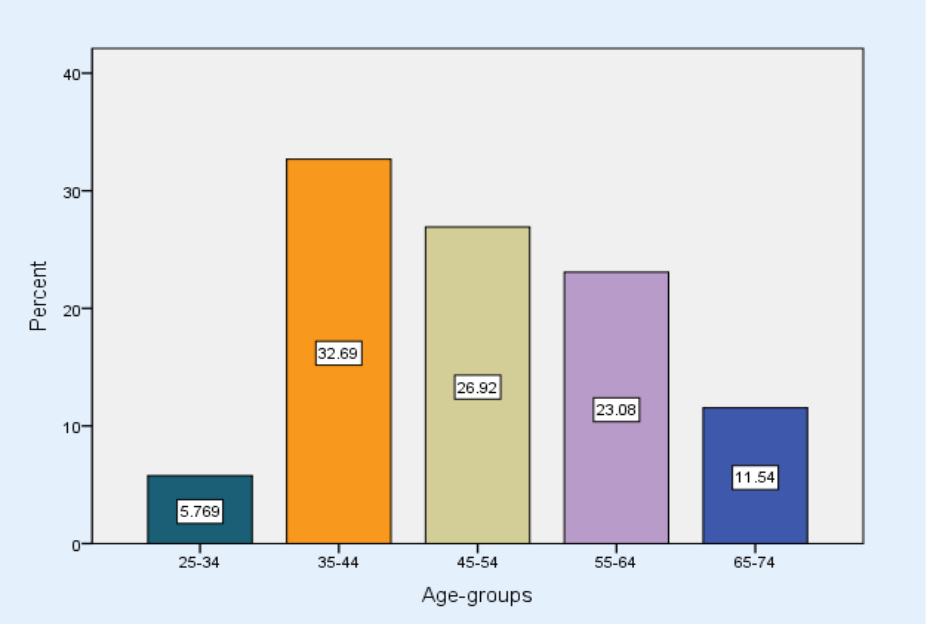
Table 5.1.2.2 and Figure 5.1.2.2 show the information on the age groups of the officials who were interviewed during the data collection. Overall, most respondents were between 35-44 years old. 32.7 percent of the respondents' age group was between 35-44 years old, followed by 26.9 percent of the respondents aged between 45-54, 23.1 percent of the respondents aged between 55-64, and 11.5 percent of the respondents aged between 65-74, and lastly, 5.8 percent of the respondents aged between 25-34. (Table 5.1.2.2 and Figure 5.1.2.2).

Table 5.1.2.2: Distribution of Officials by Age-group

Sl. No.	Age group (In Years)	Number	Percent
1	25-34	3	5.8
2	35-44	17	32.7
3	45-54	14	26.9
4	55-64	12	23.1
5	65-74	6	11.5
Total		52	100

Source: Own Survey.

Figure 5.1.2.2: Percentage of Officials by Age-group



5.1.3 Family Size

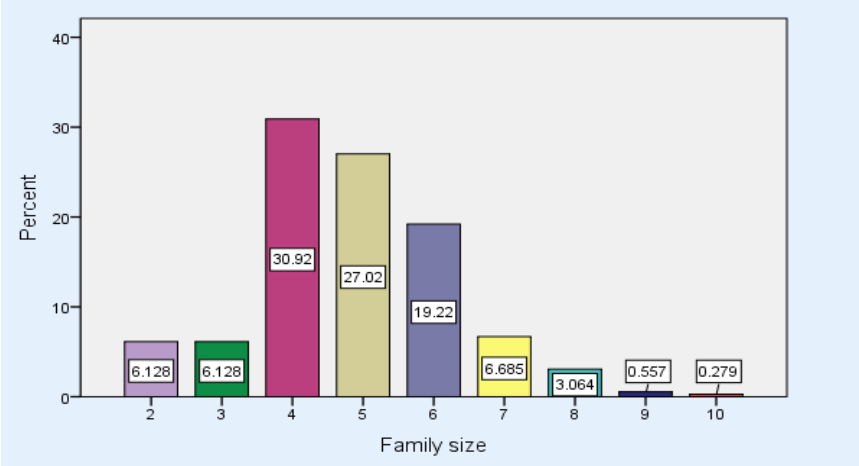
Table 5.1.3.1 and Figure 5.1.3.1 demonstrate the distribution of the community members by family size. Most interviewees had an average of four members, with 30.9 percent. In comparison, the interviewees with five family members were 27 percent, and the respondents with six were 19.2 percent. The respondents with two, three, and seven family members are almost the same at around 6 percent, followed by the people with three members are three percent. In addition, the lowest percentages of respondents with nine and ten family members are less than 1 percent.

Figure 5.1.3.1 Distribution of CMs by Family Size

Sl. No.	Family Size	Number	Percent
1	2	22	6.1
2	3	22	6.1
3	4	111	30.9
4	5	97	27.0
5	6	69	19.2
6	7	24	6.7
7	8	11	3.1
8	9	2	.6
9	10	1	.3
Total		359	100.0

Source: Own Survey.

Figure 5.1.3.1 Percentage of CMs by Family Size



5.1.4 Ethnicity

Table 5.1.4.1 and Figure 5.1.4.1 show the distribution of the community members by Ethnicity and Khmer. The majority of respondents were Khmer compared to Kouy and Punong, who were the indigenous group. Among 359 respondents, 65.46 percent were Khmer, followed by Kouy, 22.46 percent, and Punong, 11.98 percent respectively. All the groups lived in the same communities, and the indigenous groups adopted the Khmer culture. However, they also preserved their traditions, beliefs, and cultures (Table 5.1.4.1 and Figure 5.1.4.1).

Table 5.1.4.1: Distribution of CMs by Ethnicity

Sl. No.	Ethnicity	Number	Percent
1	Khmer	235	65.46
2	Kouy	81	22.56
3	Punorng	43	11.98
Total		359	100.0

Source: Own Survey.

Figure 5.1.4.1: Percentage of CMs by Ethnicity

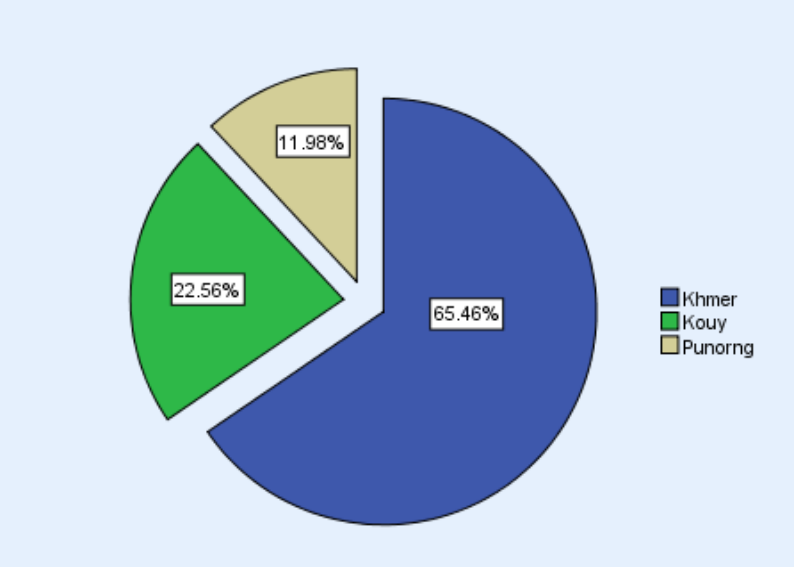


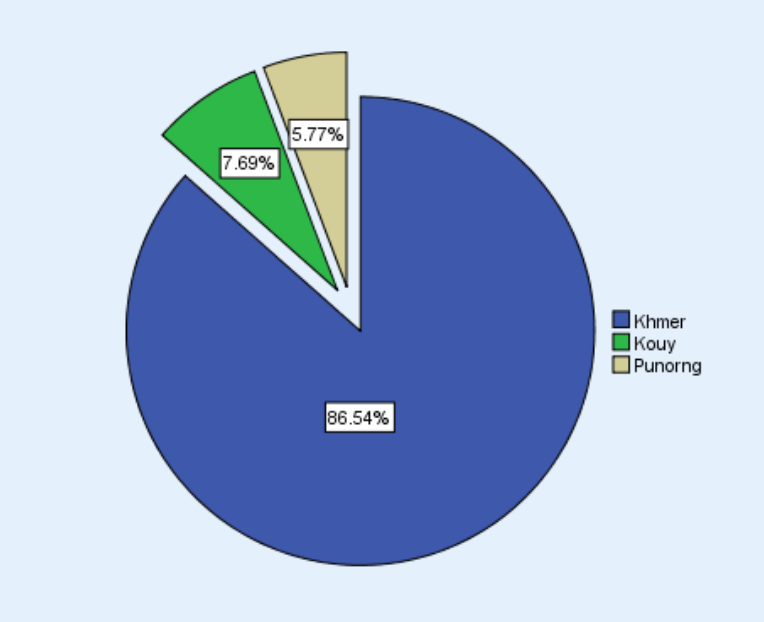
Table 5.1.4.2 and Figure 5.1.4.2 show the distribution of the officials by Ethnicity. Most interviewed officials were Khmer compared to Kouy and Punong, who were the indigenous group. Among 52 respondents, 86.5 percent were Khmer, followed by Kouy, 7.7 percent, and Punong, 5.8 percent, respectively.

Table 5.1.4.2: Distribution of Officials by Ethnicity

Sl. No.	Ethnicity	Number	Percent
1	Khmer	45	86.5
2	Kouy	4	7.7
3	Punorng	3	5.8
Total		52	100.0

Source: Own Survey.

Figure 5.1.4.2: Percentage of Officials by Ethnicity



5.1.5 Educational Level

Table 5.1.5.1 and Figure 5.1.5.1 explain the distribution of the community members by formal educational level. Overall, the most significant number of respondents studied in primary education. It is found that 47.4 percent of respondents studied in primary education (from grade one to six), followed by 35.7 percent of respondents who studied in secondary school (from grade seven to nine), and 12 percent of respondents did not go to formal education. In contrast, about five percent of the respondents pursued their studies in high school (from grade ten to twelve).

Table 5.1.5.1: Distribution of CMs by Educational Level

Sl. No.	Level of Education	Number	Percent
1	No formal education	43	12.0
2	Primary education	170	47.4
3	Secondary education	128	35.7
4	High school education	18	5.0
Total		359	100.0

Source: Own Survey.

Finger 5.1.5.1: Percentage of CMs by Educational Level

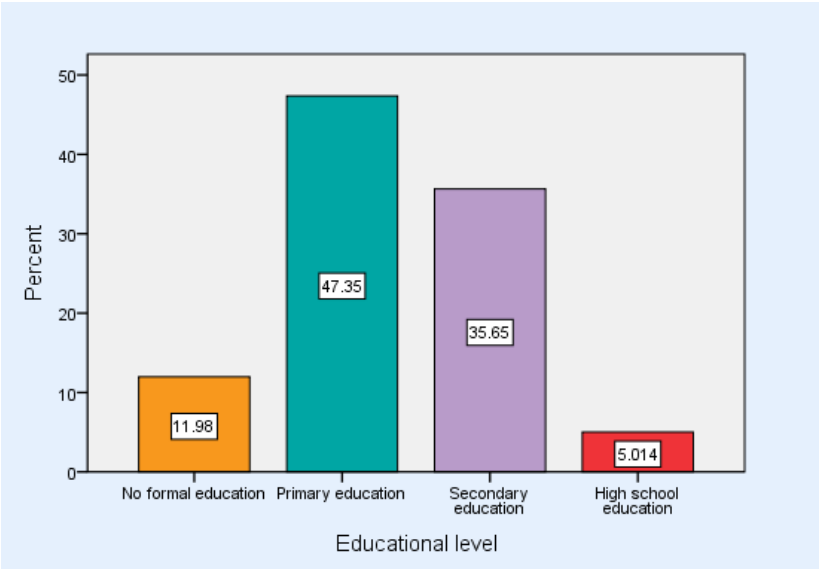


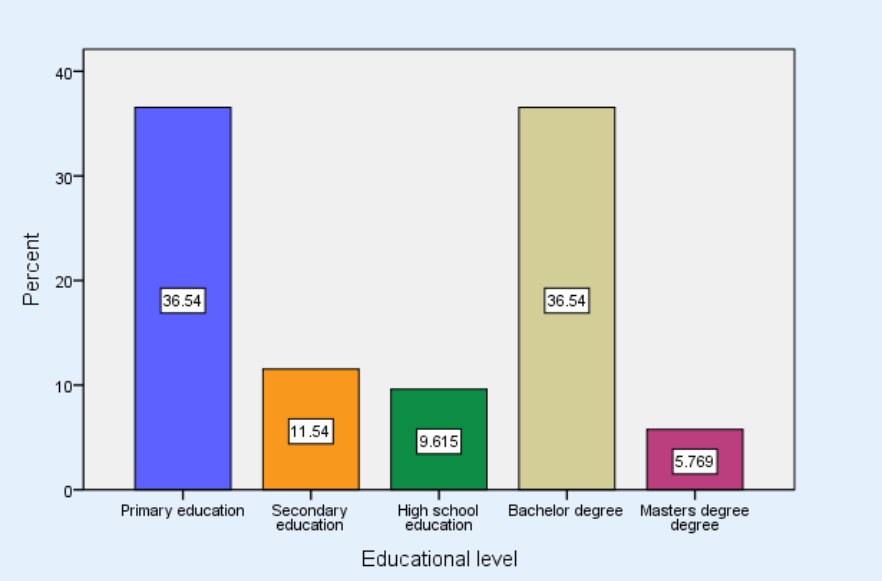
Table 5.1.5.2 and Figure 5.1.5.2 illustrate the distribution of the officials by educational level. Overall, a significant number of respondents studied in primary education. It was found that 36.5 percent of respondents studied in primary education. Another 36.5 percent graduated Bachelor's degree, followed by 11.5 percent of respondents who studied in secondary school and 5.8 percent who hold their Master's degree.

Table 5.1.5.2: Distribution of Officials by Educational Level

Sl. No.	Level of Education	Number	Percent
1	Primary education	19	36.5
2	Secondary education	6	11.5
3	High school education	5	9.6
4	Bachelor degree	19	36.5
5	Master degree	3	5.8
Total		359	100.0

Source: Own Survey.

Figure 5.1.5.2: Percentage of Officials by Educational Level



5.1.6 Community Roles in Community Natural Resource Management

Table 5.1.6.1 and Figure 5.1.6.1 demonstrate the distribution of the community members' roles in the communities. Overall, the respondents had roles, including residents and community members of CFMC, CFiMC, CPAMC, CPM, CBETMC, and IPCLC. Moreover, a considerable number of respondents were residents who are members of these CBOs at 36.5 percent, followed by 17.3 percent of CPM, 16.4 percent of CFMC, 13.4 percent of CFiMC, and 4.5 percent of CBETMC.

Table 5.1.6.1: Distribution of CMs as per their Roles in CBNRM

Sl. No.	Community Professions	Number	Percent
1	Community Forestry Management Committee (CFMC)	59	16.4
2	Community Fisheries Management Committee (CFiMC)	48	13.4
3	Community Protected Area MC (CPAMC)	5	1.4
4	Community Patrolling Member (CPM)	62	17.3
5	Community-Based Eco-Tourism MC (CBETMC)	16	4.5
6	Indigenous Collective Land MC (ICLMC)	38	10.6
7	Members	131	36.5
Total		359	100.0

Source: Own Survey.

Figure 5.1.6.1: Percentage of CMs as per their Roles in CBNRM

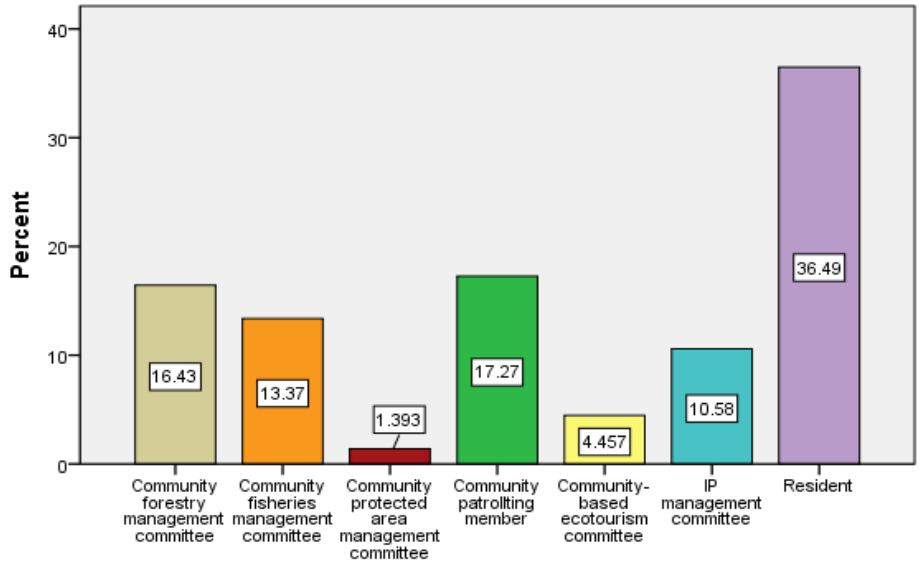
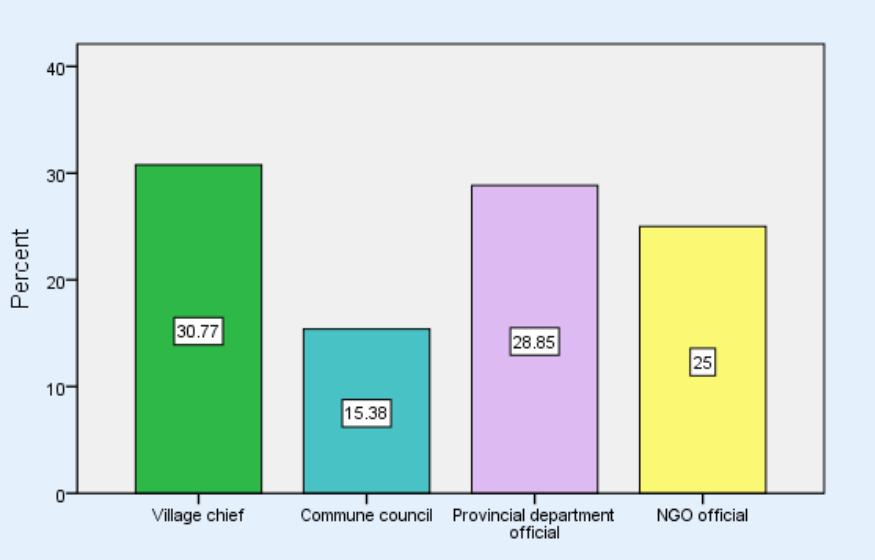


Table 5.1.6.2 and Figure 5.1.6.2 indicate that four officials were interviewed, including village chiefs, commune councils, provincial department officials, and NGO officials. A significant number of interviewees were village chiefs, with 30.6 percent, followed by 28.8 percent provincial department officials, 25 percent NGO officials, and 15.4 percent commune councils.

Table 5.1.6.2: Distribution of Officials as per their Roles in CBNRM

Sl. No.	Officials' Roles	Number	Percent
1	Village Chief	16	30.6
2	Commune Council	8	15.4
3	Provincial Department Officials	15	28.8
4	NGO Officials	13	25.0
Total		52	100.0

Figure 5.1.6.2: Percentage of Officials as per their Roles in CBNRM



5.2 Natural Resource Management (NRM) Activities

Table 5.2.1 and Figure 5.2.1 illustrate the community members' views of NRM activities. The NRM activities include Community-Based Ecotourism (CBET), Dolphin Conservation,

Protected Area (PA) Management, Community Protected Area CPA), Indigenous People Collective Land Title (IPCLT), Community Fisheries (CFi), and Community Forestry (CF). Most respondents, 25.1 percent, mentioned CF as one of the NRM activities, Protected Area Management 24 percent, CFi 19.2 percent, IPCLT 10.9 percent, Dolphin Conservation 12.5 percent, and CBET 8 percent.

Table 5.2.1: Distribution of CMs as per their Views on NRM Activities

Sl. No.	Areas of NRM Activities	Number	Percent
1	Community forestry	90	25.1
2	Community fisheries	69	19.2
3	IP collective land titling	39	10.9
4	Community protected area	1	0.3
5	Protected area management	86	24.0
6	Dolphin conservation	45	12.5
7	Community-based ecotourism	29	8.1
Total		359	100.0

Source: Own Survey.

Figure 5.2.1: Percentage of CMs as per their Views on NRM Activities

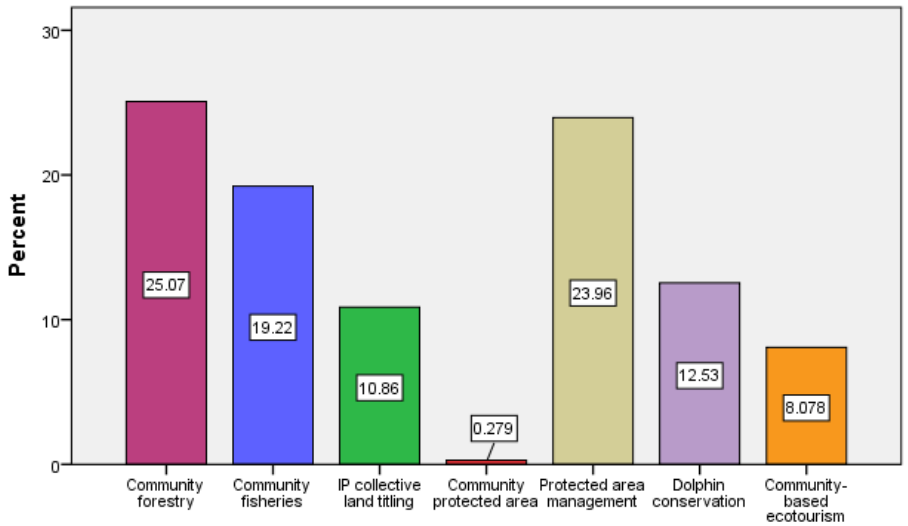


Table 5.2.2 and Figure 5.2.2 show the officials' views on NRM activities. Overall, most officials, with 30.8 percent, informed that the NRM activities are community-based

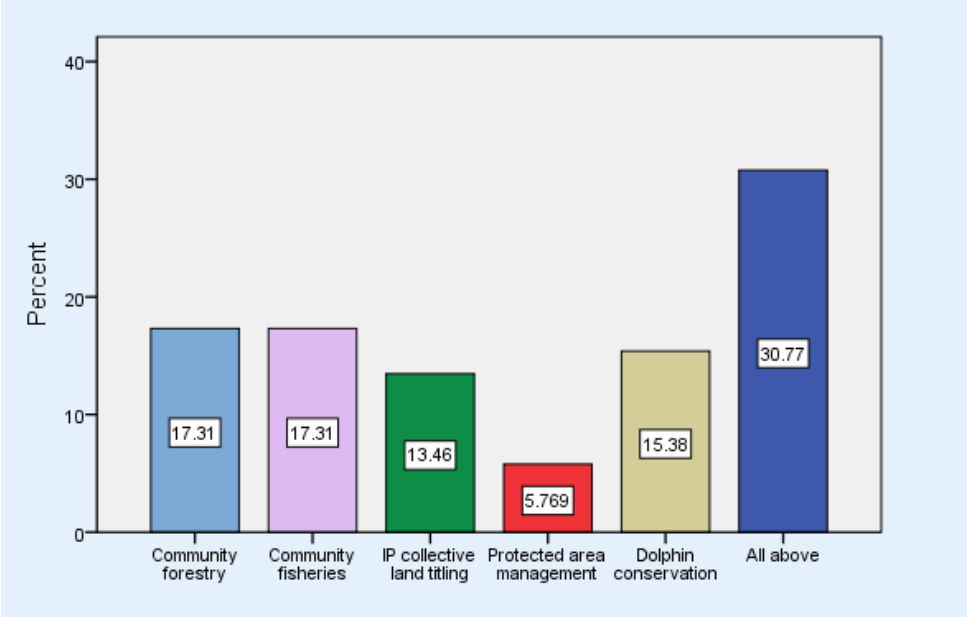
ecotourism, dolphin conservation, protected area management, community-protected area, IP collective land titling, community fisheries, and community forestry. In addition, 17.3 percent of respondents showed their views on community forestry, 17.3 percent on community fisheries, 15.4 percent on dolphin conservation, and 5.8 percent on protected area management.

Table 5.2.2: Distribution of Officials as per Their Views on NRM Activities

Sl. No.	Areas of NRM Activities	Number	Percent
1	Community forestry	9	17.3
2	Community fisheries	9	17.3
3	IP collective land titling	7	13.5
4	Protected area management	3	5.8
5	Dolphin conservation	8	15.4
6	Community-based ecotourism	0	0
7	Community-Protected Area	0	0
8	All above	16	30.8
Total		52	100.0

Source: Own Survey.

Figure 5.2.2: Percentage of Officials as per their Views on NRM Activities



5.3 Knowledge of Community Members on Natural Resource Management

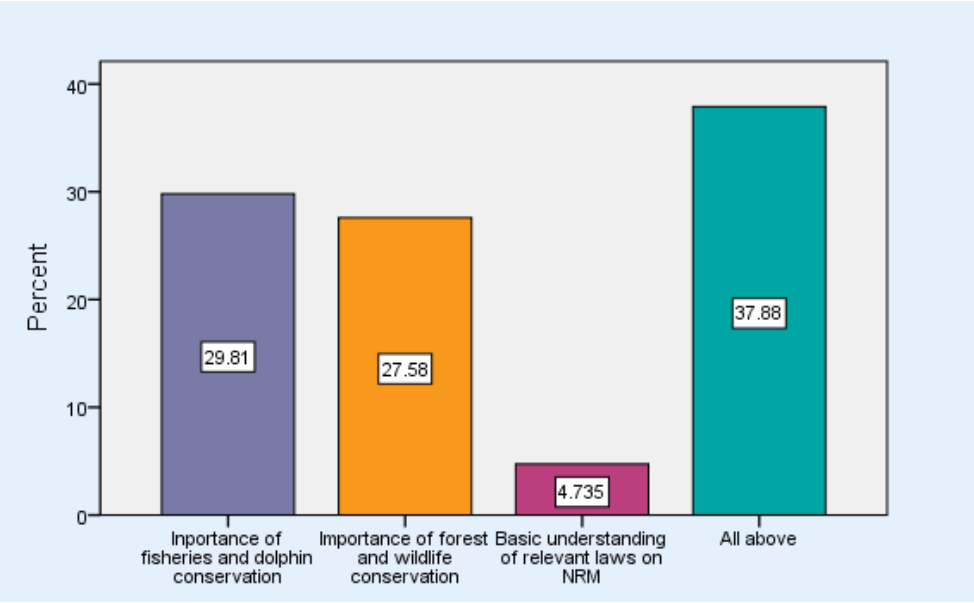
Table 5.8.1 and Figure 5.8.1 illustrate the distribution of the Community Members' knowledge of NRM. Overall, most respondents had a basic understanding of the importance of fisheries and dolphin conservation, forestry and wildlife conservation, and relevant laws on NRM (they can recognize legal and illegal activities), with 37.9 percent. In addition, 29.8 percent of the respondents had a basic knowledge of the importance of fisheries and dolphin conservation, 27.6 percent of the importance of forest and wildlife conservation, and 4.7 percent on a fundamental understanding of relevant NRM laws.

Table 5.3.1: Distribution of CMs as per their Knowledge of NRM

Sl. No.	Knowledge Type	Number	Percent
1	Importance of fisheries and dolphin conservation	107	29.8
2	Importance of forest and wildlife conservation	99	27.6
3	Basic understanding of relevant laws on NRM	17	4.7
4	All above	136	37.9
Total		359	100.00

Source: Own Survey.

Figure 5.3.1: Percentage of CMs as per their Knowledge of NRM



5.4 Community Participation in Natural Resource Management

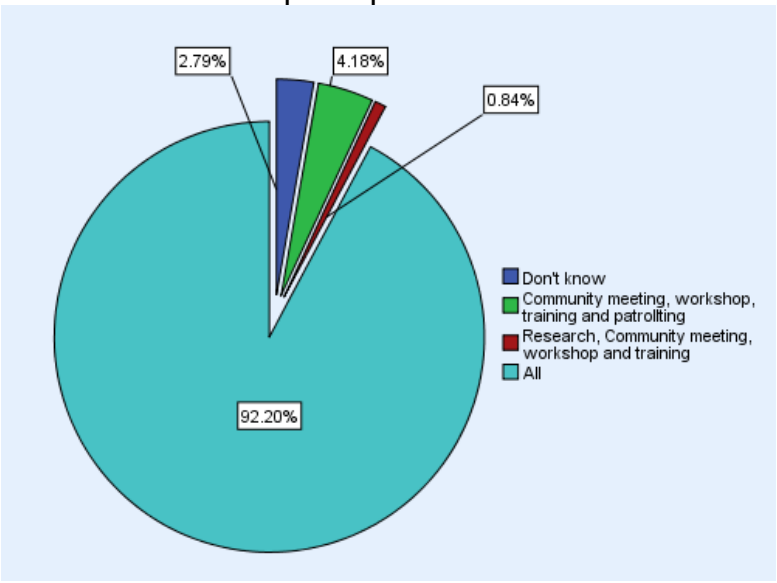
Table 5.4.1 and Figure 5.4.1 demonstrate the NRM activities which communities participated in natural resource management. Most people were involved in community meetings, workshops, training, research, and patrolling. A majority, 92.2 percent of the interviewees, indicated their participation in NRM, including community meetings, workshops, training, research, and patrolling. They were Community-Based Organizations (CBO) members and understood that these NRM activities were their roles.

Table 5.4.1: Distribution of CMs as per their Views on their Participation in NRM

Sl. No.	Views on their Participation in NRM	Number	Percent
1	Do not know	10	2.8
2	Community meetings, workshops, training, and patrolling	15	4.2
3	Research, Community meetings, workshop, and training	3	0.8
4	All	331	92.2
Total		359	100.0

Source: Own Survey.

Figure 5.4.1: Percentage of CMs as per their Views of their participation in NRM



5.5 Effectiveness of NRM in Community Conservation and Sustainability

5.5.1 Community Forestry Management

Table 5.5.1.1 and Figure 5.5.1.1 present the perspectives of community members regarding the impact of CF management in the study areas. In general, the effectiveness of CF management was assessed as moderately effective. The majority of respondents (66.3 percent) expressed moderate effectiveness, indicating that CF had received legal recognition from the government, the Community Forest Management Committee (CFMC) was functioning, and illegal logging had decreased compared to the previous decade, but forest loss continued to occur. A smaller proportion (10.5 percent) perceived CF management to be less effective, citing poor performance of the CFMC, ongoing illegal logging activities within the CF area, and an increase in forest loss. A further 2.3 percent considered CF management to be ineffective, highlighting issues such as the ineffectiveness of the CFMC, and widespread illegal logging in the CF area, resulting in significant loss of forest resources and land.

