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**NON-TIMBER FOREST PRODUCT (NTFP) UTILIZATION
AND LIVELIHOOD DEVELOPMENT IN BANGLADESH**

A Dissertation in

Forest Resources

by

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ABSTRACT

Globally, forest management remains focused on timber; yet, as concern about rural poverty, deforestation, and sustainable development emerges, so NTFPs' crucial role in rural development and resource conservation has been recognized. NTFPs constitute a safety net for forest-adjacent people, who, having collected NTFPs for centuries, depend on them for subsistence and cash income. Bangladesh's Chittagong Hill Tracts (CHT) is a case in point, as its indigenous peoples survive in precisely this way. Given this dependence, establishing better approaches to NTFP management for rural development and conservation has become a vital issue. There is great concern, too, that initiatives to commercialize NTFPs be designed so as not to encourage even more overharvesting than is currently taking place.

This research takes its place in this conversation about conserving natural resources and improving local people's livelihoods. Its purpose is threefold: to establish site-specific NTFP–livelihood linkages and to investigate the problems and potential of using NTFPs to sustain and improve livelihoods, and on this basis to conceptualize initiatives for supporting sustainability and higher incomes for local people in the long term. As there is little research on Bangladesh's use of NTFPs, this study's central research question is both fundamental and far-reaching in nature: How could NTFPs be better utilized to improve the livelihoods of forest-adjacent communities and to achieve the goal of conserving forest resources?

This study has been conceptualized through a research framework focused on sustainable livelihoods to achieve the research goals of improving forest-adjacent peoples' livelihoods and conserving forest resources. Instrumental to pursuing the research question was a mixed method that involved both quantitative and qualitative approaches, including the participatory rural appraisal tools of structured questionnaire interviews targeting households and NTFP-market stakeholders, focus group discussions, key informant interviews, and field observations. An entire

year of numeric and qualitative field data was collected, and statistical methods along with NTFP production-to-consumption system (PCS) analysis were used to compile and analyze the data.

The study's results confirmed that forest-adjacent communities depend on diverse types of NTFPs for their livelihoods, and that the poor are more dependent than are the rich. Analysis showed that the households' average NTFP-related income is much higher than their timber income, as the forest areas though much degraded still yield some NTFPs. A regression model showed that a household's NTFP income could be estimated from how many members it has and the value of its implements and furniture. Noteworthy, too, is that females collect most of the NTFPs for their households and that most of the time the households spend collecting NTFPs is dedicated to those that provide food, which, therefore, warrant special attention for subsistence-oriented NTFP promotion and conservation. Various factors constrain NTFP markets, among which are insufficient transport facilities, lack of financial capital, and shortage of market information in the absence of any market information system (MIS). The villagers' market knowledge of most NTFPs is limited, in large part due to various socioeconomic factors. NTFP domestication initiatives are few and organizational efforts to develop NTFP-based entrepreneurship are almost nonexistent; yet, most of the villagers expressed interest in such interventions, seeing in them a way to improve earnings. The results also established that NTFPs of CHT are being overharvested and that, even at its current level, NTFP commercialization is accelerating resource depletion mainly because of undefined land and property rights, financial crises experienced by the villagers, and overpopulation. Moreover, analysis of five NTFP market chains showed that the NTFP-market stakeholders' vertical linkages are stronger than the horizontal linkages, and there is little NTFP cultivation or investment. NTFP stakeholders' average NTFP incomes show great disparities that are not proportional to differences in time, labor, and capital invested. Overall, the research findings indicated that there is a wide margin for improving NTFP management in order to meet development and conservation objectives. Some

key interventions include defining land and property rights, making NTFP-specific plans, effectively enforcing rules, developing NTFP entrepreneurship with domestication support, establishing a MIS, and having a people-oriented forest-management approach.

TABLE OF CONTENTS

| | |
|--|------|
| LIST OF FIGURES | x |
| LIST OF TABLES | xiii |
| ACKNOWLEDGEMENTS | xvi |
| Chapter 1 Introduction | 1 |
| 1.1 Background and research issues: Global perspective | 1 |
| 1.2 Background and research issues: Asian perspective | 6 |
| 1.3 Background and research issues: Bangladesh perspective | 7 |
| 1.3.1 Bangladesh as a country for the research | 7 |
| 1.3.2 Forest condition of Bangladesh and contribution to local and national economy | 8 |
| 1.3.3 Policy issues relating to forest resources | 10 |
| 1.3.4 Chittagong Hill Tracts: The study region | 11 |
| 1.3.5 NTFPs utilization in Bangladesh and the research problems | 18 |
| 1.4 Importance of the study | 23 |
| 1.5 Structure of the dissertation | 24 |
| Chapter 2 Conceptual Research Framework | 26 |
| 2.1 Sustainable livelihoods approach | 27 |
| 2.1.1 What is a livelihood? | 27 |
| 2.1.2 Principles of sustainable livelihoods | 29 |
| 2.1.3 The sustainable livelihood framework | 29 |
| 2.1.4 Limitations and critics of the sustainable livelihood framework | 34 |
| 2.2 Production-to-consumption systems | 37 |
| 2.2.1 Dimensions of production-to-consumption systems | 39 |
| 2.2.2 Application of the production-to-consumption system approach in the NTFP sector | 43 |
| 2.3 Conceptual framework to address the research problem | 46 |
| 2.3.1 How sustainable livelihood and production-to-consumption concepts interrelate | 46 |
| 2.3.2 How the combined conceptual framework will address the research problem | 48 |
| 2.4 Research goals and objectives | 52 |
| Chapter 3 Methods | 53 |
| 3.1 Introduction | 53 |

| | |
|--|---------|
| 3.2 Reconnaissance and initial site selection | 55 |
| 3.3 Village survey | 58 |
| 3.4 Field enumerator recruitment, training, and data checking | 59 |
| 3.5 Household questionnaire survey | 61 |
| 3.6 NTFP market questionnaire survey | 62 |
| 3.7 Other participatory rural appraisal tools and secondary information | 63 |
| 3.8 Database management | 64 |
| 3.9 Statistical methods and data analysis | 64 |
| 3.9.1 Objective 1: To examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities | 67 |
| 3.9.2 Objective 2: To investigate potential NTFP-related initiatives and market strategies required to improve livelihoods, sustainable trade, and resource conservation in Bangladesh | 72 |
| 3.10 Conclusion | 76 |
| Chapter 4 NTFPs and Household Livelihood Linkages | 77 |
| 4.1 Introduction | 77 |
| 4.2 Types, collection, and uses of NTFPs | 79 |
| 4.2.1 Types of NTFPs and villagers' rankings of them | 79 |
| 4.2.2 Collection of NTFPs | 80 |
| 4.2.3 Uses of NTFPs | 85 |
| 4.3 NTFP income contribution to household economy and influencing factors | 86 |
| 4.3.1 Income from NTFPs | 86 |
| 4.3.2 Dependence of households on NTFPs and all other forest products | 89 |
| 4.4 Socioeconomic factors affecting NTFP incomes and livelihoods | 94 |
| 4.4.1 Household-level factors | 94 |
| 4.4.2 District, village, and ethnicity-level factors | 98 |
| 4.4 NTFP stock degradation and its causes | 102 |
| 4.4.1 Current stock of NTFPs in Chittagong Hill Tracts | 102 |
| 4.4.2 Reasons for NTFP stock degradation in Chittagong Hill Tracts | 103 |
| 4.5 Discussion: Prospects for and limitations of NTFP-based development and conservation | 106 |
| 4.6 Conclusion and recommendations | 117 |
| Chapter 5 Market Constraints and Market Potentials for NTFPs at the Village Level | 120 |
| 5.1 Introduction | 120 |
| 5.2 Existing NTFP market characteristics in Chittagong Hill Tracts | 121 |
| 5.3 NTFP market constraints | 122 |
| 5.4 NTFP-related market knowledge and information sources | 126 |
| 5.4.1 Sources of market information | 133 |
| 5.5 Domestication of NTFPs | 134 |
| 5.6 Entrepreneurship development initiatives based on NTFPs | 138 |
| 5.7 Observed impacts of NTFP commercialization | 140 |
| 5.8 Conservation, development, and sustainability issues for NTFPs | 142 |
| 5.9 Discussion | 143 |
| 5.10 Conclusion and recommendations | 151 |

| | |
|---|-----|
| Chapter 6 Production-to-Consumption Systems of Selected NTFPs: Market and Livelihood Analysis | 156 |
| 6.1 Introduction | 156 |
| 6.2 Existing stakeholders of selected NTFPs in Chittagong Hill Tracts | 157 |
| 6.3 Bamboo production-to-consumption systems | 159 |
| 6.3.1 Introduction | 159 |
| 6.3.2 Production-to-consumption system of raw bamboo | 160 |
| 6.3.3 Production-to-consumption system of bamboo-made products | 171 |
| 6.3.4 Production-to-consumption system of bamboo pulp | 180 |
| 6.3.5 Production-to-consumption system of bamboo shoot overview | 185 |
| 6.4 Wild vegetables production-to-consumption systems | 185 |
| 6.4.1 Introduction | 185 |
| 6.4.2 Vertical dimension of wild vegetables' production-to-consumption system .. | 186 |
| 6.4.3 Horizontal dimension of wild vegetables' production-to-consumption system | 187 |
| 6.4.4 Intensity dimension of wild vegetables' production-to-consumption system | 188 |
| 6.4.5 Seasonality, changes, trends, constraints, and potential of wild vegetables.... | 188 |
| 6.5 Medicinal plants production-to-consumption systems | 194 |
| 6.5.1 Introduction | 194 |
| 6.5.2 Production-to-consumption system of medicinal plants at the local producer level | 195 |
| 6.5.3 Production-to-consumption system of medicinal plants at the regional or national level | 198 |
| 6.5.4 Income from medicinal plants at both the local and regional producer levels | 201 |
| 6.5.5 Seasonality, changes, trends, constraints, and potential of medicinal plants .. | 201 |
| 6.6 Broom grass production-to-consumption systems | 207 |
| 6.6.1 Introduction | 207 |
| 6.6.2 Vertical dimension of the broom grass production-to-consumption system ... | 208 |
| 6.6.3 Horizontal dimension of the broom grass production-to-consumption system | 211 |
| 6.6.4 Intensity dimension of broom grass production-to-consumption system | 211 |
| 6.6.5 Seasonality, changes, trends, constraints and potential of broom grass | 212 |
| 6.7 Menda bark production-to-consumption systems | 218 |
| 6.7.1 Introduction | 218 |
| 6.7.2 Vertical dimension of menda bark production-to-consumption system | 219 |
| 6.7.3 Horizontal dimension of menda bark production-to-consumption system | 222 |
| 6.7.4 Intensity dimension of menda bark production-to-consumption system | 222 |
| 6.7.5 Seasonality, changes, trends, constraints, and potential of broom grass | 223 |
| 6.8 Comparative analysis of the NTFP production-to-consumption systems and discussion | 229 |
| 6.8.1 Comparison of the different types of NTFP production-to-consumption systems | 229 |
| 6.8.2 Comparison of the NTFP income of different stakeholders in various production-to-consumption systems and impacts of the business on their livelihoods and NTFP conservation | 232 |
| 6.9 Conclusion | 237 |

| | |
|--|-----|
| Chapter 7 Overall Discussion and Conclusion | 241 |
| Literature Cited | 257 |
| Appendix A Locations of Selected Villages in Chittagong Hill Tracts based on Recorded GPS Coordinates in the Field..... | 274 |
| Appendix B Details on the Study Villages in Chittagong Hill Tracts | 275 |
| Appendix C NTFP-related Household Questionnaire | 286 |
| Appendix D NTFP-related Market and Livelihoods Study Questionnaire..... | 290 |
| Appendix E ANOVA and Chi-square Tests Results Related to NTFP Collection Time, Stock Degradation and Market Constraints | 297 |
| Appendix F Proposed NTFP-based Livelihood Development and Forest Conservation Model | 300 |
| VITA | 301 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1-1: Bangladesh map showing the forest areas managed by forest department. | 9 |
| Figure 1-2: Map showing location of Chittagong Hill Tracts in Indian sub-continent and Bangladesh (IWGIA, 2010; CIA 2010). | 12 |
| Figure 2-1: Linkages of concepts to targeted research outcome. | 27 |
| Figure 2-2: The sustainable livelihoods framework of Department for International Development (DFID, 1999). | 30 |
| Figure 2-3: The production-to-consumption systems approach (adapted from Belcher, 1998). | 38 |
| Figure 2-4: The Philippine rattan PCS (Belcher 1998). | 45 |
| Figure 2-5: The combined conceptual research framework for this study (adapted from DFID, 1999). | 48 |
| Figure 4-1: Ranking of the most important wild NTFPs by the villagers in Chittagong Hill Tracts (N = 209). | 79 |
| Figure 4-2: Who collects the NTFPs for the households (N = 5367)?..... | 80 |
| Figure 4-3: Land types from which NTFPs are collected (N = 5367). | 81 |
| Figure 4-4: Percentage of ownership of lands from which NTFPs are collected (N = 5367). | 82 |
| Figure 4-5: How far do the villagers go to collect NTFPs (N = 209)? | 83 |
| Figure 4-6: Time spent by households to collect different NTFPs (N = 207). | 84 |
| Figure 4-7: Incomes of households from major types of wild NTFPs (N= 5367). | 87 |
| Figure 4-8: Relative NTFP incomes of households based on different income quintiles group (N = 181). | 90 |
| Figure 4-9: Relative forest incomes of households based on different income quintile groups (N= 181). | 91 |
| Figure 4-10: Percentages of total number of households that have incomes from various sectors (N = 181). | 92 |

| | |
|--|-----|
| Figure 4-11: Seasonal variation in income dependence of the villagers from different types of forest products (N = 181). | 93 |
| Figure 4-12: Stock condition of NTFPs compared to 10 years ago (mean score in 0 to 10 scale). | 102 |
| Figure 4-13: Reasons for NTFP stock degradation in Chittagong Hill Tracts..... | 103 |
| Figure 5-1: Market constraints for the NTFPs (N=209). | 122 |
| Figure 5-2: Initiatives required to eliminate NTFP market constraints (N= 209)..... | 125 |
| Figure 5-3: Existing sources of information for NTFP markets (N= 209). | 133 |
| Figure 5-4: Kinds of information needed for better access to NTFP markets (N= 209)..... | 134 |
| Figure 5-5: Reasons for not domesticating NTFPs (N= 209). | 135 |
| Figure 5-6: Reasons to be a cooperative member (N= 209). | 139 |
| Figure 5-7: Initiatives/organizational efforts that will encourage NTFP-based development. | 139 |
| Figure 5-8: Positive impacts of NTFP commercialization (N= 209)..... | 140 |
| Figure 5-9: Negative impacts of commercializing NTFPs (N= 209)..... | 141 |
| Figure 5-10: Reasons for unsustainable harvesting of NTFPs (N= 209). | 142 |
| Figure 5-11: Respondents' suggestions for NTFP conservation (N= 209). | 143 |
| Figure 6-1: PCS of raw bamboo in Chittagong Hill Tracts. | 162 |
| Figure 6-2: Peak and off-peak season for bamboo sale at market. | 166 |
| Figure 6-3: Major problems in the raw bamboo market. | 167 |
| Figure 6-4: Conservation actions taken by bamboo market stakeholders..... | 170 |
| Figure 6-5: Why collectors are not taking action to conserve bamboo..... | 170 |
| Figure 6-6: Production-to-consumption system of bamboo-made products..... | 173 |
| Figure 6-7: Peak season for bamboo-made products sale in market..... | 176 |
| Figure 6-8: Major problems in the bamboo products market. | 177 |
| Figure 6-9: Bamboo pulp and paper production-to-consumption system..... | 181 |
| Figure 6-10: Production-to-consumption system of wild vegetables. | 186 |

| | |
|--|-----|
| Figure 6-11: Peak season for wild vegetable market activities..... | 189 |
| Figure 6-12: Major constraints in the wild vegetable business..... | 190 |
| Figure 6-13: Major conservation initiatives in wild vegetable business by stakeholders..... | 193 |
| Figure 6-14: Why wild vegetable stakeholders do not take any action?..... | 193 |
| Figure 6-15: Production-to-consumption system of medicinal plants focusing on local level herbal medicine production..... | 196 |
| Figure 6-16: Production-to-consumption system of medicinal plants focusing on regional- or national-level herbal medicine production..... | 199 |
| Figure 6-17: Peak and off-peak seasons for the medicinal plant market..... | 202 |
| Figure 6-18: Major problems in the medicinal plant business..... | 202 |
| Figure 6-19: Medicinal plants conservation actions by stakeholders..... | 205 |
| Figure 6-20: Reasons why stakeholders do not take action to preserve medicinal plants..... | 205 |
| Figure 6-21: Production-to-consumption system of broom grass..... | 209 |
| Figure 6-22: Peak season for the broom grass market..... | 212 |
| Figure 6-23: Major problems in the broom grass business..... | 213 |
| Figure 6-24: Broom grass conservation actions taken by stakeholders..... | 216 |
| Figure 6-25: Reasons why stakeholders do not take action to conserve broom grass..... | 216 |
| Figure 6-26: Production-to-consumption system of menda bark..... | 220 |
| Figure 6-27: Seasonal demand in the menda bark market..... | 223 |
| Figure 6-28: Major problems in menda bark business..... | 224 |
| Figure 6-29: Stakeholders' actions to conserve menda bark..... | 227 |
| Figure 6-30: Why stakeholders do not take action to conserve menda bark..... | 228 |

LIST OF TABLES

| | |
|---|-----|
| Table 1-1: Bangladesh at a glance. | 7 |
| Table 1-2: The Chittagong Hill Tracts, Bangladesh. | 17 |
| Table 1-3: Major NTFPs of Bangladesh. | 19 |
| Table 3-1: The survey questionnaires: contents and timing..... | 59 |
| Table 3-2: Research questions, hypothesis, data collected, and methods. | 65 |
| Table 4-1: Time spent by different ethnic groups' households to collect major NTFPs (N = 209). | 85 |
| Table 4-2: Forest-related annual incomes of households including subsistence and cash income. | 88 |
| Table 4-3: Comparison of absolute and relative NTFP and forest income with household incomes (N= 181). | 89 |
| Table 4-4: Annual household income and income contribution from various sectors (N = 181). | 91 |
| Table 4-5: Effects of household-level socioeconomic categorical variables on NTFP income (N=181). | 95 |
| Table 4-6: Bivariate relationships between different socioeconomic factors and log of annual household NTFP income (N =181). | 96 |
| Table 4-7: Regression-correlation analysis for the relationships of total forest land areas of household, number of members in household, total value of household implements and furniture, years of household formation, and net savings of the household to Ln (annual NTFP income) (N =181). | 97 |
| Table 4-8: Effects of district- and village-level variables on NTFP income (N = 181). | 100 |
| Table 4-9: Effects of ethnicity variation on NTFP income (N =181). | 101 |
| Table 4-10: Selected NTFPs and the reasons for degradation. | 104 |
| Table 4-11: Bivariate correlation between current stock condition score and distance to forest and time spent by households. (N = 743). | 105 |
| Table 4-12: Differences in NTFP stock conditions based on districts, villages and ethnicity variations (N = 743). | 106 |

| | |
|--|-----|
| Table 5-1: Market constraints vary between-types of NTFPs. | 123 |
| Table 5-2: Initiatives for eliminating market constraints for different types of NTFPs. | 125 |
| Table 5-3: Villagers' NTFP-related market knowledge (N= 209)..... | 127 |
| Table 5-4: Bivariate correlation of different socioeconomic factors with market knowledge scores for various NTFPs. | 129 |
| Table 5-5: Nonparametric correlation of different socioeconomic factors with market knowledge scores for various NTFPs. | 130 |
| Table 5-6: Regression-correlation analysis for the relationships different soci-economic factors to villagers' market knowledge of bamboo (N =181). | 131 |
| Table 5-7: Differences in bamboo market knowledge scores by ethnicity, districts, and villages. | 132 |
| Table 5-8: Negative impacts of commercializing different types of NTFPs. | 141 |
| Table 6-1: Number and categories of market stakeholders interviewed for each type of NTFP..... | 158 |
| Table 6-2: Different stakeholders' mean monthly household income and mean income from raw bamboo. | 164 |
| Table 6-3: Change in number of raw bamboo stakeholders. | 168 |
| Table 6-4: Major trends/changes in the bamboo business during 2003–2008..... | 169 |
| Table 6-5: Monthly average household income and income from bamboo products for different stakeholders. | 174 |
| Table 6-6: Change in number of bamboo product stakeholders and reasons..... | 178 |
| Table 6-7: Major trends/changes in the bamboo products business during 2003–2008. | 179 |
| Table 6-8: Monthly household income and wild vegetable income of different stakeholders..... | 187 |
| Table 6-9: Changes in the numbers of wild vegetable stakeholders and reasons. | 191 |
| Table 6-10: Major trends/changes in the wild vegetable business during 2003–2008. | 192 |
| Table 6-11: Income of different stakeholders in the medicinal plant business. | 201 |
| Table 6-12: Changes in numbers of medicinal plant market stakeholders and reasons..... | 203 |
| Table 6-13: Major trends/changes in the medicinal plant business during 2003–2008. | 204 |

| | |
|---|-----|
| Table 6-14: Monthly average household income and income from broom grass by different stakeholders. | 210 |
| Table 6-15: Change in number of broom grass market stakeholders and reasons. | 214 |
| Table 6-16: Major trends/changes in the broom grass business during 2003–2008. | 215 |
| Table 6-17: Monthly average household income and income from menda bark by different stakeholders. | 221 |
| Table 6-18: Change in number of menda bark market stakeholders and reasons. | 225 |
| Table 6-19: Major trends/changes in menda bark business during 2003–2008. | 226 |
| Table 6-20: Average monthly NTFP income of different types of stakeholders. | 233 |
| Table 6-21: Comparison of household income and NTFP income of all stakeholders of selected NTFPs. | 234 |
| Table 6-22: Bivariate correlation of different socioeconomic factors with monthly average NTFP income of various stakeholders. | 236 |
| Table 7-1: Research questions, hypotheses and key findings. | 243 |

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Chapter 1

Introduction

1.1 Background and research issues: Global perspective

A historic change is occurring in the management and conservation of non-timber forest products (NTFPs), defined as products of biological origin other than timber that are derived from forests, other wooded land, and trees outside forests (FAO, 1999). Although timber is still considered a main forest product used for subsistence and income, interest in NTFP management has increased over the last few decades (from the late 1980s onwards) along with emerging global concern about rural poverty, deforestation, and most recently by adopting the concept of sustainable development (Belcher et al., 2005; Chamberlain & Predny, 2004). For example, Peters et al.'s (1989) pioneering study of the Amazonian rainforest showed that the total value of NTFPs outweighs the total value of timber. Although, some later studies criticized the assumptions made by Peters et al., in particular their study's over-estimation of the value of NTFPs, more conservative valuation systems also indicate that a significant portion of total forest products' value comes from NTFPs (Godoy & Bawa, 1993; Godoy et al., 2000; Sheil & Wunder, 2002), though the resource value proportions vary from site to site. This reality warrants site-specific investigations regarding the use and potential of NTFPs as they pertain to sustainable development with close attention to forest-based rural livelihoods and forest conservation.

People living in and around forest areas have collected NTFPs for centuries and depend on them for the local trade that constitutes their livelihoods (Delang, 2006; FAO, 2006; Ticktin, 2004; Wollenberg & Ingles, 1998). Further, NTFPs are also used for cultural and recreational purposes, and offer various opportunities, including cultural maintenance and revival, forest

biodiversity support, and rural economic development (Cocksedge, 2006). In many places, people consume NTFPs for subsistence more than they trade them. In such situations, NTFPs are considered a safety net to fill in the gaps should there be an agricultural shortfall or another kind of emergency (Angelson & Wunder, 2003; Nepstad & Schwartzman, 1992; Neuman & Hrisch, 2000; Paumgarten, 2005; Shackleton & Shackleton, 2004; Vantomme et al., 2002). Also, Arnold and Ruiz-Pérez (2001) state that NTFPs supplement household diets and income as well as serving as an “economic buffer in hard times.”

Although NTFPs are an important source of subsistence and cash income, there is growing concern regarding the fact that overharvesting fuelled by an increasing population and market demand is accelerating stock depletion (Arnold & Perez, 2001; Banana 1996; Belcher et al., 2005; Homma, 1992; Mahapatra & Mitchell 2005, 1997). To minimize overexploitation of NTFPs and to enhance local subsistence and cash income from the NTFPs in conjunction with development interventions, it is essential to examine the site-specific problems and potential of NTFPs in regard to sustainability. To this end, investigations should include the role of NTFPs in rural livelihood development and conservation with reference to existing NTFP collection, consumption, and trade trends, and current NTFP production and market strategies, which involve many stakeholders and processes.

The proposition of “conservation by commercialization” as applied to NTFPs (Evans, 1993; Plotkin & Famolare, 1992) posits the idea that the NTFP-based earnings of local communities can be increased and forest conservation improved simultaneously by providing more incentives to harvest NTFPs in sustainable ways. The idea that NTFPs can help achieve the desired development and conservation goals (Nepstad & Schwartzman, 1992; Ruiz-Pérez & Arnold, 1996; Wollenberg & Ingles, 1998) has led conservation and development organizations to promote NTFP-based livelihood development and conservation programs with funding from different donor agencies in areas worldwide, but particularly in the tropics. In accord with these

programs, some studies also showed that NTFP use could contribute to rural livelihood development (Saxena, 2003), and that harvesting NTFPs could be ecologically less destructive than timber extraction (FSC, 2002; Myers, 1988). In keeping with these ideas, Byron and Ruiz-Pérez (1996) argued that identifying new products and developing markets for NTFPs would make tropical forests more valuable and thus help to reduce deforestation. However, recent large important studies have shown that many NTFP development interventions have failed because they did not consider socioeconomic conditions and site-specific policies. These studies were conducted by the Center for International Forestry Research (CIFOR) (Belcher et al., 2005), which focused on 61 case studies from Asia (Kusters & Belcher, 2004), Africa (Sunderland & Ndoye, 2004) and Latin America (Alexisdes & Shanely, 2004), and by the United Nations Environment Program-World Conservation and Monitoring Center (UNEP-WCMC) (Marshall et al., 2006), which focused on 18 community case studies and 16 value chain case studies in Bolivia and Mexico respectively.

In line with the findings of the CIFOR and UNEP-WCMC, Arnold and Ruiz-Pérez (2001) questioned the ability of NTFPs to meet development and conservation objectives without the establishment of specific policies and interventions targeting the people involved in NTFP gathering and production: the pro-poor, who gather NTFPs exclusively or almost exclusively for subsistence, and the less-poor, who gather and sell NTFPs in order to gain an alternative livelihood income. However, the authors asserted that though NTFPs could be a good starting place to improve production in rural development and thereby give better access to resources, targeted people might shift to other income alternatives as they become better off. Similarly, in considering NTFP commercialization, Belcher and Schreckenberg (2007) also challenged the idea that NTFPs could be easily used to achieve development (livelihood improvement) and conservation objectives (ecosystem and species biodiversity). Emphasizing that NTFPs are not a magic bullet product that will meet development and conservation objectives, they suggest

reconsidering national policies, taking an integrated view of NTFP market chains linked to different types of livelihoods, and considering the implications of different NTFP production and management systems and integrating them into multi-resources based systems. More NTFP cultivation and value addition of the products have also been emphasized to achieve the desired development and conservation.

To ensure that NTFPs fulfill their sustainable development potential, Marshall et al. (2006) called for a number of factors important to successfully commercializing NTFPs to be taken into account: local conditions, land tenure and resource rights, access to credit and market information, infrastructure and communication development, entrepreneurship development, producers' bargaining power, training to develop skills and awareness for better management, harvesting and domestication of NTFPs, and policy focus on diversified livelihood strategies in which NTFP would feature as a livelihood component. Belcher et al. (2005) also urged the necessity of a broad consideration of similar socioeconomic factors. They also argued for an intermediate cultivation and management system that would involve multipurpose resources (e.g., agroforestry, forest gardens) to meet the economic needs of the forest-adjacent poor as well as support biodiversity more effectively than can NTFP monoculture or agriculture.

Domestication is necessary if NTFP production is to be intensified; and domestication involves cultivating socially or economically valuable wild forest plants or animals with appropriate scientific techniques for domestic use or sale. It plays an important role in maintaining the flow of resources for household and market consumption especially when the natural stocks have become degraded. Domestication is also crucial for improving genetic quality in order to realize higher yields, extended periods of production, and the development of tolerance to variable temperature and soil conditions (Leaky & Izac, 1996). Therefore, domestication of NTFP species to enrich and sustain stock is essential for sustainable commercialization and marketing (Mahapatra & Mitchell, 1997; Vantomme et al., 2002).

There is also a strong connection between NTFP domestication and commercialization through the development of supply chains and potential markets. Commercialization of NTFPs is usually characterized by greater market orientation of the products, including more availability, usability, and profitability. As indicated earlier, the commercialization of NTFPs can play a part in improving the livelihoods of forest-adjacent people (Wollenberg & Ingles, 1998); however, segregated attention may be required to target local people from different social strata with tailored NTFP plans and policy interventions (Arnold & Ruiz-Pérez, 1998, 2001). Therefore, domestication and commercialization, which concentrate on higher production of NTFPs and more market orientations respectively, complement each other in efforts to ensure supplies of and markets for the targeted products and to enhance livelihood incomes.

Further, in considering the domestication and commercialization of NTFPs and the current and future dependence of forest-adjacent people on NTFPs, it must be held central that sustainability depends on harvesting methods and other management strategies. Site-specific socioeconomic and institutional factors must be considered in any efforts to promote sustainable practices, and thereby increase the income of local people and improve forest-conservation outcomes (Mahapatra & Mitchell, 1994; Marshall et al., 2006). However, some authors offer the timely caution that ill-considered NTFP promotion can be risky: instead of achieving development and conservation objectives, it may deprive the poor by favoring the wealthy who have more capital, skills, market access, and connections than do the poor. Critically, too, sustainability promotion efforts that are not carefully considered could even further compromise ecosystem and species biodiversity (Belcher & Schreckenberg, 2007; Belcher et al., 2005).

1.2 Background and research issues: Asian perspective

Asia is the world's largest producer and consumer of NTFPs, of which the bulk are consumed for subsistence (FAO, 2005b; Vantomme et al., 2002). Traditionally the biodiversity-rich forests of South Asia have been a major source of many NTFPs essential for local people's livelihoods (Vantomme et al., 2002). According to several authors (Bhattacharya & Hayat, 2004; Mahapatra et al., 2005; Misra & Dash, 2000; Tewari & Cambell, 1995), in India, NTFPs form a critical element of rural capital that supports the livelihoods of the forest-poor especially the indigenous peoples. Similarly, in Nepal, a large part of the rural population depends on NTFPs for their livelihoods (Larsen et al., 2000; Maraseni, 2009, 2008).

Until recently the governments on the Indian sub-continent have shown little interest in sustaining NTFPs. With specific focus on this region, Shaanker et al.'s timely book, "Non-timber Forest Products: conservation, management and policy in the Tropics (2009)" considers the ways that NTFPs are currently used and managed and NTFP-related problems and prospects that warrant conservation and policy supports. The overexploitation of NTFPs will not abate, as is the case with commercially collected medicinal plants in Nepal (Larsen et al., 2000), unless domestication and marketing strategies are strengthened. To minimize such overharvesting, recent local-level domestication initiatives have included NTFP nursery development and plantation programs, including medicinal plants in home gardens in some countries as well as training and capacity-building support with scientific harvesting and cultivation techniques (e.g., Bhattacharya & Hayat, 2004). Also, the private sector has started to invest in small-scale processing industries for NTFPs for sustainable resource usage (Vantomme et al., 2002). However, more policy and institutional supports are essential to establishing patterns of NTFP harvesting and use that are sustainable in the region (Maraseni, 2009).