On the other hand, 20.9 percent of respondents regarded CF management as effective. They noted that CF had obtained legal recognition from the government, had a management plan in place, witnessed a reduction in illegal logging activities, and experienced tangible benefits from forest resources, while also actively participating in forest conservation efforts. However, it is worth mentioning that 273 respondents were unable to provide an opinion on CF management effectiveness because they were not directly involved in CF management but engaged in other NRM activities.

Table 5.5.1.1: Distribution of CMs as per their Views on the Effect of CF Management

Sl. No.	Extent of Effectiveness	Number	Percent
1	Not effective	2	2.3
2	Less effective	9	10.5
3	Moderately effective	57	66.3
4	Effective	18	20.9
	Total	86	100.0
	Missing system (Not involved)	273	
Total		359	

Source: Own Survey.

Figure 5.5.1.1: Percentage of CMs as per their Views on the Effect of CF Management

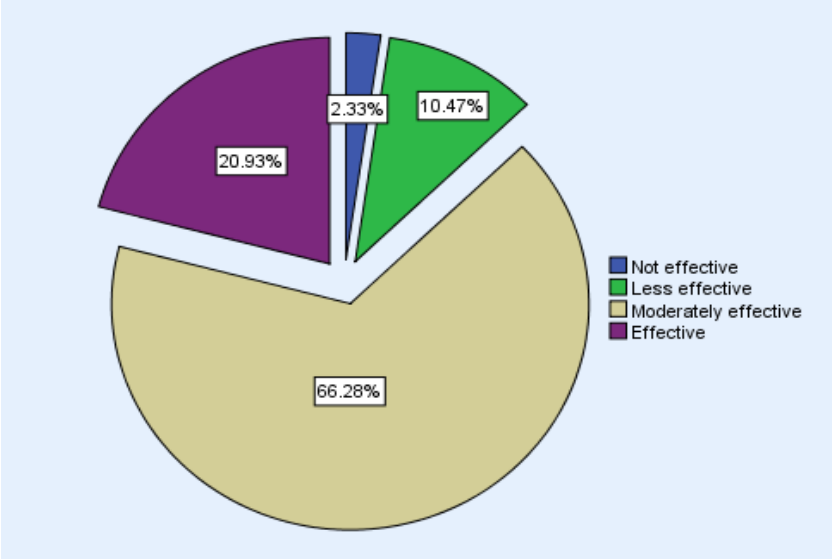


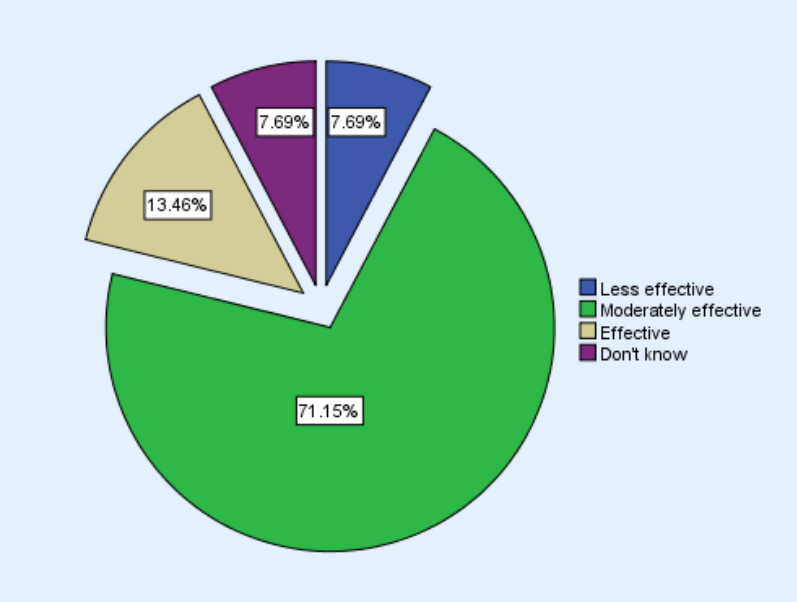
Table 5.5.1.2 and Figure 5.5.1.2 present the perspectives of officials regarding the impact of CF (Community Forest) management in the study areas. The findings reveal that a majority of officials (71.2 percent) considered CF management to be moderately effective. A smaller proportion of officials (7.7 percent) expressed the view that CF management was less effective. Conversely, 13.5 percent of the respondents indicated that CF management was effective.

It is noteworthy that the perception of both the communities and officials regarding the effectiveness of CF management aligns. Both groups share a similar view on the impact of Natural Resource Management (NRM) in the study areas.

Table 5.5.1.2: Distribution of Officials as per their Views on the Effectiveness of CF Management

Sl. No.	Extent of Effectiveness	Number	Percent
1	Not effective	4	7.7
2	Moderately effective	37	71.2
3	Effective	7	13.5
4	Do not know	4	7.7
Total		52	100.0

Figure 5.5.1.2: Percentage of Officials as per their Views on the Effect of CF Management



5.5.2 Community Fishery Management

Table 5.5.2.1 and Figure 5.5.2.1 show the Community members' views on the effect of CFi management in the study areas. Most respondents indicated that CFi management was Moderately effective, with 56.3 percent meaning that the CFi had legal recognition from the government and the CFi management committee was functioning. However, illegal fishing still happens in the CFi area. Nevertheless, 23.9 percent of the officials illustrated that the CFi management was effective because the CFi had legal recognition from the government with their management plan, and the CFi management committees actively participated in fisheries conservation. In contrast, 8.5 percent of the respondents understood that CFi management was not effective, and 11.3 percent was less effective. This means that the CFiMC did not work and was not functioning, and there were many illegal fishing activities in the CFi area and lost fisheries resources. However, 288 respondents were not interviewed on CFi management because they were not involved but engaged with other NRM activities.

Table 5.5.2.1: Distribution of CMs as per their Views on the Effect of CFi Management

Sl. No.	Extent of Effectiveness	Number	Percent
1	Not effective	6	8.5
2	Less effective	8	11.3
3	Moderately effective	40	56.3
4	Effective	17	23.9
	Total	71	100.0
	Missing system (Not involved)	288	
Total		359	

Source: Own Survey.

Figure 5.5.2.1: Percentage of CMs as per their Views on the Effect of CFi Management

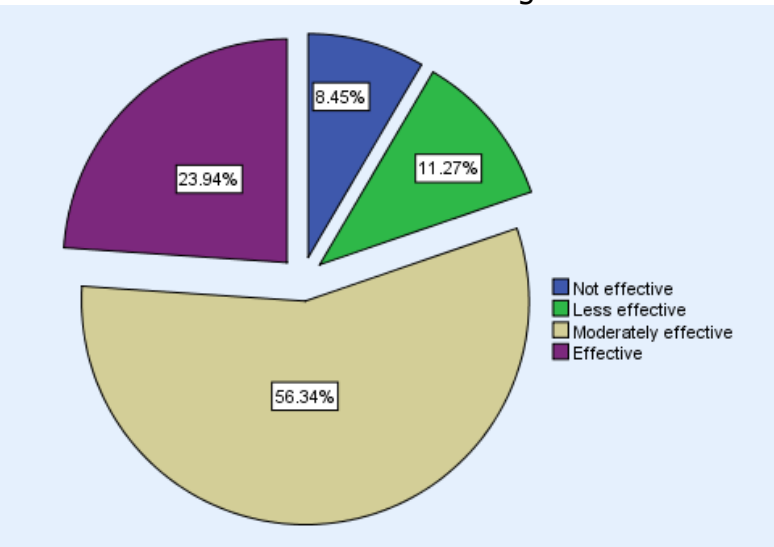


Table 5.5.2.2 and Figure 5.5.2.2 provide an in-depth analysis of officials' perspectives on the effectiveness of CFi management in the study areas. The findings indicate that CFi management was predominantly perceived as highly moderately effective, with an overwhelming majority of 82.7 percent of officials expressing this view. Furthermore, it is worth noting that a notable proportion of officials, comprising 5.8 percent of the respondents, viewed CFi management as effective. This subgroup of officials recognizes the tangible benefits and successful outcomes associated with CFi initiatives in the study areas.

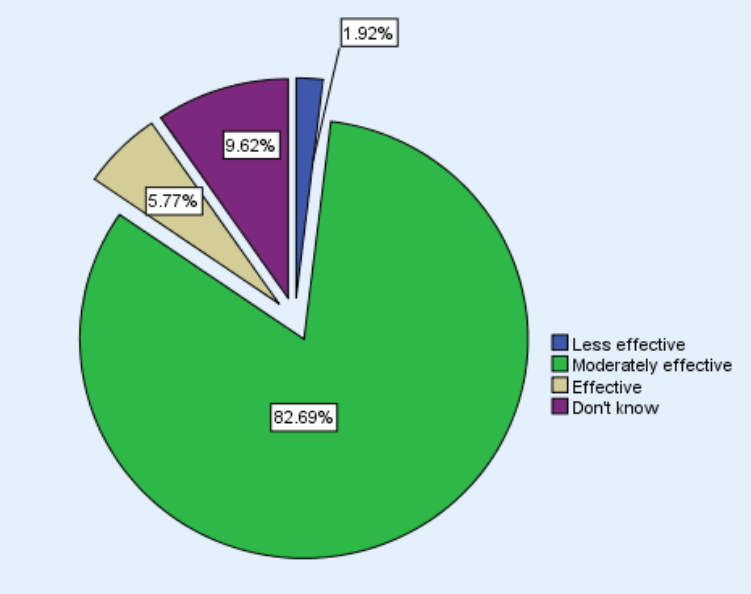
On the other hand, a small percentage of officials, specifically 1.9 percent of the respondents, indicated that CFi management was less effective. This critical perspective sheds light on areas where improvements or interventions are needed to enhance the effectiveness of CFi management in certain contexts.

Table 5.5.2.2: Distribution of Officials as per their Views on the Effect of CFi Management

Sl. No.	Extent of Effectiveness	Number	Percent
1	Less effective	1	1.9
2	Moderately effective	43	82.7
3	Effective	3	5.8
4	Do not know	5	9.6
Total		52	100.0

Source: Own Survey.

Figure 5.5.2.2: Percentage of Officials as per their Views on the Effect of CFi Management



5.5.3 Indigenous Communal Land Titling (ICLT)

Table 5.5.3.1 and Figure 5.5.3.1 illustrate the effect of ICLT. A majority, 59 percent, expressed their views of moderately effective ICLT because the IP community was under legally registered process at MoI, illegal logging and land encroachment activities were decreased, and there were some IP tradition and culture preservation activities. 35.9 percent for effective ICLT, because the IP community was legally registered at the Ministry of Interior (MoI), the IP community received legal collective land title from the

Ministry of Land Management Urban Planning and Cadastre (MoLMUPC), IP tradition and culture were preserved, communities have benefitted from the communal land on their livelihoods. Nevertheless, 5.1 percent of respondents viewed ICLT as less effective because the IP Community did not work well, and there were many illegal logging and land encroachment activities in the IP communal land. However, 320 respondents were not interviewed because they were not involved in IP collective land management. Nevertheless, they engaged in other NRM activities.

Table 5.5.3.1: Distribution of CMs as per their Views on the Effect of ICLT

Sl. No.	Extent of Effectiveness	Number	Percent
1	Less effective	2	5.1
2	Moderately effective	23	59.0
3	Effective	14	35.9
	Total	39	100.0
	Missing system (Not involved)	320	
	Total	359	

Source: Own Survey.

Figure 5.5.3.1: Percentage of CMs as per their Views on the Effect of ICLT

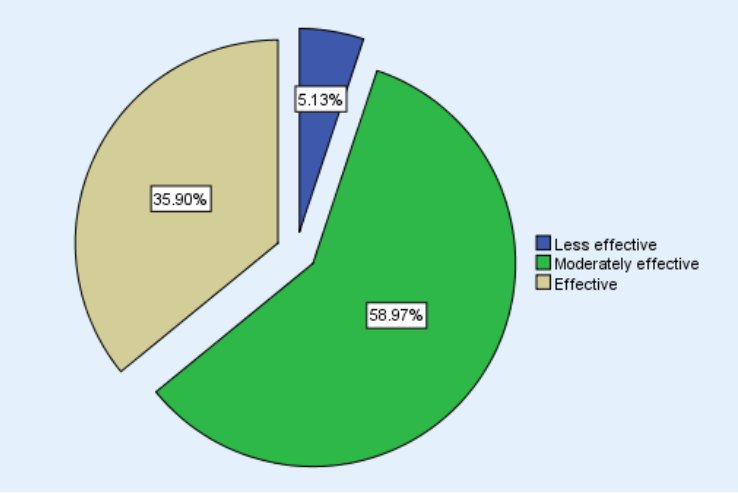


Table 5.5.3.2 and Figure 5.5.3.2 present an assessment of the effectiveness of ICLT management as perceived by officials. Approximately 33 percent of respondents indicated that ICLT management was moderately effective.

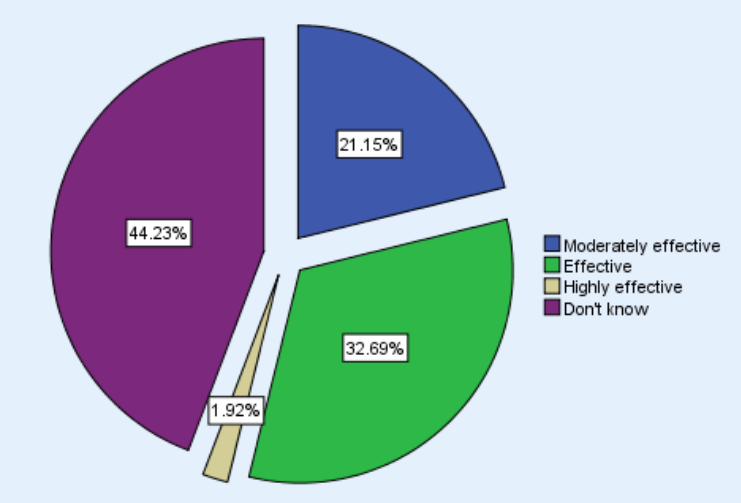
Furthermore, 21.2 percent of officials viewed ICLT management as effective, and interestingly, a small proportion of officials, comprising 1.9 percent of the respondents, considered ICLT management to be highly effective. However, it is important to note that a substantial portion of respondents, accounting for 44.2 percent, reported not knowing about the effectiveness of ICLT.

Table 5.5.3.2: Distribution of Officials as per their Views on the Effect of ICLT

Sl. No.	Extent of Effectiveness	Number	Percent
1	Moderately effective	11	21.2
2	Effective	17	32.7
3	Highly Effective	1	1.9
4	Do not know	23	44.2
Total		52	100.0

Source: Own Survey.

Figure 5.5.3.1: Percentage of Officials as per their Views on the Effect of ICLT



5.5.4 Community-Based Ecotourism

Table 5.5.5.1 and Figure 5.5.5.1 present the perspectives of local residents regarding the impact of Community-Based Ecotourism (CBET). Overall, the majority of respondents (86.2 percent) expressed that CBET had a moderate level of effectiveness. This implies that CBET was officially registered within the CBET management structure, had well-defined service provider groups, and generated income through its services.

In contrast, 13.8 percent of community members regarded CBET as effective due to its official registration with a functional management structure, clear marketing strategy, and diverse range of services. Additionally, CBET was observed to have increased incomes, utilized a portion of the profits for Natural Resource Management (NRM) and development initiatives, and generated income for the respondents. It is important to note that 314 respondents did not discuss CBET as they were not involved in CBET activities but instead were engaged in other NRM-related endeavors.

Table 5.5.4.1: Distribution of CMs as per their Views on the Effect of CBET

Sl. No.	Extent of Effectiveness	Frequency	Percent
1	Moderately effective	25	86.2
2	Effective	4	13.8
	Total	29	100
	Missing system (Note involved)	314	
	Total	359	

Source: Own Survey.

Figure 5.5.4.1: Percentage of CMs as per their Views on the Effect of CBET

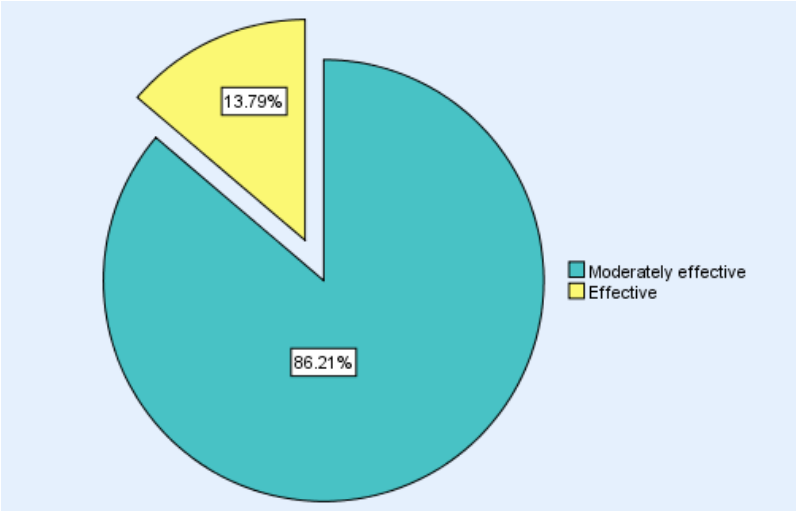


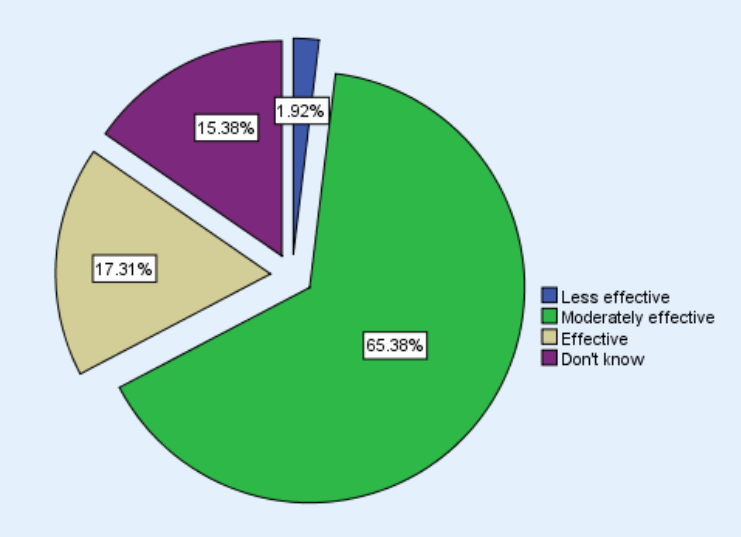
Table 5.5.4.2 and Figure 5.5.4.2 present the perspectives of officials regarding the effectiveness of Community-Based Ecotourism (CBET). The majority of officials (65.4 percent) expressed that CBET was moderately effective, followed by 17.3 percent who considered it effective. However, a small percentage (1.9 percent) mentioned it as less effective, and 15.4 percent admitted to not having a clear opinion on the matter. It is worth noting that officials' views on CBET were similar to those of the local communities.

Table 5.5.4.2: Distribution of Officials as per their Views on the Effect of CBET

Sl. No.	Extent of Effectiveness	Number	Percent
1	Less effective	1	1.9
2	Moderately effective	34	65.4
3	Effective	9	17.3
4	Do not know	8	15.4
Total		52	100.0

Source: Own Survey.

Figure 5.5.4.2: Percentage of Officials as per their Views on the Effect of CBET



5.5.5 Wildlife Sanctuary Management

Table 5.5.5.1 and Figure 5.5.6.1 demonstrate the community members' views on the effect of wildlife sanctuary (WS) management. Most respondents with 78.7 percent viewed wildlife sanctuary management as moderately effective. This percentage showed large because more conservation activities, including patrolling, awareness outreach, and communities, participated in conservation activities. However, poaching activities in WS still happened. Effective WS management was 16.9 percent because of the establishment of more conservation activities with strong community participation and a clear patrolling plan leading to decreased poaching activities. Fewer people mentioned that WS management was ineffective because they thought there were many poaching activities in the PA and strongly decreased its biodiversity. However, 270 respondents were not discussed the effect of wildlife sanctuary management because they were not involved in this activity but engaged with other NRM activities.

Table 5.5.5.1: Distribution of CMs as per their Views on the Effect of WS Management

Sl. No.	Extent of Effectiveness	Frequency	Percent
1	Not effective	1	1.1
2	Less effective	3	3.4
3	Moderately effective	70	78.7
4	Effective	15	16.9
	Total	89	100.0
	Missing system (Not involved)	270	
	Total	359	

Source: Own Survey.

Figure 5.5.5.1: Percentage of CMs as per their Views on the Effect of WS Management

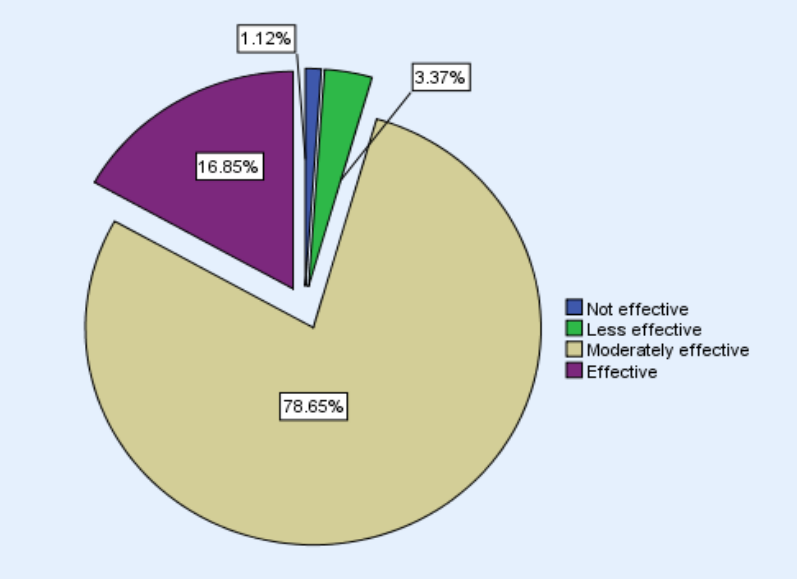


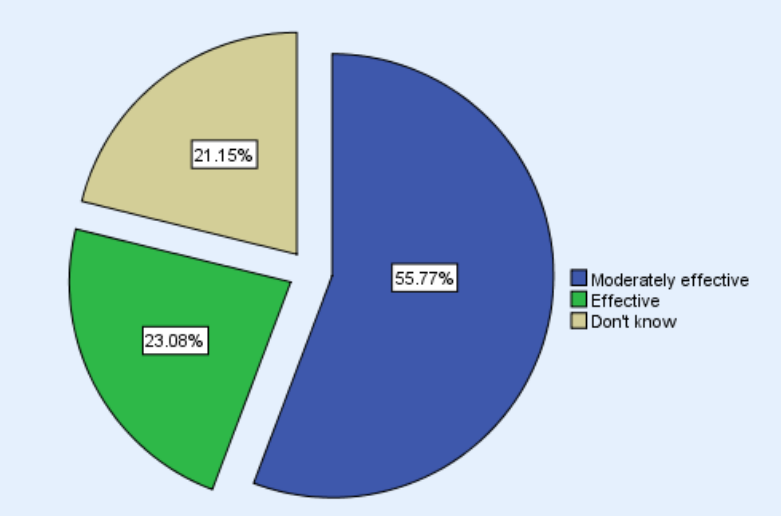
Table 5.5.5.2 and Figure 5.5.5.2 display the perspectives of officials regarding the impact of wildlife sanctuary (WS) management. The majority of respondents (55.8 percent) considered WS management to be moderately effective. Meanwhile, 23.1 percent of the respondents acknowledged WS management as effective, while 21.2 percent indicated that they did not have a clear opinion on the matter.

Table 5.5.5.2: Distribution of Officials as per their Views on the Effect of WS Management

Sl. No.	Extent of Effectiveness	Number	Percent
1	Moderately effective	29	55.8
2	Effective	12	23.1
3	Do not know	11	21.2
Total		52	100.0

Source: Own Survey.

Figure 5.5.5.2: Percentage of Officials as per their Views on the Effect of WS Management



5.6 Sustainability of Natural Resource Management

Table 5.6.1 and Figure 5.6.1 mention the community members' views on the sustainability of the NRM without the NGOs and Government's support. Most respondents, 43.5 percent, stated that they could moderately sustain the NRM activities after the project. 37 percent mentioned slightly sustain, 11.4 percent responded no sustain, and 5 percent replied they did not know. Although, 3.1 percent of the interviewees answered that they could sustain the NRM activities even if there were no support from the government and NGOs because the community was functioning with clear role and responsibilities, and

the community also had a strong capacity to lead NRM activities. Moreover, the community had community financial schemes such as CF credit and members' fees, which the community can use some of the community's funds for community NRM activities.

Table 5.6.1: Distribution of CMs as per their Views on the Sustainability of NRM

Sl. No.	Sustainability of the NRM	Frequency	Percent
1	Do not know	18	5.0
2	Not sustained	41	11.4
3	Slightly sustained	133	37.0
4	Moderately sustained	156	43.5
5	Sustained	11	3.1
Total		359	100.0

Source: Own Survey.

Figure 5.6.1: Percentage of CMs as per their Views on the Sustainability of NRM

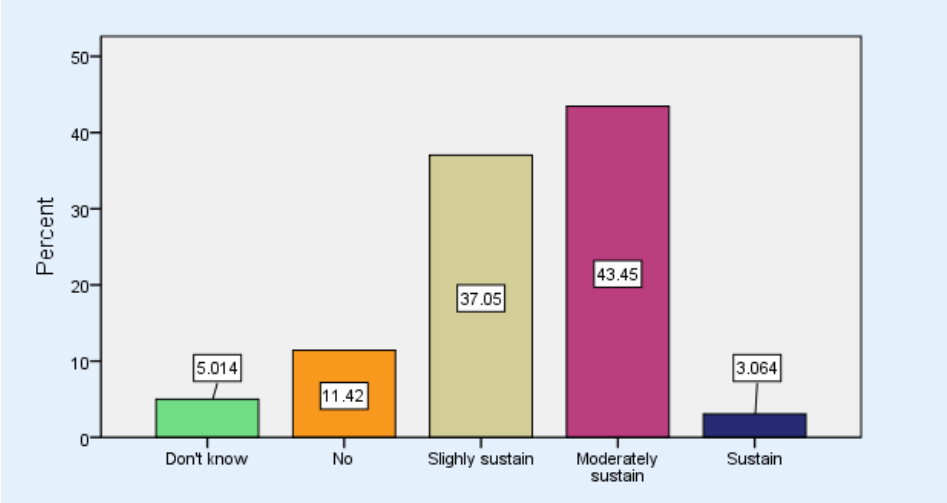


Table 5.6.2 and Figure 5.6.2 present the perspectives of officials regarding the sustainability of NRM without the support of NGOs and the government. The majority of respondents (46.2 percent) indicated that communities could sustain NRM activities to a slight extent after the project. Additionally, 36.5 percent mentioned that the sustainability of NRM activities would be moderate, and 1.9 percent responded that communities could

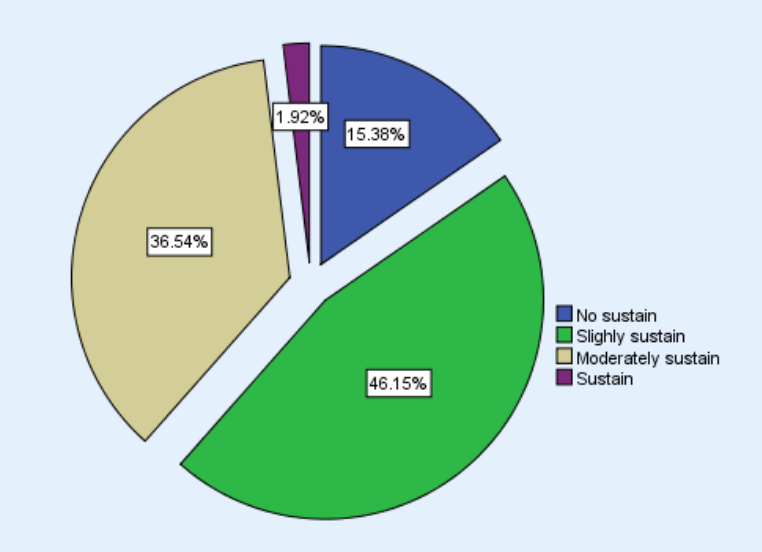
sustain themselves effectively. However, it is worth noting that 15.4 percent of officials expressed concerns that communities would not be able to sustain themselves without external support for NRM activities.

Table 5.6.2: Distribution of Officials as per their Views on the Sustainability of NRM

Sl. No.	Sustainability of the NRM	Frequency	Percent
1	No sustained	8	15.4
2	Slightly sustained	24	46.2
3	Moderately sustained	19	36.5
4	Sustained	1	1.9
Total		359	100.0

Source: Own Survey.

Figure 5.6.2: Percentage of Officials as per their Views on the Sustainability of NRM



5.7 Effect of NRM on Socioeconomic Development

5.7.1 House

Table 5.7.1.1 and Figure 5.7.1.1 provide information on the community members' house conditions before and after the project. Overall, before and after the project implementation, most people had houses of wood and zinc (zinc for the roof). According

to the respondents after the project, a remarkable improvement in their houses from wood-bamboo to thatch, wood-bamboo to zinc, wood, tile, or zinc was found.

Before the project, about 35.7 percent of respondents had wood and zinc houses, and 24.5 percent had houses made of wood with bamboo and zinc. In addition, 23.4 percent of the respondents had wood with bamboo and thatch houses and 7.2 percent with wood and tile houses. Lastly, less than 5 percent of the respondents had concrete with tile, concrete with zinc, and concrete with wood and tile.

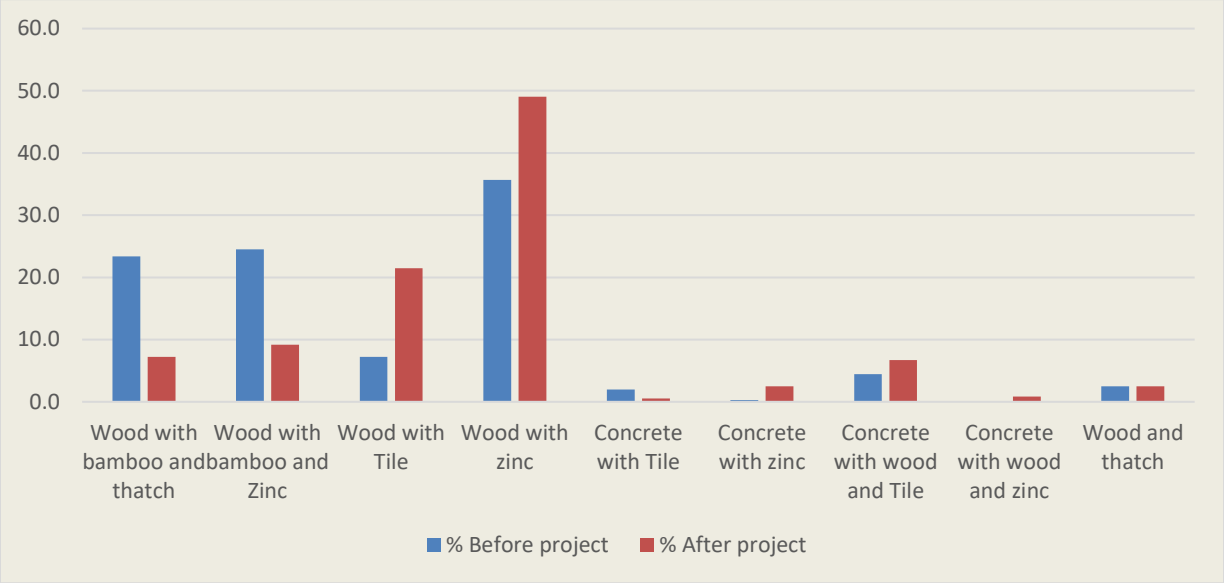
After the project, almost 49 percent of respondents had houses made of wood and zinc, followed by 21.4 percent of wooden with tile houses, 9.2 percent of wood-bamboo with zinc houses, 7.2 percent of wood-bamboo and thatch, and 6.7 percent of concrete with zinc houses. Lastly, less than 3 percent of the people had houses made of; concrete with tile, concrete with zinc, concrete with wood and zinc, and wood with thatch.

Table 5.7.1.1: Distribution of CMs on their Type of House, Before and After the NRM Project

Sl. No.	Type of House	Before the Project		After the Project	
		Number	Percent	Number	Percent
1	Wood with bamboo and thatch	84	23.4	26	7.2
2	Wood with bamboo and Zinc	88	24.5	33	9.2
3	Wood with Tile	26	7.2	77	21.4
4	Wood with zinc	128	35.7	176	49.0
5	Concrete with Tile	7	1.9	2	.6
6	Concrete with zinc	1	.3	9	2.5
7	Concrete with Wood and Tile	16	4.5	24	6.7
8	Concrete with wood and zinc	-	-	3	.8
9	Wood and thatch	9	2.5	9	2.5
Total		359	100.0	359	100.0

Source: Own Survey.

Figure 5.7.1.1: Percentage of CMs on their Type of House, Before and After the Project



5.7.2 Household Equipment

Table 5.7.2.1 and Figure 5.7.2.1 illustrate the percentages of the respondents' house equipment for consumption before and after the project. Before the project, most people had simple equipment such as bicycles, phones, radios, and TV. In contrast, most respondents had additional motorbikes and agriculture machines after the project. Consequently, this finding shows that respondents improved from basic equipment to basic equipment, motorbike, and agricultural machine (tractors, water pumps, and rice mills).

Before the project, 45.1 percent of the respondents had simple equipment for household consumption, 18.9 percent had simple equipment and a motorbike, and 16.7 percent had simple equipment plus a motorbike and agricultural machine. In addition, 8.9 percent had simple equipment plus a boat with an engine. In addition, less than 5 percent of the respondents had simple equipment plus motorbike and boat with engine, simple

equipment plus motorbike and car, and simple equipment plus motorbike, car, and agricultural machine.

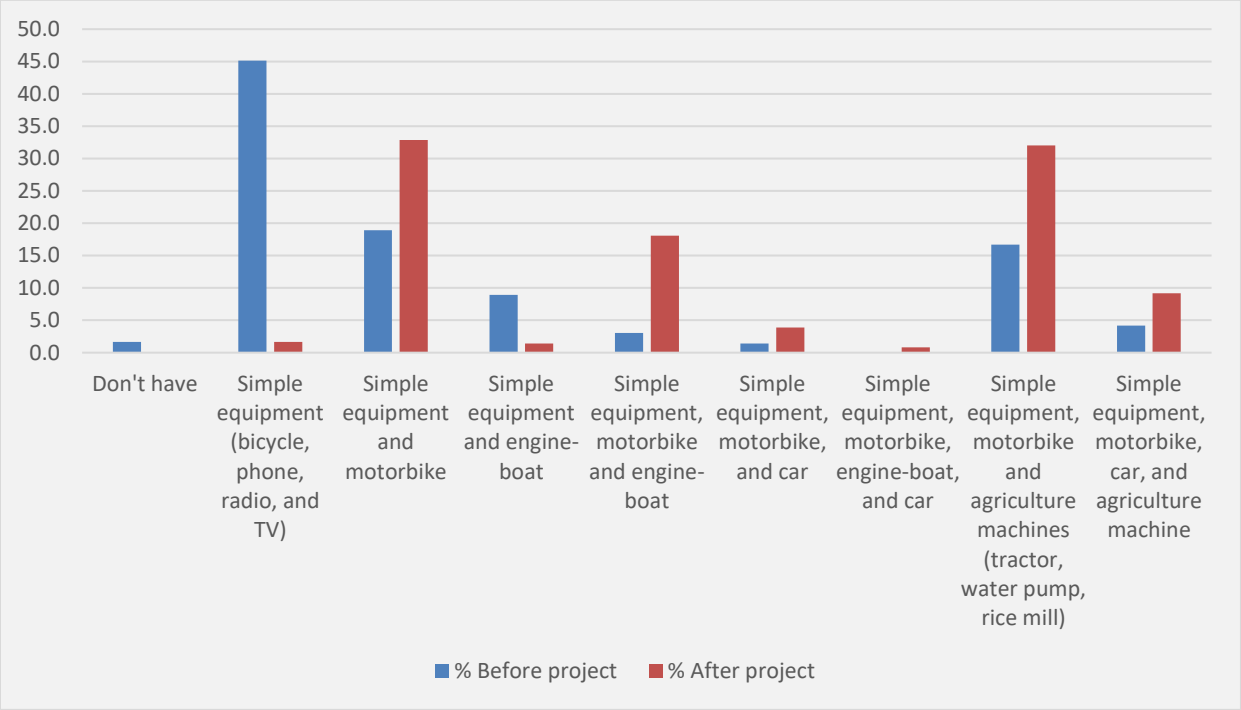
After the project, most respondents, 32.9 percent, had simple equipment and motorbikes, and 32 percent had simple equipment, motorbikes, and agriculture machines—moreover, 18.1 percent had simple equipment, motorbikes, and engine-boats, and 9.2 percent had simple equipment, motorbikes, cars, and agriculture machines. In contrast, less than 4 percent had simple equipment with motorbikes and cars, simple equipment with engine-boats, and simple equipment.

Table 5.7.2.1: Distribution of CMs as per their Views on the Type of Household Equipment They Possessed Before and After the NRM Project

Sl. No.	Type of Household Equipment	Before the Project		After the Project	
		Number	Percent	Number	Percent
1	Do not have	6	1.7	0	0
2	Simple equipment (bicycle, phone, radio, and TV)	162	45.1	6	1.7
3	Simple equipment and motorbike	68	18.9	118	32.9
4	Simple equipment and engine-boat	32	8.9	5	1.4
5	Simple equipment, motorbike, and engine-boat	11	3.1	65	18.1
6	Simple equipment, motorbike, and car	5	1.4	14	3.9
7	Simple equipment, motorbike, engine-boat, and car	0	0	3	.8
8	Simple equipment, motorbike, and agriculture machine (tractor, water pump, rice mill)	60	16.7	115	32.0
9	Simple equipment, motorbikes, car, and agriculture machine	15	4.2	33	9.2
Total		359	100.0	359	100.0

Source: Own Survey.

Figure 5.7.2.1: Percentage of CMs as per their Views on the Type of Household Equipment they Possessed Before and After the NRM Project



5.7.3 Electricity Supply

Table 5.7.3.1 and Figure 5.7.3.1 provide information about the percentages of respondents who used electricity as the source of energy supply before and after the project implementation. Overall, the people had improved their sources of electricity supply from using the battery (before the project) to consuming solar and the state electricity called EDC (after the project). In addition, after the project, most people used solar as their source of electricity supply.

Before the project, 57.4 percent of the people used batteries, and 27.6 percent of respondents consumed oil lamps and other traditional lighter for lighting in their houses. In addition, 11.4 percent of community members consumed solar as their electricity supply, and less than 3 percent of people used state electricity and private generator. In

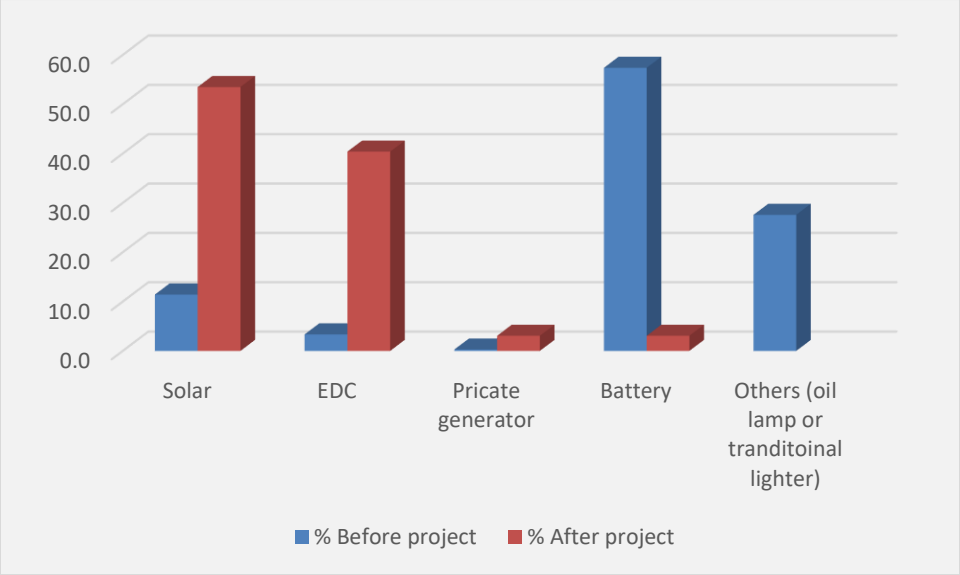
comparison, after the project, most people, 53.5 percent, used solar, 40.4 percent consumed state electricity (EDC), and 3.1 percent used private generators and batteries, respectively.

Table 5.7.3.1: Distribution of CMs as per their Views on the Electricity Supply Before and After the NRM Project

Sl. No.	Type of Electricity Supply	Before project		After project	
		Number	Percent	Number	Percent
1	Solar	41	11.4	192	53.5
2	EDC	12	3.3	145	40.4
3	Pricate generator	1	.3	11	3.1
4	Battery	206	57.4	11	3.1
5	Others (oil lamps or traditional lighters)	99	27.6	-	-
Total		359	100	359	100

Source: Own Survey.

Figure 5.7.3.1: Percentage of CMs as per their Views on the Electricity Supply Before and After the NRM Project



5.7.4 Income Source

Table 5.7.4.1 and Figure 5.7.4.1 show the community members' income sources before and after the project implementation. Overall, before the project, the utmost respondents' sources of income were farming (rice and other farming) and fishing, while after the project, most respondents' sources of income were farming, livestock, and fishing.

Before the project, approximately 27.6 percent of respondents' sources of income were from farming and fishing, 20.9 percent from farming and livestock, 12.8 percent from farming and labor work, 10.6 percent from farming, livestock, and fishing, 6.7 percent from farming and other supplementary incomes, and 5.6 percent from fishing and labor work. Less than 5 percent of the respondents depended on a single firming, farming with logging and hunting, farming with livestock and fishing and salary, and farming with livestock and grocery and logging.

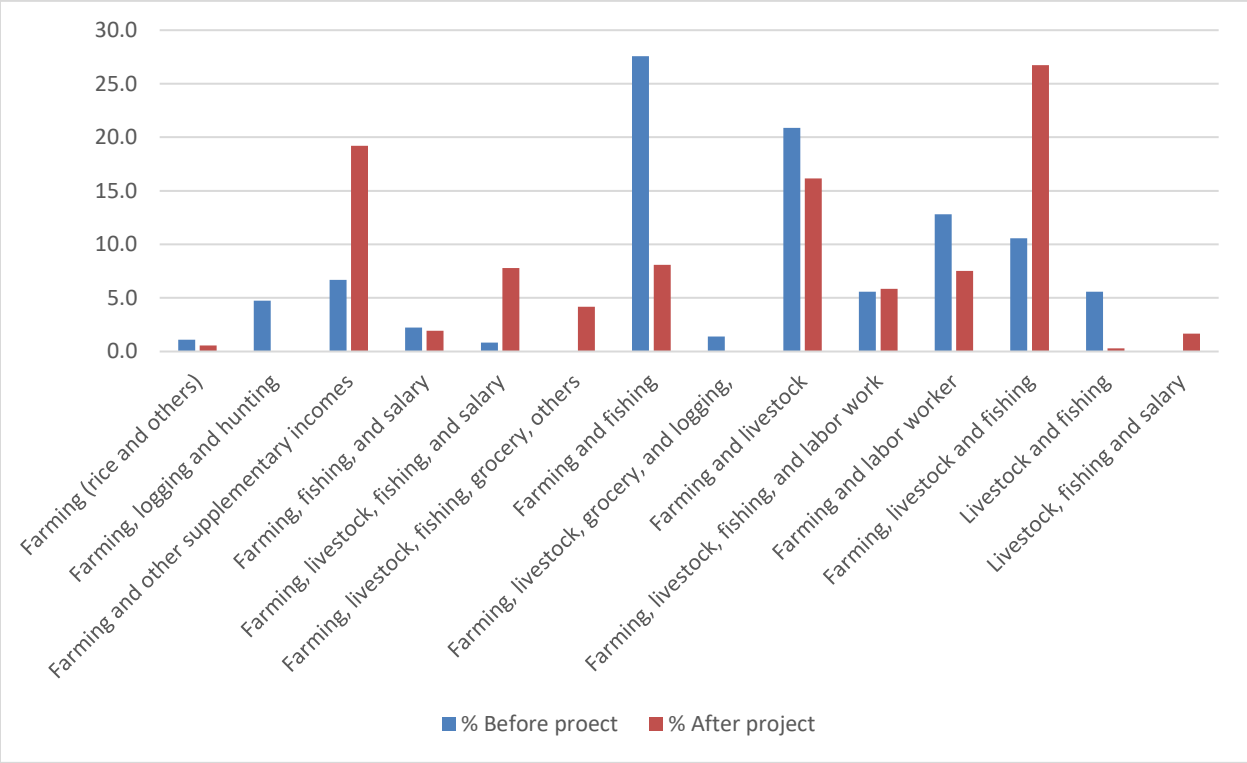
After the project, approximately 26.7 percent of the respondents generated their incomes from farming with livestock and fishing, 19.2 percent from farming and other supplementary incomes, and 16.2 percent from farming and livestock. Less than nine percent of community members depended on farming and fishing, farming with livestock and fishing and salary, farming and labor work, farming-livestock plus fishing and salary, farming-fishing-livestock plus labor work with grocery and others, and fuel farming, and farming-fishing.

Table 5.7.4.1: Distribution of CMs as per their Views on the Sources of Income Before and After the NRM Project

Sl. No.	Sources of Income	Before the Project		After the Project	
		Number	Percent	Number	Percent
1	Farming (rice and others)	4	1.1	2	0.6
2	Farming, logging and hunting	17	4.7	0	0
3	Farming and other supplementary incomes	24	6.7	69	19.2
4	Farming, fishing, and salary	8	2.2	7	1.9
5	Farming, livestock, fishing, and salary	3	.8	28	7.8
6	Farming, livestock, fishing, grocery, and others	-	-	15	4.2
7	Farming and fishing	99	27.6	29	8.1
8	Farming, livestock, grocery, and logging	5	1.4	-	-
9	Farming and livestock	75	20.9	58	16.2
10	Farming, livestock, fishing, and labor work	20	5.6	21	5.8
11	Farming and labor worker	46	12.8	27	7.5
12	Farming, livestock, and fishing	38	10.6	96	26.7
13	Livestock and fishing	20	5.6	1	0.3
14	Livestock, fishing, and salary	-	-	6	1.7
Total		359	100	359	100

Source: Own Survey.

Figure 5.7.4.1: Percentage of CMs as per their Views on the Sources of Income Before and After the NRM Project



5.7.5 Income Level

Table 5.7.5.1 and Figure 5.7.5.1 demonstrate the information on the different annual income groups of the community members before and after the project. Overall, before the project, most respondents generated between USD1,500-2,000 per year compared to USD 2,000-5,500 after the project. This indicates an increase in respondents' annual incomes after the project.

Before the NRM project, 27.9 percent of the respondents generated an annual income between USD 1,500- 2,000, 18.4 percent earned between USD 2,500-3,000, and 18.9

percent between USD 2,000-2,500 per year. In addition, 10 percent of the community members generated their annual incomes between USD 1,000-1,500, 9.2 percent earned between USD 3,000-3,500, 6 percent between USD 500-1,000), and 4.7 percent between USD 3,500-4,000. Nevertheless, fewer respondents earned between USD 4,000-4,500, 4,500-5,000, and 5,000-2,500.

After the project, 22.8 percent of the local people made their annual incomes between USD 4,000-4,500, followed by 18.7 percent between USD 3,000-3,500, 15.3 percent between USD 2500-3000, 10.3 percent between USD 2,500-3,000), and 9.7 percent between USD 1500-2000, respectively. In contrast, no respondents earned an annual income between USD 500-1,000 compared to before the project 6.4 percent. In addition, the respondents generated USD 4,000-4,500, 4,500-5,000, and 5,000-5,500 increased from less than 1 percent before the project to 17 percent and 23 percent after the project.

The Chi-square results show a significant improvement in the income level of the community members after the implementation of the natural resource management project activities in the study area. The Chi-square value is estimated at 690.577 with 90 degrees of freedom and 0.000 significance level. So, the null hypothesis "Ho 1: Natural Resource Management is not effective in improving the income level of the community members in the study area" is rejected, because the data illustrates significant change in the annual income distribution among respondents before and after the NRM project. Before the project, a considerable percentage of respondents earned between USD 1,000 to USD 3,000 annually, with fewer earning beyond USD 3,000. However, after the project,

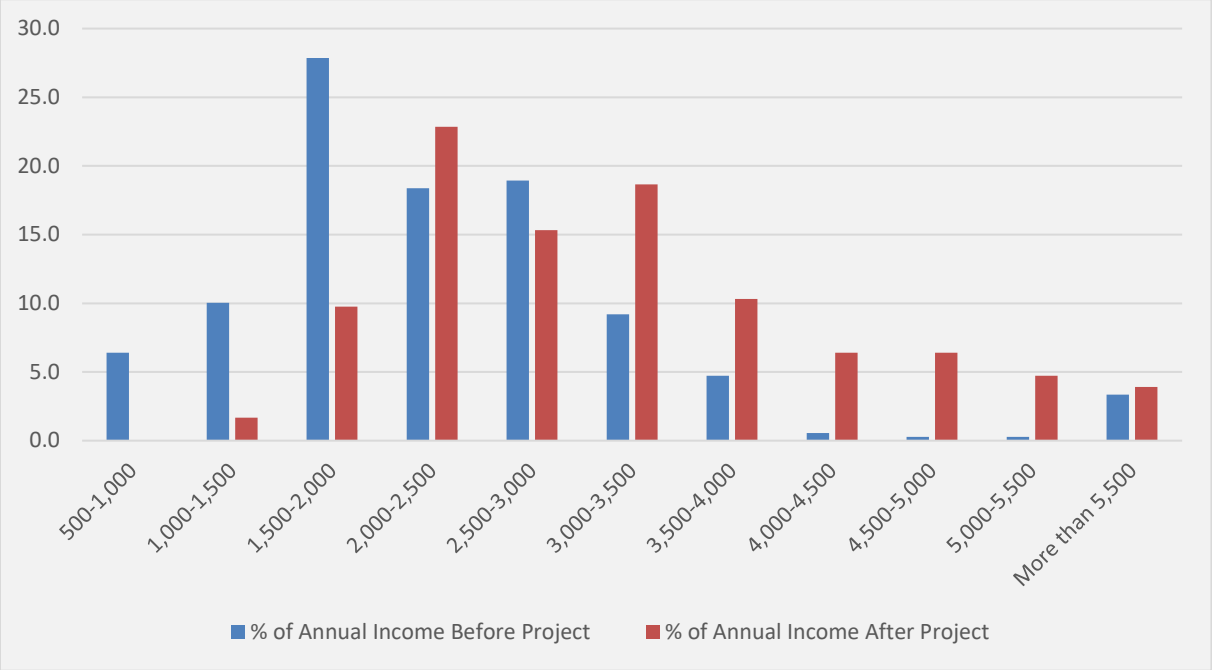
there was a notable shift towards higher income brackets, particularly between USD 2,500 to USD 4,500 and even higher.

Table 5.7.5.1: Distribution of CMs as per their Views on the Annual Income Level Before and After the NRM Project

Sl. No.	Annual Income Level (In USD)	Before the Project		After the Project	
		Number	Percent	Number	Percent
1	500 - 1,000	23	6.4	-	-
2	1,000 - 1,500	36	10.0	6	1.7
3	1,500 - 2,000	100	27.9	35	9.7
4	2,000 - 2,500	66	18.4	82	22.8
5	2,500 - 3,000	68	18.9	55	15.3
6	3,000 - 3,500	33	9.2	67	18.7
7	3,500 - 4,000	17	4.7	37	10.3
8	4,000 - 4,500	2	.6	23	6.4
9	4,500 - 5,000	1	.3	23	6.4
10	5,000 - 5,500	1	.3	17	4.7
11	More than 5,500	12	3.3	14	3.9
Total		359	100	359	100
X^2 Value = 690.577		df = 90		Sig. Level = 0.000	

Source: Own Survey.

Figure 5.7.5.1: Percentage of CMs as per their Views on the Annual Income Level Before and After the NRM Project



5.7.6 Expenditure Level

Table 5.7.6.1 and Figure 5.7.6.1 provide information on the numbers and percentages of the community members in different annual expense groups before and after the project. The respondents' annual expenses increased from USD 1,500- 2,000 to USD 2,000-2,500.

Before the project, the annual expense distribution among the respondents was: 32 percent spent between USD 1,500-2,000, 20.3 percent between USD 2,000-2,500, 19.2 percent between USD 1,000-1,500, 12.5 percent between USD 2,500-3,000, and 8.4 percent between USD 500-1,000. However, only 4.5 percent spent between USD 3,000-3,500, and less than 2 percent spent between USD 4,000-4,500, USD 5,000-5,500, and more than USD 5,500.

After the project, 29.2 percent of the respondents spent between USD 2,000-2,500 per

year, followed by 21.4 percent between USD 2,500-3,000, 17 percent between USD 3,000-3,500), 9.5 percent between USD 1,500-2,000, 9.2 percent between USD 3,500-4,000, and 6.4 percent spent between USD 1,000-1,500. Nevertheless, a few percentages of the respondents annually spent between USD 500-1000, USD 4,000-4,500, USD 4,500-5,000, USD 5,000-5,500), and more than USD 5,500.

Overall, the data indicates a notable shift in the annual expense distribution among respondents before and after the project. Before the project, a significant portion had expenses between USD 1,000 to USD 3,000, with fewer spending beyond USD 3,000. After the project, there was a shift towards higher expense brackets, particularly between USD 2,000 to USD 3,500. The Chi-square result, as mentioned in the table below, reveals a significant increase in the expense level of the community members after implementing the natural resource management project activities in the study area compared to that before the project activities.

The Chi-square analysis, as shown in the table below, demonstrates a substantial increase in community members' expense levels after the implementation of natural resource management project activities in the study area compared to before the project. With a Chi-square value of 854.532, 80 degrees of freedom, and a significance level of 0.000, the null hypothesis "Ho 2: Natural Resource Management is not effective in improving the expense level of the community members in the study area" is accepted

Table 5.7.6.1: Distribution of CMs as per their Views on the Annual Expense Level Before and After the NRM Project

Sl. No.	Annual Expense Level (In USD)	Before the Project		After the Project	
		Number	Percent	Number	Percent
1	500 - 1,000	30	8.4	2	0.6
2	1,000 - 1,500	69	19.2	23	6.4
3	1,500 - 2,000	115	32.0	34	9.5
4	2,000 - 2,500	73	20.3	105	29.2
5	2,500 - 3,000	45	12.5	77	21.4
6	3,000 - 3,500	16	4.5	61	17.0
7	3,500 - 4,000	0	0	33	9.2
8	4,000 - 4,500	1	0.3	6	1.7
9	4,500 - 5,000	0	0	4	1.1
10	5,000 - 5,500	3	0.8	6	1.7
11	More than 5,500	7	1.9	8	2.2
Total		359	100	359	100
X^2 Value = 854.532		df = 80		Sig. Level = 0.000	

Source: Own Survey.

Figure 5.7.6.1: Percentage of CMs as per their Views on the Annual Expense Level Before and After the NRM Project

5.7.7 Saving

Table 5.7.7.1 and Figure 5.7.7.1 show the community members' annual saving groups before and after the project implementation. Before the project, most respondents, 39.3 percent, saved less than USD 500, 34.8 percent saved between USD 500-1,000, 15 percent saved between USD 1,000-1,500, and a few percent of the respondents saved between USD 1,500-2,000 and 2,000-2,500. However, 7 percent of the people could not save.

After the project, almost 33.7 percent of the respondents yearly saved between USD 500-1000, 31.2 percent saved less than USD 500, 16.7 percent saved between USD 1000-1,500, and 8.1 percent saved between USD 1,500-2,000. Nevertheless, 10.3 percent of the respondents could not save.

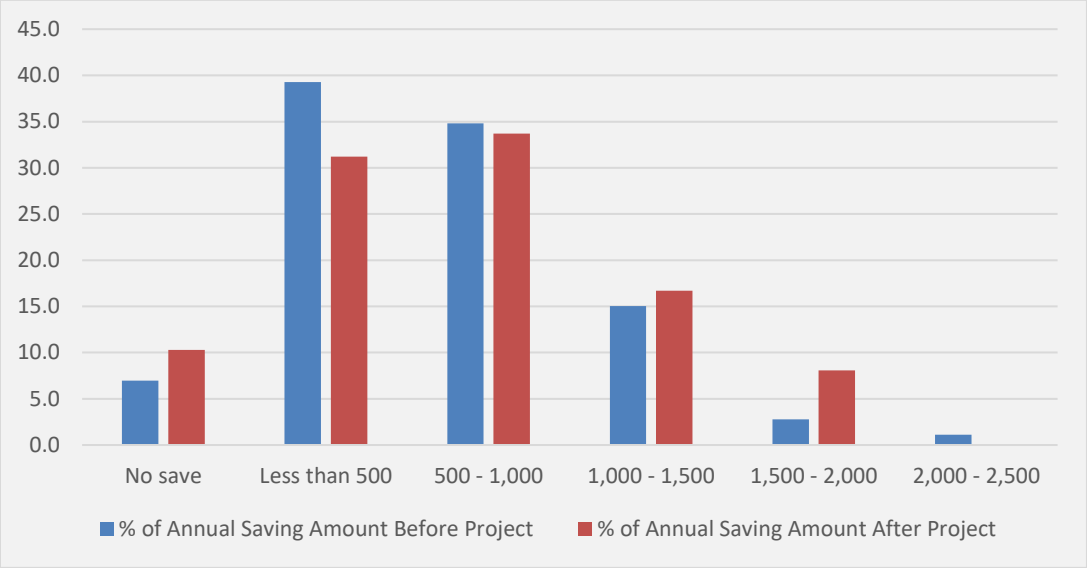
The Chi-square result as mentioned in below table indicates that there was a significant decline in the saving amount level of the community members after the implementation of the natural resource management project activities in the study area as compared to that before the project, because of the inflation, and the communities spent more agricultural production, including fertilizer and fuel for the generator for irrigating. The Chi-square value is estimated at 225.280 with 20 degrees of freedom and 0.000 significance level. Hence, the null hypothesis "Ho 3: Natural Resource Management is not effective in improving the saving amount level of the community members in the study area" is not rejected.

Table 5.7.7.1: Distribution of CMs as per their Views on the Amount of Saving Before and After the NRM Project

Sl. No.	Annual Saving Amount (In USD)	Before Project		After Project	
		Number	Percent	Number	Percent
1	No saving	25	7.0	37	10.3
2	Less than 2,000,000	141	39.3	112	31.2
3	2,000,000-3,999,999	125	34.8	121	33.7
4	4,000,000-5,999,999	54	15.0	60	16.7
5	6,000,000-7,999,999	10	2.8	29	8.1
6	8,000,000-9,999,999	4	1.1	-	-
Total		359	100	359	100
X^2 Value = 225.280		df = 20	Sig. Level = 0.000		

Source: Own Survey.

Figure 5.7.7.1: Percentage of CMs as per their Views on the Amount of Saving Before and After the NRM Project



5.8 Challenges Faced in Natural Resource Management

Table 5.8.1 and Figure 5.8.1 provide information on the distribution of the community members as per their views on the Natural Resources Management challenges. Overall, illegal fishing activity is a significant challenge to natural resources management, followed by illegal logging, land encroachment, and hunting. The graph shows that 37.3 percent of the respondents indicated illegal fishing as a threat to natural resources, and around 18 percent illegal logging, land encroachment, and hunting. Moreover, 13.1 percent of the respondents indicated illegal logging, fishing, land encroachment and hunting as the natural resource management challenges, seven percent illegal logging and land encroachment, and 2.5 percent were concerned about the proposed hydropower dam.

Table 5.8.1: Distribution of CMs as per their Views on the Challenges They Observed Different NRM Activities

Sl. No.	Types of Challenges	Frequency	Percent
1	I do not know	8	2.2
2	Illegal fishing	134	37.3
3	Illegal logging	67	18.7
4	Land encroachment	5	1.4
5	Logging for charcoal	2	.6
6	Illegal logging and land encroachment	25	7.0
7	Illegal logging, land encroachment and hunting	62	17.3
8	Concern on the proposed hydropower dam	9	2.5
9	Illegal logging, fishing, land encroachment, and hunting	47	13.1
Total		359	100.0

Source: Own Survey.