1.3 Background and research issues: Bangladesh perspective

1.3.1 Bangladesh as a country for the research

Bangladesh is one of the most densely populated countries in the world. It currently comprises about 150 million people, 40% of whom live below the poverty line (BBS, 2009, 2010a). In the absence of effective institutional arrangements and governance, this high density of poor people in conjunction with their heavy dependence on natural resources has led to the overexploitation of forest and other natural resources, resulting in an accelerated rate of resource depletion (GOB, 2009; FAO 2000). Details of Bangladesh's socioeconomic status and resources are outlined in Table 1-1.

Table 1-1: Bangladesh at a glance.

| | |
|---|---|
| Area | Total: 147,570 sq. km (56,000 sq miles) |
| Land use | Arable land: 55.39%, permanent crops: 3.08% , other: 41.53% (2005) |
| Climate | Tropical; mild winter (October to March); hot, humid during summer (March to June); humid, warm during rainy monsoon (June to October) |
| Population | 153,546,896 (July 2008 est.) |
| Population growth rate | 2.022% (2008 est.) |
| Life expectancy at birth | Total population: 63.21 years, male: 63.14 years, female: 63.28 years (2008 est.) |
| Literacy (<i>definition</i> : age 15 and over, can read and write) | Total population: 43.1%, male: 53.9%, female: 31.8% (2003 est.) |
| Ethnic groups | Bengali 98%, other 2% (includes indigenous peoples, non-Bengali Muslims) (1998) |
| GDP | GDP – real growth rate: 5.9% (2008 est.) GDP – per capita (PPP): \$1,500 (2008 est.) GDP – composition by sector: agriculture: 19.1%, industry: 28.6%, services: 52.3% (2008 est.) |
| Distribution of family income – Gini index | 33.4 (2005) |
| Poverty | Population below the poverty line: Rural: 53%, Urban: 36.6%, national: 49.8 % (2000) |
| Agriculture | Products: rice, jute, tea, wheat, sugarcane, potatoes, tobacco, pulses, oilseeds, spices, fruit; beef, milk, poultry |
| Industry | Cotton textiles, jute, garments, tea processing, paper newsprint, cement, chemical fertilizer, light engineering and sugar |
| Forest sector | Total forest land of Bangladesh: 17.08% (FD-managed forest: 10.30%, USF: 4.95%, village forest: 1. 83%), actual area of forest cover: 6.5% Contribution to GDP 2.3% |

Sources: BBS, 2006, 2009; CIA, 2010; DFID, 2008; FAO, 2005a.

1.3.2 Forest condition of Bangladesh and contribution to local and national economy

Bangladesh has a total area of 14.76 million ha, including 2.14 million ha of public forests and 0.27 million ha of village groves (BFD, 2010; FAO, 2005a; Kibria et al., 2000). Of the region's total land area, about 17.5% is considered as government and village forests; however, only 0.93 million ha (0.87 million ha forest and 0.58 million ha other wooded land), which is 6.5% of the total land, is under tree cover (Anon, 1993; FAO 2005b,) (Figure 1-1). Over the last century, Bangladesh's forests became depleted and degraded in terms of area, quality, and quantity. In recent years, the annual deforestation rate has been 3.3% (8,000 ha)—much higher than the 0.8% of South Asia as a whole (Gain 2002).

There is a strong link between rural poverty and deforestation in Bangladesh, as both problems are part and parcel of overpopulation, land scarcity, natural disasters, and lack of sufficient policy measures to deal with the problems that include lack of effective management approaches to ensure the participation of forest-adjacent people and to discourage corruption on the part of concerned officials (Biswas & Chowdhury, 2007; Zashimuddin, 2004). Almost 40% of the remaining forest area is being encroached on by house building (Kibria, 2001), and this phenomena is continuing as demand for dwelling space and forest products intensifies (Safa, 2006).

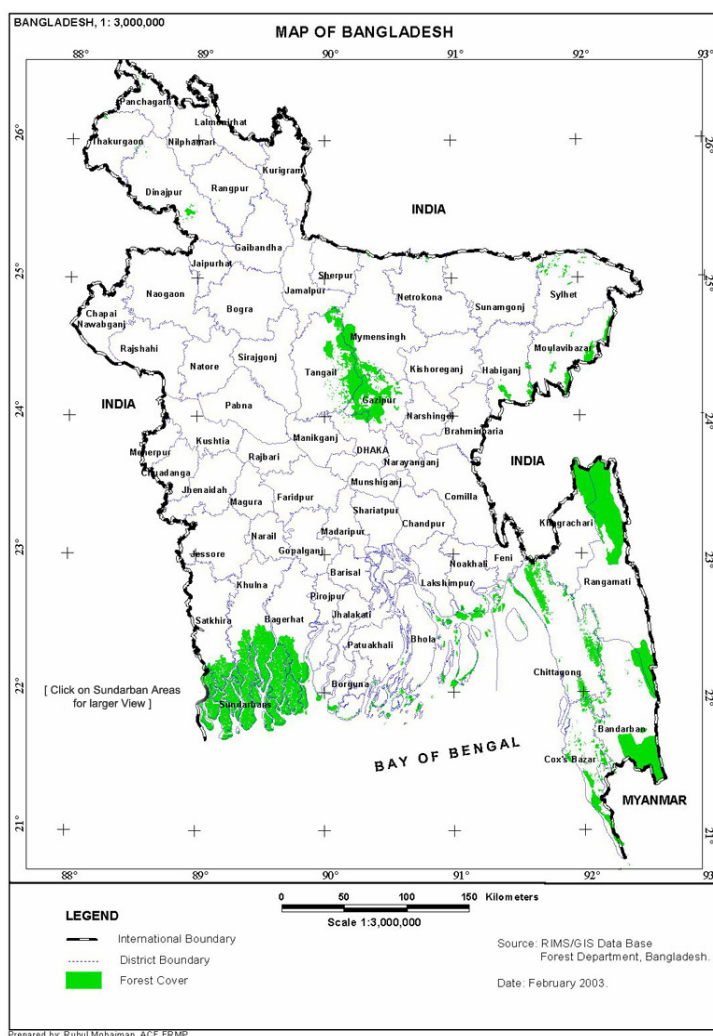


Figure 1-1: Bangladesh map showing the forest areas managed by forest department.

Although the Bangladesh's forestry sector has strong economic potential, the contribution from forest and related services to the country's Gross Domestic Product (GDP) is very low and is gradually declining. The share of forestry sector to national GDP has been decreasing since the 1988 ban on felling of trees in many forest areas as well as lower productivity and quality of the remaining forests (FAO, 2000). The data shows that in 2004, the figure was 2.3% (FAO, 2005a); the data for 2008–2009 puts the figure at 1.68% (BBS, 2010b). According to the Forest Resources Assessment Report (FRA), bamboo is responsible for most of the forest sector's contribution to the GDP followed by timber, firewood, and other NTFPs (FAO, 2000). However, Chowdhury

(2003) reported that within the small percentage of contribution of forestry sector to national GDP, only about 3.5% share of the forestry contribution derived from NTFP sector.

Further, forest-based cottage industries play an important role in supporting rural livelihoods. Bangladesh's forestry sector provides employment for 2% of the country's labor force (GOB, 2004), and within the forestry sector, cottage industries which are mostly NTFP-based (including bamboo, cane, *murta*, *khoir*, and honey) provide 36% share of the employment, and thus support the livelihoods of the rural people (FAO, 2000; Zashimuddin, 2004). Basit (1995) also reported that NTFPs provided employment to about 0.3 million people in Bangladesh throughout the year or at least during the agricultural off-season. However, the NTFP-based livelihoods are now facing challenges given the rapid degradation of forest resources. It appears that NTFPs have the potential to contribute significantly through cottage industries if forest restoration, which may include natural regeneration and niche plantation, can be ensured for continuous supply of NTFP materials and supportive markets and strategies could be developed.

1.3.3 Policy issues relating to forest resources

During British colonialism (1757–1947), the overexploitation of Bangladesh's forest resources started with a policy of clear felling followed by artificial regeneration. This policy trend continued under different guises through independence in 1971 (Ali et al., 2006; Muhammed et al., 2008). Recognized in the late 1970s as incompatible with addressing forest resource clearing and degradation in the socioeconomic context of Bangladesh, the conventional practice of centrally managing forest resources began to make way for a more people-oriented approach. This was community forestry management approach, which was supported by a number of international organizations, such as the Food and Agriculture Organization (FAO), United Nations Development Program (UNDP), and Asian Development Bank (ADB) (Biswas &

Chowdhury, 2007). Eventually, in 1993, the 20-year Forestry Master Plan (FMP) was formulated. Its detailed plan for forest management put emphasis on engaging local stakeholders in managing the forests in line with the principle that stakeholder involvement would facilitate better forest conservation and development. The FMP emphasized that NTFPs should be treated as valuable forest resources and, therefore, be managed and conserved accordingly (Anon, 1993; Biswas & Chowdhury, 2007). Therefore, the forest policy revised and formulated in 1994 was in accord with the FMP's emphasis on social forestry. This policy, therefore, gave more focus to a people-oriented forest management approach and identified NTFPs as priority species for conservation and development. In the light of the FMP, policy-makers began to have some appreciation for the value of NTFPs, but at this stage most of the forest areas were already degraded and stocks of NTFPs already very low. Although, the FMP and existing forest policy attached great importance to NTFPs and more people-oriented forest management approach, these policy measures have yet to be implemented effectively, and forest loss, therefore, continues apace (Chowdhury, 2003; Biswas & Chowdhury, 2007; FAO 2005b).

1.3.4 Chittagong Hill Tracts: The study region

The Chittagong Hill Tracts (CHT) of Bangladesh is situated at the southeast region of the country (21°25 N to 23°45 N latitude and 91°54 E to 92°50 E longitude) (Figure 1-2) and comprises three districts: Rangamati, Bandarban, and Khagrachari. This hilly forest region is traditionally dominated by 12 ethnic groups of indigenous peoples, all with distinct cultures, languages, and traditions. These indigenous ethnic peoples, who have been living in the hill ridges and valleys of CHT for centuries, have their anthropological connections with the ethnic peoples living in CHT adjacent other hill tracts of Burma as well as Tripura and Mizoram of India (van Schendel et al., 2001). These indigenous peoples are collectively known in different names

such as the Hill people, *Pahari*, *Jumyia* and *Jumma*. The total population of these hill peoples, once the region's largest ethnic groups, is now little more than half a million, accounting for about 50% of the total population (1.3 million) of CHT. The remaining 50% of CHT's population are Bengali (the plain land people of the country), who migrated to the region in the wake of a major government policy intervention during the late 1970s and early 1980s (Roy, 2002; Shelly, 2000). The Bengali people now compete with the Hill people for land and resources for their livelihoods, thus putting tremendous pressure on the natural resource base. The indigenous hill people together with the Bengali plain-land people who migrated to CHT, have put the land to different uses and employed different crop-production systems, and some of the peoples partially adopted plough/wet agriculture wherever possible within the last few decades, which provides about 10% share of the gross regional product of CHT (Adnan, 2004).

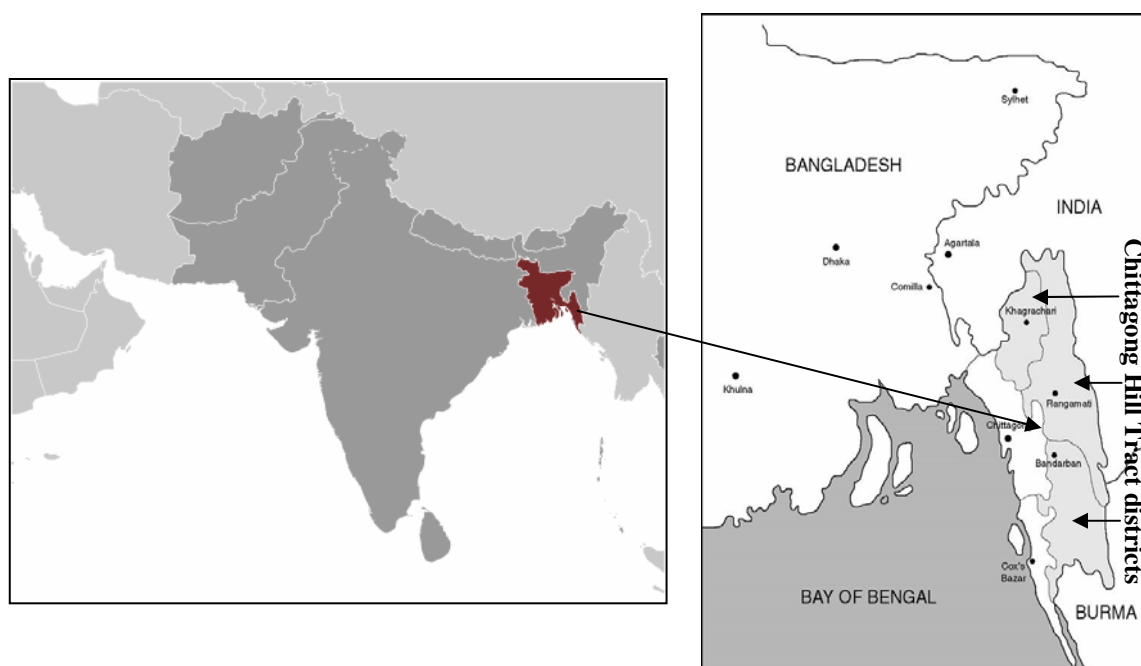


Figure 1-2: Map showing location of Chittagong Hill Tracts in Indian sub-continent and Bangladesh (IWGIA, 2010; CIA 2010).

Most of the people in CHT depend on forest resources including NTFPs directly or indirectly for their household consumption or subsistence income, so that about 40% of the gross regional product of CHT comes from the forest sector (Adnan, 2004). Although the evergreen and semi-evergreen forests of CHT are in a much-degraded condition, this region still provides the largest contribution based on forestry of any region to the national economy (FAO, 2000). Along with the hill peoples' dependence on forestry, they also engage in shifting cultivation or *jum*, the traditional farming system that comprises a broad range of agrobiodiversity and supports their livelihood subsistence (Alam & Mohiuddin, 2009). Rice is the main crop in *jum* required for the subsistence of hill peoples; and other useful crops in *jum* include vegetables, oilseeds, cotton, fruits etc. In the contemporary CHT economy, besides gathering of forest resources and *jum* cultivation for subsistence, other production activities undertaken by hill peoples include wet-rice and other crops production with plough cultivation; growing fruits, vegetables, tobacco and other cash crops; fishing in nearby waterbodies; rearing livestock and poultry for household use and cash income; weaving clothes with handlooms following various indigenous designs, making baskets and craft goods mainly using bamboo and wood, production of indigenous forms of alcohol, building indigenous style own houses extracting bamboo and timber from forests (personal observation, Adnan, 2004). Moreover, some villagers are engaged with business, services (government or private) and as wage laborers.

Traditionally, among the indigenous ethnic groups, the notions of private property rights on land were absent and were not necessary as the operational rights in common land as a community was sufficient for their subsistence production such as *jum* with agreed rules and sanctions (Adnan 2004). However, these premises have been drastically altered by subsequent historical circumstances such as British colonial regulations, hydroelectricity dam (details in the following paragraphs) and mass migration of Bengali people to CHT through government intervention. During the British regime, CHT 1900 Regulation gave formal structure of traditional

authority dividing whole CHT into three circles under three chiefs (King). The CHT consisted of 373 mouzas and each mouza was placed under a headman. Moreover, each mouza was subdivided into smaller units called para (village) headed by a karbari (manager). Karbari is the village head in each para who usually collects the tax from villagers and adjudicate disputes at village level and considered as the most powerful person in the village social structure. Moreover, some rich villagers who are more successful in agriculture and business have greater influence in the hill village systems too.

The village system in CHT is mostly based on one of the dominant ethnic groups. However, there might be few families from other ethnic groups as well in the villages. The village chief or karbari is commonly recruited from the dominant ethnic group. Most of the villagers are usually interlinked by multiple ties of kinship status and authority (Adnan 2004, personal observation). Most of the families are patrimonial and male household head leads the family members in economic and social activities. All the family members (adult or children) are engaged with either crop production, forest products collection or other production activities mostly for subsistence. Average number of members in family in CHT is about 5 and poverty is more acute in CHT than many other parts of the country. Employment opportunity except jum/agriculture is very limited. Although the employment opportunity is very limited in CHT, the villagers are very reluctant to work outside of the villages as day laborer probably due to cultural norms. Education is very low in traditional ethnic families but more children are now going to school especially those who live close to urban areas. In general, females are very active in forest products gathering and other outside activities along with their household works. However, females have very limited wage income opportunities and receive lower wage in comparison to the male household members. When adult females are out of home for gathering forest products, for agriculture or for wage income, children accompany them to help; sometimes the younger children remain at home or within the village under care of elder children or other elderly people

at the particular village. However, these socioeconomic activities and factors vary from this general picture among different ethnic groups.

Although jum is a major subsistence production activity in CHT, some recent studies' have claimed the negative environmental effects and current unsustainable farming practices of jum (Boggard, et al., 2003; Gafur et al., 2003; Rahman et al., 2007), this hill farming practice would probably remain there especially for the food security of the hill peoples (Olarieta et al., 2007). Traditionally, the social organization of jum production and management practices with certain institutional arrangements ensured the sustainability of forest resources and natural environment (Adnan, 2004). Thapa and Rasul (2006) note that jum inflicted little degradation on CHT's forest areas until the beginning of the British colonial period when the nationalization of the forests heralded a period in which the customary land and resource rights of the hill people were neglected. However, some major interventions contributed greatly to the problems in the area. One such was the Kaptai Dam, which was built on the Karnaphuli River in CHT in the 1960s for hydroelectricity. Not only was it built without any consultation with the local people, it accelerated forest degradation and land scarcity for jum as the dam eventually caused flooding in CHT's valley areas and thus forced thousands of people from their homes and greatly compromised most of the agriculture of the area. To add insult to injury, rehabilitation programs were few and far between (Roy, 2000; Tripura, 2008).

Different kinds of agroforestry practices combining agricultural, horticultural, and forest crops have great promise for CHT as sustainable alternatives to jum (Khan & Khisa, 2000; Rahman et al., 2007; Rasul & Thapa, 2006). Yet, some authors have taken the position that jum can be transformed into a sustainable hill-farming practice and continued as such. According to this view, the hill people could use traditional knowledge to create landscape mosaics, to follow a sequential-spatial-related shifting cultivation pattern of jum niche crops that works on the basis of an optimum (increased) fallow period, and to take steps to restore the forests through traditional

community resource-management systems (Alam & Mohiuddin, 2009). Along with jum, wet agriculture, and agroforestry, other current land-use practices in CHT include tree plantations, mono- or mixed-culture mainly for timber production, and horticulture, mostly monoculture and rubber plantations for industrial rubber production.

CHT is rich in forest and mineral resources, and its ethnic peoples have distinct languages, cultures and resource management practices that possess special attention. Yet, this region of the country has been one of the most neglected in terms of development, and this neglect gave rise to the 1973 *Pahari* resistance—an armed conflict of the people against the government. The conflict began after the government had rejected the hill peoples' demand for constitutional recognition, constitutional safeguards, and self-autonomy in governance (Roy, 2002, Roy, 2000; Shelly, 2000, 1992; Tripura, 2008). After more than two decades of armed conflicts, a peace accord was signed in 1997 between the *Pahari* resistance groups and the Bangladesh government, and at last an avenue of development opened up in the region. Many development agencies, including a number of local NGOs, the UNDP, and the ADB, are now concentrating on CHT as an area for development. In fact, some programs are already being implemented (ADB, 2008; UNDP-B, 2009); in these programs, NTFPs could constitute an important factor in encouraging natural resource-based development and conservation to support the livelihoods of the forest-adjacent poor. More details on CHT are outlined in Table 1-2.

Table 1-2: The Chittagong Hill Tracts, Bangladesh.

| Item | Brief Description |
|--|--|
| Land Cover and Land Use | Extended end of Himalayan mountain ranges with 1,329,500 ha areas: most of the areas are hill forest land (818,800 ha) with little portion for agriculture (85,600 ha) and settlements. Administrative land classification: 710,000 ha Unclassed State Forests (USF); 332,500 ha Reserve and Protected Forests; 57,000 ha Private Plantation Forests; the rest is households settlements, urban areas and khas lands (fallows). |
| Climate and Seasonal Calendar | Tropical monsoon climate with mean annual rainfall between 2500 mm to 4000 mm. The dry and cool season is from November to March; pre-monsoon season is April to May which is very hot and sunny and the monsoon season is from June to October, which is warm, cloudy and wet. |
| Brief History | Recorded in the map of Bengal in 1550, British India named it as Chittagong Hill Tracts in 1860. During 1200 to 1300, some ethnic groups of Mongoloid origin such as Chakma, Marma who prefer to live in valleys and riversides migrated here from Myanmar and pushed the hill peoples to more interior who used to live in the region preferring hill ridge sides. |
| Demographics | Population estimate: about 1.3 million; 200,000 households; 5.5 member/household, 12 ethnic groups comprising about 50% of the total population and the rest 50% Bengali people who migrated from plain land. Although CHT used to be indigenous peoples dominant area, now the migrated Bengalis are becoming dominant in the region. Main ethnic groups: Chakma, Marma, Tripura, Bengali |
| Poverty and main Economic Activities | Poverty is very acute in CHT and this has been increased with increased outsiders' pressure on natural resources and cultural suppression. Forestry and agriculture (shifting and plough wet-rice cultivation), fishing, trade services and cottage industries are main economic activities. |
| Main Source of Forest Products | Government forest reserve, USF under control of District Commissioner and khas hill lands, private plantations. |
| Forest Products Available | Timber (such as Teak, Gamari, Garjan, Jam, Lali etc.), Firewood, NTFPs (bamboo, broom grass, wild vegetables and fruits, thatching grass, bush meat, medicinal plants, tree bark etc.). |
| Markets for forest and Agricultural products | Timbers are mostly sold to the local traders and they extract the timber from the forest lands with the help of middlemen and labors. Varieties of NTFPs are traded at local markets. Forest and agricultural products are usually sold in the small daily local market within 1–3 km range of the hill villages; however, for wholesale of the products twice-weekly local market and district market towns are used. |
| Land Tenure and Customary rights | Traditionally the hill lands were managed under customary laws of the hill peoples. However, from the British regime about one fourth of the area was declared as forest reserves under management of government forest department excluding the customary rights of the hill peoples from those areas and resources. The rest majority of the area of CHT was declared as USF with management control under Deputy Commissioner (DC) of the district. The DC has the authority to allocate hills as lease to the indigenous peoples adjacent to their villages. Customary village land remained under control of village headperson who allocates land to households and manages the very limited remaining village forestland. |
| Government and Development projects | UNDP with the support from other donor agencies and Bangladesh government is implementing a large scale project focusing on socioeconomic improvement in the livelihoods of the hill peoples and sustainable natural resource conservation. Their activities include capacity development through awareness, training, financial support, reforming policy and institutional framework. |
| Recent Calamities | In 2008, there was serious crop failure in some areas of the CHT region as croplands were destroyed by increased rat population. This is because of massive bamboo flowering in the area and fertility of the wild rats increased several times when they eat the bamboo fruits. |
| Other | In 1960s, a hydroelectricity dam in CHT inundated majority of the good agricultural lands, valleys and human settlements. Many people had to relocate to other areas without proper compensation losing their lands and resources. |

Sources: Personal observation; Adnan, 2004; BCAS, 2006; Olarieta et al., 2007; Roy, 2002; Shelly, 2000.

1.3.5 NTFPs utilization in Bangladesh and the research problems

NTFPs play an important role in the daily life and economy of Bangladesh's rural population (Alamgir, 2006; Chowdhury, 2003; Fox et al., 2007; Zashimuddin 2004). According to Vantomme et al. (2002), NTFPs contribute to the food security of the rural people by supplementing agricultural crops. People in the hilly forests of the country depend on forest resources for food, shelter, fuel, fodder, medicine, and other uses (Banik, 1997; Nath et al., 2005). And, they had long been accustomed to harvesting whatever they needed from the forest in a sustainable way until the government withdrew their customary rights to the forest lands and resources (Ali et al., 2006). Today, the current trend of deforestation and degradation of NTFPs is putting the livelihood of forest-adjacent communities at risk. Despite the importance of NTFPs for rural livelihoods and the economic development of the country, policy-makers, forest managers and practitioners have not paid sufficient attention to these resources (Chowdhury, 2003).

Although a variety of NTFPs (Table 1-3) have good potential for socioeconomic development, this sector has generally been overlooked by national-level forestry programs (Biswas & Chowdhury, 2007; Vantomme et al., 2002). And, certainly, there is a lack of institutional arrangements and targeted strategies for the sustainable management, extraction and marketing of many valuable NTFPs. Neither is there any clearly defined action plan or guidelines to regulate and develop NTFP harvesting and trade. In the light of these facts, then, it is predictable that the Bangladesh Forest Department (BFD) lacks an NTFP inventory or monitoring program, and, therefore, has little information about stock, abundance, and marketing of NTFPs. Therefore, the market potential of many NTFPs remains underutilized (Vantomme et al., 2002). In addition, there are no incentives for local enterprise development, which results in both over- and under-exploitation of resources. There is no record of what the NTFP-related needs of forest

dwellers and other forest-dependent people living in the vicinity of the forest areas have been; nor is there any record of their consumption of NTFPs (Kibria 2001) except for some recent NTFP research and data collection in a few protected area sites of the *Nishorgo Support Project*, BFD (Fox et al., 2007).

Table 1-3: Major NTFPs of Bangladesh.

| | |
|---|---|
| Bamboo (e.g. <i>Melocanna baccifera</i> , <i>Bambusa tulda</i>) | Khoir (tannin, dye) |
| Rattan/Cane (e.g. <i>Calamus viminalis</i> , <i>C. guruba</i>) | Fibre (cotton) |
| Patipata or Murta (<i>Tenogyne dichotoma</i>) | Silk (from sericulture) |
| Sungrass (<i>Imperata</i> spp.), Nal, Khagra Broom grass (<i>Thysanolaena maxima</i>) | Honey (natural and grown) and Beeswax Menda bark (<i>Lytsea glutinosa</i>) |
| Medicinal plants: Kurus pata (<i>Holarrhena antidysentrica</i>), Horitaki (<i>Terminalia chebula</i>), Amlaki (<i>Emblica officinalis</i>), Bohera (<i>Terminalia belerica</i>), Arjun (<i>Terminalia arjuna</i>), Neem (<i>Azadirachta indica</i>), Ashok (<i>Saraca ashoka</i>), <i>Adathoda vasica</i> , <i>Rauwolfia serpentine</i> , Bel (<i>Aegle marmelos</i>) | Lac (<i>Coccus lacca</i>), Rubber (Latex), Tendu leaf (Bidi), Orchids and flowers, Gum, Agar (resin), Spices, Shells, Conch Shells and Oyster, Fish and wildlife resources (meat, horn, skin) |
| Fruits, Nuts, Vegetables (e.g. mushroom and wild potatoes, bamboo shoots) | Gol-pata (<i>Nypa fruticans</i>), Hantal (<i>Phoenix paludosa</i>) |

Source: (Vantomme et al., 2002; FAO, 2005a); personal field observation.

In terms of NTFP domestication and commercialization, community forestry programs are vital to ensuring local community participation in NTFP management; in fact, they tend to attract NTFP income above the subsistence level of the rural poor and, therefore, play a part in alleviating poverty (Muhammad et al., 2005; Zashimuddin, 2004). From the early 1980s on, the BFD used different community forestry approaches to cultivate and commercialize a small number of NTFPs—those that had already shown some market demand. Integrated production systems such as agrisilviculture, agrisilvipasture, aquasilviculture, apiculture, sericulture, lac culture, and mushroom culture have all been tried. Although some of these initiatives manifested some positive change in terms of subsistence and income generation (Zashimuddin, 2004), many of the projects did not endure because a number of key factors were lacking, among which were appropriate NTFP market links and strategies, organizational support in terms of financial capital,

land tenure, training and awareness development. Without the assurance of these key factors, participants could not conduct their NTFP activities beyond the length of the project trials.

Given the positive role that NTFP domestication can play in terms of resource conservation and increased production for market supply and enhanced income, many organizations, including the BFD, have been encouraged to cultivate more NTFPs. Among the BFD's initiatives are programs to cultivate NTFPs, such as medicinal plants, bamboo, cane, *murta*, mushrooms, and honeybees; these programs address the Forestry Master Plan (FMP) and policy emphasis on NTFPs as priority species (BFD, 2009). The FMP targets a 34,600 ha plantation area for NTFPs, with 60% devoted to a cane plantation and 30% devoted to the *lac* and Catechu (*khair*) program. The BFD also emphasizes bamboo, *murta*, fodder, and horticultural and medicinal plants for artificial regeneration programs (Zashimuddin, 2004). In most cases, the BFD's NTFP cultivation initiatives are not being effectively implemented given the continued lack of an environment that encourages the true participation of the local community in forest resource management—corruption on the part of officials continues, as does the lack of people-oriented training (Biswas & Chowdhury, 2007). Overall, there are still many constraints on the sustainable domestication and commercialization of NTFPs.

One specific area of activity emphasized through the FMP and forest policy of 1994 is NTFP-based small-scale cottage industries that can provide off-farm employment and income generation in the rural communities (Akhter et al., 1997, Alamgir, 2006; Zashimuddin, 2004; Nath et al., 2000). The Bangladesh Small and Cottage Industries Corporation (BSCIC) listed 157 types of small and cottage industries in Bangladesh, and among them were about 22 industries directly related to the NTFP trade. In 1986, there were about 3.22 million households engaged in cottage industries in Bangladesh producing 160 different products and employing about 9.18 million people, and many of these were related to NTFP trade (Sirajuddin qtd. in Zashimuddin, 2004). In addition, about 75,000 bamboo and cane units were recorded in Bangladesh in 1982

(Kanwal qtd. in Zashimuddin, 2004). However, many of these NTFP-based cottage industries are being constrained by a lack of continuous raw materials supplies and a shortage of adequate market support and incentives (Miah & Rahman, 2002; Nath et al., 2000). For example, given the shortage of cane in Bangladesh's forests, the nation imported about 194,000 canes for cane-based cottage industries in 2000–2001, (Chowdhury, 2003). Overall, the current degraded condition of the forests in Bangladesh mean that the forest resources cannot meet the needs of the country's 150 million people (Safa, 2006), and this situation will continue unless the domestication and restoration of forest resources including NTFPs are encouraged (Biswas & Chowdhury, 2007).

There is good potential for developing more NTFP-based cottage industries and small-scale enterprises in Bangladesh, but the lack of natural resources due to deforestation and limited markets prevents further expansion of the industries. In the current much-degraded condition of the forest resources, more domestication of some of the socially and economically viable NTFPs could play a crucial role. Vantomme et al. (2002) suggests that to reduce the increasing pressure on depleted forest resources and to utilize the full potential of NTFPs for rural livelihood development in Bangladesh, it is essential to concentrate on domesticating some important NTFPs, such as rattan, bamboo, medicinal plants, mushrooms, honey, lac, and khoir. Several authors suggest that through community involvement NTFP-domestication strategies could be integrated with agroforestry approaches (Khan & Khisa, 2000; Rasul & Thapa, 2006a). NTFPs, such as mushrooms, can be domesticated effectively in Bangladesh and could contribute to higher economic returns than upland agriculture or timber harvesting (Vantomme et al., 2002). Moreover, to ensure rural livelihood improvement and resource conservation, the views of forest-dependent people and their traditional knowledge of forest-resource management should be considered along with the NTFP-based cottage industry's goals, which pertain to product development and marketing (Alam & Mohiuddin, 2009; Leaky & Izac, 1996).

In relation to NTFP domestication, the Marketing Information System (MIS), which establishes a flow of information about markets and products between different levels of buyers and sellers, has been proven to have a significant positive impact on NTFP enterprises and community involvement (Binayee, 2005; Banana, 1996). There is no MIS for NTFPs in Bangladesh; therefore, for many NTFPs, links and communication between companies/consumers and forest communities are absent. In the absence of an NTFP-related MIS at the national and/or local level and supportive NTFP market policies, a poor market environment for NTFP collectors or producers has prevailed, meaning that these stakeholders are vulnerable to exploitation by other stakeholders, namely the middlemen and traders (Banana, 1996; Zashimuddin, 2004).