Figure 5.8.1: Percentage of CMs as per Their Views on the Challenges They Observed in Different NRM Activities

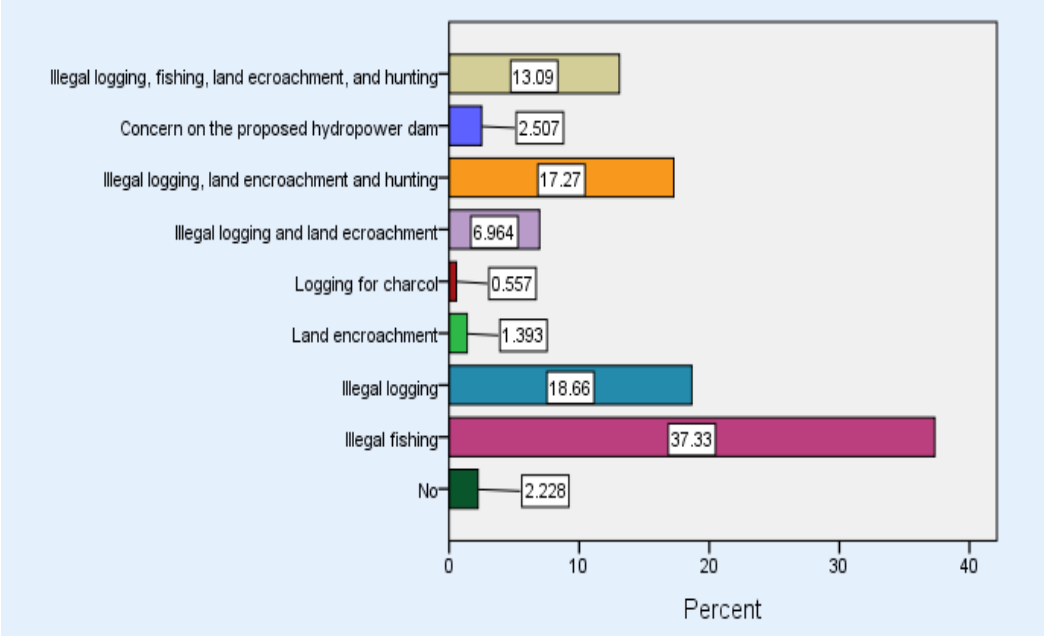
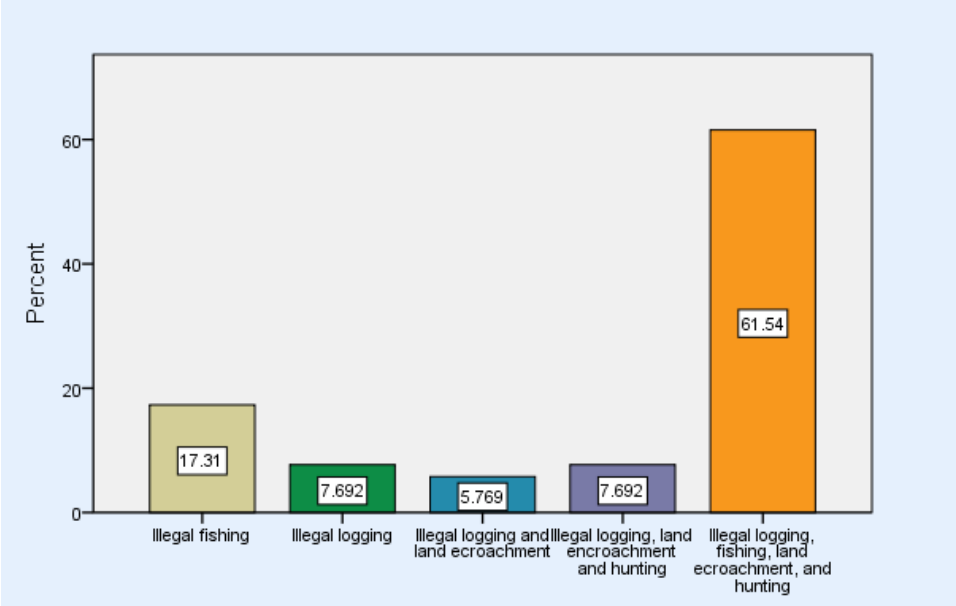


Table 5.8.2 and Figure 5.8.2 demonstrate information of the officials on the Natural Resources Management challenges. Overall, illegal logging, fishing, land encroachment, and hunting threaten natural resources. 61.5 percent of respondents mentioned these concerns. However, the local people provided their views on an individual threat, as illegal fishing is a significant threat with 17.3 percent, followed by 7.7 percent illegal logging.

Table 5.8.2: Distribution of Officials as per Their Views on the Challenges They Observed Different NRM Activities

Sl. No.	Types of Challenges	Number	Percent
1	Illegal fishing	9	17.3
2	Illegal logging	4	7.7
3	Illegal logging and land encroachment	5	5.8
4	Illegal logging, land encroachment and hunting	4	7.7
5	Illegal logging, fishing, land encroachment, and hunting	32	61.5
Total		52	100.0

Table 5.8.2: Percentage of Officials as per Their Views on the Challenges They Observed Different NRM Activities



5.9 Discussion of the Findings

From the above analysis, the findings of the study are discussed as follows:

- Community-Based Natural Resource Management (CBNRM) has been recognized as an effective approach to managing natural resources, particularly in fostering community involvement and sustainable practices. CBNRM does not only empower local communities by granting them rights and responsibilities over natural resources but also fosters a sense of stewardship, ensuring long-term sustainability. By integrating traditional ecological knowledge with modern conservation techniques, CBNRM enhances biodiversity protection while supporting local livelihoods through ecotourism, sustainable agriculture, and wildlife conservation programs. Additionally, it promotes social cohesion by encouraging collective decision-making and equitable resource distribution, reducing conflicts over land and resource access. Many successful CBNRM initiatives have demonstrated that when communities directly benefit from conservation, they are more likely to protect and manage their resources efficiently. Agrawal and Ostrom (2001) emphasized that collective action and local governance are essential for sustainable resource use, showing that communities engaged in managing their resources often achieve better conservation outcomes. Similarly, Musavengane and Simatele (2016) highlight the role of social capital in collaborative environmental management, indicating that community-based approaches can enhance resource management by promoting cooperation among local stakeholders. These findings underscore the effectiveness of CBNRM in empowering local communities and promoting sustainable practices.

However, for CBNRM to be truly effective, it requires strong institutional support, legal frameworks, financial resources, and continuous community capacity-building to overcome challenges.

- The findings indicate that Natural Resource Management (NRM) activities implemented in the study area—Community Forestry and Fisheries, Protected Area Development and Management, Indigenous Collective Land Titling, Wildlife Sanctuary Management, and Community-Based Ecotourism Management—were moderately effective. This suggests that while these initiatives contributed to conservation and sustainable resource use, they also faced challenges that limited their full potential.

  Community Forestry and Fisheries (CF and CFi) initiatives likely helped improve local livelihoods and resource sustainability by granting communities rights to manage forests and fisheries. However, the moderate effectiveness suggests that issues such as illegal logging, overfishing, weak community enforcement, or lack of technical support may have hindered their success. Without proper monitoring and enforcement, overexploitation of resources can still occur, reducing long-term sustainability.

  Protected Area (PA) and Wildlife Sanctuary management plays a crucial role in conserving biodiversity, preventing habitat destruction, and supporting ecosystem services. However, the moderate effectiveness indicates possible challenges such as inadequate funding, weak enforcement, human-wildlife conflicts, and competing land-use interests. In many cases, local communities may not be fully engaged in

protected area management, leading to conflicts over resource access and limited conservation success.

Indigenous Collective Land Titling is essential for securing land rights, preventing land grabbing, and promoting sustainable land management by indigenous communities. However, moderate effectiveness suggests that bureaucratic delays, legal complexities, or conflicts over land tenure may have slowed progress or created disputes within communities. Without clear legal frameworks and strong institutional support, land titling efforts may not fully empower indigenous groups or prevent encroachment on their territories.

Community-Based Ecotourism management is a promising approach to generating income while promoting conservation. However, moderate effectiveness may indicate issues such as uneven benefit-sharing, lack of infrastructure, insufficient marketing, or environmental degradation due to unmanaged tourism activities. Sustainable ecotourism requires careful planning, capacity-building, and fair distribution of benefits to ensure that both conservation and community development goals are met.

Several general factors may have contributed to the moderate effectiveness of these NRM activities. Limited financial and technical resources may have restricted the ability to implement and sustain projects effectively. Weak governance and enforcement could have led to ineffective policies and resource mismanagement. Community participation and capacity might have been insufficient in some cases, affecting the overall success of initiatives. Conflicts over resource use between

conservation efforts and economic activities such as agriculture or infrastructure development may have posed additional challenges. Additionally, climate change and environmental stress could have impacted resource sustainability, making it more difficult to achieve long-term conservation goals.

- CF and CFi management were moderately effective due to the prevalent poaching activities, including illegal logging, fishing, and land encroachment, within these areas. The CF and CFi communities in the study area are legally registered and operate under established management plans, with most communities actively engaged in their governance. However, poaching continues to be a significant issue, largely attributed to limited law enforcement capabilities that fall outside the communities' control and responsibilities. The findings highlight the complex challenges these communities face in protecting their resources. While the CF and CFi areas are legally registered and have established management plans, the ongoing poaching activities—such as illegal logging, fishing, and land encroachment—underscore significant gaps in enforcement and oversight. This situation indicates that simply having a management plan is insufficient without the necessary support and resources to ensure compliance and effectively protect these areas. For instance, many Community Fisheries in Cambodia struggle with limited resources and capacity, which hampers their ability to manage local fishery resources effectively (Souter, 2024).

  The moderate effectiveness of CF and CFi management can also be attributed to external pressures that extend beyond the communities' immediate control. Limited

law enforcement capabilities hinder the communities' ability to address poaching, which is often driven by economic incentives and demand for natural resources. This not only threatens the sustainability of the CF and CFi areas but also undermines the hard work and commitment of community members who strive to manage these resources responsibly. In Cambodia, many CFi members face challenges due to insufficient resource mobilization and knowledge gaps, which complicate their ability to engage in effective fisheries management (WorldFish, 2024).

Moreover, the presence of poaching activities raises critical questions about the broader governance and regulatory frameworks in place. It highlights the need for more robust support from governmental and non-governmental organizations to bolster enforcement efforts. Strengthening collaboration between local communities and law enforcement agencies could enhance the capacity to combat illegal activities effectively.

Community forestry and fisheries have been integral to local governance, allowing communities to manage resources sustainably while improving livelihoods. According to a study by Keng et al. (2017), community forestry initiatives in Cambodia have effectively enhanced forest cover and biodiversity while providing economic benefits to local populations.

- The study reveals that Indigenous Communal Land Titling (ICLT) is moderately effective in securing land rights for Indigenous Peoples (IP) communities. While many of these communities are legally registered with the Ministry of Interior (MoI), they have not yet received formal communal land titles. This lack of titling

contributes to ongoing challenges, such as increased illegal logging and land encroachment within ICLT areas.

Indigenous collective land titling is increasingly recognized as a crucial strategy for securing land rights, which can lead to improved resource management and reduced conflicts over land use. By formally recognizing indigenous land rights, communities are better empowered to manage their natural resources sustainably, fostering a sense of ownership and stewardship. A study by McCarthy et al. (2019) highlights that acknowledging and enforcing indigenous land rights is essential for sustainable resource management. This recognition not only supports environmental conservation but also enhances social cohesion within communities. When communities have secure land rights, they are more likely to invest in the sustainable management of those resources, thereby mitigating issues such as illegal logging and encroachment.

In conclusion, while ICLT processes are in place, the lack of communal land titles remains a significant barrier to effective resource management and the protection of Indigenous rights. Strengthening legal frameworks and expediting the titling process are critical steps needed to empower Indigenous communities, safeguard their lands, and promote sustainability in resource management.

- The findings indicate that community-based ecotourism (CBET) management in Cambodia has achieved a moderate level of effectiveness. Although CBET initiatives are officially registered and have established management structures with service provider groups, the benefits have not been equitably distributed among community

members. While the initiative has generated income through services supported by NGOs and the government, many community members remain excluded from the economic opportunities created by ecotourism. The CBET has the potential to foster environmental conservation while simultaneously providing economic benefits to local communities. By involving local residents in the management and operation of ecotourism activities, these initiatives can enhance awareness and commitment to conservation. As noted in a report by the Asian Development Bank (ADB, 2020), successful CBET programs engage communities not only in generating income but also in educating visitors about sustainable practices, which can lead to greater appreciation for local ecosystems. However, the limited number of community members benefiting from these initiatives raises concerns about the inclusivity and sustainability of CBET. For ecotourism to be truly effective, it must ensure that economic benefits are shared widely among all community members, particularly marginalized groups. This inclusivity is crucial for fostering a sense of ownership and responsibility toward local resources, which can enhance conservation efforts.

- The findings regarding Wildlife Sanctuary management indicate a moderate level of effectiveness in conservation efforts. The government has taken important steps by designating Protected Areas (PAs) and actively involving local communities in various conservation activities, such as patrolling, awareness outreach, and livelihood development. This community engagement is crucial, as it fosters a sense of ownership and responsibility toward local natural resources. However, despite these efforts, poaching activities—such as illegal logging, land encroachment, and

hunting—persist within the PAs. This ongoing illegal activity highlights significant challenges in enforcement and oversight. The presence of poaching not only threatens biodiversity but also undermines the hard work of communities and conservation authorities striving to protect these areas.

The moderate effectiveness of wildlife sanctuary management suggests that while the framework for conservation is in place, there are gaps in implementation that need to be addressed. Factors contributing to poaching may include insufficient law enforcement resources, lack of community incentives, and economic pressures that drive individuals to engage in illegal activities for survival.

To enhance the effectiveness of wildlife sanctuary management, it is essential to strengthen enforcement mechanisms and support community-based initiatives that provide alternative livelihoods. This could involve increasing investment in training local communities to monitor and protect their resources, as well as creating economic opportunities that reduce reliance on poaching. Furthermore, increasing awareness and education about the importance of conservation can help shift community attitudes and behaviors towards more sustainable practices.

Protected area development and management have also gained attention, with initiatives aimed at conserving biodiversity and promoting sustainable tourism. The establishment of wildlife sanctuaries, such as the Cardamom Mountains Protected Forest, has been crucial for conserving endangered species and habitats, as highlighted by the World Wildlife Fund (WWF, 2019).

- The findings indicate that the implementation of the Natural Resource Management (NRM) project has led to an increase in annual incomes for local communities. Respondents reported a rise in their incomes from approximately USD 1,500-2,000 per year to USD 2,000-2,500. This increase suggests that the NRM project has successfully enhanced economic opportunities. However, the data also reveal a critical concern: despite the increase in income, the overall savings did not improve. The relatively high expenses incurred after the project implementation have offset the income gains. This situation highlights several underlying issues that warrant attention. Firstly, while income growth is a positive outcome, it is essential to assess the sustainability of this increase. The rise in expenses was attributed to various factors, such as increased costs of living, and necessary investments in resources for maintaining livelihoods. Secondly, the lack of increased savings raises questions about financial literacy and budgeting within the communities. If individuals are unaware of how to manage their finances effectively, they may struggle to set aside savings even when their income rises. This suggests a need for complementary training in financial management, which could help community members better allocate their resources and improve their overall financial stability. Lastly, it is crucial to consider the broader economic context. If external factors, such as inflation or market fluctuations, contribute to rising expenses, the benefits of the NRM project may not be fully realized. Therefore, ongoing monitoring and support are necessary to ensure that communities can sustain their income gains and adapt to changing economic conditions.

- The study reveals significant challenges surrounding the sustainability of Community-Based Conservation (CBC) efforts following the implementation of NRM projects. While a few communities have successfully managed to sustain their initiatives independently, the majority remain heavily reliant on ongoing support from NGOs and government entities. This dependency primarily stems from the absence of community funds necessary for executing conservation activities. Only a small number of communities demonstrated the ability to continue their conservation work without external assistance, indicating that self-sustainability is not widespread. A critical barrier to sustainability is the lack of community-generated funds. Without financial resources, these communities struggle to implement and maintain their conservation initiatives. Additionally, the study highlights that the government provides a limited financial investment for NRM at the commune level. A systematic review of CBC projects found that project design and local community characteristics significantly influence the success of these initiatives, highlighting the importance of capacity building and financial support for long-term sustainability (Brooks et al. 2013). Furthermore, the review noted that many communities do not have the necessary resources to continue their conservation efforts independently, which underscores the need for sustained external assistance. Additionally, the lack of government investment in community-level conservation efforts can severely limit the effectiveness of these projects. The review suggests that without adequate funding and prioritization from governmental bodies, communities may find it

challenging to achieve their conservation goals and maintain the benefits derived from their initiatives (Brooks et al. 2013).

These findings underscore the importance of developing a more robust framework for community engagement in conservation. Capacity building is essential, providing training and resources that empower communities to create their own funding mechanisms and management strategies. Furthermore, advocating for increased government investment in community-based conservation initiatives is crucial to ensure that the NRM projects are prioritized and adequately funded. Long-term planning is also necessary to establish sustainable models that allow communities to generate income and manage resources effectively without solely relying on external support.

- The findings demonstrate significant challenges in NRM, with illegal fishing and logging emerging as the primary threats identified by local communities. These illegal activities are not just minor inconveniences; they pose serious risks to the conservation areas that these communities rely on for their livelihoods and ecological health. As community members voiced their concerns, it became clear that illegal fishing and logging were not merely environmental issues; they were deeply intertwined with the fabric of local life. The depletion of fish stocks and the destruction of forests directly impact the resources that families depend on for sustenance and income. This understanding emphasizes the critical need for communities to protect their natural resources against these encroachments.

Moreover, these findings highlight a significant gap in enforcement and management strategies within conservation areas. The prevalence of illegal activities suggests that existing measures are insufficient, leaving communities feeling vulnerable and powerless. Without effective law enforcement, these areas risk becoming unsustainable, leading to long-term ecological damage that can affect not only the environment but also the very livelihoods of the people who inhabit these regions. Moreover, land encroachment is also a key threat that often overlaps, intensifying the challenge faced by communities. Addressing these multifaceted challenges requires an integrated approach that fosters collaboration between local communities, NGOs, and government agencies. Effective NRM is not just about enforcing laws; it's about engaging communities in decision-making processes and empowering them to take an active role in conservation. By doing so, communities can feel a greater sense of ownership over their resources, which can lead to more sustainable practices (Agrawal et al. 1999).

5.10 Conclusion

Community-based NRM is the critical approach commonly used in the study area, including community forestry, community fisheries, community-based ecotourism, IP communal land community, and community-protected areas. In addition, the local communities also played an essential role in conserving the natural resources in the protected area, such as participating in patrolling, doing biodiversity research, and raising community awareness. In addition, the study showed that these conservation approaches and activities were moderately effective. It is because poaching activities, including illegal

logging, fishing, land encroachment, and hunting, still existed in the conservation areas, which caused the degradation of biodiversity. Moreover, the study found that only a few communities could sustain their work after the support. In contrast, more communities required continued financial and technical support because they could not sustain their work without NGOs and government support.

The local communities increased their incomes after the NRM project implementation. Most community members increased their annual income from USD1,500-2,000 annually to USD 2,000-2,500. However, the saved value was not increased because the expense after the project was relatively high.

NRM challenges include illegal fishing, logging, land encroachment, hunting, charcoal, and the proposed hydropower dam. However, illegal fishing and logging are the main threats the communities raised their concerns about because they were happening notably in the conservation areas.

References:

Agrawal, A., & Gibson, C. C. (1999). Enchantment and disenchantment: The role of community in natural resource conservation. *World Development*, 27(4), 629-649.

Keng, S., Chheang, S., & Sann, S. (2017). The role of community forestry in sustainable forest management in Cambodia. *Journal of Forest Research*, 22(4), 615–620.

McCarthy, J. F., Poteete, A. R., & Tumen, S. (2019). Land tenure and community-based natural resource management in Cambodia: Recent developments and future challenges. *Land Use Policy*, 83, 352–360.

Souter, N. J. (2024). *Building community capacity to manage freshwater fisheries in Cambodia*. PANORAMA.

WorldFish. (2024). *Case Study: Enhancing Community Fisheries Management in Cambodia through Peer-to-Peer Learning*.

Asian Development Bank. (2020). *Community-based ecotourism: Engaging local communities in conservation and economic development*.

CHAPTER VI

FINDINGS, CONCLUSION, RECOMMENDATIONS, AND SCOPE FOR FURTHER RESEARCH

The chapter summarizes the study's main findings and conclusion, and it provides recommendations for improving natural resource management and the scope for further research. For this purpose, the chapter is classified into four sections; the first section illustrates the main findings of the study resulting from the data analysis and interpretation, the second section demonstrates the conclusion of the findings, the third section provides recommendations for future improvement of the natural resources management, and lastly, address the scope for further research.

6.1 Key Findings of the Study

The study-wise main findings of the study are illustrated below:

Chapter one describes the main introduction, background, and problems of natural resources management in the globe, mainly in developing countries, as below:

- Natural resources management (NRM) is the term for the effective and sustainable use and preservation of natural resources, both renewable and non-renewable. The natural capitals that supply ecosystem services for a higher quality of life for people include land, water, air, minerals, forests, fisheries, and biodiversity.
- Natural resources are the cornerstone of human existence, advancement, and prosperity and a significant source of national wealth around the world. Natural

resources that are properly managed produce advantages that support and enhance livelihoods, raise living standards, and promote long-term growth. Natural resources can create a significant amount of employment possibilities.

- Community-Based Natural Management (CBNRM), one of the conservation strategies, pushes for global objectives of social justice, environmental health, and economic empowerment while attempting to achieve such desirable natural resource management goals. Programs, policies, and initiatives under the CBNRM umbrella combine government decentralization, the transfer of control over common-pool resources to local communities, and community involvement in developing local-level solutions based on grassroots efforts.
- Degradation of land and water resources, sedimentation of waterways, depletion of forest resources and biodiversity, and depletion of fisheries are the main environmental issues that impoverished farmers in Asia and the Pacific face. In addition, numerous national and international organizations have started research and development programs for NRM in response to growing concerns about the destruction of natural resources and the sustainability of agricultural production potential in many underdeveloped regions of the world.
- Degradation of the forest cover is a significant concern that threatens the loss of biodiversity habitats. Therefore, forest conversion to other land uses is essential for developing policies and measures to reduce the loss of forests and their associated carbon emission.

- Conflicts between livelihood and conservation objectives have been the agenda of many discussions over the last two decades to plan and promote long-term conservation in the protected area. Appropriate management of protected areas requires a complete understanding of the existing conditions, accurate implementation, planning, and regular supervision.

The following research questions are used to guide the research study:

i. What natural resource management approaches and strategies have the government and NGOs executed in Kratie and Stung Treng Provinces?
ii. To what extent do conservation practitioners face challenges in natural resource management in the study area?
iii. What is the effectiveness of natural resource management in community-based conservation and sustainability in the study area?
iv. What are the socio-economic developments that have taken place due to natural resource management in the study area?

In addition, the study's goal was to assess the effect of natural resource management on community conservation, sustainability, and socio-economic development. To address this specific goal, the research has focused on the following objectives:

i. To review the related literature of the study.
ii. To explore the natural resource management approaches and strategies that the government and NGOs have executed in the study area.

iii. To find out the challenges conservation practitioners face in natural resource management in the study area.

iv. To assess the effectiveness of natural resource management in community-based conservation and sustainability in the study area.

v. To examine the effectiveness of natural resource management in socio-economic development in the study area.

vi. To provide recommendations for better conservation and natural resource management by the government and NGO partners for sustainable natural resource management that would further the community-based conservation, sustainability, and socio-economic development of the people in the study area.

The hypotheses, which have been tested in the study, are mentioned below:

$H_0$1: Natural Resource Management is not effective in improving the income level of the community members in the study area.

$H_0$2: Natural Resource Management is not effective in improving the expense level of the community members in the study area.

H_o3: Natural Resource Management is not effective in improving the saving amount level of the community members in the study area.

Chapter two has made both conceptual and empirical reviews of the relevant literature. The main results of the literature reviews are indicated below:

- Natural Resources Management (NRM) refers to the sustainable use and protection of significant natural resources, for instance, land, water, air,

minerals, forests, fisheries, and biodiversity. NRM controls how people and the environment interact. It combines the preservation of biodiversity, water management, and the industry's long-term viability. Additionally, NRM is consistent with the idea of sustainable development and requires participation from various relevant stakeholders at all levels.

- Integrated natural resource management (INRM) refers to the responsible and broad-based management of the land, water, forest, and biological resources base, including genes required to maintain agricultural output and avoid degradation of prospective productivity.
- NRM combines economics, ecology, and social sciences to determine "values" or environmental characteristics of particular natural locations; the term "value" continues to be ambiguous due to many interpretations.
- Landscape management involves taking an integrated approach, defined by ecosystems rather than borders, considering both conservation and sustainable use of biological diversity components, and placing people and their sociocultural resources at the center of the conservation framework. In addition, biodiversity conservation aims to protect people and other species.
- The overall framework of the Conservation of Biological Diversity (CBD) is the significant global agreement on biodiversity's sustainable use and conservation. The CBD has three main goals: 1) conservation of biological diversity, 2) sustainable use of its components, and 3) fair and equitable sharing of benefits from genetic resources.

- A society's social and economic transformation process based on cultural and environmental factors is known as socio-economic development. It describes how individuals' lifestyles change due to their education, earnings, skill development, and job. The social, biological, skill, political, scientific, technological, and literary fields need to be improved to strengthen the weaker groups.
- Community-Based Natural Resource Management (CBNRM) has been embraced throughout East and Southern Africa as rural economic development and natural resource management strategy. It primarily refers to a strategy and evolution of local natural resource management that aims to enhance sustainability through openness, accountability, and widespread community and resource user engagement in decision-making.
- CBNRM is a co-management strategy that encourages and empowers local people to exercise their management rights over natural resources, so enabling local communities to actively participate in the long-term protection and management of those resources.
- CBNRM anticipates achieving three aspects of sustainability; 1) The social institution sustainability is community participation in conservation, equity, and sense of community ownership, social coherence, and encouraging diversity in the communities, 2) The sustainability of livelihoods includes direct and indirect economic advantages, such as improvements in education and health, where infrastructure was developed to ensure that the people have access to their

basic requirements and to promote a high standard of living in the communities, and 3) Natural resource sustainability refers to maintaining biodiversity and wildlife with sustainable use and management.

- In Cambodia, CBNRM projects frequently aim to safeguard water, fisheries, forests, ecosystem goods, and services. Community-based organizations (CBOs) come in various forms, such as CFi for the conservation of fish stocks and breeding grounds, CF for the protection and restoration of forests, farmer water user community for the administration of irrigation systems, and CBET for the preservation of ecosystem services like forests and wildlife.
- A protected Area (PA) is defined as a geographic area of land or water that is primarily dedicated to protecting biological diversity, natural resources, and resources with cultural significance. It is managed through legal or other effective means to achieve the long-term conservation of nature, including ecosystem services and cultural values.
- The PA is of utmost importance for preserving biodiversity in the face of the global crisis of species extinction and losing the universal natural capacity for supporting human habitat. It is the basis for the creation and application of all national and international conservation strategies, set aside to maintain functioning natural ecosystems, to maintain ecological processes, and to protect biodiversity and species from extinction.
- Ecosystem services are typically divided into three categories: 1) supporting services (soil formation, primary productivity, and nutrient cycling), 2)

provisioning services (fresh water supply, food, fiber, timber, and fuel products, bio-chemical or genetic resources), and 3) regulating services (equable climate, porosity, and biodiversity).

- Ecosystem Management (EM) emphasizes ecological interactions within an ecosystem over human activities, implying that entire ecosystems may be understood, controlled, and managed. On the other hand, Ecosystem-Based Management (EBM) is an integrated, science-based approach to the management of natural resources
- Forests have always provided many services to humanity, from cultural and religious significance to a wide range of economic and environmental services. Moreover, Recent developments in the forestry sector have been significantly influenced by rising social expectations for the use of forest resources and a growing trend toward the consolidation and globalization of the forest industry.
- Agriculture and natural resources are seen to be the key sources of small-scale rural livelihoods as well as the circumstances of food production. In Sustainable Rural Livelihoods, national resources are seen as the natural capitals of rural households' and communities' livelihoods.

Chapter three has explained the details of the methodology of the study. This includes sources of data, types of respondents, statistical tools for data analysis and testing hypotheses, how to select the sample for individual interviews, and how data have been collected, processed, and analyzed.

Chapter four has explained the context of natural resource values and natural resource management approaches in the Kratie and Stung Treng provinces, and the conservation areas as the critical habitats that have been legally developed and legally registered by the government of Cambodia, with financial support from NGOs and development partners, as below:

- Kratie and Stung Treng provinces have similar geographical areas and socio-economic statuses. Stung Treng Province shares the border with Loa PDR, while Kratie has a border with Vietnam. Kratie has 11,094 km^2, with a total population of 429,908. Kratie and Stung Treng are home of indigenous people, including Phnong, Kouy, Stieng, Mil, Kroal, Thmorn, and Khaonh.
- The upper Mekong River in Kratie and Stung Treng has high biodiversity values, for instance, wetlands, fisheries species, Irrawaddy dolphin, flooded and terrestrial forests, critical bird species, and other resources. The landscape has a complex of freshwater ecosystems, including wetlands, sandy, and rocky riverine habitats. Its unique habitat hosts one of the world's most diverse and prolific freshwater ecosystems. Current estimates of the biota in the areas include 411 inland fish species, 37 species of mammals, 281 species of birds, 52 species of reptiles and amphibians, and 674 vascular plants.
- The Government of Cambodia has designated critical conservation areas to protect these biodiversity values, including Dolphin's Managerial Projection Zones, Mekong Fisheries Biodiversity Conservation and Management Zone, Sambo Prek Prasab Wildlife Sanctuary, Sambo Wildlife Sanctuary, Stung Treng Ramsar Site, Siem Pang

and Siem Pang Kang Lech wildlife sanctuaries, Community Forestry and Fisheries, and Community Protected Areas.

- Natural resource management activities in Kratie and Stung Treng are including protected area management (Patrolling and law enforcement, livelihood development, zonation of the area, payment of ecosystem services..etc), dolphin conservation (Patroling, law enforcement, awareness outreach, livelihoods development, and policy influencing), Indigenous collective land titling (supporting Indigenous communities to secure their rights in sustainable collective land use, community forestry, fisheries, and protected areas (Support communities to have legal rights in sustainable forest and fisheries resource management), and community-based ecotourism development and management.

Chapter five has illustrated the analysis of the effect of natural resource management on community conservation, sustainability, and socio-economic development. The main findings of this chapter are as below:

- Community-Based Natural Resource Management (CBNRM) has been recognized as an effective approach to managing natural resources, particularly in fostering community involvement and sustainable practices. The collective action and local governance are essential for sustainable resource use, showing that communities engaged in managing their resources often achieve better conservation outcomes. These findings underscore the effectiveness of CBNRM in empowering local communities and promoting sustainable practices.