In 1993 the FAO tested an MIS that had been designed to meet community needs at a site in Bangladesh; this MIS involved farmers and shifting cultivators and focused on marketing information about cultivated and gathered forestry products (Banana, 1996); however, it was not integrated with policy support and measures. It, therefore, failed. Therefore, in undertaking new MIS initiatives, that lessons for previous failure must be learned is a given. Zashimuddin (2004) also suggests for developing marketing infrastructure to sell the NTFPs, to strengthen linkages among producers/collectors, village traders, retailers and consumers through a good MIS informing all stakeholders about demand and prices of the products to enhance livelihood income.

In regard to exploring NTFP's role to meet development and conservation objectives, from the above review and discussion, it is clear that although there is a growing body of NTFP-related research and literature worldwide carried out in last two decades, very little has been done on Bangladesh NTFP perspective. Mentionable NTFP-related studies in Bangladesh include several research initiatives by government and NGOs on exploring NTFP-livelihood relationship specific to a few protected areas of Bangladesh but not any in CHT (e.g., Fox et al., 2007; Miah, 2007; Riadh, 2007; Uddin & Mukul, 2007; Uddin & Roy, 2007) whereas other few studies

focused on NTFP related conservation issues (e.g., Banik, 1997; Biswas et al., 2010; Khan & Rashid, 2006; IUCN, 2007; NAWGBD 2007) to ensure sustainable forest management and rural livelihood development. Moreover, very little has been done to explore the constraints and prospects of NTFP markets, or to examine the role of NTFPs play in the livelihoods of concerned stakeholders (Shahidullah, 2007). Therefore, more applied research is essential to examine the extent and potential of NTFP contribution to livelihoods. Such research would do well to explore sustainable strategies for domestication and commercialization of NTFPs, and policies that would enhance rural livelihoods. Biswas and Chowdhury (2007) also urged more scientific research on forestry issues in Bangladesh including NTFPs with a focus on forest resources sustainability problems.

Therefore, the broad objectives of this study are (i) to examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities and (ii) to investigate the constraints on and potentials of NTFP-related initiatives and future NTFP interventions required to improve livelihoods, sustainable trade, and forest resource conservation in Bangladesh. To pursue these objectives, the main research question of my study is:

How could NTFPs be better utilized to improve the livelihoods of forest-adjacent communities and to achieve the goal of conserving the forest resources in Bangladesh?

1.4 Importance of the study

The research outcome will contribute to the NTFP-based rural livelihood development and conservation discourse by contributing regional comparative analysis on the utilization of potential NTFPs with empirical data from the current study and from worldwide NTFP case studies (conducted by a number of research projects and already publicly available as noted earlier). Further, in terms of practical considerations, a large-scale development project (CHT

Development Facility) is currently being implemented in CHT by an international donor agency alliance including the UNDP. The findings of this research could help achieve some of the development project's objectives focusing on natural resource management and rural development in the CHT. UNDP-Bangladesh and other local organizations cooperated with my field study, assisting with data collection with a view to integrating my research findings into their natural resource-related development activities. As discussed above, South Asia, particularly India and Nepal, is taking initiatives to conserve and develop NTFPs with the goal of sustainability and has already incorporated some guidelines into their national policies. Likewise, this research effort will help Bangladesh to investigate and integrate regional or countrywide NTFP initiatives in order to develop a comprehensive plan and policies for the sustainable use of NTFPs in rural development and conservation. Some of the findings and models used in this study could also be applied in other countries or regions in the Tropics that have socioeconomic and biophysical conditions that are similar to those of Bangladesh.

1.5 Structure of the dissertation

Chapter 1 has presented the background issues, research problem, main research question, and justification of the study. Chapter 2 focuses on the study's conceptual framework, explaining how the current research fits in theoretical contexts and offering a combined conceptual model for accomplishing research goals. Chapter 3 describes the methods and procedures followed in the field and the statistical analytical procedures followed to answer the specific research questions that will be brought to bear on the broad research question. Chapter 4 focuses on field findings; it discusses NTFP types and rankings, collection and uses of NTFPs, NTFPs income contributions to household economics, and influencing factors. It also details and discusses the current stock of NTFPs in CHT and why NTFP stock degradation is occurring at a

rapid pace. Chapter 5 analyzes and discusses survey results on market constraints and market potentials for NTFPs at the village level with a specific focus on identifying NTFP market constraints and prospects, market knowledge and sources of information, and domestication and entrepreneurship development, as well as NTFP sustainability issues. Chapter 6 shows the production-to-consumption systems (PCS) of five selected NTFPs and analyzes the livelihoods of NTFP-market stakeholders along the respective market chains. This chapter discusses how various factors related to different stakeholders at various transforming points of an NTFP PCS can influence their livelihoods. The chapter also identifies possible interventions for sustainable uses of NTFPs. Finally, Chapter 7 provides concluding remarks with possible recommendations and suggestions for effective interventions and policy measures to help improve the livelihood incomes of the forest-adjacent communities and promote the conservation of the forest resources.

Chapter 2

Conceptual Research Framework

To investigate the research problem, the study built its approach on a foundation of sustainable livelihood (SL) and production-to-consumption system (PCS) concepts. These concepts formed a combined interrelated framework within which the research questions of this study were answered. Although the SL approach provides a sufficient platform for achieving and analyzing livelihood development outcome, it lacks the market aspects of NTFPs and related livelihoods. On the other hand, PCS focuses more detail on NTFP market aspects analyzing the livelihoods of all stakeholders and processes involved starting from production of NTFP to its final consumption. Therefore, the two concepts were used to strengthen the research framework in order to answer the research question focusing on sustainable use and conservation of NTFPs and improved livelihoods. This chapter first reviews and describes the concepts and their different components in detail. How other studies have applied these concepts in different research studies in various regions will also be outlined. Then the chapter focuses on interlinking the components of the two concepts to construct the combined conceptual framework. Finally, the combined conceptual framework will be presented and described with a focus on how the research problem will be addressed within this framework.

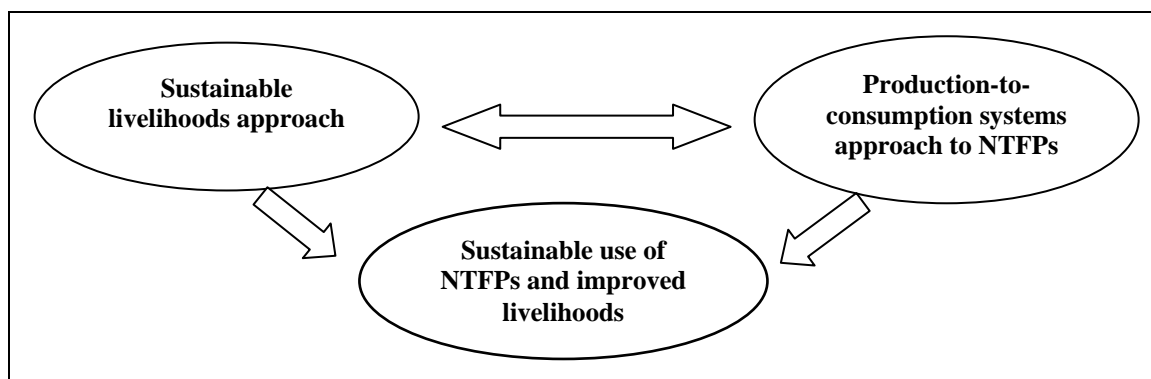


Figure 2-1: Linkages of concepts to targeted research outcome.

2.1 Sustainable livelihoods approach

2.1.1 What is a livelihood?

A livelihood comprises assets as capitals, access to these capitals and capital-based activities which influenced by institutions and social relations, determine the living of the individual or household (Ellis, 2000). Livelihood is a multifaceted concept consisting of what people do and what they accomplish by doing it with reference to outcomes and activities (Niehof, 2004). In order for a livelihood to be sustainable, several strategies involving capitals, actions, and institutions, as outlined in a Department for International Development (DFID) framework, are recommended.

The sustainable livelihoods approach has its roots in thinking about poverty reduction, focusing on the living strategies of the poor and on influencing structural and institutional issues (Ashley & Carney, 1999). In executing development activities, the SL approach targets the people and sets a benchmark to measure whether sustainable improvements have taken place in people's livelihoods. SL approaches evolved through the efforts of research institutes (e.g., the Institute of Development Studies), NGOs (e.g., CARE, OXFAM), and donors (DFID and UNDP). In 1997,

the DFID adopted an SL approach and developed an SL framework in support of the UK government's aim to halve the proportion of people living below the poverty line worldwide by 2015. The approach involves the participation of all kinds of stakeholders engaged with this organization so that international development and poverty alleviation can take place through a combination of agency and government support and stakeholder participation.

Realizing the complexity of the isolated or single sector approach compared to that of multi-sectoral programs for achieving development goals, this SL approach tries to combine all sectoral programs focusing on household economy in relation to the local policy context (Ashley & Carney, 1999). Based on Robert and Conway's (1992) definition, Carney (1998) defines the SL approach as:

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in future, while not undermining the natural resource base.

The SL approach, therefore, is an important tool for analyzing different socioeconomic and biophysical perspectives in a locality relating to poverty. It provides a platform for identifying opportunities to better utilize the capitals available to the poor for increasing their livelihood income. According to Ashley and Carney (1999) this approach aims to alleviate poverty by improving the effectiveness of development activities. Further, the approach emphasizes systematic poverty analysis with special investigation into the causes of poverty, identifying opportunities by participants, and setting development objectives based on the people's priorities.

2.1.2 Principles of sustainable livelihoods

Relating to the above discussion, the principles of SL approaches are poverty-focused and comprise (i) people-centered activities, (ii) ensuring people's participation in identifying their own problems and developing the priorities, (iii) dealing with multi-level micro to macro and all intermediary sectors, (iv) combining government and private collaborative development efforts, (v) seeking sustainable outcome concentrating on four dimensions of sustainability: economic, institutional, social, and environmental, (vi) recognizing the dynamic nature of livelihood strategies and responding to the changes in a flexible manner with long-term commitment (Ashley & Carney, 1999). These core principles of SL encompass a broad range of development perspectives; therefore, they can be applied to various development programs, with particular interventions targeting different stakeholders in an activity to enhance livelihood income and to alleviate poverty.

2.1.3 The sustainable livelihood framework

Based on the principles underpinning SL, the SL framework developed by the DFID mainly focuses on development projects and is generally used as an analytical tool. This framework provides a structure through which to better understand the livelihoods of target groups, and it stresses the importance of livelihood components and related factors. These include engaging the target people in identifying their priorities and developing strategies based on the people's priorities; having institutions, policies, and organizations that determine their access to assets or opportunities; providing access to social, human, physical, financial, and natural capital (Carney, 1998). The SL approaches and framework are evolutionary in terms of their application in various development projects. And, according to many development practitioners, they are

very useful in that they reinforce best practices for addressing core development issues (Carney, 1998).

The SL framework is used as a checklist of the livelihood issues to be targeted, and it provides a detailed structure for livelihood analysis (Fig 2-2). A people-oriented holistic approach, the SL framework focuses on alleviating poverty through resource management and rural livelihood development in terms of long-term sustainability. More specifically, it organizes and identifies constraints and opportunities associated with improving livelihoods and displays how they are interlinked (Carney, 1998). The framework is flexible in as much as its application provides a way to think about livelihoods, and it can be modified to take the needs of a particular context into account. The SL framework comprises several components, details of which are given below.

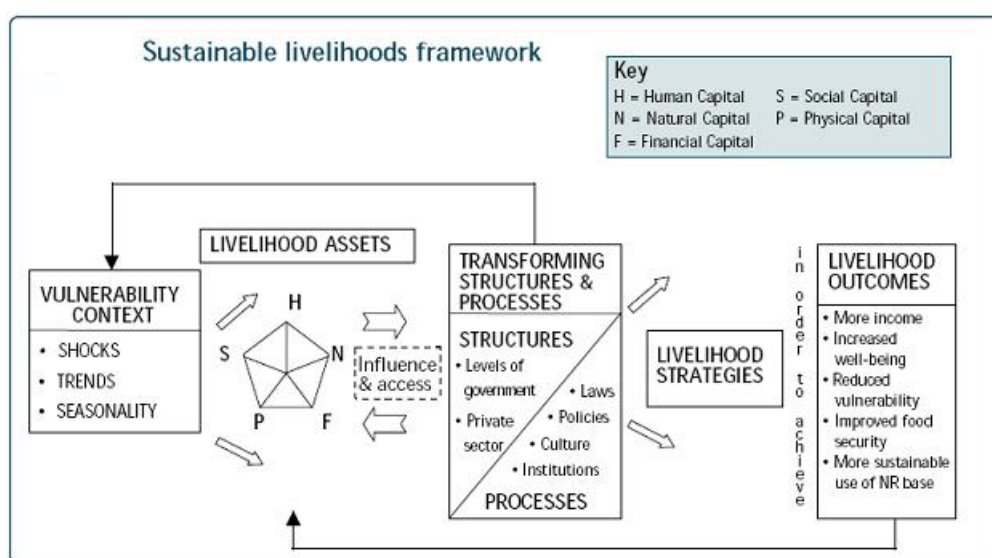


Figure 2-2: The sustainable livelihoods framework of Department for International Development (DFID, 1999).

According to the DFID (1999), the SL approach is people-oriented, and livelihood is shaped by different factors at different levels; therefore, the approach suggests that it is appropriate to begin with a simultaneous investigation of people's assets and their expected

livelihood outcomes and the livelihood strategies they are currently using to realize the desired livelihood outcome. After such investigation, these factors can be related to the vulnerability context and structure and processes for reducing the vulnerability and enhancing livelihood outcomes can be considered.

2.1.3.1 Vulnerability context

The vulnerability context refers to the external environment in which the target people live, as well as their perspectives on that environment (DFID, 1999). People's livelihoods and assets are affected by critical trends, shocks, and seasonality—factors over which they have very little or no control. Shocks, such as floods, cyclones, civil conflicts or unseasonal bamboo flowering that lead to the loss of the whole bamboo culms (as observed in my field study) can destroy the assets of the people. Besides the shocks, trends such as population growth, declining forest resources including NTFPs, and economic growth can affect the people's livelihood strategies and influence economic and other returns. Seasonal shifts in prices, employment, and food availability also affect livelihoods, and in particular poor people's living strategies. Overall, the complex influence of the vulnerability context puts pressure on the livelihoods of the poor in such a manner that they are unable to earn enough to cope with the stress.

2.1.3.2 Capital assets

Possession of and access to different types of assets or resources generally termed capitals are crucial for the livelihoods of the poor. Since SL approaches are people-oriented, it is important to understand the status and strengths of people's assets and how they convert these into positive livelihood outcomes (FAO, 2006; DFID, 1999). The SL approach is based on the

assumption that people require a range of assets to achieve a positive livelihood outcome, and it is more applicable in the case of the poor. In the SL framework, the capital is represented by a pentagon comprising five types of capitals: human (such as, skill, knowledge, ability to work, and good health), social (such as network and connectedness within society, membership in groups, relationship of trust), natural (such as land, forests, water, and biodiversity stock), physical (such as infrastructure, shelter, water supply, access to information), and financial (such as savings and inflow of money). The shape and dimension of the pentagon usually reflects the people's access to different assets.

These assets have highly complex relationships with other components of the framework. To focus on vulnerability and assets, assets can be destroyed or created by shocks, trends, or seasonality. Considering the influence of structure and processes on assets, for example, government policies and legislation and other institutions can create infrastructures, promote technology, define property rights, improve access to NTFP-market information by creating an MIS, and determine access to the assets. Assets also tend to facilitate livelihood strategies by providing a greater range of options. In most of the poverty-oriented cases, access to assets is critically important to escape from the poverty trap (DFID 1999).

2.1.3.3 Transforming structure and processes

Organizations, policies, and legislation can play a vital role in shaping people's livelihoods, as outlined in the framework (Carney, 2003; DFID, 1999). They determine access to capitals, strategies, and decision-making capability; identify the extent and sources of influence on assets; and explore terms of exchange between different types of capital and their returns to any given livelihood strategy (Carney, 1998). Moreover, culture is also a critical constituent of the transforming process and, therefore, facilitates feelings of inclusion and well-being on the part

of the target people. Transforming structure and processes have a direct feedback to the vulnerability context (DFID, 1999). For example, policies implemented or changed by organizations influence the trends and relieve shocks. Institutions define people's livelihood strategies and political structures and policies can also have a direct impact on livelihood outcomes. Structure that comprises public and private organizations and agencies, such as legislative bodies, executive agencies, NGOs, and civil society, are important as they actually affect and monitor the processes. To achieve positive livelihood outcomes there are several options: building organizations that will represent the poor, promoting reforms, expanding scope of opportunities, and supporting joint forums for decision-making and action (DFID, 1999). Likewise, processes such as policies and legislations are very important for every aspect of livelihood.

2.1.3.4 Livelihood strategies

Livelihood strategies are the combination of activities that people engage in with the purpose of reaching their livelihood goals. The strategies are diverse; they vary in accordance with geographical areas, the level of household involvement in different sectors. In many cases, too, the strategies could be combined. As stated, peoples' access to different assets is very influential in determining the livelihood strategies they use. Further, depending on the shocks or trends and the combination of household capitals that people have, their livelihood strategies change as a result of positive structure and process transformations such that better livelihoods are the outcome.

2.1.3.5 Livelihood outcomes

Improved livelihood outcomes is the goal of the SL framework's development interventions. These are the achievements or outputs that accrue from the poor people's livelihood strategies. It is also important to observe and investigate the richness of the potential livelihood undertaken by the poor. Identifying the compelling situations and underlying constraints in a particular livelihood outcome is crucial for future interventions. There could be several types of livelihood outcomes, such as more income, improved well-being, reduced vulnerability, improved food security, and more sustainable use of the natural resource base (DFID, 1999; Scoones, 1999). Trade-offs between these livelihood outcomes, though, will most certainly have to be made; for example, improved well-being could be opposed to increased income, and people will make their own choices and adopt strategies to achieve their priority goals (Carney, 1998). There may also be conflicts, too, between increased incomes from a livelihood strategy that is detrimental to a natural resource base. The framework, however, does not provide a clear solution to this dilemma (DFID 1999).

2.1.4 Limitations and critics of the sustainable livelihood framework

Although the SL framework has been widely used as a holistic approach to ameliorate poverty in different regions of the world, there are some limitations related to some of the important components of the framework. For example, the framework does not explicitly outline the market structures or how the poor will access markets; nor does it emphasize how markets can influence livelihood strategies (Dorward, 2001). Since improved market access is an important issue for the poor, they usually identify the problems with markets and seek interventions that they view as central to their livelihoods and thus central to alleviating poverty (Dorward et al.,

2003). In many cases, markets influence the livelihood strategies and outcomes of the people by creating employment opportunities and establishing the cost of acquiring assets or of substituting one asset for another (Carney, 2003). The poor, usually characterized by having little power and weak human, financial, and social capitals, face high costs in accessing market information and establishing property rights. Thus, constraints on income generation and market development greatly hinder economic and technological development (Dorward et al., 2003). Castren (2005) also asserts that providing easy access to markets and market information can enhance producers' independence from intermediaries and increase income.

Moreover, the SL framework does not describe details of governance issues (Murray, 2001). Although the framework outlines the different levels of structures in government and public sectors and focuses on the processes of the structures, such as laws, policies, institutions, and culture, it does not say much about how the power and authority systems should inform the public or execute the processes (Ashley & Carney, 1999). It also does not mention the role of gender and power distribution within the household or community—an important insight given the gender-based roles that prevail in the household and the distribution and kind of work undertaken by males and females in many contexts.

Moreover, there is no clear statement about adopting appropriate technologies. However, technologies could be developed through structures and processes, and people could use it in an adaptive way to improve livelihood outcomes. Again, technology can also impact the human, social, and natural capitals of the people and can facilitate their transformations in achieving improved livelihoods. Brocklesby & Fisher (2003) argued that SL approaches usually embody a technocratic development drive, and in many cases they fail to conceptualize the real local context for community development. However, it appears that this argument is more applicable to the implementation of the SL than to the framework itself.

Besides, some of the deficiencies of the SL framework in coping with market, governance, technology, and context conceptualization issues, some other weaknesses have been observed in different development intervention projects around the globe as shown in Box 1. The SL approach is to be applied in an adaptive way, and it is likely, I argue, that insufficient expertise was brought to bear in adapting the framework for the local context in many of the instances listed here. Overall, despite its limitations, the SL approach as a dynamic, holistic approach focused on the poor has the potential to contribute in a key way to alleviating poverty if applied in the field in well-planned adapted way.

Box 1: Weaknesses of the SL approach in practical development practice in a global context.

- The SL framework is an open-ended agenda of activities with prioritization difficulties (in India).
- It favors holistic solutions, making it time-consuming, and entry points into the framework tend to depend on history and people rather than on a development priority agenda (in Pakistan).
- The framework's multi-faceted quality was expensive and unmanageable (in Zambia).
- Some practitioners suggested unpacking the transforming structure and processes component of the framework to address each level of the component separately to avoid risks of institutional destruction (in South Africa, Zimbabwe).
- It has difficulty in mainstreaming rather than replicating, and it is hard to understand where to stop in the framework (in Indonesia).
- Institutions require a more defined method, and encompassing whole ecosystems is too broad for applying the the specifics of the framework (in Brazil).
- It was not useful for project planning; a more detailed approach was needed (in Nepal).
- Macro–micro links in the framework need a more governed environment, and area-based projects need effective macro–micro linkages to influence policy (in Kenya).
- It limits what can be achieved without the enabling actions of government (in Russia).
- The SL framework lacks explicit reference to ensuring replication mechanisms. Moreover, institutional, financial, and personnel reward structures are not conducive to adopting SL or livelihood focus (Mexico and Central America).

Source: (Ashley & Carney, 1999).

2.2 Production-to-consumption systems

Focusing on natural resource-based livelihoods and market linkages of different stakeholders with the natural resource products, production-to-consumption systems (PCS) analyze broad issues including production, management of the resources, collection, product-flow and socioeconomic dynamics, including the roles of gender and influential people, post-harvest processing and manufacturing, value addition, market types and demand, and policy regulation and institutions (Figure 2-3). Also covered is how the different stakeholders' livelihoods are interlinked with the different processes of the systems. Similar to the concept of PCS are value chain analysis and market chain analysis, which some researchers also used (e.g. te Velde et al., 2006; Jensen, 2009); these also describe and analyze a whole range of actors, activities, processes, and linkages associated with production, exchange, transport, and distribution of a particular product (Kaplinsky, 2000, 2001). However, there is some debate; for example, as te Velde et al. (2006) argue against any special kind of market chain analysis. And, by using these different terms, comparisons of studies mostly depend on interpretation as applied to the commodity- and product-related field details. However, the production-to-consumption system as it describes itself emphasizes detail analysis of all the actors, activities, and processes involved in the system; there are also examples of it having been effectively applied in different NTFP-related socioeconomic case studies. Therefore, in my study the conceptual discussion would mostly be attached to the kind of NTFP-related PCS as Belcher (1998) defines it:

PCS is the entire set of actors, materials, activities and institutions involved in growing and harvesting a particular raw material, transforming the raw material into higher-value products and marketing the final products. The system includes the technologies used to grow and process the material, as well as the social, institutional and economic environments in which these processes operate.

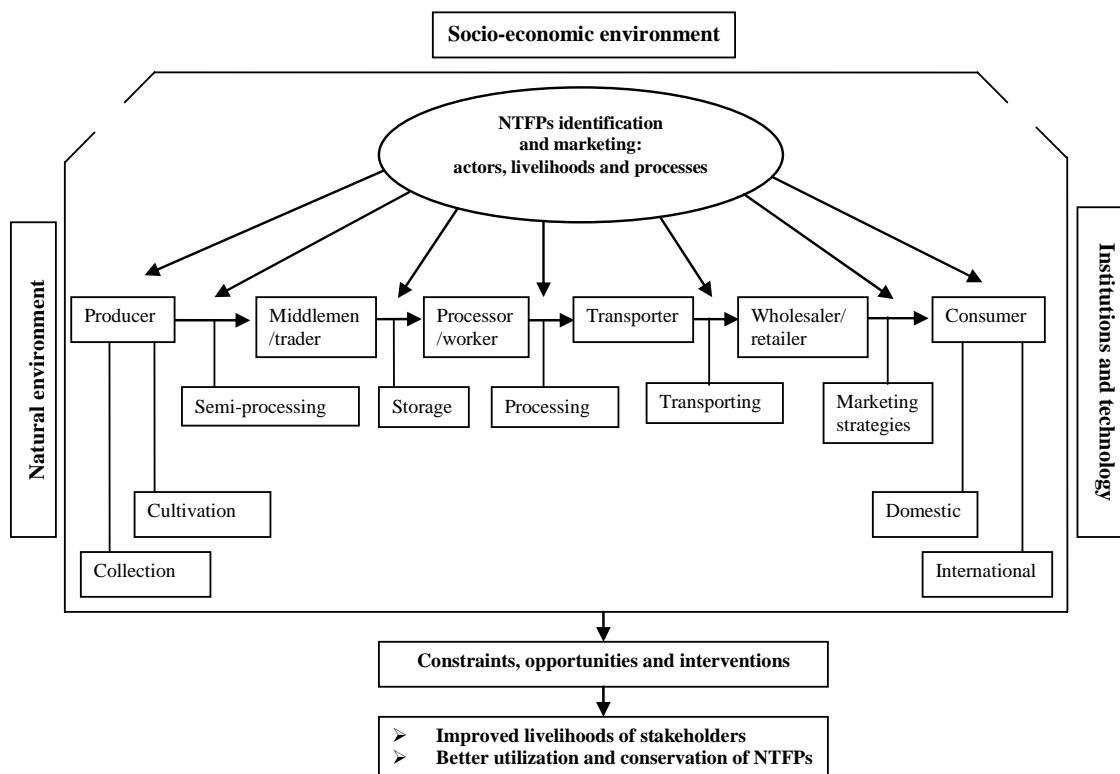


Figure 2-3: The production-to-consumption systems approach (adapted from Belcher, 1998).

Although different kinds of studies have used the PCS approach to assess NTFPs as a basis for sustainable development, it was first adapted and applied to several NTFP-related socioeconomic case studies by International Network for Bamboo and Rattan (INBAR) researchers to facilitate comparisons of one bamboo or rattan system with another in a systematic way. The PCS concept originated from agricultural and institutional economics and has its root in agricultural systems research (Sellen et al., 1993) where various system approaches have been developed to accommodate consideration and analysis of various socioeconomic, biological, and physical factors. Derived from agricultural-sector analysis, the system considers forest products as agricultural commodities in demand and consumption aspects (Belcher, 1999). However, the nature of forest products and development goals based on these products are different from those for agricultural products; for example, the nature of NTFPs are different in terms of collection or

production, availability, harvesting and transportation. Therefore, using PCS in NTFP–socioeconomic research opens up new perspectives, the different dimensions and details of which are discussed next.

2.2.1 Dimensions of production-to-consumption systems

According to Belcher (1997, 1998), the PCS has three dimensions: vertical, horizontal, and intensity. The vertical dimension refers to the flow of material from production in a biological system, through the various transactions and processes, to the final consumers. The horizontal dimension consists of the set of individuals or firms operating at a particular point in the market chain, the degree of activity, and the relationships among them. The third dimension, intensity, relates to the amount of labor and capital used to carry out a particular function in the market chain.

2.2.1.1 Vertical dimension of production-to-consumption systems

This dimension has two aspects: vertical product flow and vertical linkages; these, in turn, comprise vertical coordination and integration (Belcher 1998). Product flow refers to the series of functions that take place beginning with the biological product at its origin to its delivery to the final consumer. The functions involve growing, harvesting (either from wild or cultivation), processing to refine, preventing spoilage, separating waste from valuable components and consuming as an input for manufacturing other products. At each point, the material is physically modified in order to add value to it—a process known as “transformation in form.” In the vertical movement, the product is bought and sold, thereby transforming its ownership, carried or transported from one place to another (transformed in space), and stored (transformed in time)

(Belcher 1999) for a better market price. In such a flow, as it applies to forest products like NTFPs, transformation points involve various actors or participants: suppliers (if exists), collectors or producers, intermediate or wholesale traders, sorters, processors, retailers, and consumers.

To discuss the vertical-linkages issues, various actors or firms are involved in a product flow at each point, and they have formal or informal arrangements pertaining to coordination or integration. According to Belcher (1998), vertical coordination is the organization of the trade and movement of materials and other inputs between consecutive stages of processing in a PCS. On the other hand, vertical integration is the linking of a range of transformation activities under the control of a single company or owner as a means to ensure input supplies of the desired quality, quantity, and time necessary to gain other competitive advantages.

Several kind of mechanisms are used in the practical trade of forest products including NTFPs. Formal or informal contracts between NTFP producers or collectors and traders through middlemen predicated on advance money and supplies is a common practice in the tropics in order to ensure a flow of the material. The collectors or producers who receive the advance money or supplies from the middlemen usually have an implicit or explicit obligation to sell the forest product to the trader.

Similar to the middlemen's activities, many other mechanisms are used to ensure the coordination and integration of the flow of the forest product among buyer and seller such as cooperatives, bargaining associations, market orders, information systems, transportation services, government programs, trade practices, and trade associations (Belcher 1998). Because forest products are subject to seasonal fluctuations in growth and supply, slow growth, restricted seasons for harvesting, geographical dispersion, imperfect information, high transaction costs and some other socio-political factors, as well as perishing easily in storage, they are difficult to market competitively. Therefore, arrangements whereby middlemen go to the forest areas and

arrange advance money to supply the desired forest product is vital to create market opportunities for the poor forest-dwelling people. However, often these activities are misunderstood, such that the middlemen are seen as exploitative (Belcher, 1998); however, they perform a vital service.

The aspect of multiple market channels is another issue to consider in most forest product trade (Belcher, 1997). There could be several types of market depending on whether the consumers have access to an individual or complex vertical flow chain for the same forest product. For example, broom grass could be used for domestic consumption, for preparing brooms in national market. They could also be sold to national buyers who export internationally, to countries that then use the items to produce different kind of handicraft items. To analyze this kind of market channel, subsector analysis requires focus on the particular raw material, the transformations to which it is subjected, its particular consumer market, and the aggregate of these (Haggblade & Gamser 1991).

2.2.1.2 Horizontal dimension of production-to-consumption systems

At each transformation point along the market chains, several actors or firms interact with each other horizontally to share information about price and the required quality and quantity of a product. These horizontal linkages are important for NTFP collectors, especially the sharing of price and grade information, as such information helps them to consolidate selling power. However, the collectors tend to learn about other market requirements from the villagers rather than from the traders (Belcher 1999). Village cooperatives for the NTFP collectors could afford them a strong unity, whereby the collectors would be able to use horizontal links in order to get a better price. They would also be in a better collective position to seek more concessions from the middlemen or traders. At the upper level of the market chain, intermediary firms or industry

organizations offer more organized fora for interaction. These kinds of organizations help them to unite and to mobilize political power for policy changes in their favor (Belcher 1998).

2.2.1.3 Intensity of production-to-consumption systems

At a particular point of PCS, intensity comprises increased effort or investment in inputs to improve the quality and increase the quantity of a product. This can be done either by investing more in capital (such as harvesting or processing tools and machinery) or labor (increasing numbers and developing skills) (Belcher, 1998). The firms usually find a way that is profitable and feasible in a particular situation and at a certain PCS transformation point. In the case of NTFPs, for example broom grass, cultivation efforts whereby the traders worked with the villagers on a cooperative basis could result in intensified production for more income and employment. However, it is vital to consider the requirements for and the implications of intensification.