- NRM activities that have been implemented in the study area are; community forestry and fisheries, protected area development and management, indigenous collective land titling, wildlife sanctuary management, and community-based ecotourism management. In addition, these activities were moderately effective.
- CF and CFi management were moderately effective because poaching activities, including illegal logging, fishing, and land encroachment, existed a lot in the CF and CFi areas. The CF and CFi communities in the study area were legally registered with their management plans, and most communities were functioning and active. Nevertheless, poaching happens because of limited law enforcement beyond the communities' control and responsibilities.

- The study found that Indigenous Communal Land Titling (ICLT) is moderately effective because most IP communities were under a legally registered process at MoI, and those communities had not been provided communal land titling. Additionally, there were more illegal logging and land encroachment activities in the ICLT areas.
- Community-based ecotourism management was moderately effective. The CBET was officially registered with the CBET management structure, with service provider groups. CBET generated income from the services under the support of NGOs and the government. However, fewer community members benefited from ecotourism. Community-based ecotourism management in Cambodia has shown promise in fostering environmental conservation while providing economic opportunities.

- The wildlife sanctuary management was moderately effective. The government designated the PAs, and more conservation activities, including patrolling, awareness outreach, and livelihood development communities, participated in conservation activities. However, poaching activities, such as logging, land encroachment, and hunting, exist in the PAs.
- The local communities increased their incomes after the NRM project implementation. Most respondents increased their annual income from USD1,500-2,000 per year to USD 2,000-2,500. However, the saved value was not increased because the expense after the project was relatively high.
- The study found that a few communities could sustain their work after the support. In contrast, more communities required continued support, and they could not sustain their work without support from NGOs and the government, because they did not have community funds to execute conservation activities. Moreover, the NRM was not the government's priority, and the government invested limited funds at the commune level.
- NRM challenges include illegal fishing, logging, land encroachment, hunting, charcoal, and the proposed hydropower dam. However, illegal fishing and logging are the main threats the communities raised their concerns about because they were happening notably in the conservation areas.

Chapter six has summarized the study's significant findings along with the conclusion and recommendations for future natural resource management in Kratie and Stung Treng provinces and the entire country.

6.2 Conclusion of the Study

The government agencies, including the Forestry and Fisheries Administration, Ministry of Environment, civil society organizations, private sector, and development partners, were the critical actors in supporting local authorities and communities to promote sustainable natural resource management. In addition, the government's policies, legal frameworks, and strategies are in place to guide Cambodia's natural resource management efforts.

The study found that community forestry (CF) and community fisheries (CFi), community-based ecotourism (CBET), indigenous communal land titling (ICLT), community protected area (CPA), protected area (PA) management were the natural resource management approaches that the government, civil society organizations, and development partners implementing and supporting in the study areas of Kratie and Stung Treng Province. In addition, community-based natural resource management, including CF, CFi, ICLT, and CBET are the most common strategies for sustainable natural resource management, and the communities are empowered to become community-led NRM.

According to the analysis of the effect of natural resource management before and after the project, the study found that the natural resource management supported by the government, NGOs, and development partners, was moderately effective because more challenges were happening, such as illegal logging, fishing, and land encroachment, and hunting in the conservation areas, which resulted from poor law enforcement. However, most community-based organizations, including CF, CFi, CBET, and ICLT, were legally

registered and functioned with their management plan. However, limited law enforcement caused the degradation of the resources. Addressing this issue requires a wide range of participation from all actors and levels and restriction of the government to enforce the law in protecting these critical resources.

Sustainability is critical, which conservation agencies intend to see after the project is phased out. The study showed that the local communities could not sustain their conservation activities if the project phased out because the communities did not have community-financial security, limited capacity, required support from the project in coordination with the government and other actors, and the local people are poor which the communities would not be able to continue the project by themselves. However, some communities (community-based organizations) had strong capacity with community-financial schemes indicating their commitment to sustaining conservation activities. However, they required technical support from the government, especially local authorities.

The majority of the local people living close to the conservation highly relied on natural resources, including fish, forest, and non-timber forest products, for their livelihoods. It is found that most local communities had significant income sources from farming (rice and other farming), fishing, livestock, and labor. In contrast, other sources of income were salary, grocery, logging, and other supplementary incomes.

The local communities increased their incomes compared to the past year before the project execution because they had more alternative income sources in recent years.

However, their annual expenses were higher because of inflation. Also, they had to spend a lot on agriculture production, such as fertilizer for rice farming. Therefore, the communities' annual saved value remained unchanged compared to the past years.

Illegal logging, fishing, land encroachment, hunting, charcoal, and the proposed hydropower dam threaten natural resources. They were challenging for NRM practitioners in promoting sustainable NRM. Even though the joint efforts had made some results in addressing and managing the conservation issues. Illegal logging, fishing, and land encroachment were the main challenges made by local communities from inside and outside the villages and conservation areas. Nevertheless, the government announced that no hydropower dam would be constructed in the Upper Mekong in Cambodia. Furthermore, hydropower dam development on the mainstream of the Upper Mekong River in Cambodia was not included in the Power Development Plan 2022-2040 of the Ministry of Mines and Energy, the Government of Cambodia.

Finally, the hypothesis, $H_0$1: "Natural Resource Management is not effective in improving the income level of the community members in the study area," is rejected. The Chi-square results show a significant improvement in the income level of the community members after the implementation of the natural resource management project activities in the study area. Before the project, a considerable percentage of respondents earned between USD 1,000 to USD 3,000 annually, with fewer earning beyond USD 3,000. However, after the project, there was a notable shift towards higher income brackets, particularly between USD 2,500 to USD 4,500 and even higher.

The hypothesis, $H_0$2: "Natural Resource Management is not effective in improving the expense level of the community members in the study area" is accepted. The Chi-square analysis demonstrates a substantial increase in community members' expense levels after the implementation of natural resource management project activities in the study area compared to before the project. Initially, a substantial number had expenses between USD 1,000 to USD 3,000, with fewer exceeding USD 3,000. Post-project, there was a noticeable move towards higher expense brackets, notably between USD 2,000 to USD 3,500.

The hypothesis Ho 3: "Natural Resource Management is not effective in improving the saving amount level of the community members in the study area" is not rejected. The Chi-square results indicate a noteworthy decrease in the saving levels of community members following the implementation of natural resource management project activities in the study area compared to before the project. This decline can be attributed to inflation, resulting in increased expenditures within the communities, particularly in agricultural production, such as expenses on fertilizer and fuel for irrigation generators.

The key recommendations to improve the effect of natural resource management, including; improve communities' living conditions by providing alternative livelihood development models for the communities living adjacent to the conservation areas, Agroforestry within the community forestry area, strengthening the existing government mechanism, developing sustainable financing mechanisms, increasing annual government budget for conservation, and promote private sector engagement in conservation activities.

6.3 Recommendations

The recommendations are given for the research students and conservation practitioners to improve natural resource management efforts;

a) Enhancing the sustainability of existing Community-Based Organizations (CBOs), such as CF, CFi, CBET, and ICLT communities, involves a multifaceted approach. This includes providing tailored capacity-building programs to improve skills in resource management, financial planning, and community engagement. Additionally, promoting inclusive governance structures within CBOs can foster transparency, accountability, and participation among members, leading to more effective decision-making processes. Empowering local communities through education and training not only enables them to assert their rights in NRM but also encourages active involvement in sustainable practices that benefit both the environment and community well-being.

   The recommendation aligns with several Sustainable Development Goals (SDGs). Tailored capacity-building programs improve resource management and financial planning, supporting SDG 1 (No Poverty) by fostering economic resilience. Promoting inclusive governance structures addresses SDGs 5 (Gender Equality) and 10 (Reduced Inequalities) by ensuring all voices are heard in decision-making. Empowering communities through education aligns with SDG 4 (Quality Education) and encourages sustainable practices that benefit the environment and community well-being, linking to SDG 13 (Climate Action). Additionally, these initiatives enhance transparency and accountability, contributing to SDG 16 (Peace, Justice, and Strong Institutions).

b) Improve communities' living conditions by providing alternative livelihood development models for the communities living adjacent to the conservation areas. The communities complained about the market for their local products. Therefore, value chain development and marketing for the specific product should be well developed with participation from communities and other actors. Local communities who actively participate in natural resource management should be the first beneficiaries of the livelihood development project because they volunteer to participate in NRM and receive such a return for their motivation.

   The recommendation to improve the living conditions of communities adjacent to conservation areas through alternative livelihood development models is closely tied to several Sustainable Development Goals (SDGs) in Cambodia. By creating sustainable income sources, it addresses SDG 1 (No Poverty) and enhances food security in line with SDG 2 (Zero Hunger) through better market access. The focus on job creation supports SDG 8 (Decent Work and Economic Growth) and promotes responsible resource use, aligning with SDG 12 (Responsible Consumption and Production). Furthermore, these sustainable practices contribute to climate resilience (SDG 13: Climate Action).

c) In cases where CF and CFi areas within the Protected Area (PA) face ambiguity in management roles due to overlapping mandates between the Forestry Administration (FA) and the Ministry of Environment (MoE), transitioning these entities to Community Protected Areas (CPAs) under the direct management of the MoE can help clarify responsibilities and streamline governance structures. This shift would enable a more

coherent and coordinated approach to conservation and sustainable management practices within the PA. By establishing CPAs, the MoE can provide clearer guidelines, technical support, and regulatory frameworks tailored to the specific needs of these community-managed areas, fostering greater collaboration and effectiveness in biodiversity conservation and natural resource management efforts.

d) Agroforestry presents an intriguing model for generating profits for communities while also incentivizing active participation in forest protection. This approach not only fosters economic opportunities for communities but also serves as a sustainable method for forest conservation. By integrating trees and shrubs into agricultural systems, agroforestry enhances biodiversity, improves soil health, and promotes ecosystem resilience.

e) Enhancing the enforcement of forestry, fisheries, wildlife, and land laws is crucial for promoting sustainable natural resource management. While CF, CFi, ICLT, and CPA communities demonstrate strength in conservation efforts, they often lack the necessary local governmental support to effectively enforce these laws. The government should strictly enforce the law to protect these vital ecosystems. The key stakeholders' involvement is crucial for strengthening law enforcement to eliminate illegal fishing and logging in the conservation and protected areas.

The recommendation aligns with several SDGs. It protects ecosystems (SDG 15) and promotes sustainable fishing (SDG 14), while fostering transparency and accountability (SDG 16). Collaboration with stakeholders supports effective

governance (SDG 17) and contributes to poverty reduction (SDG 1). These efforts yield significant social, economic, and environmental benefits for communities and the nation.

f) Establishing sustainable financing mechanisms is essential for the long-term viability of community-based organizations engaged in conservation efforts. Introducing initiatives like community financial schemes, such as community credit systems and mini-trust funds, can provide a reliable source of funding to support various conservation activities and projects. Additionally, promoting community-based ecotourism can generate revenue for communities while fostering environmental awareness and sustainable practices

g) It is imperative for the government to raise the annual budget allocated for conservation and natural resource management. Additionally, enhancing the commune investment fund is crucial to empower communes to effectively address the communities' requirements related to natural resource management. This increased investment will not only bolster conservation efforts but also enable local communities to actively participate in sustainable natural resource management practices, fostering environmental protection and community development.

h) The government should review the fisheries law, particularly the mandate for community fisheries, extending it from three to five years. This revision would provide community fisheries with a longer timeframe to plan and implement sustainable

fishing practices, enhancing their ability to effectively manage and conserve fish stocks and aquatic ecosystems in the long term.

i) Encourage community involvement in the government planning process, including the commune investment and development plan, to empower communities to address their specific needs effectively within the planning framework. By promoting active participation from local communities, the planning process becomes more inclusive and reflective of the diverse requirements and priorities of community members, leading to more tailored and impactful development initiatives.

j) Encourage private sector engagement in conservation activities by involving economic land concession companies located near conservation areas in supporting and participating in conservation efforts. By fostering partnerships between the private sector and conservation initiatives, companies can contribute resources and expertise towards conservation activities, leading to mutually beneficial outcomes that promote sustainable development and environmental protection.

k) Enhance community-based ecotourism initiatives to empower local communities and promote sustainable ecotourism practices. By strengthening community involvement in ecotourism activities, CBET governance, and operation. Also, we can foster environmental conservation, preserve cultural heritage, and ensure that tourism benefits both the communities and the natural ecosystems they rely on. This approach encourages responsible tourism practices, supports economic development through community engagement, and educates visitors about the importance of conservation

and sustainable living, fostering a harmonious relationship between tourism, communities, and the environment.

Enhancing CBET initiatives supports several SDGs in Cambodia by empowering local communities and promoting sustainable practices. It fosters economic development (SDG 8) by creating jobs through community engagement in tourism, while also promoting responsible tourism that respects local cultures (SDG 11). This approach aids in environmental conservation (SDG 15) and encourages responsible resource use (SDG 12). Additionally, educating visitors about sustainability raises awareness of conservation issues (SDG 4). These initiatives cultivate a harmonious relationship between tourism, communities, and the environment, delivering significant social, economic, and ecological benefits.

6.4 Scope for Further Research

The following studies are suggested to be carried out in the future to further look into and understand the impact of natural resource management under specific areas, including forestry, fisheries, wildlife, and freshwater.

- Impact of forest protection on the livelihoods of the local communities living inside and close to the conservation areas. The research can review the literature on forest conservation approaches, forest cover status, forest and ecosystem-based adaptation to climate change, and threats. In addition, the study can analyze the impact of forest conservation that benefits the livelihoods of the local communities.

- Effect of fisheries conservation on the livelihoods of the local communities living inside and close to the conservation areas. The study can review the literature on fisheries conservation approaches, fisheries and climate change adaptation, and threats. In addition, the study can analyze the impact of fisheries conservation that benefits the livelihoods of the local communities.
- Evaluation of the protected area management in biodiversity conservation. The study can look in detail at the effect of PA management and how it impacts long-term biodiversity conservation. In addition, the study should identify sustainable financing mechanisms for biodiversity conservation in the PA
- Co-management of wildlife or biodiversity conservation. The study is to review the literature on community-based natural resource management approaches in the region and Cambodia and assess the effect of communities' participation with the government in natural resource governance and biodiversity conservation.

References:

Agrawal, A., & Ostrom, E. (2001). Collective actions, property rights, and decentralization in resource use in India and Nepal. *Political Sociology*, 29(4), 485–514.

Asian Development Bank (ADB). (2020). Community-Based Ecotourism in Cambodia: Lessons Learned and Future Directions. *ADB Briefs*.

Musavengane, R., & Simatele, D. M. (2016). Community-based natural resource management: The role of social capital in collaborative environmental management of tribal resources in KwaZulu-Natal, South Africa. *Development Southern Africa*, 33(6), 806–821.

World Wildlife Fund (WWF). (2019). Conservation success in Cambodia's Cardamom Mountains. *WWF Report*.

BIBLIOGRAPHY

1. Amaral, G. et al. (2013). *Journal of Petrology*, *369*(1), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004
2. Adams, W. M., & Hulme, D. 2010. If community conservation is the answer in Africa, what is the question? *Oryx, 35*(3), 193 – 200.
3. Allison, E. H. & Ellis, F. (2001). *The livelihoods approach and management of small-scale fisheries. Marine Policy, 25 (5): 377-388.*
4. Allison, E. H. (2001). *Big laws, small catches: Global ocean governance and the fisheries crisis. Journal of International Development, 13 (7): 933-950.*
5. Adams, W.M. and Hulme, D. (2001). *If community conservation is the answer in Africa, what is the question? Oryx. 35(3), pp.193-200.*
6. Adams V, Pressey R, and Naidoo R. (2010). *Opportunity costs: Who pays for conservation? Biol Conserv 143: 439–48.*
7. Agrawal, A., & Ostrom, E. (2001). Collective actions, property rights, and decentralization in resource use in India and Nepal. *Political Sociology*, 29(4), 485–514.
8. Asian Development Bank (ADB). (2020). Community-Based Ecotourism in Cambodia: Lessons Learned and Future Directions. *ADB Briefs*.
9. Agrawal, A., & Gibson, C. C. (1999). *Enchantment and disenchantment: The role of community in natural resource conservation. World Development, 27(4), 629–649.*
10. Aguirre, A.A., Ostfeld, R.S., Tabor, G.M., House, C. and Pearl, M.C. (Eds.) (2002). *Conservation medicine: ecological health in practice. Oxford. Oxford University Press. Allen, T., Murray, K.A., Zambrana-Torrelio.*
11. Anderson, Jon, and Shreya Mehta. 2013. *A Global Assessment of Community Based Natural Resource Management: Addressing the Critical Challenges of the Rural Sector. New York: USAID.*
12. Armitage, D. (2005). *Adaptive Capacity and Community-Based Natural Resource Management. Environmental Management. 35(6), pp.703-715.*

13. Ashley, C., & LaFranchi, C. (1997). *Livelihood strategies of rural households in Caprivi: implications for conservancies and natural resource management: Directorate of Environmental Affairs, Ministry of Environment and Tourism Windhoek, Namibia.*
14. Agrawal, A., & Gibson, C. C. (1999). Enchantment and disenchantment: The role of community in natural resource conservation. *World Development*, 27(4), 629-649.
15. Auty, Richard M. (1998). *Resource Abundance and Economic Development. Improving the Performance of Research-Rich Countries. Helsinki: UNU World Institute for Development Economics Research.*
16. Altieri, M. A. (2002). *Miguel A. Altieri ∗. 1971, 1–24.* Amaral, G., Bushee, J., Cordani, U. G., KAWASHITA, K., Reynolds, J. H., ALMEIDA, F. F. M. D. E., … Junho, M. do C. B. (2013). *Journal of Petrology, 369(1), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004*
17. Barrett, C.B., and Arcese, P. (1995). *"Are Integrated Conservation-Development Projects (ICDPs) Sustainable? On the Conservation of Large Mammals in Sub-Saharan Africa?" World Development, Vol. 23, No. 7, 1073-1084. https://doi.org/10.1016/0305-750X(95)00031-7.*
18. Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological Economics*, *29*(2), 293–301. https://doi.org/10.1016/S0921-8009(99)00013-0
19. Byers, B. A. (n.d.). *Understanding and Influencing Behaviors in Conservation and Natural Resources Management Understanding and Influencing Behaviors in Conservation and Natural Resources Management*.
20. Adams, W. M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., … Wolmer, W. (2004). Biodiversity conservation and the eradication of poverty. *Science*, *306*(5699), 1146–1149. https://doi.org/10.1126/science.1097920
21. Altieri, M. A. (2002). *Miguel A. Altieri ∗. 1971*, 1–24.

22. Anani, K. (1999). Sustainable governance of livelihoods in rural Africa: A place-based response to globalism in Africa. *Development (Basingstoke)*, *42*(2), 57–63. https://doi.org/10.1057/palgrave.development.1110037
23. Bastmeijer, K., & Van Hengel, S. (2009). The role of the protected area concept in protecting the world's largest natural reserve: Antarctica. *Utrecht Law Review*, *5*(1), 61. https://doi.org/10.18352/ulr.95
24. Bolund, P., & Hunhammar, S. (1999). Ecosystem services in urban areas. *Ecological Economics*, *29*(2), 293–301. https://doi.org/10.1016/S0921-8009(99)00013-0
25. Balint, P. J., & Mashinya, J. (2006). *The decline of a model community-based conservation project: Governance,capacity, and devolution in Mahenye, Zimbabwe. Geoforum, 37(5), 805-815. http://dx.doi.org/10.1016/j.geoforum.2005.01.011*
26. Balint, P. J., & Mashinya, J. (2008). *Campfire during Zimbabwe's national crisis: Local impacts and broader implications for community-based wildlife management. Society and Natural Resources, 21(9), 783-796. http://dx.doi.org/10.1080/08941920701681961*
27. Bansal, P., Bogner, W.C. (2002): Deciding on ISO 14001: *economics, institutions, and context. Long Range Plan. 35, 269–290*
28. Ban, N.C., Gurney, G.G., Marshall, N.A., Whitney, C.K., Mills, M., Gelcich, S., et al. (2019). *Well-being outcomes of marine protected areas. Nat. Sustain. 2 (6), 524.*
29. Barber, C. V., Miller, K. R., & Boness, M. (Eds.). (2004). *Chapter 3: Parks and people in a world of changes: Governance, participation and equity. In Securing protected areas in the face of global change. Issues and strategies. Gland, Switzerland: IUCN.*
30. Ban, N. C., et al. (2019). A social-ecological approach to marine management: *The case of ecosystem-based management. Marine Policy, 100, 15–25.*
31. Beasley, I., Marsh, H., Jefferson, T. A., & Arnold, P. (2009). *Conserving Dolphins in the Mekong River. The Complex Challenge of Competing Interests. The Mekong, 363–387. https://doi.org/10.1016/B978-0-12-374026-7.00015-2*

32. Bohensky, E. & Lynam, T. (2005). *Evaluating responses in complex adaptive systems: insights on water management from the Southern African Millennium Ecosystem Assessment (SAfMA). Ecology Society, 10(1), 11. Available at: http://www. ecologyandsociety.org/vol10/iss1/art11/.*
33. BREARTON, S., GROSS, R., and RANNEY, K. (2005). *Corporate social responsibility: 2nd annual ranking. Report on Business Magazine, 37-68.*
34. Berkes, F. (2004). *Rethinking community-based conservation. Conservation Biology. 18(3), pp.621-630.*
35. Berkes, F. (2007). *Community-based conservation in a globalized world. Proceedings of the National Academy of Sciences of the United States of America, 104(39), 15188–15193. https ://doi.org/10.1073/ pnas.07020 98104*
36. Bennett, N. (2015). *Win-win or trade-offs?: the study of conservation and development at local, national and global scales. In: Bennett, N., Roth, R. (Eds.), The conservation social sciences: what?, how? and why?: a report for conservation organizations, foundations, practitioners, agencies and researchers University of Victoria. Canada, Victoria, British Columbia, pp. 44–49.*
37. Benjaminsen. T., A. & Bryceson, I. (2012). *Conservation, green/blue grabbing and accumulation by dispossession in Tanzania. The Journal of Peasant Studies. 39(2): 335 – 355.*
38. Blaikie, P. (2006). *Is small really beautiful? Community-based natural resource management in Malawi and Botswana. World Development. 34(11), pp.1942-1957.*
39. Bluwstein, J., Moyo, F., & Kicheleri, R. (2016). *Austere conservation: Understanding conflicts over resource governance in Tanzanian wildlife management areas. Conservation and Society, 14(3), 218–231. https ://doi.org/10.4103/0972-4923.191156*
40. Bollig, M., Menestrey Schwieger, D. (2014). *Fragmentation, cooperation and power: institutional dynamics in natural resource governance in North-Western Namibia. Human Ecol. 42 (2), 167–181.*

41. Borrini-Feyerabend, G., M. Pimbert, M. T. Farvar, A. Kothari, Y. Renard. 2004. *Sharing Power. Learning-by doing in Co-Management of Natural Resources throughout the World. IIED AND IUCN.CEESP/CMWG, Cenesta, Tehran*
42. Botsford, L.W., Brumbaugh, D.R., Grimes, C., Kellner, J.B., Largier, J., O'Farrell, M.R., et al. (2009). *Connectivity, sustainability, and yield: bridging the gap between conventional fisheries management and marine protected areas. Rev. Fish Biol. Fish. 19 (1), 69–95*
43. Boyd, J. & Banzhaf, S. (2007) *What are ecosystem services? The need for standardized environmental accounting units. Ecological Economics 63, 616-626.*
44. Brehony, P., Bluwstein, J., Lund, J. F., & Tyrrell, P. (2018). *Bringing back complex socio-ecological realities to the study of CBNRM impacts: A response to Lee and Bond (2018). Journal of Mammalogy, 99(6), 1539–1542. https ://doi.org/10.1093/jmamm al/gyy118*
45. Brockington, D., Duffy, R., & Igoe, J. (2008). *Nature unbound: Conservation, capitalism and the future of protected areas. London: Earthscan.*
46. Brooks, J., Waylen K. A., Mulder, M. B. (2013): *Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioural, ecological, and economic outcomes. – Environmental Evidence 2:2*
47. Bromley, D. W., & Cernea, M. M. (1989). *The management of common property natural resources: Some conceptual and operational fallacies (Vol. 57). World Bank Publications.*
48. Bolund, P., & Hunhammar, S. (1999). *Ecosystem services in urban areas. Ecological Economics, 29(2), 293–301. https://doi.org/10.1016/S0921-8009(99)00013-0*
49. Brandon, K. E., & Wells, M. (1992). *Planning for people and parks: Design dilemmas. World Development, 20(4), 557–570. https://doi.org/10.1016/0305-750X(92)90044-V*
50. Byerlee, D., & Murgai, R. (2001). *Sense and sustainability revisited: The limits of total factor productivity measures of sustainable agricultural systems. Agricultural Economics, 26(3), 227–236. https://doi.org/10.1016/S0169-5150(00)00131-6*

51. Barrett, C. B., & Arcese, P. (1995). Are integrated conservation-development projects (ICDPs) sustainable? On the conservation of large mammals in Sub-Saharan Africa. *World Development, 23*(7), 1073-1084.
52. Brockington, D. (2004). Community conservation, inequality and injustice: Myths of power in protected area management. *Conservation and Society, 2*(2), 411- 432.
53. Brundtland, G. et al. (1987). *Our common future: Report of the 1987 World Commission on environment and development.* Oxford, Oxford University Press.
54. Cedillo, A. (2011). Climate change and forestry in Cambodia. *Cambodia Human Development Report 2011*, 1–9.
55. Chung, O. (2009). Fishing for the future. *Taiwan Review*, *59*(7), 4–11. https://doi.org/10.4337/9781788119368.00015
56. Commitment, G. (n.d.). *Environment and Natural Resource Management IFAD' s*. *Community-Based Natural Resource Management in Cambodia* (2006). (January), 1–103.
57. Conley, A., & Moote, M. A. (2003). *Evaluating Collaborative Natural Resource Management*. 371–386. https://doi.org/10.1080/08941920390190032
58. Chesson, J., Clayton, H., Whitworth, B. (1999). *Evaluation of fisheries-management systems with respect to sustainable development. ICES J. Mar. Sci. 56, 980e984.*
59. Child, B. (2004). *Parks in Transition:"Biodiversity, Rural Development and the Bottom Line". London: Earthscan.*
60. Child, B. and M. Lyman (eds). (2005). *Natural resources as community assets. Sand County Foundation and The Aspen Institute, Madison, WI.*
61. CGIAR-INRM-Group (1999): *Integrated Natural Resource Management. The Bilderberg Consensus.*
62. Cook, R., Karesh, W. and Osofsky, S. (2004). *One world, one health: building interdisciplinary bridges to health in a globalized world. Wildlife Conservation Society, Bronx, New York, USA http://www.oneworldonehealth.org/sept2004/owoh_sept04.html*

63. Convention on Biological Diversity (2010). *Decision X/2, 'Strategic Plan for Biodiversity 2011–2020)'. Montreal: Convention on Biological Diversity.*
64. Convention on Biological Diversity (2020). *Update of the zero draft of the post-2020 global biodiversity framework. Montreal: Convention on Biological Diversity.*
65. Costanza R, d'Arge R, De Groot R, Farber S, Grasso M, Hannon B, Limburg K, Naeem S, O'Neill RV, Paruelo J, et al. 1997. *The value of the world's ecosystem services and natural capital. Nature. 387:253–260. doi:10.1038/387253a0*
66. Costanza, R., de Groot, R., Sutton, P., Van der Ploeg, S., Anderson, S.J., Kubiszewski, I., et al. (2014). *Changes in the global value of ecosystem services. Global Environ. Change 26, 152–158.*
67. Coulthard, S., Johnson, D., McGregor, J.A. (2011). *Poverty, sustainability and human wellbeing: a social wellbeing approach to the global fisheries crisis. Global Environ. Change 21 (2), 453–463.*
68. Craigie, I. D., Baillie, J. E. M., Balmford, A., Carbone, C., Collen, B., Green, R. E., & Hutton, J. M. (2010). *Large mammal population declines in Africa's protected areas. Biological Conservation, 143(9), 2221–2228. https ://doi.org/10.1016/j.biocon.2010.06.007*
69. Chen, S., & Ravallion, M. (2004). *How have the world's poorest fared since the early 1980s? World Bank Research Observer, 19(2), 141–169. https://doi.org/10.1093/wbro/lkh020*
70. Chettri, N., Gurung, J., Shakya, B., & Sharma, E. (2007). *The Landscape Approach in Biodiversity Conservation: A Regional Cooperation Framework for Implementation of the Convention on Biological Diversity in the Kangchenjunga Landscape. Framework, 40. Retrieved from http://lib.icimod.org/record/7871*
71. Chen, S., & Ravallion, M. (2004). How have the world's poorest fared since the early 1980s? *World Bank Research Observer*, *19*(2), 141–169. https://doi.org/10.1093/wbro/lkh020

72. Chettri, N., Gurung, J., Shakya, B., & Sharma, E. (2007). The Landscape Approach in Biodiversity Conservation: A Regional Cooperation Framework for Implementation of the Convention on Biological Diversity in the Kangchenjunga Landscape. *Framework*, 40. Retrieved from http://lib.icimod.org/record/7871
73. Daily, G. C., Alexander, S., Ehrlich, P. R., Goulder, L., Lubchenco, J., Matson, P., … Woodwell, G. (1997). Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems, Issues in Ecology [Issues Ecol.], Vol. 1, No. 2, pp. 1-18. *Ecology*, *1*(2), 1–18.
74. De Young, C., Charles, A., & Hjort, A. (2009). FISHERIES MANAGEMENT 2. The ecosystem approach to fisheries 2.2 the human dimension of the ecosystem approach to fisheries. In *FAO. Technical Guidelines for Responsible Fisheries* (Vol. 4). Retrieved from http://www.fao.org/docrep/012/i1146e/i1146e00.htm
75. Daily, G. C., Alexander, S., Ehrlich, P. R., Goulder, L., Lubchenco, J., Matson, P., … Woodwell, G. (1997). Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems, Issues in Ecology [Issues Ecol.], Vol. 1, No. 2, pp. 1-18. Ecology, 1(2), 1–18.
76. Dearden, P., Bennett, M., & Johnston, J. (2005). Trends in global protected area governance, 1992-2002. Environmental Management, 36(1), 89–100. https://doi.org/10.1007/s00267-004-0131-9
77. Dennis, R. A., Meijaard, E., Nasi, R., & Gustafsson, L. (2008). Biodiversity conservation in Southeast Asian timber concessions: A critical evaluation of policy mechanisms and guidelines. Ecology and Society, 13(1). https://doi.org/10.5751/ES-02427-130125
78. Diepart, Jean-Christophe. (2015). Learning for Resilience: Insights from Cambodia's Rural Communities. Phnom Penh: The Learning Institute.
79. Drew, J. A. (2005). Use of traditional ecological knowledge in marine conservation. Conservation Biology 19:1286–1293.