Intensification in an NTFP at the production stage is one of the distinguishing features of PCS as developed by INBAR. It can target poverty alleviation and sustainability through increased planting and better management of the NTFP, whereby planting density is increased and harvesting techniques improved. However, intensification efforts require broad consideration of other related factors, such as biodiversity degradation, environmental disturbance of mass extractions, and other institutional and tenure issues. Belcher also (1998) argued that increased demand for an NTFP signals a higher price that could lead to increased harvesting with the subsequent result of overexploitation and the possible collapse of the system. However, the author also suggested that under the “right conditions (high prices, security of tenure, available technology and labor)” the actors in the PCS may attempt to increase production through intensive management of the raw materials or product. On the other hand, to generate income,

low-intensity sustainable commercial extraction of NTFPs within an agroforestry system can be encouraged in certain instances; for example, traditional forest dwellers's might take an integrated land use approach in a diverse ecosystem, and if this were to be accomplished without disturbance to the ecosystem, it could certainly be appropriate. Intensification can also be achieved at other transformation points on the market chains with the goal of increasing production or quality to generate more income and more employment for stakeholders.

2.2.2 Application of the production-to-consumption system approach in the NTFP sector

For the NTFP sector, it is necessary to consider the important elements and factors in PCS, as discussed, in applying the PCS, remains a challenge for increasing the employment and income of the poor people (actors/stakeholders at different transformation points). It is by such means that the people's general welfare can be improved—specifically through sustainable raw material production (Belcher 1998). As the Belcher suggested, PCS can be applied at two different levels: by targeting a group of people and by targeting an NTFP. For the first, an attempt is made to work with a group of people to identify the NTFPs that are important to them in terms of subsistence and cash income, and in regard to supplying an existing NTFP market. The existing PCS of the NTFP is analyzed to identify the constraints on and opportunities for improving them. In recent years, this approach has been used by many rural development projects such as the initiatives by Appropriate Technology International and the Biodiversity Conservation Network (Belcher, 1998). For the second level, a particular NTFP is targeted and priority groups are selected based on the actual or potential importance of the NTFP to that group as well as equity or poverty concern. Once the constraints have been identified, appropriate interventions are targeted to improve the efficiency, sustainability, and equity of production, transformation and marketing the NTFP such that the target group benefits as a whole (Belcher, 1998). INBAR

follows this second approach to improve bamboo and rattan PCS by targeting a large number of poor people in developing countries in order to achieve sustainable development goals.

In either approach, once the PCS has been selected, the same kind of analysis will follow—one that considers the whole PCS structure and organization (for example, Fig. 2-3) to identify opportunities for and constraints to improve in the system. According to Belcher (1998), in practice, after the PCS of an NTFP has been selected, the next step is to describe the system by focusing on market participants and transformations performed along the market chain. The next step starts at a point in the system (NTFP collectors or producers, middlemen, traders and exporters) and traces the physical movement of the NTFP material to the final market and/or the reverse. The following step is to gather information at each transformation point of the system by using a range of tools, among which are rapid rural appraisal, key informant interviews, observations, and secondary-information collection. These data collection tools afford a detailed view of the processes, exchanges, prices, and storage practices, both vertically and horizontally, as well as allowing a description of changing trends in each dimension of the system (e.g., as applied to the bamboo and rattan PCS in Asia (Belcher, 1999)). Once all the important variables of the PCS and the potential opportunities and constraints have been established, the next step is to take a multidisciplinary approach to develop methods and appropriate interventions.

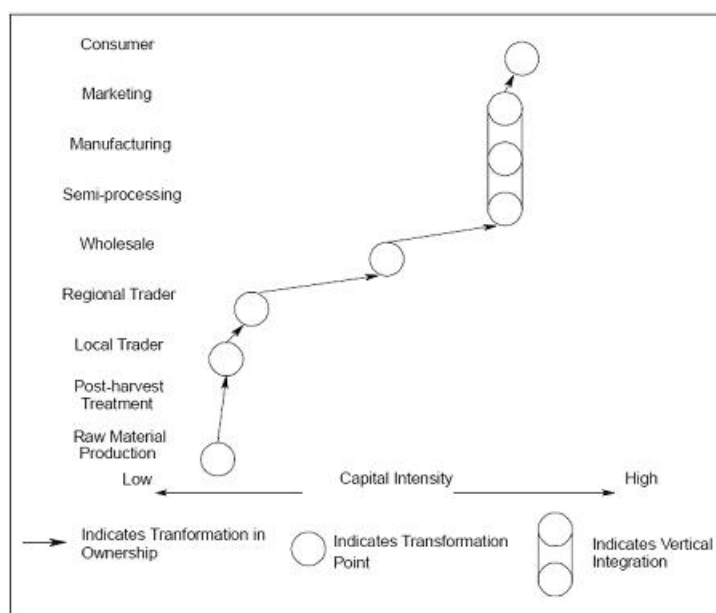


Figure 2-4: The Philippine rattan PCS (Belcher 1998).

Overall, PCS is a holistic approach to analyzing the full range of actors and functions involved in growing, processing, and marketing a forest product. It offers a broad framework within which to consider many issues in developing a forest product. It focuses on the market with emphasis on the linkages between transformation points and among all the firms or actors at any particular transformation point. And, it identifies the constraints and opportunities at different transformation points along the market chain; it also analyzes the livelihoods of the stakeholders or actors in relation to the product. Similar to value chain analysis, this approach attempts to describe and analyze governance issues and power relations in market systems (te Velde, 2006). Moreover, it provides a basis for designing potential interventions for developing the product and improving the livelihoods of the target people or stakeholders concerned with the system. Finally, seven NTFP studies of INBAR (Belcher, 1998) suggest that where technically feasible, intensified raw material production may make economic sense, and conservation objectives may be rapidly overwhelmed by an economic imperative, whether or not development planners intend it. Arnold and Ruiz-Pérez (1998) suggested that realistic strategies must identify the conditions

and limitations on NTFP conservation in conjunction with NTFP development with a specific focus on geographical region, type of ecosystem, and the given NTFP species. Moreover, in practical applications, the PCS approach does not give much attention to NTFP-related village livelihoods, which are beyond the scope of product market analysis.

2.3 Conceptual framework to address the research problem

Based on the above discussion of the SL approach and PCS concepts, analyzing the situations and initiatives relating to NTFP-based livelihood development and conservation initiatives may require multi-sectoral efforts involving various types of stakeholders linked to NTFPs. And, in order to pursue the research objectives and establish how a combined framework could be developed with the help of these concepts, the description and analysis will follow as to how these two different approaches are interlinked. As both approaches have some limitations, neither is sufficient by itself to analyze the full potential of the resources for development and conservation objectives.

2.3.1 How sustainable livelihood and production-to-consumption concepts interrelate

The SL approach, though it is holistic and addresses all the the micro to macro issues and components in the framework, lacks specific focus on defined institutions and policies, market and access to the market, and governance issues such as how power is considered for policy to be effectively implemented in a particular context. Neither does the SL approach clearly address adopting technology and using it in an adaptive way to react with or mitigate against a particular outcome. Sometimes, too, SL fails to consider the local context. In fact, it is often seen as

outsiders' intervention with poor links to community development. However, the SL approach gives a broader context for the conceptual framework used in my study.

On the other hand, the PCS approach focuses on the market aspects of an NTFP's value chain, and it illustrates how the livelihoods of the concerned stakeholders are impacted by trade in this commodity. This approach describes and analyzes how the governance within the market system works, and then, relates how power relations and consideration of authority in the market system can affect the success of different actors in the market chain (te Velde et al., 2006). Next, the PCS creates avenues for identifying opportunities and constraints for further interventions. Based on the outcomes of the PCS analysis, a set of interventions could be applied to afford opportunities or to alleviate market constraints that would help to improve the livelihoods of the people concerned in the market systems. However, PCS analysis often fails to consider the livelihoods of people who are outside the market systems or less involved in market systems in a particular locality. The SL approach, though, is more flexible in this regard. It has greater scope for analyzing the livelihoods of those engaged and those not engaged in market systems. Although, here again, SL is weak in addressing market stakeholders' livelihoods. Jensen (2009) argued that dependency on forest resources, including NTFPs, goes beyond a narrowly focused village boundary; thus, NTFP-related research should emphasize both village-level and market-level livelihood analysis. Since the SL approach lacks market focus and the PCS approach focuses on market-based livelihood development, combining the principles and components of these two approaches could offer a more complete way to consider NTFP-related development and conservation initiatives in answering the research question of my study.

2.3.2 How the combined conceptual framework will address the research problem

A combined framework is proposed here (Fig. 2-5). Adapted from SL and PCS, this combined approach emphasizes the effectiveness of joint livelihood analysis of these two systems. The combined framework has been developed as the SL and PCS approaches are complementary having some overlapping principles in regard to livelihood development based on NTFPs. Under the broader frame and principles of the SL approach, PCS would mainly deal with NTFP market-related issues, opportunities, constraints and concerned livelihoods to focus on sustainable NTFP trade and natural-resource management to achieve development and conservation goals.

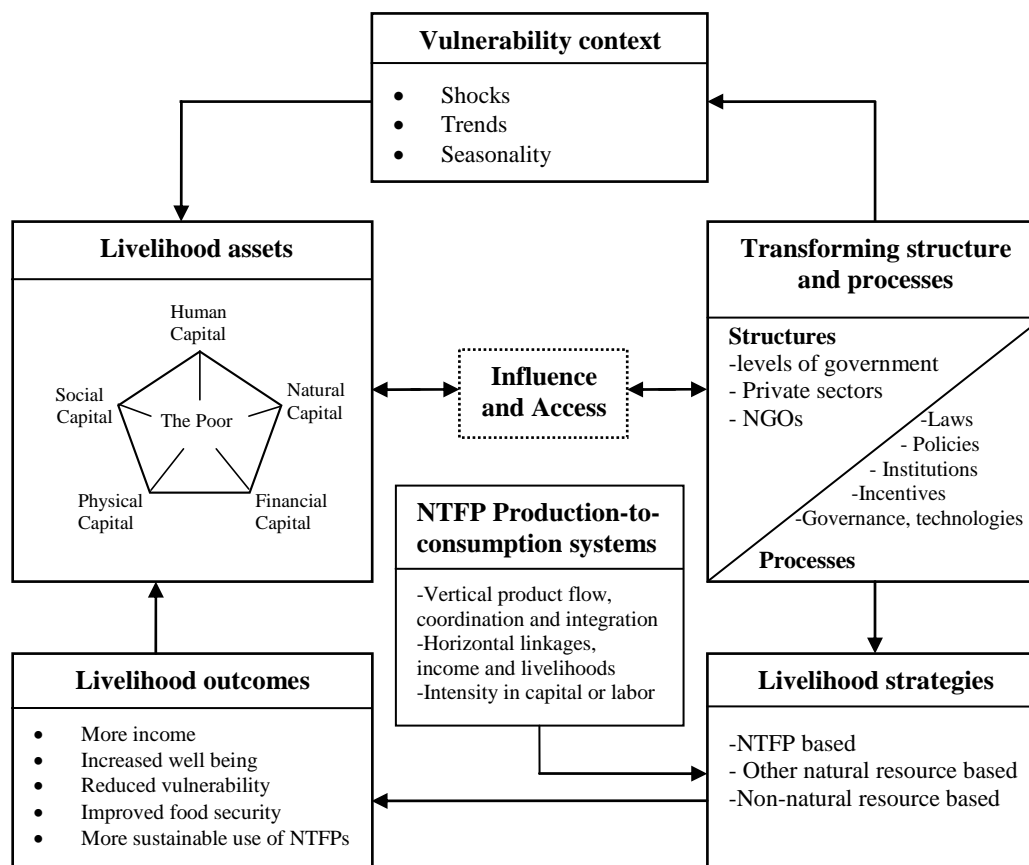


Figure 2-5: The combined conceptual research framework for this study (adapted from DFID, 1999).

This framework (Fig. 2-5) will be used as a tool to establish a checklist for livelihood-analysis issues with specific focus on NTFP-related actions and development. It will also provide a detailed structure for analyzing various factors and processes related to the NTFP-focused livelihoods of target people. The different boxes in the framework will be described as components, and the points and issues within each component will be interpreted in relation to the issues of other components in the framework.

Similar to the DFID's SL framework, the starting point for this combined framework does not necessarily have to be the vulnerability context rather; instead, it could be a simultaneous investigation of assets, the expected livelihood outcomes for the target people, and their livelihood strategies—all of which would include PCS analysis. Then the results of the interactions of these factors can be related to the vulnerability context, structure, and processes to reduce the vulnerability of the target people and improve their livelihoods.

The vulnerability context of the framework comprises shocks such as crop failure and natural disaster, and trends, such as declining forest resources, population growth, economic recession and seasonality: shifts in the prices of items of daily necessity, employment opportunities, food availability etc. These factors affect people's livelihoods and their current assets to the extent that given the vulnerability context, they will generally be obliged to try different livelihood strategies based on their available assets.

The capital assets component of the framework influences the people's livelihoods in a direct way. Based on their assets, people take various livelihood strategies to convert these into positive livelihood outcomes. The framework comprises the five types of capitals as discussed in the DFID framework, and the pentagon reflects the people's access to different assets and their ability to utilize them. NTFPs and forest lands in this study context are treated as natural capital for the people. Any change in the stock of resources over time or with seasonal variability affects the capitals, and is likely to mean that the people must adopt new livelihood strategies. There is a

direct linkage between capitals and the transformation of structures and processes. The role and change of organizational structures and different processes, such as law or policy reforms, and other institutional arrangements affect the people's access to assets. For example, any change in organizational structures to deal with NTFP activities, including restructuring the Forest Department with more emphasis on the forest extension wing and involving more NGOs in NTFP management ranging from markets and adoption of policy and institutional reforms would impact the NTFPs as natural capital. The concerned livelihoods of the people, in this case, would also be influenced by NTFP-based strategies. Therefore, considering the complex relationships between the assets and other components within the framework is vital.

Greater emphasis on transforming structures and processes and on transforming the organizations, policies and institutional reforms offers a way to relieve the vulnerability context and define access to resources and capitals on the basis of which people choose livelihood strategies. Specifically in consideration of the NTFP issues, organizational transformation and institutional reforms would help define the access of the people to the resources and help them adopt NTFP-based livelihood strategies to support their livelihoods. The livelihood strategies could be based on NTFPs, on other natural resources, or on non-natural resources, depending on the combination of capitals and the most favorable structures and processes.

In incorporating the PCS of the NTFP within the SL framework, it would be appropriate to integrate it in between the transforming structures and processes and the livelihood strategies. This is because the PCS for each NTFP will be greatly influenced by organizational and policy reforms including institutional arrangements. This would also affect the types of livelihood strategies that the NTFP stakeholders would take for each type of PCS. The current natural trends and stocks of NTFPs, access to the resources by the target people, and the current PCS for each NTFP type will be analyzed with respect to vertical, horizontal, and intensity dimensions as they are influenced by the transforming structure and processes. Following the value chains and

income generated by each type of NTFP at each transformation point, market constraints and opportunities in terms of income and employment generation relevant to the livelihood, as well as conservation issues, will be identified. Under such a model, the people concerned could adopt the newly identified appropriate livelihood strategies and gain a better livelihood outcome in terms of income, well-being, and sustainable use of resources. These kinds of livelihood outcomes will in turn influence the combination of assets of the people. The PCS would also suggest the possible transformation of structure and processes to alleviate market constraints and to reap potential market opportunities for enhancing NTFPs related to income and sustainable use.

The overall framework would work within the sustainable-livelihoods principles and framework. To reiterate the principles, the poverty-focused activities should be people-centered, responsive and participatory, multi-level, conducted in partnership, sustainable and dynamic (Ashley & Carney 1999). Therefore, in each component of the proposed framework, the activities should be conducted based on the SL approach. The reason for integrating the SL approach is to cover the deficiency of PCS that is mostly focused on in NTFP markets and the livelihoods of the concerned stakeholders. Moreover, the PCS for NTFPs have limited actors/stakeholders in the chain; therefore an examination that focused solely on these stakeholders would shed little light on the other indirectly related stakeholders or villagers and would offer only a partial picture of the conservation issues related to the NTFP resources. The SL livelihood approach, then, is called on to fill this gap and ensure sustainability in a broader context. The combined approaches will thus be consistent with SL principles for achieving sustainable utilization and conservation of the NTFPs in the light of NTFPs' overall role in the livelihoods of forest-adjacent communities.

2.4 Research goals and objectives

As outlined in Chapter 1 and explored in the previous discussion and framework, the ultimate goal of this study is to help improve the livelihoods of forest-adjacent communities concerned with NTFPs and to ensure the sustainable management of NTFP resources. To achieve the research goal through the combined conceptual research framework, the following objectives need to be addressed:

- Examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities.
- Investigate the constraints on and potentials of NTFP-related initiatives and future NTFP interventions required to improve livelihoods, sustainable trade, and forest-resource conservation in Bangladesh.

Chapter 3

Methods

3.1 Introduction

Chittagong Hill Tracts (CHT), Bangladesh's predominantly hilly southeastern region, has a rich diversity of NTFPs, comprises 12 ethnic groups with traditional NTFP-related practices and trade, and accounts for about half of the forestry sector's contribution to the country's economy (Roy, 2002; FAO, 2000). It is for these reasons that CHT was selected as the study site for this research. Involving field data collection and analysis, the study uses a combination of both quantitative and qualitative methods (mixed methods) as being more effective than any single approach. Such a methodology is in accord with Weiss's (1995) view that we should not restrict ourselves to just one approach in research design and implementation.

Mixed methods employ strategies of inquiry that involve collecting data either simultaneously or sequentially in order to best understand research problems. They also involve gathering both numeric information (e.g., with survey instruments) as well as text information (e.g., with open-ended interviews), so that the final database shows both quantitative and qualitative information (Cresswell, 2003). Mixed methods are particularly useful in collecting diverse data sets necessary to arriving at a complete and nuanced understanding of a complicated situation. For example, broad-sample quantitative surveys help to generalize results, whereas open-ended interviews, case studies, and other qualitative data-collection methods help collect detailed and in-depth information from a few samples; thus the two methods complement each other. Weiss (1995) asserts that quantitative studies pay a price for their standardized precision, as they do not obtain full reports. According to Weiss, information obtained through quantitative

methods is usually fragmentary, made up of bits and pieces of attitudes, observations, and appraisals. However, fuller responses can be obtained by integrating quantitative and qualitative surveys and then analyzing the quotations, case descriptions, and observational data, as through qualitative surveys we make gains in the coherence, depth, and density of the information obtained (Weiss, 1995). However, quantitative surveys are essential for such work as comparing aspects of different groups, such as the perceptions of different villagers regarding resource degradation. Neither can quantitative surveys be dispensed with when the purpose is to identify linkages among phenomena, especially when possible linkages are unlikely to be recognized by the respondents as such, e.g., the contribution of NTFP-interventions to livelihoods and forest-resource conservation.

In my field study, quantitative data were collected through structured survey questionnaires, and qualitative data were collected through focus group discussions (FGD), key informant interviews (KII), village meetings, personal field observations, and NTFP-specific case studies. For data analysis, qualitative information observed and collected at the field study sites, were integrated with the quantitative results of the analysis and sometimes used to justify the results of the quantitative analysis. Therefore, the combination of the quantitative and qualitative data analysis constituted a mixed method (Cresswell, 2003) that helped answer the research question.

In more detail, the research question was investigated within the mixed-method framework using different tools and approaches for collecting quantitative and qualitative field data from field respondents in CHT during the period October 2007 to October 2008. These methods constituted a participatory rural appraisal (PRA) defined as “a family of approaches and methods to enable rural people to share, enhance, and analyze their knowledge of life and conditions, to plan and act” (Chambers, 1994a). PRA tools were applied as they afford an opportunity to conduct triangulation and validity-checks of the qualitative and quantitative field

data collected through the participation of local people; thus, PRA renders the collected data more reliable and valid, which is very important point from a research and development perspective (Chambers, 1994a; WB, 2009; FAO, 2009).

In my field data collection, I used PRA tools including reconnaissance and initial site selection, KIIs, village meetings and surveys, annual and quarterly household surveys, and market surveys and FGDs. Moreover, I also took care to ensure that the forest-adjacent communities participated in a meaningful way because a crucial factor for PRA implementation is that outsiders are behaving appropriately within a particular social context to facilitate information sharing by the target communities (Chambers, 1994b). I was also aware of the fact that PRA is vulnerable to misuse if just sticking to the methods for extractive data collection (Chambers, 1994c; Kapoor, 2002) and facilitated local people's participation being flexible in the way they felt comfortable to share the information.

3.2 Reconnaissance and initial site selection

Initially, I conducted a quick reconnaissance survey that encompassed short visits to the different areas and villages concerned with NTFPs in the CHT region. I discussed NTFP-related activities with and gathered information from concerned villagers and key informants. About 10 types of NTFPs were considered initially based on secondary information; however, after discussion with the villagers and other NTFP market stakeholders about the importance of different NTFPs to their livelihoods, five types of NTFPs that people collect from the wild—bamboo, wild vegetables, broom grass, medicinal plants, and *menda* tree bark—were selected as forming a basis upon which to investigate current NTFP utilization practices and potential for concerned stakeholders' livelihoods.

CHT comprises three districts, of which the two largest districts, *Bandarban* and *Rangamati*, were selected purposively, as the villages in these two districts met the following criteria: there are forests near the village with more than 10% forest cover; the villagers predominantly harvest the forest resources that they rely on for their livelihoods; the villagers collect the NTFPs for subsistence and/or trade; and there are local NTFP trade activities and stakeholders. Among some other criteria, I also considered several such as accessibility and communication, security, ethnicity, feasibility, the scope of possible collaboration, and the cooperation of local people in making the site-selection decision.

Variation between the two selected districts was another criterion to consider in terms of biophysical characteristics, socioeconomic characteristics, and ethnicity, all of which could yield differences in NTFP subsistence and trade practices. Of the selected districts, Rangamati is the headquarters of the CHT region with many NTFP-related practices and trade conducted by more than 6 indigenous ethnic groups. This district mostly consists of medium to high hills surrounded by the Kaptai Lake. Bandarban with high hills and valleys has 12 ethnic groups, all of whom are concerned with a number of NTFP-related activities. These two districts are different in terms of their biophysical and natural settings, and they have different largest ethnic groups: *Chakma* is the largest group in Rangamati and *Marma* is the largest in Bandarban.

Eight villages from Bandarban and six villages from Rangamati were selected purposively (see locations in Appendix A; see village details in Appendix B). Similar to the district selection, criteria on the basis of which the villages were selected included the following: villagers concerned with NTFP collection for subsistence and trade, villages that were safe and accessible to the researcher and enumerators, and ethnicity differences. Security is a major issue for working in CHT. As noted in Chapter 1, a prolonged conflict between rebel indigenous groups and government armed forces prevailed in CHT from the 1970s to the late 1990s. Though a peace treaty was established in 1997 between these groups and the government, it was not

implemented effectively. Although the situation is more peaceful now, visits to some areas in the region are still restricted, either directly by government security forces or indirectly by the threat of violence from clandestine armed groups (Adnan, 2004). In many places, field movement was allowed only during daylight hours; thus, we had to stay in towns and visit the villages only during the day time. Further, for NTFP market surveys, including the selected villages and markets in sadar *upazelas* of both the districts, I also conducted market surveys in *Barkal*, *Bilaichari* upazelas of Rangamati district and *Ruma*, *Thanchi* upazelas of Bandarban district to take into account the NTFP market and trade variations.

A total of 216 households were randomly selected from the 14 villages (8 from Bandarban and 6 from Rangamati) based on (a) an introductory meeting with the village head (*karbari*), (b) an introductory meeting with villagers, and (c) a complete list of households and information about the socioeconomic condition of all households in the village provided by the *karbari* and my personal observations in the village crosschecking that list.

At the end of the reconnaissance and site selection, the village heads were informed about the selection of their villages and their permission sought for data collection procedures to begin. The introductory meetings with the village heads were important to seek their permission, to introduce the research team and to let them know the objectives of my research work. It was typical for the village heads to ask a number of questions before giving me permission to work in the villages. I gathered some general ideas about the socioeconomic condition of each village and collected a list of households from each *karbari*, which I crosschecked by walking through each village.

After meeting with the *karbari* and some of the villagers, we engaged the villagers in participating in a lottery through which numbers corresponding to a list of households in the village were drawn. This random selection of households allowed us to treat the drawn sample as representative of all the households in each respective village (Gelman, 2007). We drew a sample

for each village in this way. In addition, the numbers were drawn in the presence of the kabari for the village. The drawn sample size was 25–30% of the total number of households in each respective village. The villagers spontaneously participated in the lottery and found the way particular households were randomly selected for the interview to be of interest. Some were pleased that their households had been selected. However, as the process was transparent and engaged community participation, members of those households that had not been selected accepted the outcome willingly. After the households had been selected, we informed the villagers about the results of the lottery and the karbari requested the villagers of the selected households to cooperate with our work.

3.3 Village survey

With help from the respective karbari in each village, we invited the local people to attend a village meeting and we abided by their customary rules as set out by the karbari. The village meetings were carried out in a preferred area by the participants within the respective village, sometimes at one of the larger houses of the villagers including that of the karbari. At the village meetings, I focused on the research objectives and clarified how the work could support the villagers' future livelihoods. However, I was scrupulous in not making any promises regarding either that development would take or that any changes that did come would be certain to be positive. I also answered the villagers' questions. Since there are many government organizations, NGOs, and donor agencies working in the CHT region with different development activities, I made clear to the villagers how my research would differ from the development projects. I then gathered village-wise information and data from this meeting by interviewing and discussing villagers who were present in the meeting using a structured questionnaire (Village Survey 1; details in Table 3-1).

Table 3-1: The survey questionnaires: contents and timing.

| Questionnaire | Contents | Timing |
|--------------------------------|--|-------------------------------|
| Village Survey 1 | GPS coordinates, geographic and climate variables, demographics, infrastructure, forest land cover/use, forest resource base, forest institutions, forest user groups | December 2007 |
| Village Survey 2 | Risk, wages and prices, forest services, welfare | September 2008 |
| Annual Household Survey 1 | Household composition, land, forest resource base, forest user groups | December 2007 to January 2008 |
| Quarterly Household Survey 1 | Household income from various sectors including NTFPs | December 2007 to January 2008 |
| Quarterly Household Survey 2 | Household income from various sectors including NTFPs | March to April 2008 |
| NTFPs related Household Survey | Current NTFPs status and uses and stock condition, types and quantities of NTFPs consumed and traded, NTFPs market constraints, knowledge and information flow, domestication and entrepreneurship development initiatives, impacts of NTFPs commercialisation and sustainability | March to April 2008 |
| NTFPs Market Survey | Types of NTFPs stakeholders, NTFPs income and cost, capital and credit in NTFP business, seasonality, problems of NTFP trade, change in number of NTFP stakeholders and reasons, social capital and networks of the NTFP stakeholders, rights in NTFP business, major trends and change in NTFP business, NTFP conservation awareness and action and demographic information | April to May 2008 |
| Quarterly Household Survey 3 | Household income from various sectors including NTFPs | June to July 2008 |
| Annual Household Survey 2 | Crises and unexpected expenditures, forest services, forest clearing, welfare perceptions, social capital, and enumerator assessment of the household, assets and savings, land | September to October 2008 |
| Quarterly Household Survey 4 | Household income from various sectors including NTFPs | September to October 2008 |

3.4 Field enumerator recruitment, training, and data checking

Enumerators were needed to conduct the household and market surveys using the predesigned questionnaires; therefore, I recruited five enumerators for the Bandarban study site and nine enumerators for the Rangamati study sites. Most of the recruited enumerators had university degrees, and the rest were university students entering their final degree year. All had previous experience conducting household surveys in the region. The enumerators were found

and hired through their connections with previous employers and NGOs. However, I personally interviewed each person, and each went through some demo household interviews. I made decisions regarding whom to hire based on their performance at these interviews.

No enumerators were hired from the study villages; in fact, no qualified enumerators were available in the villages. Moreover, because of security reasons, most of the enumerators either lived in Bandarban or Rangamati town during the survey period. However, as most of the enumerators were local and from dominant ethnic groups, they were able to visit the villages easily and build the trust necessary to carry out the surveys.

All the enumerators were trained with the demo questionnaire interviews and the field sample interviews. The questionnaires were written in English but during the training all the questions were made clear to the enumerators in Bengali. I reviewed the questionnaires and corrected any errors. I also demonstrated how to conduct the surveys practically in the field. Then I accompanied and observed them as they asked the villagers questions and completed the questionnaires. Again, after returning from the field, we reviewed the answers and came up with some suggestions about how to obtain more precise answers to certain questions that had proved to be problematic in the field. After about a week of trials, the enumerators began to conduct the interviews independently. In general, the enumerators worked together in a village. However, they sometimes went to separate households individually in the same village; they would do this when they thought that it would be easier to reach the villagers at a particular time, such as at noon when many villagers returned home for lunch and a little rest.

In both study districts, all the enumerators were local to the area and worked in respective district fields. Being local, most could speak local languages. However, since my study villages comprised various ethnic groups with distinct languages and cultures, sometimes the enumerators had to hire local guides to translate from languages in which the enumerators were not proficient. But most of the time, all the ethnic groups understood the national language of Bengali

(sometimes adapted to a regional *Chittagonian* dialect); therefore, most of the interviews took place in this language. The questionnaires were explained and translated to the enumerators in Bengali, and they were trained to communicate in Bengali or respective indigenous dialects in the interviews where appropriate. However, having obtained the villagers' responses to the questions, the enumerators completed the English questionnaires' answer slots in Bengali for easy and correct note-taking (that was coded later) and for easier data entry procedures in the custom designed databases that had been developed based on the questionnaires. Moreover, as all the enumerators were proficient in reading and writing English, they had no problem doing so.

3.5 Household questionnaire survey

During the survey year, as noted in the preceding sections, I, along with the field enumerators, interviewed randomly selected households in Bandarban and Rangamati using the Poverty Environment Network (PEN) prototype household questionnaires (CIFOR, 2010)¹ in conjunction with a supplementary NTFP-related household questionnaire (Appendix C). The PEN household questionnaires consisted of two annual household surveys, one at the beginning of the survey year and one at the end, and quarterly household surveys, conducted every three months to obtain a whole survey year income picture of households from various sectors including income derived from NTFPs and other forest harvests. Annual surveys captured the household information that is almost stable throughout the year such as about household demographics, land and other household capital, forest base, resource user groups, crisis and other unexpected expenditure of households, social capital, and welfare perception (details in

¹ These prototype questionnaires were designed by a group of researchers of Poverty Environment Network (PEN), a global study of the Centre for International Forestry Research (CIFOR) focused on forest-poverty linkages in Asia, Africa, and Latin America. As I collected my own data on NTFP-related issues, I also worked as a PEN research partner for Asia. In this role, I collected data from Bangladesh forest sites for PEN, some of which complemented the NTFP-related data pertinent to my own research question.

Table 3-1). Annual Survey 1 (A1) and Quarterly Survey 1 (Q1) were carried out together at the beginning of the survey year, and Quarterly Survey 4 (Q4) and Annual Survey 2 (A2) were conducted at the end of the survey year. Quarterly Survey 2 (Q2) and Quarterly Survey 3 (Q3) were carried out in between Q1 and Q4 at three month intervals. The quarterly survey was conducted four times by repeated visits to the same household at each three-month interval in order to cover the household's socioeconomic performance for the entire year. The details of the contents and timing of the questionnaire surveys are outlined in Table 3-1.

3.6 NTFP market questionnaire survey

A market survey was carried out at the field sites targeting concerned NTFP stakeholders in the CHT region using a custom designed questionnaire (see Appendix D) during April 2008 to May 2008 (Table 3-1). The individual NTFP market stakeholders were selected through “snowball” sampling by following the business links from one stakeholder to another along each NTFP market chain. Snowball sampling is a nonprobability sampling method that is appropriate when a special target population is “difficult to locate” or “hard-to-identify” (Babbie, 2010; Schutt, 2009); therefore, it was appropriate for the current study, as I needed to collect data from undocumented NTFP-market stakeholders. In this kind of sampling, the researcher collects data from a few members of a target population and then asking them to provide information about other members of that same population (Babbie, 2010); in this line, I followed the same procedure to locate the NTFP market stakeholders.

In total, I along with enumerators conducted about 180 interviews with stakeholders—30 to 40 interviews for each of the selected NTFPs. The interviews included all types of stakeholders such as grass-roots- level collectors/producers, middlemen, traders, transporters, and wholesalers involved in NTFP markets in the CHT region. The market questionnaire concentrated on

stakeholders' income and involvement in different types of NTFP business, market problems and prospects, trends and changes in NTFP business, and future NTFP conservation challenges relating to business. Since snowball sampling yields questionable representativeness, its main value is for information exploration (Babbie, 2010); therefore, I used the collected data for exploratory purposes in describing and analyzing the PCS of different NTFPs.

3.7 Other participatory rural appraisal tools and secondary information

In addition to the surveys, as indicated earlier, other PRA tools such as key informant interviews (KII) and focus group discussions (FGD) were carried out with the participation of local communities, NTFP market stakeholders, local elites, local government officials, forest officials, NGO staff, and local policy makers at each selected study site during the whole survey year. More than 20 KIIs in total were conducted formally (with a checklist of questions) or informally to gather NTFP-related information at the study sites. About five FGDs were carried out for each group of NTFPs in each study district. Several individual NTFP-related case studies were also carried out randomly in the study areas in between the questionnaire survey periods. The study drew on various sources in order to collect secondary information: forest resource extraction and trade, related laws and policies, NTFP trade and markets, consumption and trade of other forest resources (Bangladesh Forest Department and Ministry of Environment and Forests websites); recent development interventions and status (UNDP-CHTDF-related materials, and ADB CHT rural development project materials); organizational activities and interventions (local NGOs); and community involvement and participation and biophysical and socioeconomic statistics (local government offices such as the Chittagong Hill Tracts Development Board, local offices relating to the Bangladesh Bureau of Statistics (BBS), and BBS materials from their official website).

3.8 Database management

After the field surveys and other interviews had been completed, the answers were coded according to a separate code list for each survey and then data were entered in pre-designed Microsoft (MS) Access Databases so that the data would be easily accessible (Shelly, 2008). Separate databases were used for each of the 9 types of surveys, which included the PEN surveys, the NTFP household surveys, and the NTFP market surveys. Each database contained data about each household, therefore, it was necessary to assign each household a unique code that was used in all the databases; this protocol made it possible to accurately identify any given household and pull information regarding it together from several databases using “Queries” in MS Access. Queries usually identify subsets of relevant data in a broad range of databases that can be used in a specific statistical analysis focused on answering a particular research question (Whitehorn & Marklyn, 2007). Similarly, each district and village also had a unique identifying code that helped facilitate comparisons of data between them. However, some of the data were pulled together from databases using SPSS statistical software, which also employs a query approach similar to that of MS Access, though SPSS’s scope is limited in comparison (Miller et al., 2002).

3.9 Statistical methods and data analysis

Various statistical analysis methods were performed to answer the main research question using SPSS and MS Excel. The specific data subsets pulled through the queries were imported from MS Access to SPSS and Excel, and various kinds of statistical tools and methods were employed to answer the specific research questions under specific objectives of my study that together answered the central research question as outlined in Table 3-2 and the description following.

Table 3-2: Research questions, hypothesis, data collected, and methods.

| Research questions | Hypotheses | Data topic and other information used for analysis | Statistical methods |
|---|--|---|--|
| Main research question: How could NTFPs be better used to improve the livelihoods of forest-adjacent communities and to achieve the goal of conserving forest resources? | | | |
| Objective 1: To examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities. | | | |
| (i) What are the different types of NTFPs gathered by different forest-adjacent households of multi-ethnic communities in CHT? Within the households, who does play the most important role in collecting NTFPs? And, from where, how and why do they gather NTFPs? | NTFPs of the CHT are diverse and extensively used by forest-adjacent communities. Female members of households collect most of the NTFPs. | Status and utilization of NTFPs (NTFP household questionnaire), Annual income data (questionnaire Q1, Q2, Q3, Q4) | Frequency distribution, ranking, descriptive statistics Cross tabulation, ANOVA, Chi-square analysis, correlation matrix. |
| (ii) What role do NTFPs play in terms of subsistence and cash income in the household economy comparing to other forest products? | NTFPs can provide more household income than other forest resources. | Demographic and asset data (questionnaires A1, A2), annual income data (Questionnaire Q1-Q4) | Descriptive statistics, Correlation matrix, ANOVA |
| (iii) How does seasonal variation affect the NTFP dependence of the forest-adjacent community? | People depend on and gather more NTFPs in dry season. | Annual income data (Questionnaires Q1-Q4) | Frequency distribution, Descriptive statistics |
| (iv) How do different socioeconomic factors influence the extent and patterns of forest-adjacent people's NTFP dependence? | Income poor households are more dependent on NTFPs than richer households. | Status and utilization of NTFPs (NTFP household questionnaire); demographic and asset data (Questionnaires A1, A2), annual income data (Questionnaires Q1-Q4) | Descriptive statistics, correlation matrix, linear regression analysis/ multilevel statistical model |
| (v) What is the current stock condition of NTFPs and trend? Why and how do the depletion and degradation of the current natural stocks of NTFPs in the study areas impact local livelihoods? | The gradual decline of NTFP stocks is putting pressure on concerned livelihoods. | Status and utilization of NTFPs (NTFP household questionnaire) | Frequency distribution, ranking, descriptive statistics Cross tabulation, ANOVA, Chi-square analysis, correlation matrix. |
| Objective 2: To investigate potential NTFP-related initiatives and market strategies required for improved livelihoods, sustainable trade and resource conservation in Bangladesh. | | | |
| (i) What are the constraints and potential impact inherent in the market development of NTFPs and how could NTFPs be better utilized? | Different market constraints hinder more NTFP market development and access to improved livelihoods. | Market constraints, , domestication and trade, impacts and sustainability (NTFP household surveys), Changing trend, policy change, conservation action (NTFP market questionnaire). | Descriptive statistics and analysis, correlation matrix and chi-square test |

| | | | |
|---|--|--|--|
| (ii) How do various socioeconomic factors influence villagers' NTFP market knowledge and their focus in terms of income generation? | Levels of market knowledge of villagers depend on different socioeconomic factors. | NTFP market knowledge base and flow (NTFP household survey), Demographic and asset data (Questionnaire A1, A2), annual income data (Questionnaire Q1–Q4). | Ranking, frequency distribution, correlation matrix, linear regression |
| (iii) How do villagers gather NTFP market information currently and what kind of information would be more helpful? | Villagers are the main source of NTFP market information and NTFP market information through MIS could enhance income of households. | NTFP market knowledge base and flow (NTFP household survey) | Ranking, frequency distribution, |
| (iv) What are the current initiatives focused on domesticating NTFPs and NTFP-based enterprise development? And, what are villagers' opinions of them? | NTFP based enterprise development creates more opportunity to earn and learn for local people. | Organizational initiatives (NTFP household questionnaire), NTFP business information (NTFP market survey) | Descriptive statistics, tabular analysis |
| (v) Would NTFP-based entrepreneurship development initiatives both encourage sustainable use of NTFPs and yield higher incomes for villagers? | Entrepreneurship development initiatives help conservation and better utilization of NTFPs for improved livelihood. | Entrepreneurship development (NTFP household survey), NTFP business information (NTFP market survey) | Descriptive statistics, tabular analysis, correlation and regression analysis |
| (vi) Is the current exploitation of NTFPs for household and commercial uses sustainable? If not, why? | Currently NTFPs are not being utilized and commercialized in a sustainable manner due to several socioeconomic reasons. | Status and utilization of NTFPs, Sustainability in NTFP uses, Impacts of commercialization, (NTFP household questionnaire) | Frequency distribution, ranking, descriptive statistics, Cross tabulation |
| (vii) What path do NTFPs follow in their existing market chains? What are the existing steps and processes? And, what alternative market potential could be realized if NTFPs were used more effectively? | The current NTFP market chains are constrained with many market factors needing further interventions. | General information about NTFP business, market problems and seasonality, demographic information, (NTFP market questionnaire); relevant observational data, FGD, KII and case studies | Descriptive statistics, production-to-consumption systems (PCS) analysis, tabular analysis of market constraints, ANOVA |
| (viii) In what ways are different types of stakeholders engaged in selected NTFP markets? And, how do NTFP income and other NTFP market-related factors impact the livelihoods of the stakeholders? | Collectors of NTFP earn the least among all stakeholders; however, middlemen and local traders keep the NTFP markets working for more earning. | General information on NTFP business including market stakeholders household and NTFP income, demographic information, changes and trend in stakeholders and NTFP business respectively (NTFP market questionnaire); relevant observational data, FGD, KII and case studies. | Descriptive statistics, PCS analysis, cross tabulation of different stakeholders and NTFP income, ANOVA, correlation matrix. |

3.9.1 Objective 1: To examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities.

3.9.1.1 Types, collection, uses and status of NTFPs

For objective 1 (Table 3-2), that of investigating the status and uses of NTFPs and their linkages with livelihoods in the study area, a descriptive analysis that took into account several variables was conducted. The analysis focused on frequency distribution, percentage, ranking, central tendency, and dispersion; its variables included the most important NTFPs for the households in terms of subsistence and cash (as ranked by the villagers and analysed with weighted frequency distribution²), variation in gender of household members in NTFP collection, land types and access for NTFP collection, ethnicity (based on 7 ethnic groups), districts (14 different villages in two different districts, 8 in Bandarban and 6 in Rangamati, that vary in biophysical settings), distance traveled to collect NTFPs, and time spent for collecting NTFPs, and the most used parts of the NTFPs and their purposes. A one-way ANOVA was carried out to determine the extent to which households varied in the time they spent collecting different NTFPs as well as to investigate whether different ethnic groups spent different amounts of time collecting the same NTFP. A two-way ANOVA was carried out to establish whether there was any significant difference in the time households spent collecting NTFPs when different types of ethnic groups and different districts had been controlled for.

² When respondents were asked about importance of different types of NTFPs in their livelihoods, the responses were based on different levels of importance: 1= very important, 2= somewhat important, 3= least important. However, based on frequency distribution analysis, some of the ranking of the responses were overlapping and occupying more than one rank. Therefore, to be precise in ranking the responses, I put different weight to the frequency percentages at each rank of the answers. For rank 1, percentage of responses were multiplied by 3; for rank 2, percentage of responses were multiplied by 2, and percentage of responses for rank 3 remained the same. Then I calculated the averages (dividing by total weight 6) and their respective percentages for each rank of the responses. Same weighted frequency procedure was followed for other similar survey questions' responses as well as shown in different chapters.

3.9.1.2 NTFP-related income and socioeconomic factors

To explore the role that NTFPs play in terms of subsistence and cash income³ in the household economy, I performed several descriptive statistical analyses as follow: (i) the average annual income of households derived from each type of NTFP and splitting the average annual NTFP income into subsistence and cash income; (ii) the forest-related annual incomes of households including subsistence and cash derived from different types of forest products, such as NTFPs, timber and pole, firewood—all these raw forest products and processed forest products were explored by measuring central tendency. Following these analyses, the households' total income, total forest income, and NTFP income were compared with each other on the basis of the four-quarter incomes of the household and by conducting a descriptive analysis. Based on a given household's total yearly income, it was categorized into one of five income quintiles, which ranged from poor to rich. In each income quintile, the households' relative dependence on NTFP income and forest income was measured by calculating the percentage of total household income derived from the respective NTFP and forest sectors. Again, the relative contribution of various sectors to total annual household income was measured by reference to the total income from all four quarters and then calculating mean household income for each sector. The percentage of each sector's contribution in comparison to the total annual household income was calculated. The percentage calculation of the total number of households that realizes an income from various sectors was also conducted. Further, to explore the seasonal variation in the income dependence of villagers from different types of forest products, mainly NTFPs, firewood, and timber and pole, the respective incomes from each type of product in each quarter were totaled and then compared.

³ All incomes were measured in Bangladeshi Taka (BDT). 1 USD = 68.50 BDT (2008). Monetary value of subsistence and cash incomes were measured by multiplying quantity collected/sold with the price of each unit of the product.

To investigate how different socioeconomic factors influenced the extent and patterns of forest-adjacent people's NTFP dependence, different types of statistical methods were carried out. One-way ANOVAs were conducted first in order to explore the effects of household-level socioeconomic categorical variables such as education of household head, sex of household head, the household head's marital status, whether the household head was born in the village, and whether the household collects firewood, on NTFP income. Then, focusing on several socioeconomic interval variables directly related to the household economy in the field context, a bivariate correlation matrix was developed in relation to the household's annual NTFP income of household. These variables were the household's total income, wage income, agricultural income, average livestock value, distance from forest, distance from forest products market, years in existence, total forest areas owned by household, total number of members, total value of implements and furniture, net savings, and hours spent collecting firewood, as well as the household head's education, and the household's head sex.

NTFP income tends to be a good measure of the household economy in CHT and an indicator for enhancing livelihood income with possible impacts on forest conservation. To predict the NTFP income of households as a dependent variable using a linear regression method, several household-related independent variables that represent different types of household capital were considered through the sustainable livelihood framework in Chapter 2. Among the independent variables considered in the regression analysis, the total forest land areas of the households represent the natural capital, the number of members in a household represents its human capital, the total value of the household's implements and furniture represents physical capital, the number of years the household has been in existence represents social capital, and the household's net savings represents financial capital. In conducting the linear regression, since the residuals of the annual household NTFP income dependent variable did not show normality, a natural log of the variable had been considered that normalized this variable (Gelman, 2007).

Next, following the step-wise method, the regression model was developed to consider the capital-representative variables as detailed above.

Linear regression was considered to develop the NTFP-income prediction model, as this method gives more simple and precise estimation of the statistics than many other methods; however, it is based on the assumption that the samples are representative of the whole population (Allen, 1997). In my study case, the households were selected randomly; yet, the selection of villages and districts was purposive. Therefore, theoretically the household samples do not represent the whole population of the CHT area. However, given conditions in the real world, such as the inaccessibility and insecurity of some villages, the absence of some criteria in the NTFP market study, and the noncooperation of some villagers, every effort was made to capture a representative sample of households from various districts and villages with considerable variation in biophysical, socioeconomic, and ethnicity characteristics. Moreover, some of the demographic and socioeconomic observations and data from my field study were also cross-checked with regionally reported data (BBS, 2006; ADB, 2008; UNDP-B, 2009) and found to be consistent with each other. Therefore, assuming the randomly selected sample households (without considering the effects of variations in the districts or villages) as representative of the CHT area, the linear regression appeared to be a less complicated and more easily described method than other types of regression, such as the hierarchical linear model and other nonparametric methods.

Besides the household capital-representative variables, I also included all the variables that may influence the household economy using a step-wise linear regression model; the final model is very similar to that developed by considering only five household capital variables except showing total household income as an additional significant variable to contribute in the model. Since NTFP income constitutes a significant portion of the total household income, there is a good chance that the household total income variable would have suppressed the other

variables in terms of their contribution to the predictive value of the model. Therefore, I excluded the household total income variable, which resulted in a final model that was similar as the model with only five capital-variables in predicting household NTFP income.

Following the simple linear regression model, I also carried out one-way ANOVAs to explore the effects of district- and village-level categorical variables (such as district, village, road access, transport type, and forest tenure) that might have an influence on household NTFP income. Again, to investigate the effects of ethnicity variation on household NTFP income, I constructed more one-way ANOVAs that showed variations in the NTFP-related household incomes of different ethnic communities and whether the households are members of the largest ethnic group in the village.

3.9.1.3 NTFP natural stocks, changes, and reasons

To answer another question about the natural stock condition⁴ of NTFPs, changes that stocks of different NTFPs have undergone and reasons for them, under objective 1, several statistical analysis methods were followed, and the findings were validated with personal field observations. An ANOVA, along with the option of generating descriptive statistics, was conducted that considered the types of NTFPs collected and their current scores in terms of stock condition as compared to 10 years ago in a 0 to 10 scale. A frequency distribution analysis was conducted and weighted in percentage to rank the reasons for NTFP stock degradation. In addition, a chi-square test was conducted to determine whether the level of degradation differed significantly between different types of NTFPs. Further, a bivariate correlation matrix was generated to investigate the correlation between the average NTFP stock score and harvesting

⁴ The current natural stock condition of NTFPs compared to 10 years ago has been scored in a 0 to 10 scale: 0 being no current stock of NTFPs and 10 being similar stock of NTFPs in villagers' adjacent forests now compared to 10 years ago.

distance as well as between the NTFP stock score and the yearly time that households spent collecting NTFPs. A one-way ANOVA was carried out to explore whether the scores of the current stock conditions differed between districts, between villages, and between ethnic groups separately.

3.9.2 Objective 2: To investigate potential NTFP-related initiatives and market strategies required to improve livelihoods, sustainable trade, and resource conservation in Bangladesh.

3.9.2.1 NTFP market constraints, prospects, and NTFP domestication

To explore the constraints for and impacts of NTFP-market development and to establish the best prospects and the initiatives required, a frequency distribution analysis in percentage was conducted focusing on the three most crucial NTFP-market constraints and the three most often suggested initiatives by stakeholders for eliminating market constraints. The frequency percentages were later weighted (as shown in section 3.9.1.1) to make clearer distinctions within the constraints and initiatives that the villagers emphasized the most. A cross-tabulation analysis was carried out in order to better understand the interrelationship among different types of NTFPs and the stated constraints and initiatives to test the significance of the interrelationship using chi-square.

3.9.2.2 NTFP market knowledge and flow of information

To investigate how various socioeconomic factors influence villagers' NTFP-related knowledge and their focus in terms of income generation, a descriptive statistics analysis was conducted to show different kinds of stakeholders' average market-knowledge scores for various market steps and processes for separate NTFPs. Next, bivariate correlation analysis for each type of NTFP was carried out between the market knowledge score and the various explanatory variables, including the respondent's education, sex, and age; the household's total income, membership in the village's largest ethnic group, the distance to the forest products market, and road access by car. Linear regression methods were then applied to predict respective NTFP-related market knowledge using the predictive variables as listed above. A one-way ANOVA was conducted to explore differences in NTFP market-knowledge scores by ethnicity, district, and village respectively.

To explore what kinds of information sources the villagers use for access to NTFP markets and to establish what kinds of information are needed for better NTFP markets, a frequency distribution analysis with percentages was carried out. These percentages were then weighted to rank the sources of information for NTFP markets that the villagers used the most and to rank the kinds of information most needed for access to NTFP markets. The same kind of frequency distribution analysis was conducted, and percentages were weighted for ranking the reasons the villagers gave most often for not domesticating NTFPs.

3.9.2.3 NTFP-related entrepreneurship development, NTFP sustainability and conservation

To investigate current NTFP-based entrepreneurship development initiatives and potential and to examine whether entrepreneurship development initiatives would help to generate more income and/or support NTFP conservation efforts, data on the following were analyzed by applying a frequency distribution method and a cross-tabulation analysis: village-wise current organizational initiatives, the villagers' most-expected entrepreneurship development initiative, the villagers' willingness to be involved, and their reasons for being willing to be involved in NTFP-based entrepreneurship development activities. As noted earlier, the percentage frequencies were weighted to render a clearer distinction between the most important reasons to be a member of an NTFP-based cooperative and the organizational efforts needed to encourage NTFP-based development. Similar statistical methods were applied to analyze the data by exploring the positive and negative impacts of NTFP commercialization. In addition, tabular analysis was carried out to identify the major NTFP-specific positive and negative impacts of commercialization. Again, in investigating the reasons for the unsustainable harvesting of NTFPs and ranking respondents' suggestions for NTFP conservation, a similar kind of frequency distribution analysis and weighing of the percentages were carried out.

3.9.2.4 NTFP stakeholders and market chains

A detailed production-to-consumption system (PCS) analysis was carried out with two purposes: (i) to investigate the path an NTFP follows through the existing market chain steps and processes and how different stakeholders are engaged with market chains, and (ii) to investigate the income, constraints, and prospects at each stakeholder level along the market chain of each

NTFP. The analysis drew on numeric data from market questionnaires and qualitative data from FGDs, KIIs, and field observations. The PCS analysis focused on NTFP market-related steps and processes and the stakeholders involved, NTFP income, NTFP-market problems and seasonality, changes in stakeholder types and numbers, trends in NTFP business and NTFP conservation challenges with potential NTFP-based interventions. Different data characteristics in regard to stakeholders' demography, capitals, households, and other local factors that influence NTFP trade and marketing strategies at each level of the NTFP market chain were subjected to frequency distribution analysis and descriptive statistical analysis such as establishing the mean monthly NTFP income and mean number of stakeholders. Tabular analysis was also carried out to explore reasons for changes in stakeholders and NTFP business and to analyze the stakeholder-wise NTFP income and household income.

Although the samples drawn through snowball sampling for the market surveys are questionable in terms of their representativeness and violate some assumptions of correlation analysis, I still explored the correlation between the average monthly NTFP income of different NTFP stakeholders and different socioeconomic factors, such as the household's average monthly income, the value of its assets, the total number of its members, and the rural land areas it owned, as well as the respondent's education, sex, and age. The purpose of this analysis was just to show some relational indication of different socioeconomic factors as they relate to the average NTFP income of the stakeholders. However, no certain prediction can be made relating the relationship because of the non-random sampling procedure.

3.10 Conclusion

In sum, my study employed various mixed field methods and approaches combining both quantitative and qualitative data collection and employing various PRA tools, including questionnaire surveys, FGDs, KIIs, and participatory village meetings. Two CHT districts were selected and 14 villages purposively chosen to investigate the research question based on several criteria. For the surveys, about 25–30% of the villages' households were randomly selected in order to obtain the sample. The initial surveys were followed with structured questionnaire surveys, which gathered detailed household information about forest-resource consumption and trade as well as household incomes. Simultaneously, FGDs, KIIs, and personal field observations provided a perspective from which to understand the data in a way that went beyond the scope of the surveys. After the field data collection, the surveys were coded and entered in the MS access database to facilitate easy access to data and finding a subset of the most relevant data for a particular statistical analysis. The collected data were then analyzed with various statistical tools and methods that included frequency distribution and weighted percentages, descriptive statistics, cross tabulation, bivariate correlation, linear regression, ANOVA and Chi-square analysis. The quantitative analyses of the data were then cross-checked with the qualitative field information gathered through FGDs, KIIs, and personal observations to strengthen the field findings and to answer the central research question.

Chapter 4

NTFPs and Household Livelihood Linkages

4.1 Introduction

As part of the Indo-Burma biodiversity hotspot, the Chittagong Hill Tracts (CHT) area of Bangladesh is rich in diverse types of NTFPs (Islam 2003; Myers et al., 2003; CI, 2010).

Traditionally, people, especially the indigenous groups, collect various NTFPs in CHT and are, therefore, dependent on the continued growth of forest products for their livelihoods. Yet, Bangladesh's forest policies and management strategies neglect this NTFP sector, doing very little to promote ways to use them to support the livelihoods of villagers in such a way as to both improve villagers' earnings and protect natural resources. In fact, little research has been done on exploring the importance of NTFPs and their role in sustaining the livelihoods of Bangladesh's forest-adjacent community households in terms of uses and income. Certainly, such work must be done and persuasively presented with a view to influencing the positions and emphases of policy-makers, scientists, and practitioners.

In regard to better understanding the importance of NTFPs to maintaining livelihoods, Arnold and Ruiz-Pérez (2001) argued that NTFP-based livelihood development and conservation objectives warrant special attention to forest-adjacent communities such as the pro-poor (who gather NTFPs mainly for subsistence) and the less-poor (who collect and/or grow NTFPs mostly for alternative income). There is also an argument that although there is potential for NTFP-based livelihood development, NTFP-based interventions require case-specific investigations about the implications for livelihoods and conservation (Belcher & Schreckenberg, 2007). To build on the current NTFP-related wisdom, this research verifies the arguments and investigates whether there

are other factors inherent in NTFP–livelihood linkages that might warrant attention, especially where forest resources are heavily degraded as is the case in CHT.

I, therefore, address the following specific research questions in my study to explore the role of NTFPs and their linkages with livelihoods: (i) What are the different types of NTFPs gathered by different forest-adjacent households of multi-ethnic communities in CHT? Within the households, who does play the most important role in collecting NTFPs? And, from where, how and why do they gather NTFPs? (ii) What role do NTFPs play in terms of subsistence and cash income in the household economy comparing to other forest products? And, how do different socioeconomic factors influence the extent and patterns of forest-adjacent people's NTFP dependence? (iii) How does seasonal variation affect the NTFP dependence of the forest-adjacent community? (iv) What is the current stock condition of NTFPs? And, why and how do the depletion and degradation of the current natural stocks of NTFPs in the study areas impact local livelihoods?

Thus, this chapter, first focuses on and analyzes results relating to the types of NTFPs collected, current product collection patterns, and the importance and uses of different NTFPs for the livelihoods of forest-adjacent community households. Next, the chapter presents my research results on the proportional contributions of NTFP income to household economies and how different socioeconomic factors affect the NTFP income of the households. A later section of the chapter focuses on the current stock of the NTFPs in CHT, detailing the patterns and causes of rapid degradation of the resources. Finally, the discussion section elaborates and analyzes the research findings that arose from my field observations and current views in the NTFP literature. The chapter closes with concluding remarks and future recommendations.

4.2 Types, collection, and uses of NTFPs

4.2.1 Types of NTFPs and villagers' rankings of them

The forest-adjacent communities in CHT collect various types of NTFPs, including bamboo, bamboo shoots, wild vegetables, broom grass, medicinal plants, menda bark, and sungrass. During my field household surveys, I recorded 66 types of NTFPs collected for subsistence and income by the forest-adjacent households. However, this number would be much more if we could identify all individual plant or animal species that produce some common NTFPs such as medicinal plants and wild vegetables. The survey results show that the villagers consider bamboo (45%), wild vegetables (30%), and broom grass (13%) to be the three most important wild NTFPs collected by the households for subsistence and/or income (Figure 4-1). Although bamboo shoot ranks close to broom grass, the other types of NTFPs, such as sungrass, medicinal plants, and menda bark, are by comparison of very minimal importance to most of the villagers in the current context.

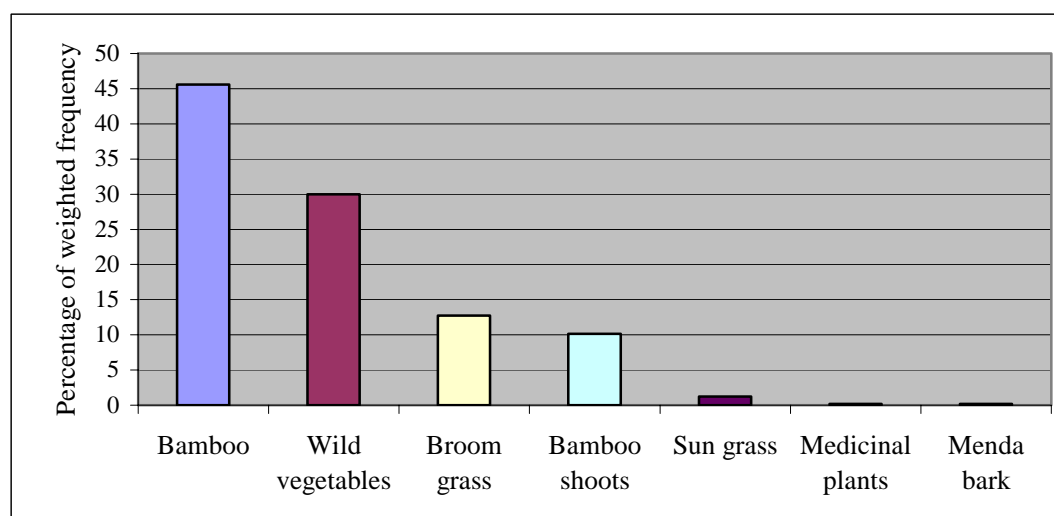


Figure 4-1: Ranking of the most important wild NTFPs by the villagers in Chittagong Hill Tracts (N = 209).

4.2.2 Collection of NTFPs

Although all members of the households contribute to collecting NTFPs, the female members do most of the collection (Figure 4-2). Adult females appear to collect about 66% (estimated⁵) of the NTFPs, whereas adult male members tend to collect about 30% (estimated⁶). Children also contribute in collecting NTFPs for their households, although girls are much more engaged with NTFP collection than are boys.

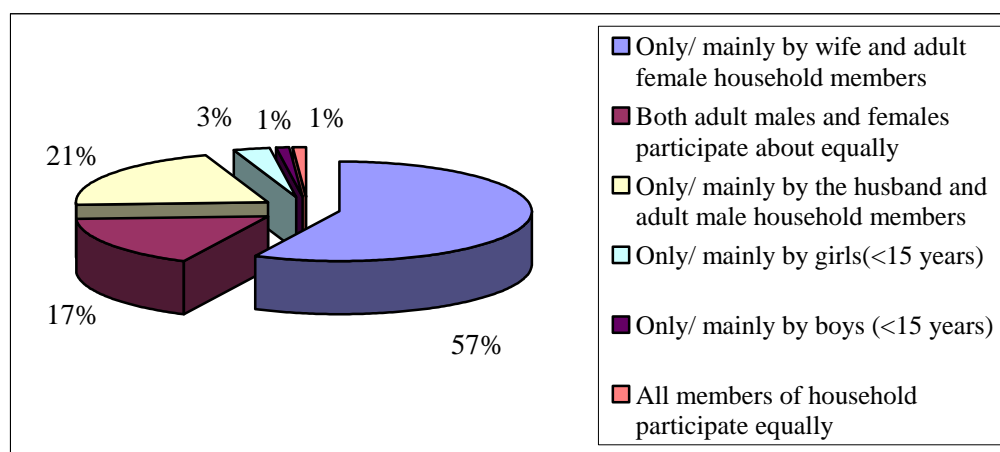


Figure 4-2: Who collects the NTFPs for the households (N = 5367)?

Results also show that most of the NTFPs are collected from natural forests (which are mostly degraded but not managed) followed by plantation forests (Figure 4-3). However, the collection of NTFPs from managed forests is negligible, as there are very few initiatives focused on managing and restoring degraded forests by supplementing them with enrichment plantation and/or by integrating tree plantations with agricultural crops as it is observed in agroforestry practices (Biswas & Choudhury, 2007). Moreover, a large amount of NTFPs is collected from residential sites surrounding the households and wetlands near the households and villages. From

⁵ Combining respective percentage contributions of only female (57%) plus proportion of females' contribution (8.5%) when both male and female participate equally and collect NTFPs together.

⁶ Combining respective percentage contributions of only male (21%) plus proportion of males' contribution (8.5%) when both male and female participate equally and collect NTFPs together.

my field observations, I can state that most of the NTFPs collected from surrounding residential areas are wild vegetables, bamboo shoots and wild fruits. In addition, villagers usually collect small fish, crabs and snails, from the wetlands near their households.

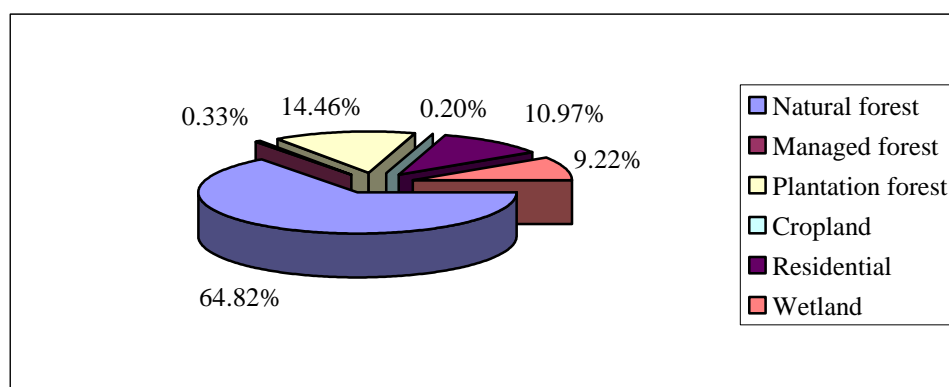


Figure 4-3: Land types from which NTFPs are collected (N = 5367).