80. Dudley N., Stolton S., Belokurov A., Krueger L., Lopoukhine N., MacKinnon K., Sandwith T. and Sekhran N. (Eds.) (2010). Natural solutions: protected areas helping people cope with climate change. Gland, Switzerland; Washington DC & New York, USA: IUCN-WCPA, TNC, UNDP, WCS, The World Bank, WWF.
81. Department For International Development, United Kingdom (DFID) Directorate General for Development, European Commission (EC) United Nations Development Programme (UNDP). (2002). Linking Poverty Reduction and Environmental Management Policy Challenges and Opportunities. The International Bank for Reconstruction and Development/ the World Bank, Washington, DC.
82. Dichmont, C.M., Pascoe, S., Kompas, T., Punt, A.E., Deng, R. (2010). On implementing maximum economic yield in commercial fisheries. Proc. Natl. Acad. Sci.107,16e21.
83. Dinerstein, E., Olson, D., Joshi, A., Vynne, C., Burgess, N.D., Wikramanayake, E., Hahn, N., Palminteri, S., Hedao, P., Noss, R., Hansen, M., Locke, H., Ellis, E.C., Jones, B., Barber, C.V., Hayes, R., Kormos, C., Martin, V., Crist, E., Sechrest, W., Price, L., Baillie, J.E.M., Weeden, D., Suckling, K., Davis, C., Sizer, N., Moore, R., Thau, D., Birch, T., Potapov, P., Turubanova, S., Tyukavina, A., de Souza, N., Pintea, L., Brito, J.C., Llewellyn, O.A., Miller, A.G., Patzelt, A., Ghazanfar, S.A., Timberlake, J., Klöser, H., Shennan-Farpón, Y., Kindt, R., Lillesø, J.-P.B., van Breugel, P., Graudal, L., Voge, M., Al-Shammari, K.F., Saleem, M. (2017). An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. BioScience 67, 534–545. doi:10.1093/biosci/bix014
84. Dangel, U. (2016). The world's forests. *In Turning Point in Timber Construction*. https://doi.org/10.1515/9783035608632-002
85. Dean, E. (2007). *Beyond community: "Global" conservation networks and "local" organization in Tanzania and Zanzibar.* Ph.D. The University of Arizona.
86. Dressler, W. et al. (2010). From hope to crisis and back again? A critical history of the global CBNRM narrative. *Environmental Conservation, 37*(1), 5 – 15.

87. Dressler, W., Bücher, B., Schoon, M., Brockington, D., Hayes, T., Kull, C. A., Mccarthy, J. & Shrestha, K. (2010). From hope to crisis and back again? A critical history of the global CBNRM narrative. Environmental Conservation. 37(1): 5 – 15.
88. Engel, S., Pagiola, S., Wunder, S. (2008). *Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics, 65, 663-674.*
89. Evans, L., Cherrett, N., Pemsl, D. (2011). *Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. J. Environ. Manage. 92 (8), 1938–1949.*
90. Eales, J., Bethel, A., Fullam, J., Olmesdahl, S., Wulandari, P., & Garside, R. (2021). *What is the evidence documenting the effects of marine or coastal nature conservation or natural resource management activities on human well-being in South East Asia? A systematic map. Environment International, 151(January), 106397. https://doi.org/10.1016/j.envint.2021.106397*
91. Eam, S., Phay, S., Hang, S., Tan, S., Lor, K., Det, C., and Phorn, S. (2020). *The Monitoring of Irrawaddy Dolphin Population in the Mekong River: The Long-Term Population Monitoring based on Mark-Resight Models. FiA/WWF- Cambodia Technical Report.*
92. Fabricius, C, & Collins, S. (2007). *Community-based natural resource management : governing the commons*. *2*, 83–97. https://doi.org/10.2166/wp.2007.132
93. Fabricius, Christo. (2013). *Rights Resources and Rural Development. In Rights Resources and Rural Development. https://doi.org/10.4324/9781849772433*
94. FAO & WRI. (2019). *The road to restoration: a guide to identifying priorities and indicators for monitoring forest and landscape restoration, by Kathleen Buckingham, Sabin Ray, Carolina Gallo Granizo, Lucas Toh, Fred Stolle, Faustine Zoveda, Katie Reytar, Rene Zamora, Peter Ndunda, Florence Landsberg, Marcelo Matsumoto & John Brandt. Washington, DC, USA.*

95. Fabricius, C. (2004). *The fundamentals of community-based natural resource management. In Rights, Resources and Rural Development: Community-based Natural Resource Management in Southern Africa. Fabricius, C., Koch, E., Magome, H. & Turner, S. (eds). Earthscan, London, pp. 3–43.*
96. FAO (2006). *Global forest resources assessment 2005: Progress towards sustainable forest management.* Rome: Forestry Department, Food and Agriculture Organization of the United Nations.
97. FAO (2010). *Global forest resources assessment 2010, Main Report.* Rome: Forestry Department, Food and Agriculture Organization of The United Nations.
98. Forestry Administration (FA) (2010). *Cambodia National Forest Programme 2010-2030. FA: Phnom Penh.*
99. FA, Ministry of Environment (MoE), Food and Agriculture Organization (FAO), & UN Development Programme (UNDP) (2010). *Development of REDD+ Readiness Roadmap for Cambodia.* FA, MoE, FAO and UNDP: Phnom Penh.
100. Freeman, H. A., Shiferaw, B., & Swinton, S. M. (2009). Assessing the impacts of natural resource management interventions in agriculture: Concepts, issues and challenges. *Natural Resource Management in Agriculture: Methods for Assessing Economic and Environmental Impacts*, 3–16. https://doi.org/10.1079/9780851998282.0003
101. Food and Agriculture Organization. (2006). *Global forest resources assessment 2005. Progress towards sustainable forest management. FAO Forest Paper 147. Food and Agricultural Organization, Rome, Italy. Available online at: http://www.fao.org/forestry/ site/fra2005/en/.*
102. Faust, C.L., McCallum, H.I., Bloomfield, L.S.P., Gottdenker, N., Gillespie, T.R., Torney, C.J., Dobson, A.P. and Plowright, R.K. (2018). *Pathogen spillover during land conversion. Ecology Letters, 21 (4): 461–483. doi:10.1111/ele.12904.*
103. Ferraro PJ, Kiss A. 2002. *Direct payments to conserve biodiversity. Science 298: 1718–1719.*
104. Folke, C., Jansson, A° ., Larsson, J., Costanza, R. (1997). *Ecosystem appropriation of cities. Ambio 26 (3), 167–172.*

105. Folke, C., T. Hahn, P. Olsson, and J. Norberg. (2005). *Adaptive governance of social-ecological systems. Annual Review of Environment and Resources 30:441–473.*
106. Fleming, L., Depledge, M., McDonough, N., White, M., Pahl, S., Austen, M., et al. (2015). *The oceans and human health. Oxford Research Encyclopedia of Environmental. Science.*
107. Garcia, S.M., Cochrane, K.L. (2005). *Ecosystem approach to fisheries: a review of implementation guidelines. ICES J. Mar. Sci. J. Conseil 62, 311e318.*
108. Garland, E. (2008). *The elephant in the room: Confronting the colonial character of wildlife conservation in Africa. African Studies Review. 51(3): 51 – 74.*
109. Getz, W. M., Fortmann, L., Cumming, D., Du Toit, J., Hilty, J., Martin, R., … Westphal, M. I. (1999). *Sustaining natural and human capital: Villagers and scientists. Science, 283(5409), 855–1856.*
110. Ghimire, K. (1994). *Parks and people: Livelihood issues in national parks management in Thailand and Madagascar. Development and Change, 25(1), 195_229.*
111. Grumbine, R. E. (1994). *What is ecosystem management? Conservation Biology 8:27–38.*
112. Ghai, D. (1994). Development and environment: Sustaining people and nature. *Development and Change, 25*(1).
113. Goldman, M. (2003). Partitioned nature, privileged knowledge: Community-based conservation in Tanzania. *Development and Change, 34*(5), 833 – 862.
114. George, G., Schillebeeckx, S. J. D., & Liak, T. L. (2018). The management of natural resources: An overview and research agenda. *Managing Natural Resources: Organizational Strategy, Behaviour and Dynamics*, 1–32. https://doi.org/10.4337/9781786435729.00009
115. Gerdes, A. B. M., Alpers, G. W., & Pauli, P. (2008). When spiders appear suddenly: Spider-phobic patients are distracted by task-irrelevant spiders. In *Behaviour Research and Therapy* (Vol. 46). https://doi.org/10.1016/j.brat.2007.10.010

116. Gylfason, T., & Zoega, G. (2001). *Natural Resources and Economic Growth : The Role of Investment*. (June), 7–15.
117. Heath, J., & Binswanger, H. (1996). Natural resource degradation effects of poverty and population growth are largely policy-induced: The case of Colombia. *Environment and Development Economics*, *1*(1), 65–84. https://doi.org/10.1017/s1355770x00000383
118. Hojnicki, Z. B. C. (2010). *Socio-Economic Development and Its Axiological Aspects*. *29*(2). https://doi.org/10.2478/v10117-010-0010-9.A
119. Holmberg, J., Thomson, K., & Timberlake, L. (1993). *Facing the future.* London: Earthscan.
120. Hutton, J., Adams, W. M., & Murombedzi, J. C. (2005). Back to the barriers? Changing narratives in biodiversity conservation. *Forum for Development Studies, 32*(2), 341 – 370.
121. Halpern, B.S., Klein, C.J., Brown, C.J., et al. (2013). *Achieving the triple bottom line in the face of inherent tradeoffs among social equity, economic return and conservation. Proc Natl Acad Sci doi:10.107.*
122. Hagmann, J., Chuma, E., Murwira, K., Connolly, M., & Ficarelli, P. (2002). *Success factors in integrated natural resource management R&D: Lessons from practice. Ecology and Society, 5(2). https://doi.org/10.5751/es-00298-050229*
123. Hughes, R., & Flintan, F. (2001). *Integrating Conservation and Development Experience : a Review and Bibliography of the ICDP Literature. International Institute for Environment and Development, 3(3), 24 p. Retrieved from http://iodeweb1.vliz.be/odin/handle/1834/805?language=en*
124. Ha¸bek, P., Wolniak, R.: Assessing the quality of corporate social responsibility reports: the case of reporting practices in selected European Union member states. Qual. Quant. (2015). *doi:10.1007/s11135-014- 0155-z*
125. Hamilton, L.; McMillan, L. (2004) *Guidelines for Planning and Managing Mountain Protected Areas. Gland (Switzerland) and Cambridge (UK): IUCN*

126. He, W., Liu, Ch., Lu, J., Cao, J.: *Impacts of ISO 14001 adoption on firm performance: evidence from China. China Econ. Rev. 32, 43–56 (2015)*
127. Homewood, K. (2004). *Policy, environment and development in African rangelands. Environmental Science &Policy. 7: 125 – 143.*
128. Hughes, K. (2013). *Measuring the impact of viewing wildlife: Do positive intentions equate to longterm changes in conservation behaviour? Journal of Sustainable Tourism, 21(1), 42_59.*
129. Hulme, D., & Murphree, M. (2001). *African wildlife and livelihoods: the promise and performance of community conservation: James Currey Ltd.*
130. Igoe, J., & Croucher, B. (2007). *Conservation, commerce, and communities: the story of community-based wildlife management areas in Tanzania's northern tourist circuit. Conservation and Society, 5(4), 534.*
131. IUCN/WCPA. (2019). *Guidelines for Recognising and Reporting Other Effective Area based Conservation Measures. Switzerland. IUCN.*
132. Ilyas, A., Arisaputra, M. I., Utami, D., Bakar, M., & Arifin, A. (2019). Natural resource management for sustainable development in managing environmental permit. *IOP Conference Series: Earth and Environmental Science*, *343*(1). https://doi.org/10.1088/1755-1315/343/1/012064
133. JENKINS, M. B. and SMITH, E. T. (1999). *The business of sustainable forestry – strategies for an industry in transition. Washington, DC: Island Press.*
134. Jabareen, Y. (2008). *A new conceptual framework for sustainable development. Environ. Dev. Sustain. 10, 179e192.*
135. Jack, B.K., Kousky, C., Sims, K. (2008). *Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. PNAS, 150 (28), 9465-9470.*
136. Jhala, Y. V., Qureshi, Q., Gopal, R., 2015. *The status of tigers in India 2014. New Delhi & Dehradun.*

137. Jones, M.A. (2009). *Trying to make sense of it all: Dealing with the complexities of community-based natural resource management. In: Mukamuri, B.B., et al. eds. Beyond Proprietorship: Murphree's Laws on Community-Based Natural Resource Management in Southern Africa. Harare, Zimbabwe: Weaver Press.*
138. Karanth, K.K., Nichols, J.D., Karanth, K.U., Hines, J.E., Christensen, N.L. (2010). *The shrinking ark: patterns of large mammal extinctions in India. Proc. R. Soc. B Biol. Sci. 277, 1971–1979.*
139. Kärnä, J., Hansen, E., & Juslin, H. (2003). *Social responsibility in environmental marketing planning. European journal of marketing*
140. Kellert, S.R., Mehta, J.N., Ebbin, S.A. and Lichtenfeld, L.L. (2000). *Community natural resource management: Promise, rhetoric, and reality. Society & Natural Resources. 13(8), pp.705-715.*
141. Kapur, R. (n.d.). *Socio-Economic Development and Empowerment of Disadvantaged Groups.*
142. Keng, S., Chheang, S., & Sann, S. (2017). The role of community forestry in sustainable forest management in Cambodia. *Journal of Forest Research*, 22(4), 615–620.
143. Karamidehkordi, E. (2012). *Sustainable Natural Resource Management, a Global Challenge of This Century. Sustainable Natural Resources Management, (January 2012). https://doi.org/10.5772/35035*
144. Kaswamila, A. (n.d.). *SUSTAINABLE NATURAL Edited by Abiud Kaswamila.*
145. Lal, R. (2010). Managing soils and ecosystems for mitigating anthropogenic carbon emissions and advancing global food security. *BioScience*, *60*(9), 708–721. https://doi.org/10.1525/bio.2010.60.9.8
146. Leader-Williams, N., & Albon, S. (1988). Allocation of resources for conservation. *Natur*e, 336(6199): 533 – 535.
147. Lo Cascio, A., & Beilin, R. (2010). Of biodiversity and boundaries: A case study of community-based natural resource management practice in the Cardamom Mountains, Cambodia. *Environmental Conservation*, *37*(3), 347–355. https://doi.org/10.1017/S0376892910000548

148. Lackey, R. T. (2005). *Fisheries: History, Science, and Management. Water Encyclopedia, (December). https://doi.org/10.1002/047147844x.sw249*

149. Limsong, H. E. S., Chhith, M., Ath, S., & Thomas, P. (2017). *Report of the International Workshop on the Conservation of Irrawaddy Dolphins in the Mekong River 1 Ministry of Agriculture, Forestry and Fisheries (MAFF) Royal Government of Cambodia.*

150. Lockwood, M., Davidson, J., Curtis, A., Stratford, E., & Griffith, R. (2010). *Governance principles for natural resource management. Society and Natural Resources, 23(10), 986–1001. https://doi.org/10.1080/08941920802178214*

151. Lee, Ellen. (2000). *Cultural connections to the land- a Canadian example. IUCN Parks, 10(2), 3-12.*

152. Lee, D. E., & Bond, M. L. (2016). *Precision, accuracy, and costs of survey methods for giraffe Giraffa camelopardalis. Journal of Mammalogy, 97(3), 940–948. https ://doi.org/10.1093/jmamm al/gyw025*

153. Leverington, F., Costa, K. L., Courrau, J., Pavese, H., Nolte, C., Marr, M., … Hockings, M. (2010). *Management effectiveness evaluation in protected areas – a global study. The University of Queensland, Brisbane, Australia.*

154. Lindenmayer, D. B., & Likens, G. E. (2010). *The science and application of ecological monitoring. Biological Conservation, 143(6), 1317–1328. https ://doi.org/10.1016/j.biocon.2010.02.013*

155. Liu, W.H., Ou, C.H., Ting, K.H. (2005). *Sustainable coastal fishery development indicator system: a case of Gungliau, Taiwan. Mar. Policy 29, 199e210.*

156. Loew, T., Ankele, K., Braun, S., and Clausen, J. 2004. *Signifi cance of CSR debate for sustainability and the requirements for companies: summary. Munster, Berlin: Future e.V. and Institute for Ecological Economy Research GmbH (IÖW).*

157. Long, S. A. (2004). *Livelihoods and CBNRM in Namibia: the findings of the WILD Project: final technical report of the Wildlife Integration for Livelihood Diversification Project (WILD). Wildlife Integration for Livelihood Diversification Project.*

158. Marks, S. (2001). Back to the future: Some unintended consequences of Zambia's communitybased wildlife program (ADMADE). *Africatoday,* 120 – 141.
159. Mascia,M. B., J. P. Brosius, T. A. Dobson, B. C. Forbes, L. Horowitz,M. A. McKean, and N. J. Turner. (2003). *Conservation and social sciences. Conservation Biology 17:649–650.*
160. Maliszewska M., Matoo A. and van der Mensbrugghe D. (2020). *The potential impact of COVID-19 on GDP and trade: a preliminary assessment. Policy Research Working Paper 9211. Washington, DC, USA: World Bank Group.*
161. MacKinnon, K., Richardson, K. and MacKinnon, J. (2020). *Protected and other conserved areas: ensuring the future of forest biodiversity in a changing climate. The International Forestry Review 22 (SI): 93–103.*
162. McGuire, W. 2014). *The effect of ISO 14001 on environmental regulatory compliance in China. Ecol. Econ. 105, 254–264*
163. Magome, H. & Fabricius, C. (2004). *Reconciling biodiversity conservation with rural development: the Holy Grail of CBNRM, Rights, Resources and Rural Development: Community-based Natural Resource Management in Southern Africa. Fabricius, C., Koch, E., Magome, H. & Turner, S. (eds). Earthscan, London, pp. 93–114.*
164. Matiku, P. (2008). *Poverty and mortality indicators: Data for the poverty-conservation debate. Oryx, 42(1), 43_59.*
165. McAfee K. 1999. *Selling nature to save it? Biodiversity and green develop-mentalism. Environment and Planning D 17: 133–154.*
166. Mbaiwa, J. E. (2004). *The socio-economic benefits and challenges of a community-based safari hunting tourism in the Okavango Delta. Botswana. Journal of Tourism Studies, 15(2), 37-50.*
167. Mbaiwa, J.E. (2008). *Tourism development, rural livelihoods, and conservation in the Okavango Delta (An unpublished PhD dissertation). Texas A & M University, Texas.*
168. McKibbin W. and Fernando R. (2020). *The economic impact of COVID-19. In: R. Baldwin and B. Weder di Mauro (Eds), Economics in the time of COVID-19 (pp. 45–52). London, UK: Centre for Economic Policy Research.*

169. McCarthy, J. F., Poteete, A. R., & Tumen, S. (2019). Land tenure and community-based natural resource management in Cambodia: Recent developments and future challenges. *Land Use Policy*, 83, 352–360.
170. Musavengane, R., & Simatele, D. M. (2016). Community-based natural resource management: The role of social capital in collaborative environmental management of tribal resources in KwaZulu-Natal, South Africa. *Development Southern Africa*, 33(6), 806–821.
171. Measham, T.G. and Lumbasi, J.A. (2013). *Success Factors for Community-Based Natural Resource Management (CBNRM): Lessons from Kenya and Australia. Environmental Management. 52(3), pp.649-659.*
172. Meinzen-Dick, R. (2009). *Coordination in Natural Resources Management. In: J. Kirsten, A. Dorward, C. Poulton and R. Vink, ed., Institutional Economics Perspectives on African*
173. Millennium Ecosystem Assessment (2004). *Ecosystems and human well-being: synthesis. Island Press, Washington, D.C.*
174. Millenium Ecosystem Assessment (2005) Ecosystems and human well-being: *Synthesis Millennium Ecosystem Assessment. Island Press, Washington DC.*
175. Mitsch WJ, Gosselink JG. (2015). *Wetlands. 5th ed. Hoboken, NJ: John Wiley & Sons, Inc.*
176. Moll, G., Petit, J. (1994). *The urban ecosystem: putting nature back in the picture. Urban Forests Oct:Nov, 8–15.*
177. Munasinghe, M. and McNeely, J. (1995). *Key concepts and terminology of sustainable development. In: Munasinghe, M. and Shearer, W. (eds.), Defining and Measuring Sustainability: The Biological Foundations, The International Bank for Reconstruction and Development/The World Bank, Washington, 19-46.*
178. Mustika, P., Birtles, A., Everingham, Y., & Marsh, H. (2013). *The human dimensions of wildlife tourism in a developing country: Watching spinner dolphins at Lovina, Bali, Indonesia. Journal of Sustainable Tourism, 21(2), 229_251.*
179. Mehta, J. A. I. N., Ebbin, S. A., Lichtenfeld, L. L., H, N., & Sa, U. (2000). *Community Natural Resource Management: Promise, Rhetoric, Reality.705-715.*

180. Milupi, I. D., Somers, M. J., & Ferguson, W. (2017). *A review of community-based natural resource management*. Applied Ecology and Environmental *Research, 15(4), 1121–1143. https://doi.org/10.15666/aeer/1504_11211143*
181. Mitsch, W. J., Bernal, B., & Hernandez, M. E. (2015). *Ecosystem services of wetlands. International Journal of Biodiversity Science, Ecosystem Services and Management, 11(1), 1–4. https://doi.org/10.1080/21513732.2015.1006250*
182. Nam, S., & Bunthang, T. (2011). Fisheries resources in Cambodia : Implications for food security, and human nutrition. *IFReDI*.
183. Nelson, F., Nshala R., & Rodgers, W.A. (2007). The evolution and reform of Tanzanian wildlife management. *Conservation and Society, 5*(2), 232 – 261.
184. Neumann, R. P. (1998). *Imposing wilderness: Struggles over livelihood and nature preservation in Africa.* Berkeley: University of California Press.
185. Noe, C., & Kangalawe, R. Y. M. (2015). Wildlife protection, community participation in conservation, and (dis) empowerment in Southern Tanzania. *Conservation and Society, 13*(3), 244- 253.
186. Nang Phirun., Sam Sreymom, Ouch Chhuong. and Lonn Pichdara. (2014). *Adaptation Capacity of Rural People in the Main Agro-Ecological Zones in Cambodia. Working Paper Series No. 93. Phnom Penh: CDRI.*
187. Narain, S., Panwar, H.S., Gadgil, M., Thapar, V., Singh, S. (2005). *Joining the Dots: The Report 761 of the Tiger Task Force. New Delhi.*
188. Ndumeya, N. (2019). *Nature, conservation and conflict in Eastern Zimbabwe: Chirinda Forest, 1980–2000. Journal of Southern African Studies, 45(2), 253–271.*
189. Nelson, F., Nshala R. & Rodgers, W.A. (2007). *The evolution and reform of Tanzanian wildlife management. Conservation and Society. 5(2):232 – 261.*
190. Nelson, F. (2010). *Democratizing natural resource governance: Searching for institutional change. In F. Nelson (Ed.), Community rights, conservation and contested land (pp. 310–333). Abingdon, Oxon: Earthscan, IUCN.*
191. Newmark, W.D., Jenkins, C.N., Pimm, S.L., McNeally, P.B., Halley, J.M. (2017). *Targeted habitat restoration can reduce extinction rates in fragmented forests. Proc. Natl. Acad. Sci.114, 9635–9640.*

192. Naidoo, R., Weaver, L. C., Diggle, R. W., Matongo, G., Stuart-Hill, G., & Thouless, C. (2016). *Complementary benefits of tourism and hunting to communal conservancies in Namibia. Conservation Biology, 30(3), https ://doi.org/10.1111/cobi.12643*

193. Nkhata, B. A., Mosimane, A., Downsborough, L., Breen, C., & Roux, D. J. (2012). *A Typology of Benefit Sharing Arrangements for the Governance of Social-Ecological Systems in Developing Countries. Ecology and Society, 17(1), 17. http://dx.doi.org/10.5751/ES-04662-170117*

194. Noe, C. & Kangalawe, R. Y. M. (2015). *Wildlife protection, community participation in conservation, and (dis) empowerment in Southern Tanzania. Conservation and Society. 13(3): 244- 253.*

195. Norris, K., Bailey, M. et al. (2011) *Chapter 4: Biodiversity in the Context of Ecosystem Services. In: The UK National Ecosystem Assessment Technical Report, UK National Ecosystem Assessment, UNEP-WCMC, Cambridge, UK.*

196. Nyaupane, G. P., & Poudel, S. (2011). *Linkages among biodiversity, livelihood, and tourism. Annals of Tourism Research, 38(4), 1344_1366.*

197. Ocampo-Peñuela, N., Jenkins, C.N., Vijay, V., Li, B.V., Pimm, S.L. (2016). *Incorporating explicit geospatial data shows more species at risk of extinction than the current Red List. Sci. Adv. 2, e1601367.*

198. Ochola, W.O., Sanginga, P.C. and Bekalo, I. (2013). *Managing Natural Resources for Development in Africa: A Resource Book. Univ. of Nairobi Press, Nairobi, Kenya.*

199. OECD. (2008). *Natural Resources and Pro-Poor Growth. Paris: Organisation for Economic Co-operation and Development (OECD).*

200. OECD. (2011). *Economic Significant of Natural Resources: Key points for reformers in Eastern Europe, Caucasus and Central Asia: Organisation for Economic Co-operation and Development (OECD).*

201. Ogutu, J. O., Kuloba, B., Piepho, H.-P., & Kanga, E. (2017). *Wildlife population dynamics in human-dominated landscapes under community- based conservation: The example of Nakuru wildlife conservancy, Kenya. PLoS ONE, 12(1), e0169730.*

https ://doi.org/10.1371/journ al.pone.0169730

202. Olsson, P., Folke, C., & Berkes, F. (2004). *Adaptive comanagement for building resilience in social ecological systems. Environmental Management, 34(1), 75-90. doi: 10.1007/s00267-003-0101-7*
203. Olsson, P., Folke, C. & Hahn, T. (2004). *Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. Ecology and Society, 9(4), 2.*
204. Paehlke, R. (1999): *Towards defining, measuring and achieving sustainability: tools and strategies for environmental valuation. In: Becker, E. and Jahn, T. (eds.), Sustainability and the Social Sciences, Zed Books, London.*
205. Pathak, Neema. (2006). *Community conserved areas in South Asia. IUCN Parks, 16(1), 56-62.*
206. Pimm, S. L., Jenkins, C. N., Li, B. V. (2018). *How to protect half of Earth to ensure it protects sufficient biodiversity. Sci. Adv. 4, eaat2616.*
207. Plowright, R.K., Parrish, C., McCallum, H., Hudson, P.J., Ko, A., Graham, A. and Loyd-Smith, J. (2017). *Pathways to zoonotic spillover. Nature Reviews Microbiology, 15(8): 502–510. doi:10.1038/nrmicro.2017.45*
208. Preston, S. M. (2003). *Landscape values and planning: the case of Ontario's Niagara escarpment. Ph.D. Dissertation. University of Waterloo, Ontario, Canada.*
209. Pretty, J. (2003). *Social Capital and the Collective Management of Resources. Science, 302(5652), pp.1912-1914.*
210. Pretty, J., and D. Smith. 2004. *Social capital in biodiversity conservation and management. Conservation Biology 18:631–638.*
211. Pauly, D. (1997). *Small-scale fisheries in the tropics: Marginality, marginalization, and some implications for fisheries management. Global Trends: Fisheries Management. American Fisheries Society Symposium. 40-49.*
212. Pretty, J. and Ward, H. (2001). *Social Capital and the Environment. World Development, 29(2), pp.209-227.*
213. Panwar, R., Rinne, T., Hansen, E., and Juslin, H. 2006. *Corporate responsibility. Forest Products Journal, 56(2), 4.*

214. Pascual, U., Phelps, J., Garmendia, E., Brown, K., Corbera, E., Martin, A., … Muradian, R. (2014). *Social equity matters in payments for ecosystem services. BioScience, 64(11), 1027–1036. https://doi.org/10.1093/biosci/biu146*

215. Pilien, J., & Walpole, P. (2003). *Moving from open access extraction to new participatory levels of accountable management Malampaya Sound, Palawan, the Philippines. Natural Resource Conflict Management Case Studies: An Analysis of Power, Participation and Protected Areas, 251–268.*

216. Reardon, T., & Vosti, S. A. (1995). Links between rural poverty and the environment in developing countries: Asset categories and investment poverty. *World Development, 23,* 1495–1506.