Of the lands where NTFPs are collected, 37% are privately owned (mostly private leaseholds of USF lands of government), 24% are state-owned (under forest department or DC), and 23% are community-owned. However, in practice, people from different communities collect NTFPs from all these lands irrespective of their own ownership of the lands (Figure 4-4). Further, about 13% of NTFP collection takes place on private lands where only owners collect NTFPs and to which outsiders are not allowed access. In less than 4% of the collection cases, NTFPs are collected from state-owned forests where anybody can collect NTFPs. Whatever the ownership status of the land, there is medium to low enforcement of the rules; therefore, villagers collect NTFPs from wherever they can, even if illegally, especially when they are in need of food for the households.

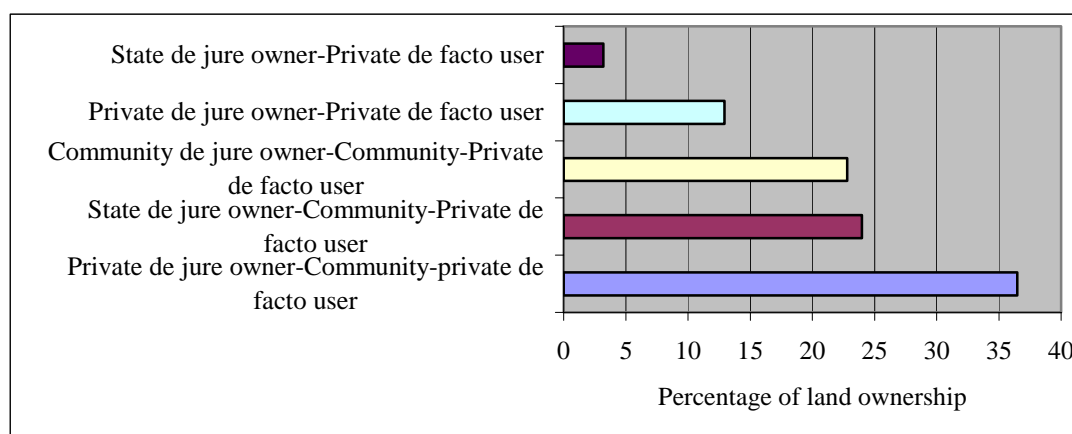


Figure 4-4: Percentage of ownership of lands from which NTFPs are collected (N = 5367).

The collection amount, type, and sale of the NTFPs depend on different socioeconomic and biophysical conditions, the uses of the NTFPs, and respective value. The survey results show that most of the households that collect NTFPs now have to go further away than they used to go 10 years ago to collect the products. According to the survey respondents, the average harvesting distance of the NTFPs from the villagers' respective households is 1.73 km, and it takes about 44 minutes on average for the household members to reach the forests or other sites where they collect NTFPs. For almost all the major NTFPs, household members usually walk 1 to 2 km in order to collect them (Figure 4-5). In particular, bamaboo shoots are the farthest away, with villagers obliged to walk more than 2 km in order to collect them. Almost as far is the average distance for bamboo and broom grass, which is a little less than 2 km. For menda bark, the villagers walk about 1.5 km, whereas for wild vegetables and medicinal plants, the average distance is slightly above or below 1 km respectively.

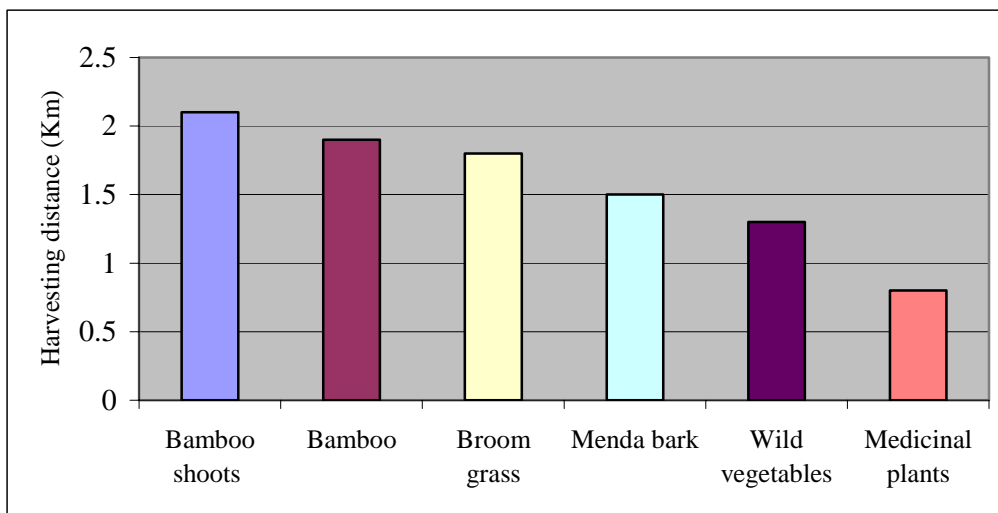


Figure 4-5: How far do the villagers go to collect NTFPs (N = 209)?

Exploring the amount of time spent by the household members to collect different NTFPs is important for future initiatives. My survey results show that each household spends an average of about 380 hours per year collecting NTFPs. This suggests that each household on average spends more than one hour every day collecting some sort of NTFP either for subsistence or cash income. However, a one-way ANOVA reveals that this collection time varies significantly ($p < .001$) between different types of NTFPs (see Appendix E). Figure 4-6 shows that households spend the most time collecting wild vegetables (average 155 hour/year) followed by bamboo shoots (average 144 hour/year) and bamboo (average 108 hour/year). Villagers spend comparatively little time collecting broom grass (which is seasonally harvested and available only between December and February), menda bark, and medicinal plants.

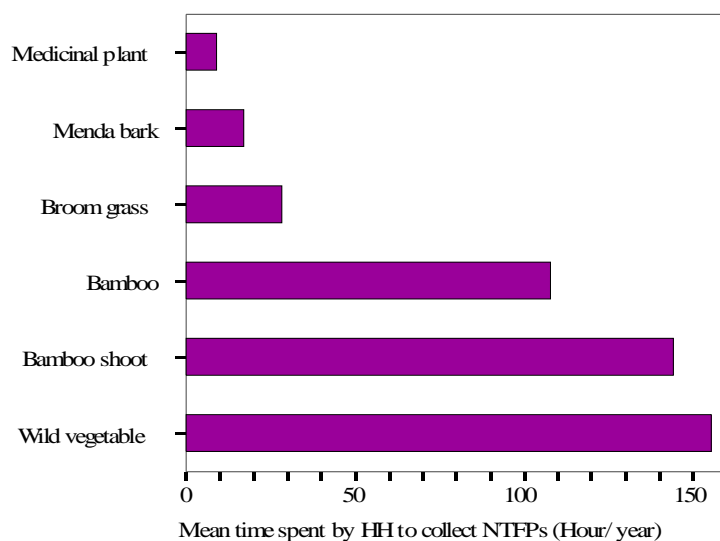


Figure 4-6: Time spent by households to collect different NTFPs (N = 207).

Moreover, one-way analysis of variance (ANOVA) shows that the time the households spend collecting NTFPs varies significantly ($p < .001$) among the seven ethnic groups in the study sites (Table 4-1). Kheong households spend the most time (897 hours/year) collecting NTFPs followed by Mro households (575 hour/year). The time spent by the households of Tripura and Tanchaingya tend to be similar (close to 500 hour/year); this is more than the time spent by Bawm, Marma, and Chakma. Bawm and Marma households appear to spend similar hours (slightly more than 350 hour/year) to collect NTFPs for their households and Chakma households seem to spend least time (256 hour/year) among all ethnic households. A two-way ANOVA also shows that controlling for different ethnic groups, the time spent by households to collect NTFPs differ significantly between types of NTFPs collected (see Appendix E).

Table 4-1: Time spent by different ethnic groups' households to collect major NTFPs (N = 209).

| | N | Mean time spent by households to collect NTFPs (hours/year) | F-value | p-value |
|------------------|-----|---|---------|---------|
| Ethnicity | | | | |
| Chakma | 88 | 256 | 10.126 | .000 |
| Marma | 55 | 355 | | |
| Tanchangya | 25 | 489 | | |
| Tripura | 2 | 493 | | |
| Bawm | 13 | 377 | | |
| Kheong | 16 | 897 | | |
| Mro | 8 | 575 | | |
| District | | | | |
| Bandarban | 107 | 496 | 24.385 | .000 |
| Rangamati | 100 | 261 | | |

Another two-way ANOVA reveals that the types of NTFPs, controlling for the districts (Bandarban and Rangamati), also differ significantly ($p < .001$) in regard to how much time the households spend collecting NTFPs per year (see Appendix E). Moreover, time spent by households to collect NTFPs differs significantly between the two districts (Table 4-1). Households in Bandarban spend much more time than those in Rangamati collecting different NTFPs. The reason could be that NTFPs are scarce near the villages in Bandarban as compared to the villages in Rangamati, so that the Bandarban villagers must travel further in order to collect the plants. And, my field observations, certainly confirm this to be the case.

4.2.3 Uses of NTFPs

Most villagers depend on NTFPs, particularly wild vegetables and bamboo shoots, for food. Significant non-edibles are bamboo, medicinal plants, broom grass, sungrass, menda bark, as well as some other types of NTFPs that are used for household subsistence and cash income. My survey results show that 63% of NTFPs are collected mainly for household consumption. Bamboo, though, is mainly used to construct houses, in agricultural and household implements, for weaving crafts, and as pulp for paper. Medicinal plants are mainly used to prepare herbal

medicines, whereas broom grass and sungrass are mainly used for preparing brooms for house cleaning and house thatching, respectively. On the other hand, about 37% of the NTFPs are collected mainly for cash sale. However, the exception is menda bark. This bark is mainly collected to sell (83%) and its powder (*tabu* powder) has industrial applications as a binder and burning agent in manufacturing mosquito repellent coils and incense sticks (details about menda bark in Chapter 6).

4.3 NTFP income contribution to household economy and influencing factors

4.3.1 Income from NTFPs

NTFPs can provide both subsistence and cash income to households. Although most of the NTFPs are used for subsistence, about one-third of the surveyed households reported selling NTFPs for their cash income as well. Villagers ranked the three most important wild NTFPs for sale as bamboo, wild vegetables, and broom grass. Among the other wild NTFPs, sungrass, bamboo shoots, medicinal plants, and menda bark are also significant for their sale value. However, few households receive income from the extraction of menda bark, as only a few (3%) villagers have the direct connections with traders or middlemen that are necessary to realize income from this plant.

NTFP-related yearly household income data analysis also shows that bamboo provides the highest income followed by income from wild vegetables and sungrass (Figure 4-7). Among these three NTFPs, bamboo yields almost double the income of wild vegetables or sungrass. Wild vegetables and sungrass tend to provide similar yearly income to households. Although bamboo contributes significant cash income to the households, wild vegetables and sungrass are collected principally for subsistence rather than to sell. However, subsistence income from bamboo is still

more than that of wild vegetables and sungrass. Among the other NTFPs, income from broom grass, game meat, bamboo shoots, medicinal plants and wild fruits are worth mentioning. Broom grass and game meat make equally important and distinct contributions to the households: broom grass provides mostly cash income, whereas game meat is more extensively used for subsistence. Similarly, too, medicinal plants and wild fruits contribute little in terms of income. Medicinal plants provide more cash income than wild fruits, which are mostly used for subsistence.

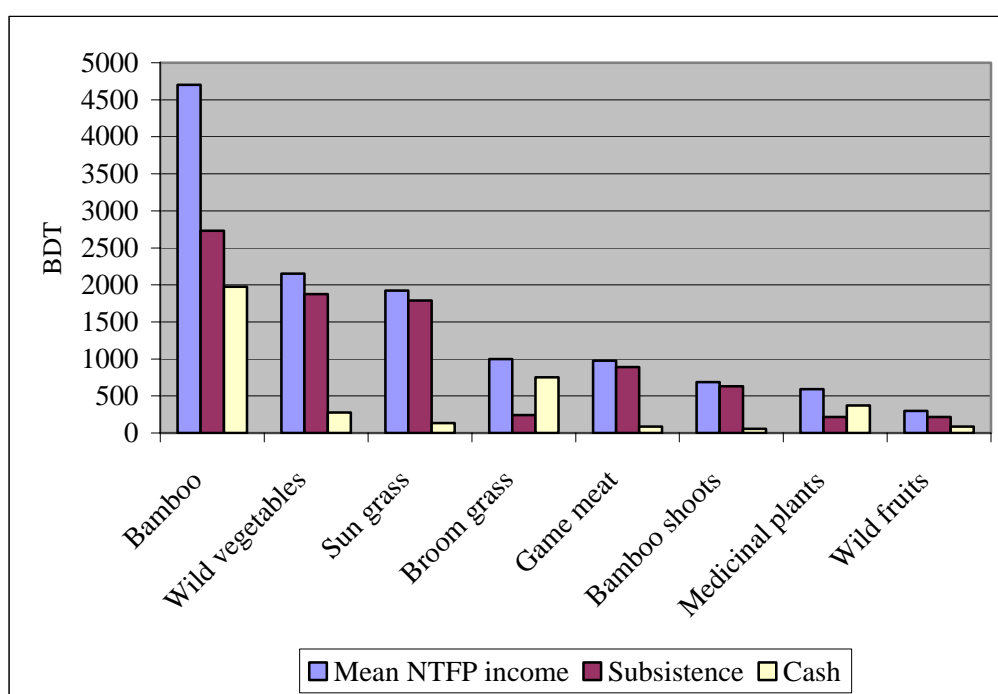


Figure 4-7: Incomes of households from major types of wild NTFPs (N= 5367).

To clarify further, people think that the three most important subsistence and cash income NTFPs to their households (as stated at the beginning of this section and in Figure 4-1) are bamboo, wild vegetables, and broom grass; yet, NTFP household income survey data validate the first two NTFPs, but rank sungrass as third largest income provider to households, placing broom grass fourth for this purpose. This could be because although sungrass provides more income than does broom grass, the latter is more extensively collected by many households for their important

cash income. Similarly, many more households gather bamboo shoots than gather game meat; thus the former given current practice is of greater importance to the villagers. Medicinal plants and menda bark were also, therefore, considered important because of their cash contribution to the households. In addition, villagers tend not to regard the NTFP-based subsistence as income; therefore, they placed less importance on it in comparison to cash income from NTFPs.

Income survey data results also show that among all the types of NTFPs directly collected from the forest by household members, considerably more income accrues from NTFPs than from timber and poles combined (Table 4-2). For example, income from NTFP income is almost double that from firewood income. On the other hand, income from processed forest products, which comprise mostly bamboo-made items, is too low to be a viable means of making money for households when other options are available in comparison to raw NTFP income.

Table 4-2: Forest-related annual incomes of households including subsistence and cash income.

| Types of forest products | Mean household income (BDT) | Subsistence income (BDT) | Cash income (BDT) |
|---------------------------|-----------------------------|--------------------------|-------------------|
| NTFPs | 10100 | 6563 | 3537 |
| Timber and Pole | 7763 | 2940 | 4823 |
| Firewood | 5137 | 4038 | 1100 |
| All raw forest products | 23000 | 13541 | 9459 |
| Processed forest products | 677 | 200 | 476 |

To compare subsistence versus cash income for different forest products including NTFPs, the results also show that villagers collect NTFPs mainly for subsistence, and this is also the case for firewood collected from the forest (Figure 4-2). On the other hand, in the case of timber and poles, the households collect or harvest the timber products mainly for cash income rather than for household uses. Bamboo-made baskets and other processed products are also usually sold rather than reserved for household use. Overall, the villagers collect the vast majority of the raw forest products for subsistence. Though modest, the cash income from selling the

forest products constitutes a very important source of money for the households, affording them the means to purchase the necessities of daily life.

Moreover, for the households, more subsistence income for the villagers comes from NTFPs followed by firewood and timber respectively. About 65% of collected NTFP-related household income is for subsistence, and the rest is for cash. On the other hand, among the total raw forest income, the households realize the most cash income from timber and poles, with NTFPs following, and firewood third (Table 4-2).

4.3.2 Dependence of households on NTFPs and all other forest products

According to my observations, villagers in my study sites depended on NTFPs to a large extent. Income data analysis also shows that NTFP income increases with increased household total income but relatively less. The richer the household, the more income they get from NTFPs for subsistence and cash (Table 4-3). Although this pattern does not precisely reflect the extent of dependence of the villagers in various income groups (based on 5 income quintiles arranged in ascending order from poor to rich) on NTFPs, it suggests that NTFPs make an important contribution to total household income.

Table 4-3: Comparison of absolute and relative NTFP and forest income with household incomes (N= 181).

| Income quintile (poor to rich) | N | Mean NTFP income | Mean forest income | Mean household income | Relative NTFP income (%) | Relative forest income (%) |
|--------------------------------|----|------------------|--------------------|-----------------------|--------------------------|----------------------------|
| 1 | 36 | 6343 | 12935 | 39250 | 16 | 33 |
| 2 | 36 | 9351 | 16274 | 56785 | 16 | 29 |
| 3 | 37 | 10890 | 19168 | 70512 | 15 | 27 |
| 4 | 36 | 10930 | 18954 | 90536 | 12 | 21 |
| 5 | 36 | 12963 | 47778 | 145659 | 9 | 33 |

If we focus on the NTFP income patterns for the different groups (Figure 4-8), the results show that villagers in the lower-income quintile groups realize relatively higher proportion of their income from NTFPs than do those in the higher-income groups. Figure 4-8 also shows that there is very little difference in the income dependence of villagers in the three lowest-income groups, and in the higher-income groups, dependence on NTFPs gradually declines as household income increases.

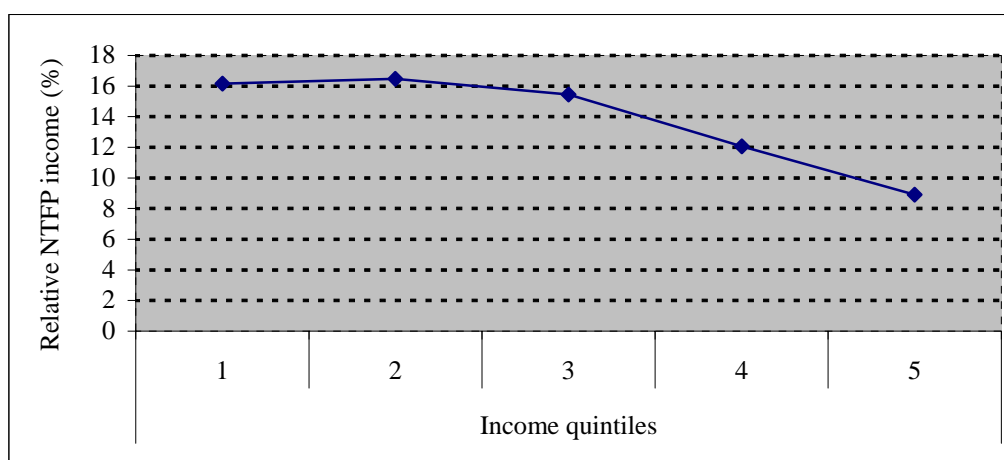


Figure 4-8: Relative NTFP incomes of households based on different income quintiles group (N = 181).

Similar to the villagers' NTFP dependence patterns, households in the lowest-income groups are more dependent on the forest, and the forest income of all the households gradually decreases with the increasing trend of household income up to the fourth income quintile (Figure 4-9). However, in the case of the richest-income quintile group, villagers' relative income from forest products increases as they have more income from timber and poles and from the bulk sale of some of the economically valuable NTFPs such as bamboo.

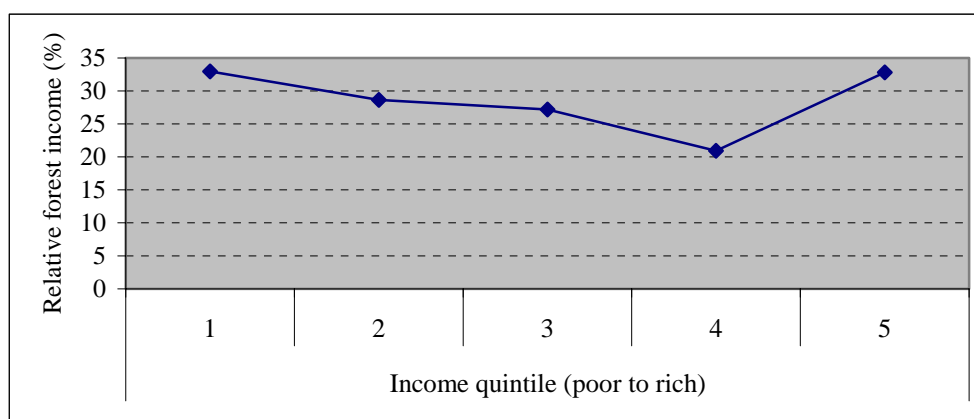


Figure 4-9: Relative forest incomes of households based on different income quintile groups (N= 181).

The extent to which the households are dependent on NTFPs in particular and on forests in general can be clarified by presenting data analysis that focuses on the relative contribution of different income sources to the households, including NTFP income and total household economy. If we consider annual total household income as an indicator of the households' economy, total forest income (that includes income from raw and processed forest products) is about one-third (29%) of total household income (Table 4-4); only income from agriculture is higher (37%). Moreover, income data analysis also shows that about half of the total forest income of the households comes from NTFPs (Table 4-2).

Table 4-4: Annual household income and income contribution from various sectors (N = 181).

| household income sectors | Annual household income (Taka) | % of total annual household income |
|----------------------------------|--------------------------------|------------------------------------|
| Total raw forest income | 23000 | 28.31 |
| Processed forest products income | 677 | 0.83 |
| Fish income | 2050 | 2.52 |
| Wage Income | 16195 | 19.93 |
| Business income | 7650 | 9.42 |
| Agricultural income | 29706 | 36.56 |
| Livestock income | 371 | 0.46 |
| Other income | 1594 | 1.96 |
| Total household income | 81244 | 100 |

Among the surveyed households, all the respondents reported having income from raw NTFPs and other forest resources (Figure 4-10). However, only 36% of households realize income from processed forest products; those that do are engaged in weaving bamboo-based products, such as baskets and mats, for their household use as well as for cash income. Since about 98% of the households in my study sites are engaged in making money from agricultural work and more than 80% have wage incomes for their livelihoods, the NTFP incomes along with other forest incomes complement these two major income sources in sustaining the livelihoods of the forest-adjacent communities.

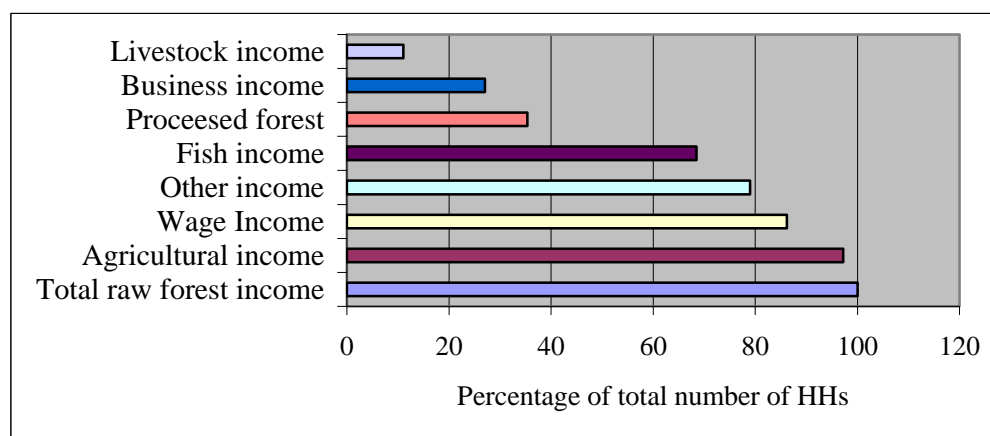


Figure 4-10: Percentages of total number of households that have incomes from various sectors (N = 181).

In terms of the villagers' seasonal pattern of income dependence on different types of forest products, the data show NTFP income as highest in the first quarter (the mainly dry period of January to March), becoming gradually lower through the second quarter (the warmest period of April to June), and then the third quarter (the predominantly rainy season of July to September). In the fourth quarter (the mainly cool and start of dry season of October to December), NTFP income tends to rise again (Figure 4-11). This same income pattern also applies for firewood. Income realized from timber and poles follows a similar pattern in the first

two quarters, but declines sharply in the third quarter. In the fourth quarter, the quarter following the rainy season, though, the income from timber and poles is much higher than it is during the other quarters. In the first three quarters, NTFP income is much higher than timber and pole income; it is also higher than firewood income. But in the fourth quarter, timber and pole income surpasses NTFP income. Income from firewood appears to be lower than income from NTFPs and timber and pole in all the quarters; this is with the exception of the rainy season, when firewood income seems to be just a little more than income from timber and pole. Overall, total forest income tends to be lowest during the third quarter, followed by the second quarter; it is highest in the first and fourth quarters.

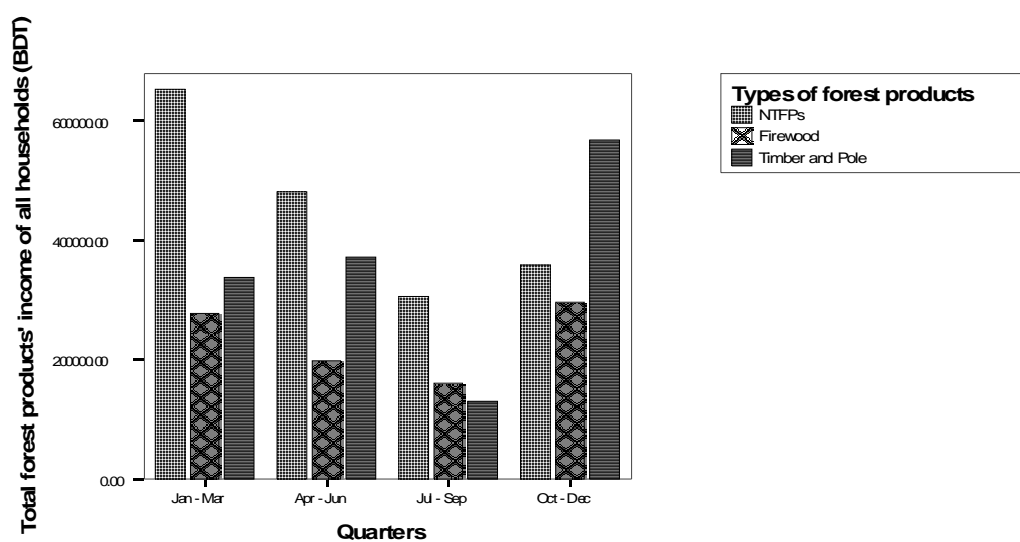


Figure 4-11: Seasonal variation in income dependence of the villagers from different types of forest products (N = 181).

4.4 Socioeconomic factors affecting NTFP incomes and livelihoods

4.4.1 Household-level factors

Many socioeconomic variables at the household level influence the NTFP income of the households. One-way analysis of variance (ANOVA) of the survey data shows (Figure 4-5) that households evince no significant differences in their NTFP income depending on different education levels of the household heads. However, the analysis also suggests that households that have heads with an elementary education or less tend to have higher NTFP income than do households that have heads with no education or with secondary education. Also worth noting is that the few female-headed households appear to have higher NTFP income than do male-headed households, but the degrees of freedom are insufficient for significance. There is also no significant difference in the households' NTFP income in respect to the marital status of the household heads. There is no significant difference in overall income based on whether household head was born in the village or not. Households that collect firewood from forests have more NTFP income than those that do not do so, but there is no significant difference in their overall NTFP incomes. My field observation and conversation with some firewood collectors also indicate that in most cases they gather any available NTFPs from the forest areas where they collect the firewood.

Table 4-5: Effects of household-level socioeconomic categorical variables on NTFP income (N=181).

| Explanatory variables | N | Mean NTFP income /household/ year | F-value | p-value |
|---|----------|--|----------------|----------------|
| Education of household head | | | | |
| No education | 101 | 9951 | .369 | .692 |
| Elementary | 47 | 10941 | | |
| Secondary | 33 | 9360 | | |
| Sex of household head | | | | |
| Female | 8 | 10261 | 1.416 | .236 |
| Male | 173 | 6612 | | |
| Marital Status | | | | |
| Married and living together | 169 | 10180 | 1.121 | .348 |
| Married but living separately | 1 | 24573 | | |
| Widow/widower | 7 | 6153 | | |
| Divorced | 1 | 8520 | | |
| Never married | 3 | 10501 | | |
| Birth of household head in the village | | | | |
| No | 72 | 10373 | .123 | .727 |
| Yes | 109 | 9920 | | |
| household collects firewood | | | | |
| No | 5 | 7613 | .439 | .508 |
| Yes | 176 | 10171 | | |

Again bivariate correlation between the NTFP income of the households and various socioeconomic interval variables was carried out, and the analysis is presented in Table 4-6. It is worth noting that although there is no significant correlation between wage income and NTFP income of households, household incomes from NTFPs increase as the wage incomes of households increase. This could be because villagers who depend more on daily wage labor are most likely to lack a secure income source, and they collect NTFPs when they don't have any wage labor in agriculture or another employment. Moreover, the more agricultural income households have, the lower their NTFP income, but this is a non-significant correlation. The negative correlation between households' agricultural income and NTFP income suggests that

households with higher agricultural income have less dependence on NTFPs although there is no sufficient evidence to make that conclusion.

Table 4-6: Bivariate relationships between different socioeconomic factors and log of annual household NTFP income (N =181).

| Variables | Bivariate relationship with Ln (NTFP income) (r-value) |
|---|---|
| Education of household head | -0.054 |
| Sex of household head | -0.104 |
| Age of household head | 0.031 |
| Hours per week firewood collected by household | -0.022 |
| Wage income | 0.097 |
| Agricultural income | -0.011 |
| household total income | 0.196** |
| Average livestock end value | 0.070 |
| Distance of forest from household | 0.015 |
| Distance to forest products market | 0.094 |
| Years of household formation | 0.066 |
| Total forest areas of household | 0.10 |
| Number of members in household | 0.161* |
| Total value of household implements and furniture | -.174** |
| Net savings of household | -.083 |

*Significant at the 0.05 level; **Significant at the 0.01 level

Further, total household income is significantly positively ($p < .001$) related to the NTFP income log. This suggests that the higher the total household income, the more the households earn from NTFP sources. Similarly, significantly ($p < .05$) positively correlated with the NTFP log is total number of household members indicating that more member of households can gather more NTFPs. Moreover, the total value of the households' implements and furniture are significantly ($p < .001$) negatively correlated with the log suggesting that households that possess more implements and furniture (could be a sign of rich or well off family) are less dependent on NTFPs. Similar observation was made during my field visits to the villages.

Since different types of capital such as natural, physical, financial, human, and social capital constitute and influence rural livelihoods (details in conceptual framework), I have conducted a linear regression analysis to predict the NTFP income of the households from the

estimates of 5 variables representing the above-referenced 5 types of household capitals (Table 4-7). More specifically, the total forest land areas of the households represent the natural capital, the number of members in a household represents its human capital, the total value of the household's implements and furniture represents physical capital, number of years the household has been in existence represents social capital, and the household's net savings represents financial capital.

Table 4-7: Regression-correlation analysis for the relationships of total forest land areas of household, number of members in household, total value of household implements and furniture, years of household formation, and net savings of the household to Ln (annual NTFP income) (N =181).

| Independent Variables | Bivariate correlations | Initial model | | Final model | |
|--|------------------------|---------------|-------------|-------------|-------------|
| | | b-value | Part. corr. | b-value | Part. corr. |
| Total forest areas of HH | 0.10 | .000175 | .083 | | |
| Number of members in HH | 0.161* | .06540* | .156 | .07194* | .181 |
| Total value of HH implements and furniture | -.174** | -.0000215** | -.193 | -.0000214** | -.193 |
| Years of HH formation | .066 | .0003784 | .008 | | |
| Net savings of the HH | -.083 | -.00000435 | -.077 | | |
| Constant | | 8.615*** | | 8.649*** | |
| Multiple R | | .274* | | .249** | |
| R-square | | .075* | | .062** | |

*Significant at the 0.05 level; **Significant at the 0.01 level; ***Significant at the 0.001 level

Bivariate correlation analysis shows that the number of members in a household is significantly positively correlated with the household's log of NTFP income, whereas the total value of the implements and furniture owned by the household is significantly negatively correlated with it. The initial regression model, which considers all 5 variables representing 5 different capitals for the households, shows a significant b-value for only the number of members of the households and the total value of implements and furniture. And, once the non-significant variables have been discarded one by one (and also following stepwise method), the final regression model consists of only two independent variables showing a significant b-values.