217. Riehl, B., Zerriffi, H., & Naidoo, R. (2015). Effects of community-based natural resource management on household welfare in Namibia. *PLoS One*, *10*(5). https://doi.org/10.1371/journal.pone.0125531

218. Royal Government of Cambodia (RGC) (2010). *National Strategic Development Plan 2009-2013 (updated version). RGC: Phnom Penh.*

219. Rana, M. P., Sohel, M. S. I., Mukul, S. A., Chowdhury, M. S. H., Akhter, S., Koike, M. (2010): *Implications of ecotourism development in protected areas: a study from Rema Kalenga Wildlife Sanctuary, Bangladesh – iForest(3) : 23-29*

220. Reser, JP & Bentrupperbaumer, JM. (2005). '*What and where are environmental values? Assessing the impacts of current diversity of use of 'environmental' and 'World Heritage' values', Journal of Environmental Psychology, vol. 25, pp. 125-146.*

221. Ribot, Jesse C. (2002). *Democratic decentralization of natural resources: Institutionalizing popular participation. World Resources*

222. Roe, D. and Nelson, F. (2009). *The origins and evolution of community-based natural resource management in Africa. In: Roe, D., et al. eds. Community management of natural resources in Africa: Impacts, experiences and future directions. [Online]. London, UK: IIED. Available from: http://pubs.iied.org/pdfs/17503IIED.pdf*

223. RajuandThakuria. (2010). *Socio-economicaspectsofNRM (1).pdf. (n.d.).*
224. Shiferaw, B., Bank, W., Freeman, A., Bank, W., & Swinton, S. (2005). *Natural Resource Management in Agriculture : Methods for Assessing Natural Resources Management in Agriculture Methods for Assessing Economic and*.
225. Singh, A. K., Singh, V. K., & Roy, S. K. (2009). *Natural Resources Management : An Overview*. (September 2009), 1–20.
226. Thomas, L., & Middleton, J. (2003). Guidelines for Management Planning of Protected Areas. In *Guidelines for Management Planning of Protected Areas*. https://doi.org/10.2305/iucn.ch.2003.pag.10.en
227. Tiwari, K. R., Bajracharya, R. M., & Sitaula, B. K. (2009). Natural Resource and Watershed Management in South Asia: A Comparative Evaluation with Special References to Nepal. *Journal of Agriculture and Environment*, *9*, 72–89. https://doi.org/10.3126/aej.v9i0.2120
228. Vidal, N. G., & Kozak, R. A. (2008). The recent evolution of corporate responsibility practices in the forestry sector. *International Forestry Review*, *10*(1), 1–13. https://doi.org/10.1505/ifor.10.1.1
229. WCPA, I. (2012). The International Journal of Protected Areas and Conservation. *Parks*, *18*(1).
230. Woodhouse, P., Howlett, D., & Rigby, D. (2000). Sustainability Indicators for Natural Resource Management & Policy A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods. *Economic Policy*, (January 2000), 1–39.
231. Science, S. (2011). *Socio-Economic Develop_Ment and Empowerment of Disadvantaged Groups. 220–244.*
232. Singh, V. K. (2016). Natural Resources Management : *An Overview Natural Resources Management : An Overview. (October).*
233. Salafsky, N., Cauley, H., Balachander, G., Cordes, B., Parks, J., Margoluis, S., Bhatt, S., Encarnacion, C., Russell, D. & Margoluis, R. (2001). *A systematic test of an enterprise strategy for community-based biodiversity conservation. Conservation Biology, 15, 1585–1595.*

234. Salafsky, N., & Wollenberg, E. (2000). *Linking livelihoods and conservation: A conceptual framework and scale for assessing the integral of human needs and biodiversity. World Development, 28(8), 1421_1438.*

235. Salafsky, N., Salzer, D., Stattersfield, A. J., Hilton-Taylor, C., Neugarten, R., Butchart, S. H. M., … Wilkie, D. (2008). *A standard lexicon for biodiversity conservation: Unified classifications of threats and actions. Conservation Biology, 22, 897–911.*

236. Sala, E., Mayorga, J., Bradley, D., Cabral, R.B., Atwood, T.B., Auber, A., Cheung, W., Costello, C. et al. (2021). *Protecting the global ocean for biodiversity, food and climate. Nature 592: 397–402. https://doi.org/10.1038/s41586-021-03371-z*

237. Salerno, J., Borgerhoff Mulder, M., Grote, M. N., Ghiselli, M., & Packer, C. (2016). *Household livelihoods and conflict with wildlife in community- based conservation areas across northern Tanzania. Oryx, 50(4), 702–712. https ://doi.org/10.1017/s0030 60531 5000393*

238. Sam Sreymom with Ouch Chhuong. (2015). *Agricultural Technological Practices and Gaps for Climate Change Adaptation. CDRI Working Paper Series No. 100. Phnom Penh: CDRI.*

239. Sanderson, E. W. et al. (2002). *The human footprint and the last of the wild. Bioscience 52, 891–904*

240. Sanderson, S. (2005). *Poverty and conservation: The new century's "peasant question". World Development, 33(2), 323_332.*

241. Scanlon, L. J., & Kull, C. A. (2009). *Untangling the links between wildlife benefits and community-based conservation at Torra Conservancy, Namibia. Development Southern Africa, 26(1), 75-93.http://dx.doi.org/10.1080/03768350802640107*

242. Sebele, L.S. (2010). *Community-based tourism ventures, benefits and challenges: Khama Rhino Sanctuary Trust, Central District, Botswana. Tourism Management, 31(1), 136_146.*

243. Secretariat of the CBD (2004) *Biodiversity Issues for Consideration in Planning, Establishment and Management of Protected Area Sites and Networks, CBD Technical Series No 15. Montreal: SCBD*

244. Secretariat of the Convention on Biological Diversity. (2008): *Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. – Technical Series (36).*
245. Shiferaw, B. and Freeman, H.A. (eds) (2003) *Methods for Assessing the Impacts of Natural Resource Management Research. A Summary of the Proceedings of an International Workshop, 6–7 December 2002, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India, 136 pp.*
246. Shogren, J. F., et al. 1999. *Why economics matters for endangered species protection. Conservation Biology 13:1257–1261.*
247. Silva, J. A., & Mosimane, A. W. (2012). *Conservation-Based Rural Development in Namibia: A Mixed Methods Assessment of Economic Benefits. The Journal of Environment & Development. http://dx.doi.org/10.1177/1070496512469193*
248. Summary Report of the INRM workshop held at Bilderberg, The Netherlands, 3-5 September 1999. *(http://www.inrm.cgiar.org)*
249. Stone, M.T., & Rogerson, C. (2011). *Community-based natural resource management and tourism: Nata Bird Sanctuary, Botswana. Tourism Review International, 15, 159_169.*
250. Strickland-Munro, J., Allison, H., & Moore, S. (2010). *Using resilience concepts to investigate the impacts of protected area tourism on communities. Annals of Tourism Research, 37(2), 499_519.*
251. Strickland-Munro, J., & Moore, S. (2013). *Indigenous involvement and benefits from tourism in protected areas: A study of Purnululu National Parkand Warmun Community, Australia. Journal of Sustainable Tourism, 12(1), 26_41.*
252. Swatuk, L. A. (2005). *From "project" to "context": Community based natural resource management in Botswana. Global Environmental Politics, 5(3), 95–124.*
253. Schuerholz, G., & Baldus, R. D. (2007). *Community based wildlife management in support of transfrontier conservation: the Selous-Niassa and Kawango Upper Zambezi challenges. Parks, Peace and Partnerships Conference 2007.*

254. Shackleton, Sheona, B. Campbell, E. Wollenberg and D. Edmunds. 2002. *Devolution andCommunity-based Natural Resource Management: Creating Space for Local People to Participate and Benefit? ODI Natural Resource Perspectives No. 76. London: ODI.*
255. SHARMA, S. and HENRIQUES, I. 2005. *Stakeholder influences on sustainability practices in the Canadian forest products industry. Strategic Management Journal, 26(2), 159.*
256. Schlager, E. and Ostrom, E. (1992). *Property-Rights Regimes and Natural Resources: A Conceptual Analysis. Land Economics, 68(3), p.249.*
257. SMP (Sansom Mlup Prey). 2015. *Ibis Rice Project. http://programs.wcs.org/smpcambodia/ About/Partnership-and-Funding.aspx.*
258. Stolton, S. & Dudley, N. (2010). *Arguments for Protected Areas: Multiple Benefits for Conservation and Us.*
259. Soeftestad, L. T. (ed.). (2006). *The Community-Based Natural Resource Management Network, Newsletter. Issues 1-25 (0nline) URL:http://www.cbnrm.net/index.html.*
260. Sola, L. (2001). *Impact of poverty on the environment in Southern Africa, Retrieved November 5, 2005, from http://www.sarpn.org.za.*
261. Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., Ludwig, C. (2015). *The trajectory of the Anthropocene: the great acceleration. Anthropocene Rev. 2 (1), 81–98*
262. Sandker, M., Finegold, Y., D'Annunzio, R., & Lindquist, E. (2017). Global deforestation patterns: Comparing recent and past forest loss processes through a spatially explicit analysis. *International Forestry Review*, *19*(3), 350–368. https://doi.org/10.1505/146554817821865081
263. Statistics, P. I. (2009). Part I Statistics and main indicators FAO Fisheries statistics. *FAO*, (2005).
264. Stocking, M., & Perkin, S. (1992). Conservation-with-development: An application of the concept in the Usambara Mountains, Tanzania. *Transactions of the Institute of British Geographers, 17*(3), 337 – 349.

265. Tsing, A. L., Brosius, P. J., & Zerner, C. (1999). Assessing community-based natural resource management. *Ambio, 28*(2), 197 – 198.
266. Twyman, C. (1998). Rethinking community resource management: Managing resources of managing people in western Botswana? *Third World Quarterly, 19*(4), 745 – 770.
267. Talukdar, B.K., Emslie, R., Bist, S.S., Choudhury, A., Ellis, S., Bonal, S.B., Malakar, C.M., Talukdar, B.N., Barua, B.N. (2008). *Rhinoceros unicornis [WWW Document]. URLhttp://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19496A8928657.en. (accessed 7.20.18).*
268. Thakadu, O. (2005). *Success factors in community based natural resources management in northern Botswana: Lessons from practice. Paper presented at the Natural resources forum. http://dx.doi.org/10.1111/j.1477-8947.2005.00130.x*
269. Tittensor DP, et al. (2014). *A mid-term analysis of progress toward international biodiversity targets. Science 346:241–244.*
270. Turner, S. (2004). *A crisis in CBNRM? Affirming the commons in southern Africa. In: 10th IASCP Conference, Oaxaca.*
271. Twyman, C. (2000): *Participatory conservation? Community-based natural resource management in Botswana, The Geographical Journal, 166, 323-335.*
272. UNCED. (1992). *United Nations Conference on Environment and Development Report, United Nations, New York.*
273. UNDP (United Nations Development Programme). (2012). *"Tmatboey Community Protected Area Committee, Cambodia." Equator Initiative Case Study Series. New York:UNDP UNEP–WCMC.(2014) World Database on Protected Areas http://www.wdpa.org.*
274. United States Agency for International Development (USAID) (Africa Bureau). (2009). *Chapter 2: Community-based natural resource management (CBNRM). In Environmental guidelines for small scale activities in Africa. Retrieved from Environmentally Sound Design and Management Capacity Building for Partners and Programs in Africa (ENCAP): http://www.encapafrica.org/EGSSAA/cbnrm.pdf*

275. United Nations. (1992). *AGENDA 21. United Nations Conference on Environment and Development Rio de Janerio, Brazil, 3 to 14 June 1992.*
276. UN. (1997). Urban and Rural Areas 1996. *UN, New York United Nations publications (ST:ESA:SER.a:166), Sales No. E97.XIII.3, 1997.*
277. United Nations Environment Programme (2010) *Analysis of the assessment landscape for biodiversity and ecosystem service, Executive summary. Third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science- policy platform on biodiversity and ecosystem services. Busan, Republic of Korea, 7–11 June 2010.*
278. United Nations Environment Programme. (2000). *Decisions adopted by the conference of the parties to the Convention on Biological Diversity at its fifth meeting Nairobi, 15-26 May 2000 UNEP/CBD/COP/5/23 Annex III. Retrieved January 7th, 2006 from www.cbd.int/doc/meetings/cop/cop-05/official/cop-05-23-en.doc.*
279. UNEP-WCMC and IUCN. (2021). *Protected Planet: The World Database on Protected Areas (WDPA). On line, February 2021, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.*
280. United Nations (2015). *The millennium development goals report.* https://doi.org/978-92-1-101320-7
281. United Nations Environment Programme (UNEP) (2008). *Green Jobs: Towards decent work in a sustainable, low-carbon world.* Report produced by the Worldwatch Institute for the United Nations Environment Programme.
282. Vie, J.-C., Hilton-Taylor, C. & Stuart, S.N. eds. 2009. *Wildlife in a changing world: an analysis of the 2008 IUCN Red List of Threatened Species. Gland, Switzerland, IUCN.*
283. Williams, D. R., & Patterson, M. E. (1996). Environmental meaning and ecosystem management: Perspectives from environmental psychology and human geography. *Society & Natural Resources*, 9(5), 507-521.

284. Williams, M. (2006). Deforesting the earth: From prehistory to global crisis. Reviewed by William Meyer*, Annals of the Association of American Geographers 96:* 674–675.
285. Western, D., & Wright, M. (1994). *Natural connections: Perspectives in community-based conservation.* Washington, DC: Island Press.
286. World Bank (2006). *Where is the wealth of nations: Measuring capital for the 21st century.* The World Bank, Washington, DC.
287. World Wide Fund for Nature (WWF) (2009). *Land suitability evaluation for sustainable agricultural developments in Pechreada District, Mondulkiri Province.* WWF: Phnom Penh.
288. Watson, J.E., Dudley, N., Segan, D.B. and Hockings, M. (2014). *The performance and potential of protected areas. Nature 515 (7525): 67–73.*
289. Walston, J., Stokes, E., Hedges, S., 2016*. The importance of Asia's protected areas for safeguarding commercially high value species, in: Joppa, L.N., Baillie, J.E.M., Robinson, J.G. (Eds.), Protected areas: Are They Safeguardng Biodiversity? Wiley-Blackwell, pp. 190–207.*
290. World Commission on Environment and Development, (WCED). (1987). *Our Common Future, Oxford University Press, London.*
291. Woodhouse, E., Homewood, K.M., Beauchamp, E., Clements, T., McCabe, J.T., Wilkie, D., et al., 2015. *Guiding principles for evaluating the impacts of conservation interventions on human well-being. Phil. Trans. R Soc. B. 370 (1681), 20150103.*
292. World Wildlife Fund (WWF). (2019). Conservation success in Cambodia's Cardamom Mountains. *WWF Report*.
293. Wells, M., & Brandon, K. (1992). *People and parks: Linking protected area management with local communities. Washington, DC: The World Bank.*
294. Western, D., Russell, S., & Cuthil, I. (2009). *The status of wildlife in protected areas compared to non-protected areas of Kenya. PLoS ONE, 4(7), e6140. https ://doi.org/10.1371/journ al.pone.0006140*

295. White, C., Halpern, B. S. & Kappel, C. V. (2012). *Ecosystem service tradeoff analysis reveals the value of marine spatial planning for multiple ocean uses. Proc. Natl Acad. Sci. USA 109, 4696–4701.*

296. Williams, D. R., & Patterson, M. E. (1996). *Environmental meaning and ecosystem management: Perspectives from environmental psychology and human geography. Society & Natural Resources, 9(5), 507-521.*

297. Woodley, S., Locke, H., Laffoley, D., MacKinnon, K., Sandwith, T. and Smart, J. (2019). *A review of evidence for area-based conservation targets for the post-2020 global biodiversity framework. PARKS 25(2): 31–46.*

298. World Bank. (2003). *The CGIAR at 31: an independent meta-evaluation of the CGIAR. Volume 1: overview report. Operations Evaluation Department. World Bank, Washington, D.C., USA.*

299. World Bank. (2006). *Where is the Wealth of Nations: Measuring Capital for the 21st Century. The World Bank. Washington, DC.*

300. Wright, Gavin, and Jesse Czelusta. (2002). *"Exorcising the Resource Curse: Minerals as a Knowledge Industry, Past and Present", Economics Working Paper, Stanford University. Retrieved from: http://www-econ.stanford.edu/faculty/workp/swp02008.pdf*

301. Yusuf, H. K. (2014). *Ecologically Sustainable Natural Resource Management (NRM) for National Development*. *5*(May), 7–10.

302. Yaffee, S. L. (1999). *Three faces of ecosystem management. Conservation Biology 13:713–725.*

303. Zanetell, B. A. and B. A. Knuth. (2004). *Participation Rhetoric or Community-Based Management Reality?: Influences on Willingness to Participate in a Venezuelan Freshwater Fishery. World Development 32:793-807.*

304. Zhou P., Yang X., Wang X., Hu B., Zhang W., Si H., Zhu Y., Li B., Huang C., Chen H., … Shi Z. (2020). *A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature, 579: 270–273. doi: 10.1038/s41586-020-2012-7.*

APPENDIX

សំនួរលេខ:_____ ឈ្មោះអ្នកសំភាសន៍ : _____ កាលបរិច្ឆេទ _____
Questionnaire No Interviewer Date

បញ្ជីសំណួរសំភាសន៍សហគមន៍សម្រាប់ការស្រាវជ្រាវថ្នាក់បណ្ឌិត
Questionnaire for Interviewing Communities for PhD Research

Informant profile		
1	អាសយដ្ឋានអ្នកផ្តល់សម្ភាសន៍ Address of interviewee	ភូមិ Village : _____ ឃុំ Commune : _____ ស្រុក District : _____ ខេត្ត Province : _____
2	ឈ្មោះអ្នកផ្តល់សម្ភាសន៍ Name of interviewee	_____លេខទូរស័ព្ទ_____
3	ភេទ Sex	☐1. ប្រុស Male ☐2. ស្រី Female ☐3. មិនមានចំលើយ Prefer not answer
4	អាយុ Age	☐ 18-24 years old ☐ 25-34 years old ☐ 35-44 years old ☐ 45-54 years old ☐ 55-64 years old ☐ 65-74 years old ☐ Above 75 years old
5	កំរិតសិក្សារបស់អ្នកផ្តល់សម្ភាសន៍ Education	☐1. មិនបានរៀន No formal education ☐2. បឋមសិក្សា Primary school ☐3. អនុវិទ្យាល័យ Secondary school ☐4. វិទ្យាល័យ High school ☐5. បរិញ្ញាប័ត្រ Bachelor degree ☐6. អនុបណ្ឌិត Master degree
6	ចំនួនសមាជិកគ្រួសារ Family members	_____ នាក់ members
7	តើអ្នកជនជាតិអ្វី? Which ethnicity best describes you?	☐1. ខ្មែរ Khmer ☐2. កួយ Kouy ☐3. ភ្នង Pou Norng ☐4. ចាម Cham ☐5. ផ្សេងៗ Other:_____
8	តើអ្នកជាសមាជិកក្នុងគណៈកម្មការសហគមន៍ដែរ រឺទេ? What is your role in the community? ☐1. គណៈកម្មការគ្រប់គ្រងសហគមន៍ព្រៃឈើ Community Forestry Management Community ☐2. គណៈកម្មការគ្រប់គ្រងសហគមន៍នេសាទ Community Fishery Management Committee ☐3. គណៈកម្មការគ្រប់គ្រងសហគមន៍តំបន់ការពារធម្មជាតិ CPA Management Committee ☐4. សមាជិកក្រុមល្បាតសហគមន៍ Community Patrolling Member	

	☐5. គណៈកម្មការគ្រប់គ្រងសហគមន៍អេកូទេសចរណ៍ CBET Committee ☐6. គណៈកម្មការគ្រប់គ្រងសហគមន៍ជនជាតិដើមភាគតិច Indigenous People Committee ☐8. មេភូមិ Village Chief ☐9. ប្រជាពលរដ្ឋ Villager ☐10. ផ្សេងៗ Others.....
9. តើនៅក្នុងភូមិអ្នកមានសកម្មភាពគ្រប់គ្រងធនធានធម្មជាតិអ្វីខ្លះ? What is the natural resource management activities in your community?	*ចំលើយអាចលើសពីមួយ Answer can be more than one* ☐1. សហគមន៍ព្រៃឈើ ☐2. សហគមន៍នេសាទ ☐3. សហគមន៍ចុះបញ្ជីដីជនជាតិដើមភាគតិច ☐4. សហគមន៍តំបន់ការពារធម្មជាតិ ☐5. ការគ្រប់គ្រងដែនជម្រកសត្វព្រៃ ☐6. ការអភិរក្សសត្វផ្សោត ☐7. សហគមន៍អេកូទេសចរណ៍ ☐8. ផ្សេងៗ..... ☐9. គ្មាន
10-How many natural resource management activities in your community?	☐1. One activity ☐2. Two activities ☐3. More than two
11. តើសកម្មភាពសហគមន៍ព្រៃឈើមានប្រសិទ្ធិភាពកម្រិតណា? What is the effectiveness of community forestry?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CFMC doesn't work ☐b. មានបទល្មើសច្រើន Many illegal logging activities ☐c. បាត់បងព្រៃឈើច្រើន Lost much forests ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CFMC works less ☐b. មានបទល្មើសច្រើន Many illegal logging activities ☐c. បាត់បងព្រៃឈើច្រើន Lose much forests ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. បទល្មើសមានការថយចុះក្នុងព្រៃសហគមន៍ Illegal logging is decreased ☐c. បន្តបាត់បងព្រៃឈើ Lost less forests ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. បទល្មើសក្នុងព្រៃសហគមន៍តិចតួច Illegal logging is decreased ☐d. បន្តបាត់បងព្រៃឈើតិចតួច Less degradation of the forest resources ☐e. សហគមន៍បានអាស្រយ័ផល និងអនុផលព្រៃឈើ

	☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐4. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. គ្មានបទល្មើសក្នុងព្រៃសហគមន៍ No illegal logging in the CF area ☐e. សហគមន៍កើនចំណូលពីអនុផលព្រៃឈើ និងសកម្មភាពផ្សេងៗ ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
11. តើសហគមន៍នេសាទមានប្រសិទ្ធិភាពកម្រិតណា? What is the effectiveness of community fishery?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CFiMC doesn't work ☐b. មានបទល្មើសច្រើន Many illegal fishing activities ☐c. បាត់បង់ធនធានជលផលច្រើន Lose more fisheries ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CFiMC works less ☐b. មានបទល្មើសនេសាទច្រើន Many illegal fishing activities ☐c. បាត់បង់ធនធានជលផលច្រើន Lose much fisheries ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. គណៈកម្មការគ្រប់គ្រងមានការតាំងចិត្តខ្ពស់CFiMC has strong commitment ☐c. បទល្មើសនេសាទនៅតែមាន Illegal fishing still happens ☐d. បន្តបាត់បង់ធនធានជលផល Gradually continue to lose the fisheries ☐e. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានជលផលបានល្អ Strong fisheries protection ☐d. បទល្មើសនេសាទតិចតួច Less illegal fishing activities ☐e. បន្តបាត់បង់ធនធានជលផលតិចតួច Less degradation of the fisheries ☐f. សហគមន៍បានអាស្រយ័ធនធានជលផល ☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐4. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានជលផលបានល្អ Strong fisheries protection

	☐e. ស្ថានបទល្មើសនេសាទខុសច្បាប់ No illegal fishing in the CFi area ☐f. មិនមានការបាត់បង់ធនធានជលផល No degradation of the fisheries ☐g. សហគមន៍កើនចំណូលពីធនធានជលផល និងសកម្មភាពផ្សេងៗ ☐h. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
12. តើហគមន៍ជនជាតិដើមភាគតិចគ្រប់គ្រងដីសម្បូហភាពមាន ប្រសិទ្ធិភាពកម្រិតណា? What is the effectiveness of indigenous community for collective land management?	☐**1. ស្ថានប្រសិទ្ធិភាព Note effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ IP Community doesn't work well ☐b. មានបញ្ហាច្រើនដូចជាការចាប់ដី Many issues, such as land encroaching ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐**2. មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The IP Community works less ☐b. មានបញ្ហាច្រើនដូចជាការចាប់ដី Many issues, such as illegal logging and land encroaching ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. បានកំណត់អត្តសញ្ញាណកម្មជនជាតដើមភាគតិច IP community was established ☐b. Illegal logging and land encroaching are decreased ☐c. កំពុងដំណើរការចុះឈ្មោះសហគមន៍ជនជាតដើមភាគតិចនៅក្រសួងមហាផ្ទៃ IP community is under legal registration at the Ministry of Interior ☐d. មានសកម្មភាពថែរក្សារបួបធម៌ហគមន៍ជនជាតិដើមភាគខ្លះៗ There are some IP culture preservation activities. ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**4. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. អត្តសញ្ញាណកម្មជនជាតដើមភាគតិចត្រូវបានកំណត់ IP community was legally register at MoI ☐c. សហគមន៍បានទទួលបណ្ណ័កម្មសិទ្ធិដីសម្បូហភាពផ្តល់ការពីក្រសួងដែនដី IP community received legal communal land title from MoL ☐d. របួធម៌ហគមន៍ជនជាតិដើមភាគតិចត្រូវបានថែរក្សា IP culture is preserved ☐e. សហគមន៍បានអាស្រ័យផលលើដីសម្បូហភាព ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**5. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. IP community was legally register at MoI ☐c. សហគមន៍បានទទួលបណ្ណ័កម្មសិទ្ធិដីសម្បូហភាពផ្តល់ការពីក្រសួងដែនដី IP community received legal communal land title ☐d. Forest, land, and other resources are well managed ☐d. សហគមន៍កើនប្រាក់ចំណូលតាមរយៈ ការប្រើប្រាស់ដីសម្បូហភាព IP community increased incomes through the use of communal land ☐e. របួធម៌ហគមន៍ជនជាតិដើមភាគតិចត្រូវបានថែរក្សា IP culture is preserved

	☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
13. តើសហគមន៍តំបន់ការពារធម្មជាតិមានប្រសិទ្ធិភាពកម្រិតណា? What is the effectiveness of community protected area?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CPA MC doesn't work well ☐b. មានបទល្មើសច្រើន Many illegal logging/fishing activities ☐c. បាត់បង់ធនធានជលផលច្រើន Lose more forest/fisheries resources ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CPA works less ☐b. មានបទល្មើសច្រើន Many illegal logging/fishing activities ☐c. បាត់បង់ព្រៃឈើច្រើន Lose much forest/fisheries resources ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. គណៈកម្មការគ្រប់គ្រងCPAមានការតាំងចិត្តខ្ពស់ CPAMC has strong commitment ☐c. បទល្មើសនេសាទ រឺព្រៃឈើមានការថយចុះ Decrease poaching activities ☐d. បន្តបាត់បង់ធនធានជលផល រឺព្រៃឈើ Gradually lose the forest/fisheries ☐e. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានធម្មជាតិបានល្អ Strong forestry/fisheries protection ☐d. បទល្មើសធនធានធម្មជាតិតិចតួច Less illegal logging/fishing activities ☐e. បន្តបាត់បង់ធនធានព្រៃឈើ រឺ ជលផលតិចតួច Less degradation of forest/fisheries ☐e. សហគមន៍បានអាស្រយ័ជល និងអនុជលព្រៃឈើ និងធនធានជលផល ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐5. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. មានផែនការ គ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានធម្មជាតិបានល្អ Strong forestry/fisheries protection ☐e. គ្មានបទល្មើសព្រៃឈើ រឺ នេសាទខុសច្បាប់ No illegal logging/fishing in the CPA area ☐e. សហគមន៍កើនចំណូលពីអនុជលព្រៃឈើ ជលផល និងសកម្មភាពផ្សេងៗ

	☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
14. តើការគ្រប់គ្រងដែនជម្រកសត្វព្រៃមានប្រសិទ្ធិភាពកម្រិតណា? What is the effectiveness of wildlife sanctuary management?	☐**1. គ្មានប្រសិទ្ធិភាព Not Effective ហេតុអ្វី? Why?** ☐a. មានបទល្មើសច្រើនក្នុងតំបន់ការពារ Many poaching in the PA ☐b. ធនធនព្រៃឈើ និងជីវចម្រុះផ្សេងៗមានការថយចុះច្រើនខ្លាំង Strongly decreased biodiversity ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**2. មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a.មានសកម្មភាពការពារតិចតួច Less conservation activities ☐b មានបទល្មើសក្នុងតំបន់ការពារ Many poaching in the PA ☐c. ធនធនព្រៃឈើ និងជីវចម្រុះផ្សេងៗមានការថយចុះច្រើនខ្លាំង Forest and biodiversity area significantly decreased ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderate Effective ហេតុអ្វី? Why?** ☐a. មានផែនការសកម្មភាពល្បាតច្បាស់លាស់ More conservation activities, including patrolling, awareness outreach ☐b. Better patrolling plan ☐c. បទល្មើសក្នុងតំបន់ការពារមានការថយចុះ Poaching activities are decreased ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. More conservation activities with strong community participation ☐b. Clear patrolling plan ☐c. Poaching activities are significantly decreased ☐d. PA zone and management plan ☐e. Biodiversity is increased ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**4. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. More conservation activities with strong community participation ☐b. Clear patrolling plan ☐d. PA zone and management plan ☐c. Zero Poaching activities ☐c. Biodiversity is increased ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
15. តើសហគមន៍អេកូទេសចរណ៍មានប្រសិទ្ធិភាព កម្រិតណា?	☐**1 គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ CBET does not work ☐b. សហគមន៍គ្មានសេវាកម្មទេសចរណ៍ច្បាស់លាស់ No clear ecotourism services

What is the effectiveness of community-based ecotourism management?	☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify)…… ☐**1 មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច CBET works less ☐b. សហគមន៍គ្មានសេវាកម្មទេសចរណ៍ច្បាស់លាស់ No clear ecotourism services ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) …… ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐ a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ CBET is officially registered ☐ b. សហគមន៍មានក្រុមផ្តល់សេវាកម្ម CBET has clear service provider groups ☐ c. សហគមន៍ទទួលបានប្រាក់ចំណូលសហគមន៍ CBET get income from service ☐ d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) …… ☐**4. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐ a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ និងមានគណៈកម្មការគ្រប់គ្រងច្បាស់លាស់ CBET is officially registered with clear management structure ☐ b. សហគមន៍មានការផ្សព្វផ្សាយទីផ្សាច្បាស់លាស់ CBET has clear marketing strategy ☐ c. សហគមន៍មានក្រុមផ្តល់សេវាកម្មច្បាស់លាស់ CBET has clear services ☐ d. សហគមន៍កើនប្រាក់ចំណូលសហគមន៍ និងបានប្រើប្រាស់ចំណូលនេះសម្រាប់ការការពារធនធានធម្មជាតិ និងការងារអភិវឌ្ឍន៍ផ្សេងៗ CBET has increased incomes and used some of the profits for NRM protection and development activities ☐ f. ប្រជាពលរដ្ឋមានការកើនប្រាក់ចំណូល Villagers generated better incomes ☐ g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) …… ☐**5. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ និងមានគណៈកម្មការគ្រប់គ្រងច្បាស់លាស់ CBET is officially registered with clear management structure ☐b. សហគមន៍មានការផ្សព្វផ្សាយទីផ្សាច្បាស់លាស់ CBET has clear marketing strategy ☐c. សហគមន៍មានក្រុមផ្តល់សេវាកម្មច្បាស់លាស់ CBET has good services ☐d. សហគមន៍កើនប្រាក់ចំណូលសហគមន៍ និងបានប្រើប្រាស់ចំណូលនេះសម្រាប់ការការពារធនធានធម្មជាតិ និងការងារអភិវឌ្ឍន៍ផ្សេងៗ CBET has increased incomes and used some of the profits for NRM protection and development activities ☐e. ប្រជាពលរដ្ឋកើនប្រាក់ចំណូល និងមានការចូលរួមយ៉ាងសកម្មក្នុងការការពារធនធានធម្មជាតិ Communities generated better incomes, and actively participate in NRM ☐f. រដ្ឋមានការកើនចំណូលដើម្បីអភិវឌ្ឍន៍ក្នុងខេត្ត The government has increase national incomes ☐h. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ……
16. តើអ្នកបានចូលរួមសកម្មភាពការងារអភិរក្សអ្វីខ្លះ?	*ចំលើយអាចលើសពីមួយ Answer can be more than one*

What type of activities have you been involved in your communities?	☐1. សិក្ខាសាលា Workshop ☐2. ប្រជុំសហគមន៍ Community meetings ☐3. វគ្គបណ្តុះបណ្តាល Trainings ☐4. សកម្មភាពល្បាត Patrolling ☐5. សកម្មភាពស្រាវជ្រាវ Research ☐6. ផ្សេងៗ Other……
17. តើសហគមន៍របស់អ្នកមានការគាំទ្រពីអង្គការ រឺស្ថាប័នរដ្ឋដែរ រឺទេ? Does your community receive any supports from NGOs or Government?	*ចំលើយអាចលើសពីមួយ Answer can be more than one* ☐1. ក្មាន No (ប្រសិនបើឆ្លើយទេ រម្លងទៅសំណួរទី22) (If the answer "No" skip questioning 22) ☐2. មិនដឹង Don't know (ប្រសិនបើឆ្លើយទេ រម្លងទៅសំណួរទី22) (If the answer "No" skip questioning 22) ☐3. អង្គការ NGOs ☐4. មន្ទីរពាក់ពន្ធ័ Relevant government departments ☐5. ផ្សេងៗ Others _____
18. តើសហគមន៍របស់អ្នកមានការគាំទ្រអ្វីខ្លះពីអង្គការ រឺស្ថាប័នរដ្ឋ? What types of supports has your community/CBO received from the organizations/government?	*ចំលើយអាចលើសពីមួយ Answer can be more than one* ☐1. គាំទ្រផ្នែកថវិកា Funding ☐2. គាំទ្រផ្នែកបច្ចេកទេស Technical assistance ☐3. ការពង្រឹងសមត្ថភាព Capacity development ☐4. ចុះជួយជាប្រចាំ Closely and regular support ☐5. ផ្សេងៗ Others…… …… ……
19. ប្រសិនបើគ្មានការគាំទ្រថវិកាពីអង្គការ រឺមន្ទីរវិស័យ តើសហគមន៍របស់អ្នកអាចដំណើរការដោយខ្លួនឯងបានដែរ រឺទេ? Assuming there is no further financial support from NGOs and the government in the coming year. Can your community sustain the activities?	*លើយមានតែមួយ Select only one answer* ☐1.មិនអាចដំណើរការបាន No sustain ☐2.អាចដំណើរការបានតិចតួច Slightly sustain ☐3.អាចដំណើរការបានមធ្យម Averagely sustain ☐4.អាចដំណើរការបានធម្មតា Sustain ☐5.អាចដំណើរការបានធម្មតាល្អ Highly Sustain ហេតុអ្វី? Why?……
20. បច្ចុប្បន្ន តើអ្នកមានផ្ទះប្រភេទអ្វី? (សង្កេតមើល) At the present, what household equipment do you have? ☐1. ដំបូលRoof (□a. ដំបូលស្បូវThatch □b. ស័ង្កសី Zinc □c: ក្បឿងTile) ☐2.ជញ្ជាំង Wall (□a. ឈើ Wood □b. ឫស្សី Bamboo □c. ស៊ីម៉ង់ត៍ Concrete) ☐3.កំរាល ឬរនាប Floor (□a. ឈើ Wood □b. ឫស្សី Bamboo □c. ស៊ីម៉ង់ត៍ Concrete)	21. កាលពីមុនគម្រោង តើអ្នកមានផ្ទះប្រភេទអ្វី? Before the project started, what household equipment did you have? ☐1. ដំបូលRoof (□a. ដំបូលស្បូវThatch □b. ស័ង្កសី Zinc □c: ក្បឿងTile) ☐2.ជញ្ជាំង Wall (□a. ឈើ Wood □b. ឫស្សី Bamboo □c. ស៊ីម៉ង់ត៍ Concrete) ☐3.កំរាល ឬរនាប Floor (□a. ឈើ Wood □b. ឫស្សី Bamboo □c. ស៊ីម៉ង់ត៍ Concrete)
22. តើស្ថានភាពផ្ទះមានការផ្លាស់ប្តូរដែរ រឺទេ? Is the house changed?(អង្កេតមើល) ☐1. Worst than before ☐2 Not improved ☐3. Slightly improved ☐4. Moderately improved	

☐5. Improved
☐6. Highly improved

23.បច្ចុប្បន្ន តើអ្នកមានសម្ភារប្រើប្រាស់អ្វីខ្លះក្នុងផ្ទះ?
At the present, what equipment for household consumption did you have?