Finally, a livelihood model was constructed following conceptual livelihood framework (as described in Chapter 2) in order to predict the NTFP income of the households as noted below. As the final model shows (Table 4-7), there is no sufficient statistical evidence to conclude that NTFP income of the households can be predicted from the estimates of different variables that represent different household capitals. It is evident from the very low R-square (.062) in final model which indicates the slight proportion of explanatory variables (how many members there are in the household and the value of all the furniture and implements in the household) that is attributable to predict the NTFP income of the households as a dependent variable. Thus the prediction will not be reliable and the estimates of households' NTFP income may depend on many other socioeconomic factors. However, there is some slight tendency for the dependent variable and explanatory variables to vary together. Interestingly, although a high number of household members increases the value of the model, households with a higher value of furniture and implements tend to reduce numbers from the model. It could be because a household with a lot of members has many hands to gather the various NTFPs. Again, if a household has furniture and implements that are worth a lot of money, it seems to be less dependent on NTFPs, as it often has other income sources. The model estimating NTFP-based livelihood income from estimates of different types of capitals of households is shown as follows:

$$\mathbf{Ln}(\mathbf{annual\ NTFP\ income}) = 8.649 + .07194*(\mathbf{number\ of\ members\ in\ household}) - .0000214*(\mathbf{total\ value\ of\ household\ implements\ and\ furniture}).$$

4.4.2 District, village, and ethnicity-level factors

Although ANOVA shows no significant difference between the NTFP incomes at the district level, the NTFP income of Bandarban's households has mean value a little higher than that of Rangamati's households. Additional analysis of field data also shows that several village- or community-level factors, such as difference in villages, road access to village, transport types

used to carry NTFPs, and main forest-tenure types influence NTFP household incomes (Table 4-8). The NTFP income of the households differs significantly ($p < .001$) between 14 study villages. Households in Punorbason para have the highest mean NTFP incomes among households of other villages. This could be because the Punorbason para's households realize their main income from a rubber plantation. Households in Mubachari para, Ghungru para, Thoingya para, Hazachari para, and Khamar para realize more NTFP income than the average (BDT. 10,100). The reason could be that most of these villages are located in distant places from district headquarters; hence, they have easy access to NTFPs that remain in abundance. On the other hand, the households of Kandabachara para, Renikheong para, Faruk para, and Lemujhiri para tend to have very low NTFP income; accounting for this is likely to be these villages' alternative income opportunities, such as fishing in Kandabachara, horticulture in Renikheong and Faruk para, and more involvement in plain-land agriculture involvement in Lemujhiri para.

Whether a village had road access makes no significant difference to NTFP income of households. Although villagers use various types of transportation to carry the NTFPs they collect, NTFP income did not vary significantly depending on the transport type. Also, data suggest that NTFP income of the households located in villages with natural forests nearby is higher than the income of villages with plantation forests. This could be because, as noted before, the majority of NTFPs are collected from natural forests (unmanaged forests).

Table 4-8: Effects of district- and village-level variables on NTFP income (N = 181).

| Explanatory variables | N | Mean NTFP income/household/ year | F-value | p-value |
|---|-----|--|---------|---------|
| Districts | | | | |
| Bandarban | 91 | 10548 | .507 | .477 |
| Rangamati | 90 | 9647 | | |
| | | | | |
| Villages | | | | |
| Lemujhiri para | 8 | 6297 | 2.765 | .001 |
| Thoaingya para | 21 | 11421 | | |
| Prue Mong U para | 11 | 7678 | | |
| Uzi Headman para | 7 | 8476 | | |
| Punorbason para | 12 | 19697 | | |
| Ghungru para | 14 | 12588 | | |
| Faruk para | 10 | 6309 | | |
| Renikheong para | 8 | 6272 | | |
| Bodhipur para | 23 | 7652 | | |
| Khamar para | 21 | 11177 | | |
| Agyachari para | 13 | 10041 | | |
| Hazachari para | 8 | 11288 | | |
| Mubachari para | 12 | 13778 | | |
| Kandabachara para | 13 | 5490 | | |
| | | | | |
| Road access to village | | | | |
| No | 53 | 9752 | .125 | .724 |
| Yes | 128 | 10244 | | |
| | | | | |
| Transport types used for forest products | | | | |
| Foot | 37 | 9200 | .782 | .538 |
| Truck/lorry | 14 | 12588 | | |
| Motorized boat | 46 | 9946 | | |
| Rickshaw/3-wheeler van | 18 | 7988 | | |
| Jeep/motorized 4-wheeler | 66 | 10760 | | |
| | | | | |
| Forest Tenure | | | | |
| Natural (112) | 35 | 11782 | 1.707 | .193 |
| Plantation (362) | 146 | 9697 | | |

Further, one-way ANOVA shows that ethnicity-level factors such as difference in different ethnic groups and whether the household is a member of the village's largest ethnic group significantly influence household NTFP income (Table 4-9). Although the mean NTFP income of households in Tripura is the highest, it should be noted that this observation is based on only 2 households in Punorbason para who have considerable income from rubber and thus, it is

not representative of the Tripura ethnicity. Besides the Tripura, Tanchangya households also have a higher than average NTFP income. Again, income from rubber in Tanchangya dominant Punorbason para is likely to be the reason. Kheong households also have a higher than average NTFP household income. In this instance, the reasons could be remoteness of the Ghungru para and that it has more access to NTFPs and lacks other alternative income sources. On the other hand, data show that the households of the Mro and Bawm ethnic groups, located in Renikheong para and Faruk para respectively, have very limited mean NTFP income. Both villages pursue horticultural activities as alternative income opportunities, and the Bawm community makes household-based handloom textiles, another major income source in which the female household members play the major role.

Table 4-9: Effects of ethnicity variation on NTFP income (N =181).

| Explanatory variables | N | Mean NTFP income/household/ year | F-value | p-value |
|--|-----|----------------------------------|---------|---------|
| Ethnicity | | | | |
| Chakma | 81 | 9172 | 3.188 | .005 |
| Marma | 47 | 10001 | | |
| Tanchangya | 19 | 14374 | | |
| Tripura | 2 | 26250 | | |
| Bawm | 10 | 6309 | | |
| Kheong | 14 | 12588 | | |
| Mro | 8 | 6272 | | |
| | | | | |
| Household's membership in the largest ethnic group of the village | | | | |
| No | 7 | 14976 | 2.419 | .122 |
| Yes | 174 | 9904 | | |

4.4 NTFP stock degradation and its causes

4.4.1 Current stock of NTFPs in Chittagong Hill Tracts

Stocks of NTFPs are much depleted and degraded in CHT. According to the forest-adjacent villagers, the average current stock of NTFPs compared to that of 10 years ago is 4.5 on a 0 to 10 scale (details in methods). However, a one-way ANOVA shows that the average scores of NTFP stocks differ significantly ($p < .001$) by type of NTFP (see Appendix E), ranging from 3.4 to 4.9. (Figure 4-12). Stocks of medicinal plants appear to be highest (4.9) among the NTFPs, followed by stocks of broom grass, wild vegetables, bamboo, and bamboo shoots. However, villagers reported stocks of menda bark trees as having become much depleted during the last decade—the result of commercialization begun without proper organizational interventions such as scientific bark extraction techniques and domestication and management strategies.

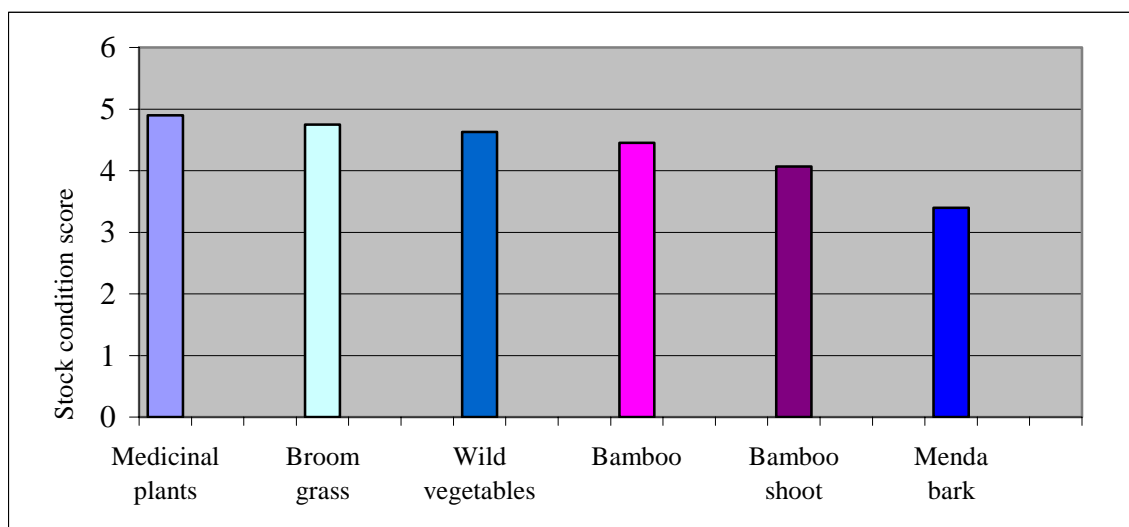


Figure 4-12: Stock condition of NTFPs compared to 10 years ago (mean score in 0 to 10 scale).

4.4.2 Reasons for NTFP stock degradation in Chittagong Hill Tracts

There are many reasons for the sharp degradation of the NTFPs. Based on a weighted calculation (details in methods) of the response frequencies, cumulatively the three most important reasons for NTFP stock degradation are overexploitation with increased population pressure (46%), land clearing for shifting cultivation (*jhum*) and/or plantation (17%), and financial crisis of forest-adjacent households (14%) (Figure 4-13).

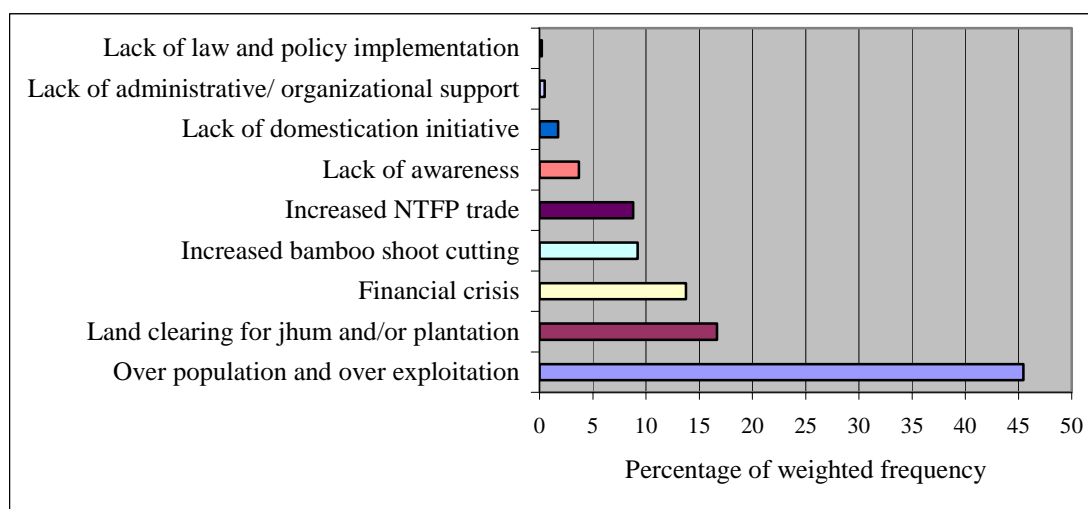


Figure 4-13: Reasons for NTFP stock degradation in Chittagong Hill Tracts.

The villagers point to other reasons as important in stock degradation: increased cutting of bamboo shoots, increased trade in NTFPs, lack of awareness of conservation, and lack of domestication initiatives for NTFPs. Although overpopulation leading to overexploitation of NTFPs is reported as the main reason for the degradation, this is not the case for menda bark. For this bark, land clearing for *jhum* or plantation appears to be the main reason.

A chi-square analysis of data shows that reasons for the NTFPs' degradation differ significantly ($p < .001$) between different types of NTFPs (see Appendix E). Table 4-10 outlines the relationship between each NTFP species and the main reasons for its degradation. Lack of

domestication initiatives is one of the main reasons for medicinal plants. Increased trade is another significant cause for medicinal plants, as it is for menda bark and bamboo. Lack of awareness about the menda bark in terms of identification, use, markets, and domestication, is causing significant depletion of the plant from its natural habitat. In the case of bamboo shoots, increased population pressure and the necessity of using more land for jhum or plantations are causing degradation. The financial crisis of the forest-adjacent households and their traditional food habits based on NTFPs are also making them more dependent on collecting bamboo shoots. This accelerated rate of bamboo shoot collection will eventually compromise the bamboo's natural ability to regenerate.

Table 4-10: Selected NTFPs and the reasons for degradation.

| NTFP | The three main reasons for stock degradation |
|------------------|--|
| Bamboo | Overpopulation and exploitation, increased bamboo shoot cutting and harvesting, increased bamboo trade, and some other reasons |
| Wild vegetables | Overpopulation and exploitation, land clearing for jhum and/or plantations, financial crisis of forest-adjacent households |
| Medicinal plants | Overpopulation and exploitation, increased medicinal plant trade, lack of domestication initiatives |
| Bamboo shoots | Overpopulation and exploitation, financial crisis of forest-adjacent households, land clearing for jhum and/or plantations |
| Broom grass | Overpopulation and exploitation, land clearing for jhum and/or plantations, and financial crisis of forest-adjacent households |
| Menda bark | Land clearing for jhum and/or plantation, increased trade in menda bark, lack of awareness |

Villagers usually do not go far to harvest NTFPs if stock is available nearby. Results show that the current stock condition of NTFPs and the average NTFP harvesting distance are negatively ($p < .001$) correlated. This correlation suggests that the lower the stock in the vicinity, the further the villagers travel to collect the NTFPs (Table 4-11). There is also a negatively significant ($p < .001$) correlation between the NTFPs' current stock score and the time spent by households to collect these NTFPs over a year. The analysis suggests that with the declining stock of NTFPs the households need to spend more time to gather NTFPs.

Table 4-11: Bivariate correlation between current stock condition score and distance to forest and time spent by households. (N = 743).

| Variables | Bivariate relationship with Ln (NTFP income) |
|--|--|
| Distance of forest from household | -.152** |
| Yearly time spent by households to collect NTFPs | -.155** |
| ** Significant at the .001 level | |

One-way ANOVA shows that the scores for the current stock conditions differ significantly ($p < .001$) between the 2 districts, 14 villages, and 7 ethnic groups of the study sites (Table 4-12). This suggests that Rangamati tends to have more NTFP stocks in forests in comparison to Bandarban. Among the villages, Ghungru para and Faruk para have the lowest scores (mean score 3.46) in describing NTFP stock near their villages, whereas Lemujhiri para, Mubachari para, Kandabachara para, and Khamar para appear to have higher NTFP stock (mean score 5.26) than the other villages. Overall, most of the villages in Rangamati have a higher score for NTFP stock than the villages in Bandarban. Again, among different ethnic groups, Kheong and Bawm (mainly residents of Ghungru para and Faruk para, respectively) have the lowest NTFP stock score (mean score 3.46), but all the other ethnic groups have very similar scores in regard to NTFP stock in their locales.

Table 4-12: Differences in NTFP stock conditions based on districts, villages and ethnicity variations (N = 743).

| Explanatory variables | N | Mean NTFP stock score | F-value | p-value |
|-----------------------|-----|-----------------------|---------|---------|
| Districts | | | | |
| Bandarban | 412 | 4.16 | 43.077 | .000 |
| Rangamati | 345 | 4.90 | | |
| Villages | | | | |
| Lemujhiri para | 28 | 5.54 | 8.788 | .000 |
| Thoingya para | 94 | 4.45 | | |
| Prue Mong U para | 46 | 4.41 | | |
| Uzi Headman para | 47 | 4.15 | | |
| Punorbason para | 47 | 4.09 | | |
| Ghungru para | 64 | 3.66 | | |
| Faruk para | 52 | 3.27 | | |
| Renikheong para | 34 | 4.35 | | |
| Bodhipur para | 92 | 4.57 | | |
| Khamar para | 77 | 5.09 | | |
| Agyachari para | 51 | 4.63 | | |
| Hazachari para | 37 | 4.95 | | |
| Mubachari para | 40 | 5.28 | | |
| Kandabachara para | 48 | 5.15 | | |
| Ethnicity | | | | |
| Chakma | 308 | 4.83 | 11.952 | .000 |
| Marma | 216 | 4.63 | | |
| Tanchangya | 75 | 4.37 | | |
| Tripura | 8 | 4.63 | | |
| Bawm | 52 | 3.27 | | |
| Kheong | 64 | 3.66 | | |
| Mro | 34 | 4.35 | | |

4.5 Discussion: Prospects for and limitations of NTFP-based development and conservation

NTFP collection: Forest-adjacent communities' collection of NTFPs varies depending on the type, traditional use, and market values of the NTFPs, and the villagers' access to markets for the NTFPs. According to my field observations and analysis of collected data, although forest-adjacent communities collect various types of NTFPs, villagers rank a few NTFPs such as bamboo, wild vegetables, and broom grass as most important because they extensively collect

these forest resources for subsistence and cash income. NTFPs are most often used as food, followed by house construction and other household uses, and they are also sold for cash. Besides day-to-day uses, some forest-adjacent villagers in CHT also go to the forests to collect NTFPs, especially when they are experiencing a crisis in regard to food or income; thus, these resources provide a safety net to the forest poor. Furthermore, several studies focused on different parts of the world also recorded a similar pattern of forest dependence, especially in times of crisis (Chowdhury et al., 2004; Kusters & Belcher, 2004; Malhotra et al., 1993; Miah, 2007; Mukherjee et al., n.d.; Mukul, 2007; Riadh, 2007; Wollenberg & Ingles, 1998).

Although some NTFPs, such as wild vegetables and bamboo shoots, do not provide much income in terms of subsistence and cash, villagers use them widely in their day-to-day lives. On the other hand, some NTFPs, such as medicinal plants and menda bark, are not widely used by households, but they have high market value. And, currently, some villagers also depend on NTFPs that have high market value and foresee potential income opportunities from these resources if there were more effective market-based interventions. These findings are also evident from Marshall et al.'s (2006, 2003) observations and case studies and those of several other studies (e.g., CPWild, 2004). Another group of NTFPs that includes bamboo and broom grass have both substantial use value and medium market value. These medium-market-value NTFPs are sold for cash earning besides subsistence, as they already have some kind of existing market systems.

Understanding the gendered nature of household members' involvement in NTFP collection and use is crucial (IFAD, 2008; Marshall & Schreckenber, n.d.; Sen, n.d.). My study shows that female household members play the most important role in collecting NTFPs followed by males and children. Females mainly take care of the families, performing all household works and other tasks including rearing children and gathering forest products and working outside in the household's own farm or garden. Although female members of households work hard, they

have very limited outside income opportunities as observed in several other studies, e.g., Carr and Chen (2001) and Kumar and Nair (2004). Even when females get daily wage-based agricultural farm jobs, they are paid much less than are males. These limited outside income opportunities and low pay compel them to stay home and perform household work and discourages them from obtaining paid employment. Therefore, instead of seeking paid daily labor, females collect NTFPs that are essential for running their households, using them as food and for other household uses.

Besides using NTFPs instead of making expenditures, the females provide income to their households by collecting NTFPs. On the other hand, since male members do have some paid employment options, they rarely go to the forests to collect NTFPs. They are, therefore, less informed about types and uses of NTFPs than are females. However, males play a vital role in collecting timber and poles for household use and cash. As the results show, children make significant contributions in regard to collecting NTFPs; however, in most cases, they do collect NTFPs instead of going to school. Further, female children engage in NTFP collection for households and spend three times more time collecting NTFPs than do male children. Therefore, any NTFP-based initiatives would require paying adequate attention to gender-oriented interventions, especially engaging females in NTFP management in order to generate more income from NTFP entrepreneurship development and to better conserve natural NTFP resources.

Ownership of forest lands from which NTFPs are collected is another key factor that influences the type, extent, and frequency of NTFP collection as well as motivation to conserve the resources (RRI, 2005; Ellsworth, 2002). In CHT, most of the NTFPs are collected from degraded natural forests (unmanaged forests) that are usually owned through private leaseholds of government lands or state-owned, as is evident from several studies on CHT (Tripura, 2008; Roy, 2002). Whatever the ownership of the lands, villagers tend to collect NTFPs from each type of land with no regard to ownership; therefore, they collect NTFPs both legally and illegally. NTFP

rights are not defined in most cases possibly because of their labor-intensive lower market values to attract much income to the land owners in current market situation. And, in some cases although rights are defined, the rules are not strictly enforced. Most of these NTFPs are not managed; instead they grow wild in degraded forest lands, and in such cases land owners pay little mind to villagers collecting NTFPs. Even in most private plantation forests, given that the lands are managed mainly for the purpose of growing trees, the NTFPs remain underutilized (a typical problem with anti-commons, as shown by Buchanan and Yoon (2000)). The rich plantation owners, therefore, informally allow local people the privilege of collecting NTFPs on their lands. Such communal sharing is customary—it is part of the traditional rules of communal forest management among CHT's different ethnic populations (Gain, 2006). This kind of *de facto* open access to NTFPs provides owners and collectors with no incentives to extract them according to principles of sustainability (Hardin, 1968). Moreover, insufficient knowledge about the value of NTFPs, market access without a set of enforced rules, and a lack of NTFP management and marketing plans all contribute to unsustainable practices.

However, this trend of overexploitation of forest resources is reversed in the village common forests (VCF) management system that still exists sporadically in CHT. In this traditional system, the villagers all agree to a set of customary rules and incentives for all their household members to manage, use, and conserve the forest resources and this system ensured sustainability of forest resources in CHT for hundreds of years (Misbahuzzaman, 2008; Khisa et al., 2006). However, currently, very few CHT villages possess these VCF and their village-based management policies as they were interrupted by government new policies and interventions such as settlements of plain-lander Begalis in the Hills, hydroelectricity projects, paper mills, forests being designated as reserve forests, and exclusion of forest people from their traditional hill lands (Adnan, 2004).

The villagers have open access to forests that afford NTFPs; therefore, all the forests with NTFPs that are near villages have been depleted of their stock (UNDP-B, 2009). This means that villagers must now travel further in order to collect NTFPs from forests that are better stocked. However, if this pattern of unsustainable NTFP harvesting continues, all the NTFP resources will be depleted and degraded, rendering the forest lands unfit for forestry practices in future. Results show that because of the sharp resource depletion, villagers now spend more time collecting different NTFPs for their households, a consequence that impacts their health as well as the energy and time they can devote to household work including child rearing. Therefore, if NTFPs are to be used in such a way as to maintain sufficient subsistence and earn more cash money, due consideration must be given to a number of factors: land types, ownership, definitions of NTFP property rights, and education on conserving and domesticating the resources. Bista and Webb (2006) also suggested similar kinds of initiatives for conserving and sustaining NTFPs in Nepal.

The time households spend collecting different NTFPs also depends on the ways they are used within the households and their values in terms of subsistence and cash income. As my study results show, villagers spend most of their NTFP collecting time on gathering wild vegetables and bamboo shoots for their households' consumption. This is because the villagers do not need bamboo on such an ongoing basis as wild vegetables and bamboo shoots. On the other hand, NTFPs with higher market value, such as broom grass, medicinal plants, and menda bark, are not widely and frequently used within the households and market information about these products is also limited. Therefore, households spent less time collecting the latter NTFPs in comparison to wild vegetables, bamboo shoots, and bamboo. However, time-use patterns differ depending on districts and ethnicity, which are factors that, therefore, warrant attention in future NTFP-based development planning. NTFP-based initiatives would thus require site-specific and NTFP-specific interventions to facilitate subsistence and natural conservation. Some other studies

have proposed similar approaches (e.g., Shaanker et al., 2009; Maraseni, 2008; Ros-Tonen & Wiersum, 2003).

NTFP income and dependence: Estimating the contribution of NTFP income to the livelihoods of forest-adjacent communities in terms of subsistence and cash income is important in designing any development and conservation initiative (Wunder, 2001; Wollenberg & Ingles, 1998). In CHT, NTFPs provide more subsistence rather than cash income. However, different levels of income are realized from different NTFPs; villagers reported bamboo, wild vegetables and broom grass as the three most important NTFPs for both subsistence and cash sale. These NTFPs seem to have more market orientation and income opportunity than the others. For example, although medicinal plants and menda bark have higher market value, villagers have neither the market information nor the connections to markets necessary to make income from them.

A slight difference has been observed between villagers' view of the relative importance of specific NTFPs and the ranking of NTFPs based on household income survey data. In the villagers' view, the three most important NTFPs for sale are bamboo, wild vegetables, and broom grass, whereas survey income data from the households show that households get the most income from bamboo, wild vegetables, and sungrass, followed by broom grass and other NTFPs. The difference is in regard to third ranking between sungrass and broom grass as reported by villagers and ranked through household income data analysis respectively. Although sungrass appears to provide more total NTFP income (both subsistence and cash) than broom grass, the cash income from broom grass is much higher than that provided by sungrass. On the other hand, medicinal plants provide a little more cash income than do wild vegetables; however, households spent more time and collect wild vegetables more frequently than medicinal plants, and, therefore, most households prefer selling wild vegetables over selling medicinal plants.

My research findings also suggest that the importance of any given NTFP to the households depends on that NTFP's current ability to provide cash income as well as how extensively the majority of households collect it for both subsistence and cash income. Policy and development initiatives, thus, would entail focusing on NTFPs in terms of their ability to provide cash income, specialization of livelihoods (Ruiz-Pérez et al., 2004), household-market linkages, and the intensity of households' NTFP use.

In CHT, NTFP income appears to be much higher than income from timber and pole or from firewood. Although the finding that NTFP has a higher value than timber appears to conform to the results of Peters et al. (1989) in regard to the Amazon, the reason for NTFP's higher value may be different from that established in the Amazonian study. In my study, NTFP income is higher than income from timber and pole because of the area's heavily degraded forests. Similar to my findings, Ambrose-Oji reported that most of the NTFPs of south-west Cameroon come from secondary and fallow forests rather than from protected forests (2003). Currently, among all forest products, NTFPs and firewood are the most easily available forest resources in the degraded forest lands in CHT. Nevertheless, there are some private and government plantations focusing on timber production. Although the households' total NTFP income (subsistence and cash) is higher than their income from timber and pole, the cash income from the timber and pole is higher than the income from NTFPs. This means that NTFPs are mainly gathered by households for subsistence purposes, whereas timber is still the source of cash income for many families. This finding validates some other findings in the literature (Belcher et al., 2005). That said, there is scope for using NTFPs of higher market value, such as medicinal plants, menda bark, and broom grass, in order to obtain more cash income. More NTFP domestication initiatives as suggested by Bista and Webb (2006) for Nepal, and entrepreneurship (details in Chapter 5) can complement NTFP utilization initiatives by providing higher income to pro-poor villagers and relieving the pressure on wild NTFPs.

Observations regarding the villagers' seasonal dependence on various forest resources give a comprehensive picture against which to undertake any development initiatives. Seasonal variations in gathering forest resources including NTFPs have been observed in my study and the dependence of forest villagers on those resources are also reflected in studies of different regions (e.g., Das, 2005; Ingless, 1998; Kusters & Belcher, 2004; Neumann & Hirsch, 2000; Latif, et al., 2006.). My study results also show that villagers tend to depend on NTFPs and all other forest products to a greater extent in the long dry season that follows the rainy season. The reasons for this greater dependence during the dry season could be the inaccessibility of the forest during the rainy season and the unavailability of and lowered demand for certain forest products, for example bamboo, during this time. Moreover, villagers are more engaged with agricultural activities in rainy season and less dependent on forest products having more stock of agricultural crops.

Assessing villagers' relative dependence on NTFPs for their livelihoods is a primary prerequisite for initiating any NTFP-based intervention (Kusters et al., 2006; Ros-Tonen & Wiersum, 2003). CHT villagers appear to depend on NTFPs and other forest resources to a large extent. Although the NTFP income of the households increases as total household incomes increase, relatively poor households depend on NTFPs more than richer households do. This pattern of findings was also reported in several studies on the tropics (Arnold & Ruiz-Pérez, 2001; de Beer & McDermott, 1996; Belcher & Schreckenberg, 2007; Fox, 1995; Pimentel et al., 1997). A similar pattern of dependence has been observed in regard to forest-adjacent communities' dependence on total forest income; this is with the exception of the very richest group of villagers, who depend on the forest primarily for income from timber and other bulk sale of NTFPs. This is an interesting site-specific finding, although some of studies have claimed that overall forest dependence declines as household income increases (Angelsen & Wunder, 2003; Arnold, 2002; Arnold & Ruz-Perez, 1998; Cavendish, 2000, 1997; Neumann and Hirsch, 2000;

Pimentel et al., 1997; Wunder, 2001). Another important finding is that for the households in the study sites, forest income is their second largest income. In addition, all the households are involved in collecting forest products all year round. It is probable then that forest-adjacent communities depend on NTFPs and other forest resources to a great extent, and any forest-based development interventions should be designed to improve income and facilitate NTFP conservation. The goal would be to reduce poverty by providing alternative ways to generate income as poor people are more dependent than are wealthy people on NTFPs and other forest resources. Certainly, it is necessary that pro-poor groups receive adequate consideration in economic development and resource conservation initiatives (Arnold, 2001).

Households' NTFP income tends to be influenced by varied socioeconomic factors (Karki, 2001; Marshall et al., 2003, 2006); but these influences could be site-specific and are not necessarily generalizable to all socioeconomic conditions and geographic locations. Nonetheless, for a specific site, households' NTFP income could be estimated from the measures of the socioeconomic variables that represent different capital of the households. Therefore, understanding both seasonal variations in NTFP-dependence and the different socioeconomic factors that play a role in such is crucial to designing future conservation and income development initiatives.

Villagers' income from and dependence on processed products from raw NTFPs also play crucial roles in the rural economy. In the study sites, about 36% of households were found to be involved in various NTFP-processing activities, such as weaving bamboo baskets and other bamboo-made souvenir products; making agricultural implements, brooms, and wood-crafts; and preparing healing herbal medicines. My study results show that the current dependence of households on NTFPs in terms of income is very low; yet, there is great potential for using the villagers' traditional skills and knowledge to prepare processed forest products in order to generate more NTFP-based income. Several studies (e.g., Akhter et al., 1997; Alamgir et al.,

2005, 2006; Khan & Rashid 2006; Miah & Rahman, 2002; Nath et al., 2000) on the CHT region and other parts of Bangladesh show that villagers engaged in NTFP-processing cottage industries do have the potential to earn important cash income for households, but that more support in terms of raw material supplies, credit support, training and market access are necessary to realize it.

NTFP stock and abundance: In the absence of any proper inventory or monitoring of NTFP resources, estimating a locality's current stock of NTFPs from the forest-adjacent villagers' perceptions is an important element in designing an effective NTFP management and utilization plan. According to the villagers, the current NTFP stocks in CHT appear to be much depleted and degraded (with each NTFP scoring from 3 to 5 on a 0 to 10 scale); that the NTFPs in this area are depleted and degraded is also evident from some other studies (e.g., Gafur, n.d.; Rasul & Karki, n.d.). Therefore, special interventions are necessary to deal with the main causes—population pressure that leads to overexploitation of the resources, land clearing for different crops, and poor economic conditions of the households—that are causing the resource depletion. Banik (1998) also reported the depletion of NTFPs particularly bamboo and cane in CHT. However, few domestication and restoration efforts to increase the stock and abundance of the NTFPs (as the author suggested) have been undertaken so far. Since the reasons for stock degradation differ between types of NTFPs, it may be necessary to take separate specific measures to deal with the resource degradation issues associated with each NTFP (Alam, 1990; Banik, 1998; Shamsuddin, 2000) and likewise in regard to sustainable NTFP management planning measures (FAO, 2005a; GOB, 2009; Islam, 2003; ITTO, 2006; Nasreen et al. 2006; NSP, 2006; Rafi & Chowdhury, 2001; Roy & DeCosse, 2006; SCBD, 2001). Well-planned market access with clear rules and incentives for conservation may also be essential.