□1. កង់ Bike □2. ម៉ូតូ Motorbike □3. ឡានតូច Vehicle □4. ទូក និងម៉ាស៊ីន Boat with engine □5. ម៉ាស៊ីនភ្ជួរដី Ploughing machine □6. ត្រាក់ទ័រភ្ជួរដី Ploughing tractor □7. ឡានកែច្នៃសម្រាប់ដឹកទំនិញ Local-made vehicle □8. ម៉ាស៊ីនបូមទឹក Water pump machine □9. ម៉ាស៊ីនកិនស្រូវ Rice mill machine □10. ទូរសព្ទធម្មតា Normal mobile phone □11. ទូរសព្ទស្មាតហ្វូន Smart phone □12. វិទ្យុ Radio □13ទូរទស្សន៍TV

24. មុនពេលចាប់ផ្តើមគម្រោង តើអ្នកមានសម្ភារប្រើប្រាស់អ្វីខ្លះក្នុងផ្ទះ?Before the project commencement, what equipment for household consumption did you have?

□1. កង់ Bike □2. ម៉ូតូ Motorbike □3. ឡានតូច Vehicle □4. ទូក និងម៉ាស៊ីន Boat with engine □5. ម៉ាស៊ីនភ្ជួរដី Ploughing machine □6. ត្រាក់ទ័រភ្ជួរដី Ploughing tractor □7. ឡានកែច្នៃសម្រាប់ដឹកទំនិញ Local-made vehicle □8. ម៉ាស៊ីនបូមទឹក Water pump machine □9. ម៉ាស៊ីនកិនស្រូវ Rice mill machine □10. ទូរសព្ទធម្មតា Normal mobile phone □11. ទូរសព្ទស្មាតហ្វូន Smart phone □12. វិទ្យុ Radio □13ទូរទស្សន៍TV

25. តើសំភារៈប្រើប្រាស់មានការផ្លាស់ប្តូរទេ? Is the house equipment consumption changed?
☐1. Worst than before
☐2 Not improved
☐3. Slightly improved
☐4. Moderately improved
☐5. Improved
☐6. Highly improved

26.បច្ចុប្បន្ន តើអ្នកប្រប្រាស់ប្រភេទអគ្គិសនីអ្វីក្នុងផ្ទះ?
Now, what type of electricity supply do you use?

☐1.សូឡា Solar
☐2.អគ្គិសនីរដ្ឋ (EDC)
☐3.ម៉ាស៊ីនភ្លើងឯកជន Private generator
☐4.អាគុយ Battery
☐5.ផ្សេងៗ Other (សូមបញ្ជាក់)៖_____

27. កាលពីមុនចាប់ផ្តើមគម្រោង តើអ្នកប្រប្រាស់ប្រភេទអគ្គិសនីអ្វីក្នុងផ្ទះ? Before the project started, what type of electricity supply did you use?
☐1.សូឡា Solar
☐2.អគ្គិសនីរដ្ឋ (EDC)
☐3.ម៉ាស៊ីនភ្លើងឯកជន Private generator
☐4.អាគុយ Battery
☐5.ផ្សេងៗ Other (សូមបញ្ជាក់)
៖_____

28. តើការប្រើប្រាស់ថាមពលអគ្គិសនីមានការផ្លាស់ប្តូរទេ? Is the electricity supply changed?
☐1. Worst than before
☐2 Not improved
☐3. Slightly improved
☐4. Moderately improved
☐5. Improved
☐6. Highly improved

29. បច្ចុប្បន្ន តើគ្រួសារបស់អ្នកមានចំណូលពីប្រភពណាខ្លះ?
In the presence, what are the sources of your incomes?

ប្រភពចំណូល **Sources**	ចំណូលប្រចាំឆ្នាំ (រៀល) **Annual income**	ប្រភពចំណូល **Souce**	ចំណូលប្រចាំឆ្នាំ (រៀល) **Annual income**
1.ធ្វើស្រែ Rice farming	_____	10.ស៊ីឈ្នួលគេ Labor worker	_____
2.ធ្វើចំការ Other farming	_____	**11.ប្រមូលអនុផលព្រៃឈើ Collect NTFP**	_____
3.នេសាទ Fishing	_____	12.លក់ដូរ (ចាបហួយ) Grocery store	_____
4.កាប់ឈើ		13.ប្រាក់ខែ Salary	

30. កាលពីមុនគម្រោង តើគ្រួសារបស់អ្នកមានចំណូលពីណាខ្លះ?

ប្រភពចំណូល **Sources**	ចំណូលប្រចាំឆ្នាំ (រៀល) **Annual income**	ប្រភពចំណូល **Souce**	ចំណូលប្រចាំឆ្នាំ (រៀល) **Annual income**
1.ធ្វើស្រែ Rice farming	_____	10.ស៊ីឈ្នួលគេ Labor worker	_____
2.ធ្វើចំការ Other farming	_____	**11.ប្រមូលអនុផលព្រៃឈើ Collect NTFP**	_____

Logging	_____		_____
6.បរបាញ់សត្វ Hunting	_____	14.ឡដុតធ្យូង Charcoal producer	_____
6.ជាងជួសជុល Mechanic	_____	15.កាត់ដេរ Tailor	_____
7.ចិញ្ចឹមសត្វ Livestock	_____	16.ដាំបន្លែ Vegetable growing	_____
8.បិទស្រា Make local wine	_____	17.ដំណាំឈើហូបផ្លែ Fruit farming	_____
9.អេកូទេសចរ Ecotourism	_____	18.ផ្សេងៗ Other _____	_____

3.នេសាទ Fishing	_____	12.លក់ដូរ (ចាបហួយ) Grocery store	_____
4.កាប់ឈើ Logging	_____	13.ប្រាក់ខែ Salary	_____
6.បរបាញ់សត្វ Hunting	_____	14.ឡដុតធ្យូង Charcoal producer	_____
6.ជាងជួសជុល Mechanic	_____	15.កាត់ដេរ Tailor	_____
7.ចិញ្ចឹមសត្វ Livestock	_____	16.ដាំបន្លែ Vegetable growing	_____
8.បិទស្រា Make local wine	_____	17.ដំណាំឈើហូបផ្លែ Fruit farming	_____
9.អេកូទេសចរ Ecotourism	_____	18.ផ្សេងៗ Other _____	_____

Before the project, what were sources of your income?

31. ប្រាក់ចំណូលបច្ចុប្បន្ន សរុបក្នុងមួយឆ្នាំ
Present total income per year.....

32. ប្រាក់ចំណូលកាលពីមុន សរុបក្នុងមួយឆ្នាំ
Total income per year.....

33. តើចំណូលមានការផ្លាស់ប្តូរទេ?Is the income changed?
☐1. ចំណូលកើនឡើង ☐2. ចំណូលថយចុះ

34. បច្ចុប្បន្ន តើប្រាក់ចំណាយ សរុបក្នុងមួយឆ្នាំបានប៉ុន្មាន?
At the presence, how much do you spend per year?

ការចំណាយប្រចាំឆ្នាំ Total expenses per year.....

- ☐1. សម្រាប់អាហារ Food
- ☐2. សម្រាប់កូនរៀន Education
- ☐3. សម្រាប់ការថែទាំសុខភាព Health care
- ☐4. សម្រាប់ការធ្វើដំណើរ និងទំនាក់ទំនង Transport and communication
- ☐5. សម្រាប់កសិកម្ម ដូចជាជី Agriculture
- ☐6. ផ្សេងៗ Others .....

35. កាលពីមុនចាប់ផ្តើមគម្រោង តើប្រាក់ចំណាយសរុបក្នុងមួយឆ្នាំបានប៉ុន្មាន? Before the project, how much did you spend per year?
ការចំណាយប្រចាំឆ្នាំ Total expenses per year.....

- ☐1. សម្រាប់អាហារ Food
- ☐2. សម្រាប់កូនរៀន Education
- ☐3. សម្រាប់ការថែទាំសុខភាព Health care
- ☐4. សម្រាប់ការធ្វើដំណើរ និងទំនាក់ទំនង Transport and communication
- ☐5. សម្រាប់កសិកម្ម ដូចជាជី Agriculture
- ☐6. ផ្សេងៗ Others .....

36. បច្ចុប្បន្ន តើអ្នកសន្សំសរុបក្នុងមួយឆ្នាំបានប៉ុន្មាន?
Currently, how much can you save per year?

Total asset value per year.....

37. កាលពីមុនចាប់ផ្តើមគម្រោង តើអ្នកសន្សំសរុបក្នុងមួយឆ្នាំបានប៉ុន្មាន? Before the commencement of project, how much could you save per year?
Total asset value expenses per year.....

38. តើការសន្សំមានការកើនឡើងទេ? ☐1. កើនឡើង ☐2. ធ្លាក់ចុះ ☐3. ថេរ

39. ប្រៀបធៀបទៅមុនពេលចាប់ផ្តើមគម្រោង តើអ្នកមានការយល់ដឹងអំពីការគ្រប់គ្រងធនធានធម្មជាតិ (ដូចជាការការពារព្រៃឈើ ជលផល សត្វព្រៃ និងដីរំលុះ) កម្រិតណា?
Comparing to 5 years ago, to what extend do you understand the natural resource management?

- ☐1. មានការយល់ដឹងតិចតួច To some extend understanding
- ☐2. មានការយល់ដឹងមធ្យម Moderate understanding
- ☐3. មានការយល់ដឹងច្រើន Understanding
- ☐4. ក្រប់គ្នាមានការយល់ដឹងច្រើនណាស់ Highly understanding
- ☐5. ផ្សេងៗ Others..... .....

40. នៅក្នុងសហគមន៍របស់អ្នក តើមានកត្តាប្រឈមអ្វីខ្លះមកលើធនធានធម្មជាតិ? What are the challenges of NRM in the community?

- ☐1.មិនមានទេ No
- ☐2.បទល្មើសនេសាទ Illegal fishing

កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number

a) ☐ មិនធ្ងន់ធ្ងរ Not much severe

b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe

c) ☐ធ្ងន់ធ្ងរ Severe

	d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐3.បទល្មើសកាប់ព្រៃឈើខុសច្បាប់ Illegal logging កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐4.ចាប់ដីខុសច្បាប់ Land encroachment កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐5.ការបរបាញ់សត្វព្រៃ Hunting កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐6.ឡដុតធ្យូង Charcoal កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐7.ក្រុមហ៊ុនសម្បទានដីសេដ្ឋកិច្ច Economic land concession កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐8.ផែនការទំនប់វារីអគ្គិសនី Planned hydropower dam កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe

	☐9.ទំនប់វារីអគ្គិសនី Up-stream hydropower dam (In Lao PDR) កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐10.ផ្សេង Others (Specify)……. កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe _____
41. តើងអ្នកមានយោបល់អ្វីខ្លះដើម្បីគ្រប់គ្រងធនធានធម្មជាតិអោយមានប្រសិទ្ធិភាព? What is your suggestion for successful and sustainable natural resource management?	☐1. គ្មានយោបល់ No comments ☐2. ផ្សេងៗ Others_____ _____ _____ _____ _____

****

សូមអរគុណ! Thank you!

សំនួរលេខ:_____ ឈ្មោះអ្នកសំភាសន៍ : _____ កាលបរិច្ឆេទ _____

Questionnaire No Interviewer Date

បញ្ជីសំណួរសំភាសន៍មន្ត្រី

Questionnaire for Interviewing Officials

Informant profile		
1	ស្ថាបន័ និងអាសយដ្ឋានអ្នកផ្តល់សម្ភាសន៍ Institution and Address of interviewee	ស្ថាបន័ Institution : _____ ខេត្ត Province : _____

2	ឈ្មោះ អ្នកផ្តល់សម្ភាសន៍ Name of interviewee	ឈ្មោះ Name _____
3	ភេទ Sex	☐1. ប្រុស Male ☐2. ស្រី Female ☐3. មិនមានចំលើយ Prefer not answer
4	អាយុ Age	☐ 18-24 years old ☐ 25-34 years old ☐ 35-44 years old ☐ 45-54 years old ☐ 55-64 years old ☐ 65-74 years old ☐ Above 75 years old
5	កំរិតសិក្សារបស់អ្នកផ្តល់សម្ភាសន៍ Education	☐1. មិនបានរៀន No formal education ☐2. បឋមសិក្សា Primary school ☐3. អនុវិទ្យាល័យ Secondary school ☐4. វិទ្យាល័យ High school ☐5. បរិញ្ញាប័ត្រ Bachelor degree ☐6. អនុបណ្ឌិត Master degree
6	What is your role? ☐1. Official of Provincial Department of Environment ☐2. Official of Provincial Department of Tourism ☐3. Official of Provincial Department of Rural Department ☐4. Official of Forestry Administration ☐5. Official of Fisheries Administration ☐6. Village Chief ☐7. Commune Chief ☐8. District Official ☐9. NGO Officials	
7. What is the effectiveness of community forestry?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CFMC doesn't work ☐b. មានបទល្មើសច្រើន Many illegal logging activities ☐c. ជាត់បងព្រៃឈើច្រើន Lost much forests ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CFMC works less ☐b. មានបទល្មើសច្រើន Many illegal logging activities ☐c. ជាត់បងព្រៃឈើច្រើន Lose much forests ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. បទល្មើសមានការថយចុះក្នុងព្រៃសហគមន៍ Illegal logging is decreased ☐c. បន្តជាត់បងព្រៃឈើ Lost less forests	

	☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. បទល្មើសក្នុងព្រៃសហគមន៍តិចតួច Illegal logging is decreased ☐d. បន្តបាត់បង់ព្រៃឈើតិចតួច Less degradation of the forest resources ☐e. សហគមន៍បានអាស្រ័យផល និងអនុផលព្រៃឈើ ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐4. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CF has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. គ្មានបទល្មើសក្នុងព្រៃសហគមន៍ No illegal logging in the CF area ☐e. សហគមន៍កើនចំណូលពីអនុផលព្រៃឈើ និងសកម្មភាពផ្សេងៗ ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
8. What is the effectiveness of community fishery?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CFiMC doesn't work ☐b. មានបទល្មើសច្រើន Many illegal fishing activities ☐c. បាត់បង់ធនធានជលផលច្រើន Lose more fisheries ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CFiMC works less ☐b. មានបទល្មើសនេសាទច្រើន Many illegal fishing activities ☐c. បាត់បង់ធនធានជលផលច្រើន Lose much fisheries ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. គណៈកម្មការគ្រប់គ្រងមានការតាំងចិត្តខ្ពស់CFiMC has strong commitment ☐c. បទល្មើសនេសាទនៅតែមាន Illegal fishing still happens ☐d. បន្តបាត់បង់ធនធានជលផល Gradually continue to lose the fisheries ☐e. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
	☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានជលផលបានល្អ Strong fisheries protection ☐d. បទល្មើសនេសាទតិចតួច Less illegal fishing activities

	☐e. បន្តបាត់បង់ធនធានជលផលតិចតួច Less degradation of the fisheries ☐f. សហគមន៍បានអាស្រយ័ធនធានជលផល ☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐4. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CFi has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានជលផលបានល្អ Strong fisheries protection ☐e. ស្ថានបទល្មើសនេសាទខុសច្បាប់ No illegal fishing in the CFi area ☐f. មិនមានការបាត់បង់ធនធានជលផល No degradation of the fisheries ☐g. សហគមន៍កើនចំណូលពីធនធានជលផល និងសកម្មភាពផ្សេងៗ ☐h. ផ្សេងៗ (បញ្ជាក់) Other (Specify).....
9. What is the effectiveness of indigenous community for collective land management?	☐**1. ស្ថានប្រសិទ្ធិភាព Note effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ IP Community doesn't work well ☐b. មានបញ្ហាច្រើនដូចជាការចាប់ដី Many issues, such as land encroaching ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐**2. មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The IP Community works less ☐b. មានបញ្ហាច្រើនដូចជាការចាប់ដី Many issues, such as illegal logging and land encroaching ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. បានកំណត់អត្តសញ្ញាណកម្មជនជាតដើមភាគតិច IP community was established ☐b. Illegal logging and land encroaching are decreased ☐c. កំពុងដំណើរការចុះឈ្មោះសហគមន៍ជនជាតដើមភាគតិចនៅក្រសួងមហាផ្ទៃ IP community is under legal registration at the Ministry of Interior ☐d. មានសកម្មភាពថែរក្សារប្បធម៌ហគមន៍ជនជាតិដើមភាគខ្លះៗ There are some IP culture preservation activities. ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**4. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. អត្តសញ្ញាណកម្មជនជាតដើមភាគតិចត្រូវបានកំណត់ IP community was legally register at MoI ☐c. សហគមន៍បានទទួលបណ្ណកម្មសិទ្ធិដីសមូហភាពផ្លូវការពីក្រសួងដែនដី IP community received legal communal land title from MoL ☐d. វប្បធម៌ហគមន៍ជនជាតិដើមភាគតិចត្រូវបានថែរក្សា IP culture is preserved ☐e. សហគមន៍បានអាស្រ័យផលលើដីសមូហភាព ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....

	☐**5. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. IP community was legally register at MoI ☐c. សហគមន៍បានទទួលបណ្ណកម្មសិទ្ធិដីសមូហភាពផ្លូវការពីក្រសួងដែនដី IP community received legal communal land title ☐d. Forest, land, and other resources are well managed ☐d. សហគមន៍កើនប្រាក់ចំណូលតាមរយៈ ការប្រើប្រាស់ដីសមូហភាព IP community increased incomes through the use of communal land ☐e. វប្បធម៌ហគមន៍ជនជាតិដើមភាគតិចត្រូវបានថែរក្សា IP culture is preserved ☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
10. What is the effectiveness of community protected area?	☐1. **គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ The CPA MC doesn't work well ☐b. មានបទល្មើសច្រើន Many illegal logging/fishing activities ☐c. បាត់បង់ធនធានជាន់ដលផលច្រើន Lose more forest/fisheries resources ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐2. **មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច The CPA works less ☐b. មានបទល្មើសច្រើន Many illegal logging/fishing activities ☐c. បាត់បង់ព្រៃឈើច្រើន Lose much forest/fisheries resources ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐3. **មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. គណៈកម្មការគ្រប់គ្រងCPAមានការតាំងចិត្តខ្ពស់ CPAMC has strong commitment ☐c. បទល្មើសនេសាទ រឺព្រៃឈើមានការថយចុះ Decrease poaching activities ☐d. បន្តបាត់បង់ធនធានជាន់ដលផល រឺព្រៃឈើ Gradually lose the forest/fisheries ☐e. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐4. **មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. មានផែនការគ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានធម្មជាតិបានល្អ Strong forestry/fisheries protection ☐d. បទល្មើសធនធានធម្មជាតិតិចតួច Less illegal logging/fishing activities ☐e. បន្តបាត់បង់ធនធានព្រៃឈើ រឺ ដលផលតិចតួច Less degradation of forest/fisheries ☐e. សហគមន៍បានអាស្រយ័ដល និងអនុដលព្រៃឈើ និងធនធានជាន់ដលផល ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....

	☐5. **មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជី និងទទួលស្គាល់ផ្លូវការ CPA has legal recognition ☐b. មានផែនការ គ្រប់គ្រងសហគមន៍ច្បាស់លាស់ Clear management plan ☐c. មានសកម្មភាពការពារធនធានធម្មជាតិបានល្អ Strong forestry/fisheries protection ☐e. គ្មានបទល្មើសព្រៃឈើ រឺ នេសាទខុសច្បាប់ No illegal logging/fishing in the CPA area ☐e. សហគមន៍កើនចំណូលពីអនុផលព្រៃឈើ ជលផល និងសកម្មភាពផ្សេងៗ ☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
11. What is the effectiveness of wildlife sanctuary management?	☐**1. គ្មានប្រសិទ្ធិភាព Not Effective ហេតុអ្វី? Why?** ☐a. មានបទល្មើសច្រើនក្នុងតំបន់ការពារ Many poaching in the PA ☐b. ធនធនព្រៃឈើ និងជីវចម្រុះផ្សេងៗមានការថយចុះច្រើនខ្លាំង Strongly decreased biodiversity ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**2. មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a.មានសកម្មភាពការពារតិចតួច Less conservation activities ☐b មានបទល្មើសក្នុងតំបន់ការពារ Many poaching in the PA ☐c. ធនធនព្រៃឈើ និងជីវចម្រុះផ្សេងៗមានការថយចុះច្រើនខ្លាំង Forest and biodiversity area significantly decreased ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderate Effective ហេតុអ្វី? Why?** ☐a. មានផែនការសកម្មភាពល្បាតច្បាស់លាស់ More conservation activities, including patrolling, awareness outreach ☐b. Better patrolling plan ☐c. បទល្មើសក្នុងតំបន់ការពារមានការថយចុះ Poaching activities are decreased ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. More conservation activities with strong community participation ☐b. Clear patrolling plan ☐c. Poaching activities are significantly decreased ☐d. PA zone and management plan ☐e. Biodiversity is increased ☐f. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**4. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. More conservation activities with strong community participation ☐b. Clear patrolling plan

	☐d. PA zone and management plan ☐c. Zero Poaching activities ☐c. Biodiversity is increased ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) .....
12. What is the effectiveness of community-based ecotourism management?	☐**1 គ្មានប្រសិទ្ធិភាព Not effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មិនដំណើរការ CBET does not work ☐b. សហគមន៍គ្មានសេវាកម្មទេសចរណ៍ច្បាស់លាស់ No clear ecotourism services ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify)..... ☐**1 មានប្រសិទ្ធិភាពតិចតួច Less effective ហេតុអ្វី? Why?** ☐a. សហគមន៍ដំណើរការតិចតួច CBET works less ☐b. សហគមន៍គ្មានសេវាកម្មទេសចរណ៍ច្បាស់លាស់ No clear ecotourism services ☐c. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**3. មានប្រសិទ្ធិភាពមធ្យម Moderately effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ CBET is officially registered ☐b. សហគមន៍មានក្រុមផ្តល់សេវាកម្ម CBET has clear service provider groups ☐c. សហគមន៍ទទួលបានប្រាក់ចំណូលសហគមន៍ CBET get income from service ☐d. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**4. មានប្រសិទ្ធិភាព Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ និងមានគណៈកម្មការគ្រប់គ្រងច្បាស់លាស់ CBET is officially registered with clear management structure ☐b. សហគមន៍មានការផ្សព្វផ្សាយទីផ្សារច្បាស់លាស់ CBET has clear marketing strategy ☐c. សហគមន៍មានក្រុមផ្តល់សេវាកម្មច្បាស់លាស់ CBET has clear services ☐d. សហគមន៍កើនប្រាក់ចំណូលសហគមន៍ និងបានប្រើប្រាស់ចំណូលនេះសម្រាប់ការការពារធនធានធម្មជាតិ និងការងារអភិវឌ្ឍន៍ផ្សេងៗ CBET has increased incomes and used some of the profits for NRM protection and development activities ☐f. ប្រជាពលរដ្ឋមានការកើនប្រាក់ចំណូល Villagers generated better incomes ☐g. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ..... ☐**5. មានប្រសិទ្ធិភាពខ្លាំង Highly Effective ហេតុអ្វី? Why?** ☐a. សហគមន៍មានការចុះបញ្ជីទួលស្គាល់ផ្លូវការ និងមានគណៈកម្មការគ្រប់គ្រងច្បាស់លាស់ CBET is officially registered with clear management structure ☐b. សហគមន៍មានការផ្សព្វផ្សាយទីផ្សារច្បាស់លាស់ CBET has clear marketing strategy ☐c. សហគមន៍មានក្រុមផ្តល់សេវាកម្មច្បាស់លាស់ CBET has good services ☐d. សហគមន៍កើនប្រាក់ចំណូលសហគមន៍ និងបានប្រើប្រាស់ចំណូលនេះសម្រាប់ការការពារធនធានធម្មជាតិ និងការងារអភិវឌ្ឍន៍ផ្សេងៗ CBET has increased incomes and used some of the profits for NRM protection and development activities

	☐e. ប្រជាពលរដ្ឋកើនប្រាក់ចំណូល និងមានការចូលរួមយ៉ាងសកម្មក្នុងការការពារធនធានធម្មជាតិ Communities generated better incomes, and actively participate in NRM ☐f. រដ្ឋមានការកើនចំណូលដើម្បីអភិវឌ្ឍន៍ក្នុងខេត្ត The government has increase national incomes ☐h. ផ្សេងៗ (បញ្ជាក់) Other (Specify) ……
13. What are the challenges of NRM?	☐1.មិនមានទេ No ☐2.បទល្មើសនេសាទ Illegal fishing កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐ មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐3.បទល្មើសកាប់ព្រៃឈើខុសច្បាប់ Illegal logging កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐4.ចាប់ដីខុសច្បាប់ Land encroachment កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐5.ការបរបាញ់សត្វព្រៃ Hunting កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐6.ឡងជ្រូង Charcoal កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐7.ក្រុមហ៊ុនសម្បទានដីសេដ្ឋកិច្ច Economic land concession កម្រិតណា? ចូរគូសរង្វង់លើលេខ How severe? Please circle on the number a) ☐មិនធ្ងន់ធ្ងរ Not much severe b) ☐ធ្ងន់ធ្ងរមធ្យម Moderately severe c) ☐ធ្ងន់ធ្ងរ Severe d) ☐ធ្ងន់ធ្ងរខ្លាំង Extremely severe ☐8.ផែនការទំនប់វារីអគ្គិសនី Planned hydropower dam

	កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number a) □មិនធ្ងន់ធ្ងរ Not much severe b) □ធ្ងន់ធ្ងរមធ្យម Moderately severe c) □ធ្ងន់ធ្ងរ Severe d) □ធ្ងន់ធ្ងរខ្លាំង Extremely severe □9.ទំនប់វារីអគ្គិសនី Up-stream hydropower dam (In Lao PDR) កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number a) □មិនធ្ងន់ធ្ងរ Not much severe b) □ធ្ងន់ធ្ងរមធ្យម Moderately severe c) □ធ្ងន់ធ្ងរ Severe d) □ធ្ងន់ធ្ងរខ្លាំង Extremely severe □10.ផ្សេង Others (Specify)…… កម្រិតណា? ចូរគូរង្វង់លើលេខ How severe? Please circle on the number a) □មិនធ្ងន់ធ្ងរ Not much severe b) □ធ្ងន់ធ្ងរមធ្យម Moderately severe c) □ធ្ងន់ធ្ងរ Severe d) □ធ្ងន់ធ្ងរខ្លាំង Extremely severe _____

****

សូមអរគុណ! Thank you!