The degradation of NTFP stocks in a village's environs eventually compel the villagers to travel further to collect NTFPs and, therefore, to dedicate more time to collecting NTFPs. Under

the current trend of NTFP stock degradation, the Hills may become so much degraded that it may not support future forestry practices. Further, as my results show, various factors such as differences in districts, villages, and ethnicities may have effects on the quality and availability of NTFPs. Distinct bio-physiographic locations, traditional NTFP management or extraction practices, and different ethnic groups' traditional knowledge of how to use NTFPs all contribute to differences in NTFP stocks according to location. Undefined rights for NTFP resource accessibility, varied market access, unreliable transportation facilities, food habit and varied dependence of the forest villagers on the NTFPs and lack of domestication initiatives could be the underlying causes of stock degradation. Adequate attention to stocks of NTFP and the causes and consequences of current extraction trends is necessary to establishing effective programs for conservation and improving livelihood income. Lessons could be learned from some good examples of interventions as observed and implemented in China (Hunter et al., 2003), Vietnam (Duong, 2003), Lao PDR (Foppes & Ketphanh, 2005), India (Shaanker et al., 2009, 2004), and Nepal (Larsen et al., 2000).

The extent to which the stock of an NTFP has become depleted should be understood in the context of different socioeconomic pressures and markets. For example, rattan (cane) used to be a significant NTFP (this is a climbing plant that usually grows on tall trees) in CHT; it was sold at market for cash, but it is now extremely scarce thanks to the felling of all the large trees except for some in plantations in village homesteads and in a few reserve forests (my field observations and my personal interviews with forest officials; Alam, 1990; Banik, 1998). Excessive market demand for rattan, land disputes, lack of defined property rights, lack of local people's participation in forest management (Renuka, 2002), lack of law enforcement, lack of domestication and conservation initiatives through the government forest department, poverty, and overpopulation led to the rapid depletion of this NTFP resource (personal observation, discussion with concerned stakeholders; Alamgir et al., 2006; Miah & Rahman, 2002). Other

NTFPs that are becoming depleted at an alarming rate could well meet the same fate if interventions that include incentives for development and conservation are not put in place to engage local people in NTFP management practices (Safa, 2006).

4.6 Conclusion and recommendations

In sum, the gathering of various types of NTFPs, most importantly bamboo, wild vegetable and broom grass, is strongly related to the livelihoods and lifestyles of CHT's forest-adjacent communities. Female members of the households collect most of the NTFPs that are very important for household uses (subsistence income) and cash income. Cash from the sale of NTFPs, which is less than subsistence income, still enables some of the villagers to purchase some daily necessities from nearby markets. NTFPs act as a safety net for most of the villagers. Although the contribution of different types of NTFPs is variable in terms of subsistence and cash income, overall NTFP income is much higher than income from timber and pole and higher than income from firewood; thus, it is clear that the households are largely dependent on NTFPs. My study explores a specific example of people's continued dependence on forests for subsistence even as those forests become degraded. It explores conditions in which unsustainable forestry practices, such as the illegal logging of trees and harvesting of other forest products, prevail with no management focus on NTFPs, and in which no substantial NTFP-based interventions for enhancing the livelihoods of forest-adjacent people and better conservation of the forest ecosystems are undertaken. It illustrates, too, how inappropriate government policies make forest-dependent poor people more vulnerable, as also pointed out by Biswas and Choudhury (2007), when the forests accessible to them are becoming depleted and degraded at an alarming rate. Given that different socioeconomic and bio-physical factors influence the nature of particular forest-adjacent people's dependence on NTFPs, interventions should be planned accordingly.

Several development and conservation interventions, policy initiatives, and incentives to managing and conserving NTFPs in the long-term interest of the villagers:

- Undertaking NTFP-specific interventions, such as domestication, integrated land use systems, and initiatives for NTFP-based cooperatives involving forest villagers, would help rehabilitate the degraded forests and reduce poverty if true participation were to be systemic (Nath et al., 2005; Safa, 2006).
- Establishing gender-specific initiatives, such as engaging females more in NTFP management and income generation and providing incentives for both female and male children to attend school would help villagers' achieve better livelihoods in the long run.
- Emphasizing NTFPs that are mainly used for subsistence would help maintain and conserve stocks for the future needs of the villages.
- Focusing on potential NTFPs with high market value would bring more cash income through enterprise development, credit support, and cultivation technique and supports.
- Defining land rights and NTFP usufruct rights are important for developing awareness regarding their importance to sustaining the ecosystem and, therefore, livelihoods.
- Identifying the weaknesses of indigenous forest management systems and adopting a people-oriented small-scale cooperative approach would help ensure that sufficient and appropriate incentives are offered (DN, 2001).
- Updating forest, land use, and related policies focused on NTFPs that would contribute to the development of long-term and short-term NTFP management planning.

- Undertaking sufficient measures to implement policies is essential; these include setting defined NTFP extraction and management rules and strengthening their enforcement.
- Undertaking initiatives to provide parallel support to other kind of income-generating opportunities would reduce poverty and increase the income of forest-adjacent people.
- Encouraging more education and establishing effective family-planning programs would help create better living conditions in areas where natural forest resources have become limited.

Chapter 5

Market Constraints and Market Potentials for NTFPs at the Village Level

5.1 Introduction

Most of the villagers in Chittagong Hill Tracts (CHT) are directly or indirectly linked with NTFP markets for their livelihoods and to buy necessities. NTFP markets can be formal or informal; both types are generally characterized by various constraints. Although there is considerable potential for NTFP-based development and conservation, little research has been done to identify market constraints and identify and explore initiatives to overcome them. This knowledge gap fosters the continuation of unsustainable practices that accelerate the depletion of NTFP resources. Likewise, it retards NTFP-based domestication and entrepreneurship development initiatives aimed at the sustainable management of NTFP resources.

To bridge that knowledge gap, my study focuses on the following specific research questions: (i) What are the constraints and potential impact inherent in the market development of NTFPs and how could NTFPs be better utilized? (ii) How do various socioeconomic factors influence villagers' NTFP market knowledge and their focus in terms of income generation? (iii) What are the current initiatives focused on domesticating NTFPs and NTFP-based enterprise development? And, what are villagers' opinions of them? (iv) Would NTFP-based entrepreneurship development initiatives both encourage sustainable use of NTFPs and yield higher incomes for villagers? (v) Is the current exploitation of NTFPs for household and commercial uses sustainable? If not, why? This chapter answers these questions by presenting and analyzing results based on field data and observation. I start by giving an overview of the market systems of NTFPs in CHT and then focus on related market constraints, prospects, and market knowledge issues. In the context of this overview, I next describe and analyze issues

inhering in the domestication, entrepreneurship development, and impacts of commercialization as they relate to NTFPs. Finally, having analyzed the causes and consequences of current unsustainable NTFP practices, I provide recommendations for sustainable use of NTFP resources designed to yield both better livelihoods for local people and contribute to conservation over the long term.

5.2 Existing NTFP market characteristics in Chittagong Hill Tracts

NTFP markets in CHTs comprise formal and informal structures, activities, and processes. Most formal markets, that usually comprise physical structures such as shops and/or arrangement of buyers and sellers at a particular place, are located road- or river-side near villages, or at local and district markets. NTFPs are collected from forests, semi-processed (sorted, bundled, seasoned etc.) and carried to the nearby markets. In some cases, the raw NTFPs are directly sold to the markets. Depending on the type of NTFP and the scale of the household collections, these products are sold in markets on either a retail or wholesale basis. With the exception of roadside markets, every local or district market has specific market days, usually twice weekly. Villagers carry the NTFPs to market and sell there on these particular days. In many cases, villagers go to market with a dual purpose: to sell the NTFPs they have gathered and to buy the commodities they need. Having sold their NTFPs for cash, many villagers buy other commodities with the money.

At informal markets, traders or middlemen come to villages and purchase NTFPs with cash or order a future supply through an informal advance money lending system known as *dadon*. Through this system, influential local traders advance money to the poor villagers, thereby compelling the villagers to collect a particular NTFP and sell it exclusively to them (Personal observation; Adnan, 2004). This system actually constitutes a trap for the villagers, especially

given that the villagers usually receive a lower price through it than the price of the NTFP in local markets. In most cases, the traders use middlemen to disburse the money to the villagers before the harvesting season begins. These middlemen, who often work on a commission basis on behalf of traders, are usually local people linked with the villagers and work as market linkage between the villagers and the traders. Once the NTFPs have been gathered and the villages are stocked with them, middlemen then carry them as a bulk load using locally arranged labor and transport to supply them to local, regional, or national market traders.

5.3 NTFP market constraints

Villagers identified many NTFP market constraints that deprive them of opportunities to make income. Three major NTFP market constraints are lack of sufficient transport facilities, lack of capital and/or financial support, and lack of market information (Figure 5-1). Other significant market constraints include lack of a nearby marketplace and middlemen linkages, poor road and water communication systems, the informal money lending system, and lack of awareness and training about the kind of NTFPs that have better markets.

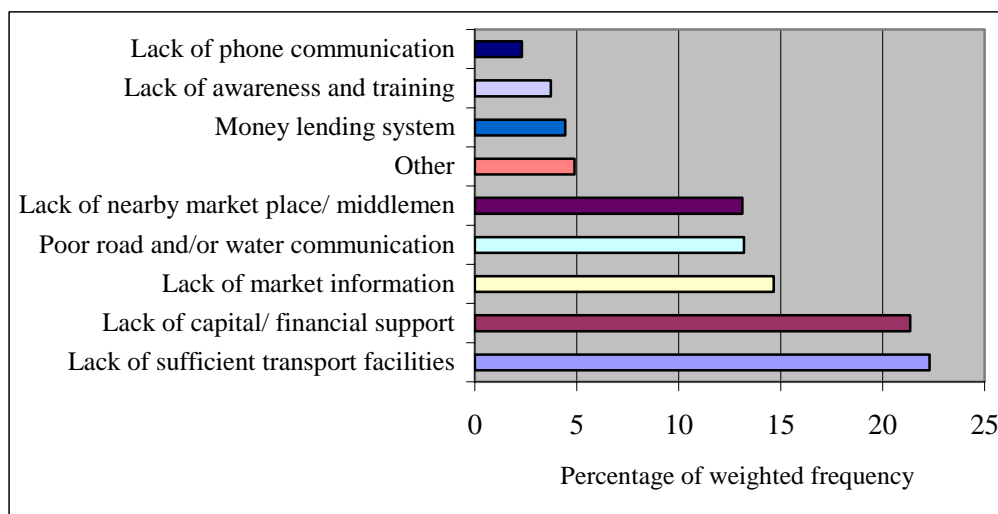


Figure 5-1: Market constraints for the NTFPs (N=209).

Lack of capital or financial support is a market constraint common to all NTFPs; however, there are also constraints that are specific to particular kinds of NTFPs (Table 5-1). Bamboo, wild vegetable, and bamboo shoot markets are characterized by constraints such as lack of sufficient transport facilities, lack of capital or financial support, and poor road and/or water communication systems. For medicinal plants, broom grass, and *menda* bark, the major market constraints are lack of market information and lack of capital or financial support. However, although the lack of a nearby marketplace and the lack of middlemen linkages constitute major market constraints for medicinal plants and *menda* bark, they generally have little effect on the broom grass market. Lack of sufficient transport facilities appears to be a market constraint common to all NTFPs, except for medicinal plants.

Table 5-1: Market constraints vary between-types of NTFPs.

| NTFPs | Main three market constraints |
|------------------|--|
| Bamboo | Lack of sufficient transport facilities, lack of capital or financial support, poor road and/or water communication |
| Wild vegetables | Lack of sufficient transport facilities, lack of capital or financial support, poor road and/or water communication |
| Medicinal plants | Lack of market information, lack of capital or financial support, and lack of a nearby marketplace or middleman linkage |
| Bamboo shoot | Lack of sufficient transport facilities, lack of capital or financial support, poor road and/or water communication |
| Broom grass | Lack of sufficient transport facilities, lack of capital or financial support, and lack of market information |
| Menda bark | Lack of capital or financial support, lack of market information, lack of a nearby marketplace or middleman linkage, lack of sufficient transport facilities |

For bamboo, wild vegetables, and bamboo shoot, villagers are especially concerned about transport facilities, communication systems, and financial support; they are less worried about market information and market linkages. On the other hand, villagers see lack of market information and lack of a marketplace or linkages as bigger constraints in the case of medicinal plants, broom grass, and *menda* bark. One reason for these differences could be that villagers are

more informed about the market and linkages for bamboo, wild vegetables, and bamboo shoot than they are in regard to medicinal plants, broom grass, and menda bark.

For broom grass, many villagers do not know where to get a better price or how to find and communicate with other broom grass traders. For medicinal plants, many villagers do not know that a particular plant could be sold at market for a cash income. Only a few villagers have this income opportunity— those directly related to the local healers (*boiddo* and *kabiraaqj*) who usually place orders for medicinal plants with them. Similarly, in the case of menda bark, most villagers tend not to have market information or a market linkage; very few have the information to use menda bark as a good cash alternative income. The availability of transport facilities has little effect on the medicinal plant market. The key is information: specifically, the villagers need to know exactly where to sell a particular plant's product.

The villagers pointed out different types of initiatives that are essential to eliminating these market constraints and giving them better market access. The villagers identified the three initiatives most important to this purpose as developing more transport facilities, arranging more financial support, and enhancing the villagers' access to NTFP markets through extension officers and through radio and other media (Figure 5-2). Other suggested initiatives include efforts to make people more aware of NTFP markets and government or private initiatives to develop more marketplaces, more roads, and improved infrastructure.

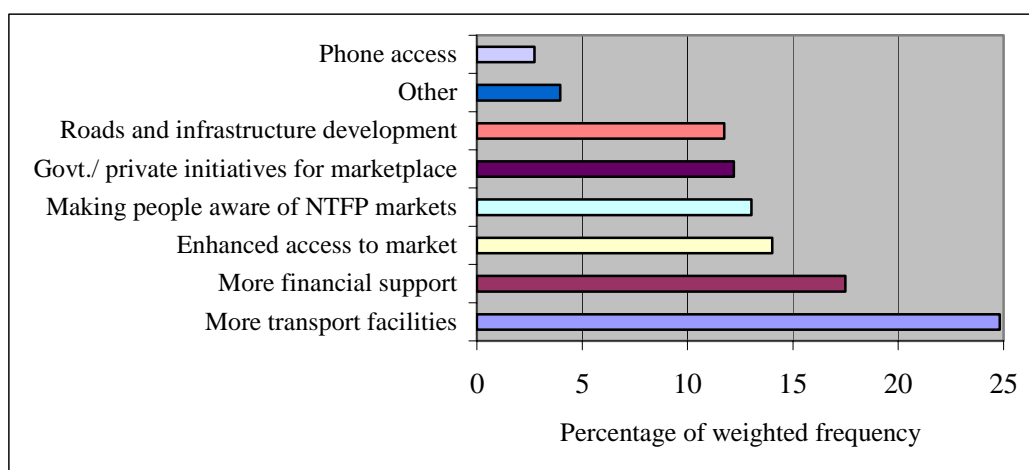


Figure 5-2: Initiatives required to eliminate NTFP market constraints (N= 209).

Although the initiatives mentioned above are applicable to most NTFPs, some also require different types of initiatives (Table 5-2). A Chi-square result shows that these suggested major initiatives differ significantly ($p < .001$) between different types of NTFPs (see Appendix E). More transport facilities seem to be the common suggested initiative for all NTFPs, except medicinal plants and menda bark. Again, more financial support in terms of credit is suggested for all the NTFPs except medicinal plants. Bamboo, wild vegetables, and broom grass require similar types of initiatives to eliminate their market constraints.

Table 5-2: Initiatives for eliminating market constraints for different types of NTFPs.

| NTFPs | The three main initiatives for eliminating market constraints |
|------------------|---|
| Bamboo | More transport facilities, more financial support as grants or loans, and road and infrastructure development |
| Wild vegetables | More transport facilities, more financial support as grants or loans, and road and infrastructure development |
| Medicinal plants | Government or private initiatives for market development (new marketplace or facilities), efforts to improve awareness of markets for medicinal plants, and enhanced access to market information |
| Bamboo shoot | More transport facilities, more financial support as grants or loans, road and infrastructure development |
| Broom grass | More transport facilities, enhanced access to market information, and more financial support as grants or loans |
| Menda bark | More financial support as grants or loans, efforts to improve awareness of markets for the plants, enhanced access to market information |

On the other hand, enhanced market information is commonly suggested for medicinal plants, broom grass and menda bark. Moreover, in the case of medicinal plants, the villagers asked for more government, NGO, and/or private initiatives and for marketplace or display center facilities as well. Initiatives focused on developing more awareness of the product are also of great importance in eliminating the market constraints for medicinal plants and menda bark.

5.4 NTFP-related market knowledge and information sources

If villagers are to make informed decision about price, involvement in trade, and alternative livelihood strategies, it is imperative that they acquire up-to-date and extensive market knowledge. Better market knowledge flow usually helps people to learn more about NTFP markets and subsequently to increase their earnings. Among the villagers who sell NTFPs, 98% answered that they could earn more if they knew more about the NTFP markets. When asked about the possible ways for earning more from NTFPs, 56% agreed that they would be able to sell to the people offering the best price and/or they would have the flexibility to try other sale options, 30% stated that they could organize themselves to bargain more, and 13% agreed that they could conserve NTFP resources for future.

Results also show that the households have different levels of knowledge of the market chains for different NTFPs (Table 5-3). On a scale of 0 to 10, the villagers' knowledge score is much higher for wild vegetables (average score 7.27) and bamboo shoots (average score 6.46) than for other NTFPs (average score range .85 to 3.79). The average market knowledge score of respondents for bamboo and broom grass is between 3 and 4, but their market knowledge of medicinal plants and menda bark is too low (average score below 1) for lack of sufficient market orientation. For wild vegetable and bamboo shoots, the respondents' market knowledge is high; this could be because these NTFPs have shorter market chains that involve few stakeholders and

market steps. For bamboo and broom grass, villagers have some market knowledge (score between 3 and 4), though it is much less extensive than their market knowledge for wild vegetables and bamboo shoots. The villagers' market knowledge of medicinal plants and menda bark is very low, indicating that only a few of the respondents have limited market knowledge about these two NTFPs.

However, for all the NTFPs, the villagers' market knowledge mostly consists of information about different stakeholders, different steps performed in the trade chains, destinations, and end users. They have considerably more information of this kind, than they do about other market information. About the profit margins between different stakeholders and the final prices of different NTFPs, they know very little.

Table 5-3: Villagers' NTFP-related market knowledge (N= 209).

| Are you aware of the following: | NTFP-related market knowledge of respondents (Mean score*) | | | | | |
|---|--|---------------|-------------|-----------------|------------------|------------|
| | Bamboo | Bamboo shoots | Broom grass | Wild vegetables | Medicinal plants | Menda bark |
| a) Different-level stakeholders in the NTFP trade | 4.58 | 7.44 | 4.98 | 8.08 | .91 | 1.09 |
| b) Different steps in the trade | 3.91 | 7.15 | 4.37 | 7.88 | .64 | .73 |
| c) Profit margin between different traders | 2.81 | 6.09 | 3.23 | 6.99 | .60 | .71 |
| d) Destinations | 3.61 | 6.20 | 3.31 | 7.06 | .69 | .61 |
| e) Final prices | 2.55 | 5.75 | 2.60 | 6.62 | .59 | .56 |
| f) End users of the NTFPs | 3.66 | 6.11 | 4.23 | 7.01 | 1.72 | 1.38 |
| Average Score | 3.52 | 6.46 | 3.79 | 7.27 | .85 | .85 |

* No market knowledge <0 1 2 3 4 5 6 7 8 9 10> Full market knowledge

Respondents' market knowledge of different information pertaining to the market chain for specific NTFP also varies. For bamboo, the villagers are somewhat aware of different stakeholders in the value chain and different steps (such as semi-processing and value adding), scoring between 3 and 5. However, their knowledge about the profit margins between traders, the bamboo's ultimate destinations, and who consumes it and at what price is lower, with villagers scoring between 2 and 4.

For bamboo shoots, most of the villagers are collectors who are most informed about the stakeholders' levels and the different steps (sorting, carrying, storing, preserving) involved in preparing the NTFP for market; in this regard, the villagers' average score is above 7. However, the average knowledge score about profits, destinations, final prices, and end users is a little lower (around 6); this is still much higher than scores on the same items for many of the other NTFPs. In addition, market knowledge for wild vegetables shows a similar pattern to that for bamboo shoots.

In the case of broom grass, the average market knowledge of the villagers is 3.79, which is less than half of the highest score possible. This is the third largest average market knowledge score, following wild vegetables and bamboo shoots. For the broom grass market, villagers have more market knowledge about different types of stakeholders and different steps in the broom grass trade than they do about profit margins between traders, the products' destinations and final prices.

For medicinal plants and menda bark, the villagers are considerably less aware of the market, scoring only .85. In comparison to other NTFP market chains, villagers know very little about the stakeholders, consumers, and users of medicinal plants and menda bark, and they know almost nothing about the steps, profit margins, prices, and destinations of these items.

Different socioeconomic variables impact the respondents' market knowledge of various NTFPs (Table 5-4). Respondent's education is significantly positively related to bamboo and menda bark market knowledge scores. This relationship suggests that as the household members' education level increases, so does their market knowledge for bamboo and menda bark. However, this bivariate correlation is not significant in the case of bamboo shoots, wild vegetables, broom grass, and medicinal plants. Interestingly, the more educated villagers tend to have less knowledge of the bamboo shoot and wild vegetable markets. This could be because the more educated villagers are less involved in wild vegetable and bamboo shoot trading. However, for

broom grass and medicinal plants, the observed correlation for education is positive, but not to an extent that is significant. The respondent's age also does not significantly affect market knowledge score.

Table 5-4: Bivariate correlation of different socioeconomic factors with market knowledge scores for various NTFPs.

| Explanatory variables | Correlation (r-value) with NTFP market knowledge scores (N = 181) | | | | | |
|-------------------------------------|---|---------------|-----------------|-------------|------------------|------------|
| | Bamboo | Bamboo shoots | Wild vegetables | Broom grass | Medicinal plants | Menda bark |
| Respondent's education | 0.151* | -0.038 | -0.088 | 0.146 | 0.131 | 0.278** |
| Respondent's age | 0.017 | 0.133 | 0.135 | -0.011 | -0.014 | -0.123 |
| household's total income | 0.215** | 0.187* | 0.134 | 0.245** | 0.240** | 0.078 |
| Distance of forest products' market | 0.318** | 0.328** | 0.152* | 0.271** | 0.271** | 0.216** |

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

Household income is significantly related to the market knowledge scores for different NTFPs except for wild vegetable and menda bark. The higher the household's income, the more extensive is their market knowledge for bamboo, bamboo shoots, broom grass, and medicinal plants. The distance between the village and the forest products' market also has positive significant effects on the villagers' market knowledge for all the NTFPs. The data show that the further away the market is from the village, the higher the villagers' market knowledge score. This could be because existing NTFP market knowledge is related to the extent of villagers' NTFP-related involvement, which, in turn, depends on the relative local abundance or scarcity of NTFPs in a given village's locale. Villagers in distant places who are engaged in NTFP collection and who sell the product may have more knowledge about the market than villagers who reside nearer to market but have less involvement in selling NTFPs.

Spearman rank correlation analysis (Table 5-5) shows that the gender of the household member is significantly negatively correlated with the market knowledge scores of bamboo, medicinal plants, and menda bark. For these NTFPs, it illustrates that male household members

have more market knowledge than do female household members. In the case of wild vegetables, bamboo shoots, and broom grass, this relationship is not significant.

Table 5-5: Nonparametric correlation of different socioeconomic factors with market knowledge scores for various NTFPs.

| Categorical variables | Spearman correlation (r-value) with NTFP market knowledge scores (N = 181) | | | | | |
|---|---|---------------|-----------------|-------------|------------------|------------|
| | Bamboo | Bamboo shoots | Wild vegetables | Broom grass | Medicinal plants | Menda bark |
| Respondent's sex | -.319** | -.124 | .007 | -.143 | -.252 | -.247** |
| Household's membership in the largest ethnic group of the village | .194** | -.014 | .057 | .088 | .094 | .140 |
| Road access by car | -.266** | -.257** | -.146 | -.209** | -.319** | -.278** |

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).

NTFP market knowledge also differs based on whether or not the household belongs to one of the village's largest ethnic groups of the village. For bamboo and menda bark, whether or not the household belongs to one of the village's main ethnic groups is significantly related to the household member's market knowledge. However, there is no significant correlation between whether or not the household belongs to a main ethnic group and market knowledge scores for bamboo shoots, wild vegetables, broom grass, and medicinal plants.

Road access by car to a village where the household is located is significantly negatively correlated with the villagers' market knowledge scores for all the NTFPs except wild vegetables. In most NTFPs' cases, this suggests that the household belonging to a village that has road access tend to have low market knowledge as compared to the NTFP market knowledge of villagers who are located in remote areas without road access and who probably have water communication by boat. This could be because households in villages accessible by car are less involved in NTFP trade due to their locales' depleted stock of NTFPs, than are villagers in remote places who are more involved in NTFP markets given their areas' relative abundance of NTFPs. It is likely that villages accessible by road experienced accelerated NTFP depletion in a context in which there

were no incentives to conserve the resources. Eventually, it became necessary for villagers to become involved in other income-generating alternatives.

In the socioeconomic context of the study sites, market knowledge of NTFPs could be estimated from the measures of different factors such as the distance between the village and the forest products market, road accessibility to the village where the household is located, whether the household belongs to one of the village's largest ethnic groups, and the sex and education of the household member, as shown in the following model for the market knowledge of bamboo. A regression model (Table 5-6) to estimate villagers' market knowledge of bamboo from measures of different socioeconomic factors has been shown here:

Villagers' market knowledge of bamboo = 1.675 + .304* Distance of forest products' market - 1.377* Road access by car - 1.123* Sex of respondent + 1.394* household belongs or does not belong to the largest ethnic group of village + .095* Education of respondent.

Table 5-6: Regression-correlation analysis for the relationships different soci-economic factors to villagers' market knowledge of bamboo (N =181).

| Independent Variables | Bivariate correlations | Final model | | |
|---|------------------------|-------------|---------|-------------|
| | | b-value | Partial | Part. corr. |
| Distance of forest products' market | .318*** | .304*** | .378 | .342 |
| Road access by car | -.255*** | -1.377*** | -.300 | -.264 |
| Sex of respondent | -.306*** | -1.123** | -.259 | -.225 |
| Household belongs or does not belong to the largest ethnic group of village | .190** | 1.394* | .177 | .151 |
| Education of respondent | .151* | .095* | .153 | .129 |
| Constant | | 1.675* | | |
| Multiple R | | .546* | | |
| R-square | | .298* | | |

*Significant at the 0.05 level; **Significant at the 0.01 level; ***Significant at the 0.001 level

Similar kinds of models could be estimated for assessing villagers' market knowledge of other NTFPs as well.

ANOVA also shows that bamboo market knowledge scores differ significantly between different ethnic groups, between districts, and between villages (Table 5-7). Among the different

ethnic groups, Chakma members have the highest scores followed by Tanchaynga members. On the other hand, Tripura and Mro members have the lowest scores in market knowledge of bamboo.

Table 5-7: Differences in bamboo market knowledge scores by ethnicity, districts, and villages.

| Explanatory variables | N | Bamboo market knowledge (mean score) | F-value | p-value |
|-----------------------|----|--------------------------------------|---------|---------|
| Ethnicity | | | | |
| Chakma | 81 | 4.58 | 7.051 | .000 |
| Marma | 47 | 2.70 | | |
| Tanchangya | 19 | 3.04 | | |
| Tripura | 2 | 0.59 | | |
| Bawm | 10 | 2.23 | | |
| Kheong | 14 | 2.88 | | |
| Mro | 8 | 1.56 | | |
| Districts | | | | |
| Bandarban | 91 | 2.26 | 68.707 | .000 |
| Rangamati | 90 | 4.74 | | |
| Villages | | | | |
| Lemujhiri para | 8 | 1.73 | 6.670 | .000 |
| Thoaingya para | 21 | 2.19 | | |
| Prue Mong U para | 11 | 2.30 | | |
| Uzi Headman para | 7 | 3.81 | | |
| Punorbason para | 12 | 1.53 | | |
| Ghungru para | 14 | 2.88 | | |
| Faruk para | 10 | 2.23 | | |
| Renikheong para | 8 | 1.56 | | |
| Bodhipur para | 23 | 4.72 | | |
| Khamar para | 21 | 5.25 | | |
| Agyachari para | 13 | 3.62 | | |
| Hazachari para | 8 | 5.19 | | |
| Mubachari para | 12 | 4.25 | | |
| Kandabachara para | 13 | 5.26 | | |

Between the two districts, household members of Rangamati have much higher scores in bamboo market knowledge than do Bandarban members. Market knowledge scores also vary significantly between household members of different villages: Results suggest that the bamboo market knowledge scores of Punorbason para's and Renikheong bagan para's household members are lowest, whereas the household members of Knadabachara para and Khamar para have the highest scores.

5.4.1 Sources of market information

Having access to good sources of market information is crucial if the villagers are to obtain better prices and forge long-term market linkages with other NTFP stakeholders. Among the many existing sources of NTFP market information, the most important are the villagers, local markets, village heads, and traders (Figure 5-3).

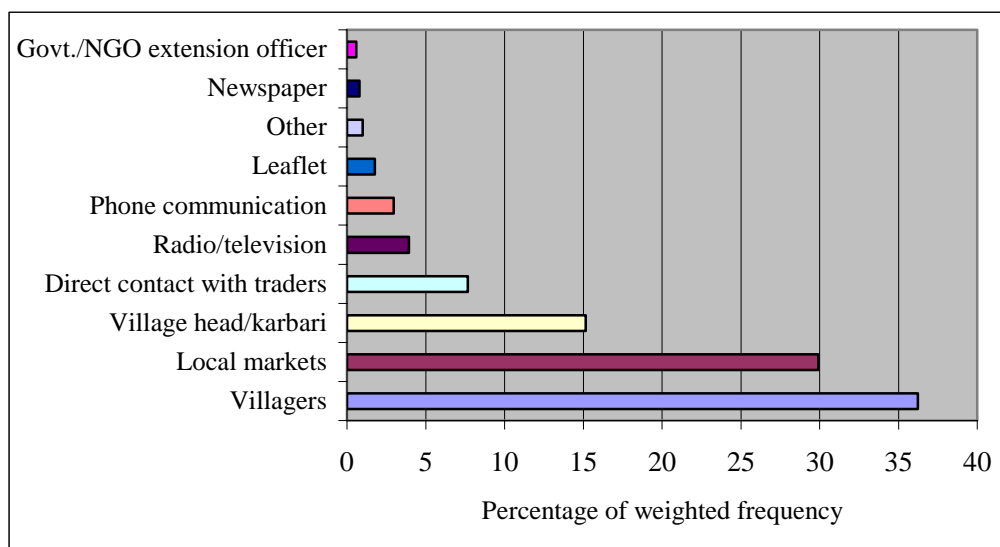


Figure 5-3: Existing sources of information for NTFP markets (N= 209).

Since the villagers do not have sufficient access to NTFP market information, they are eager to obtain the kind of information that will allow greater access to the available NTFP markets. According to the villagers, the three most important kinds of information relevant to gaining more income from NTFP markets are market price, last month's or season's trade history and trends, and information about more NTFP traders (Figure 5-4).

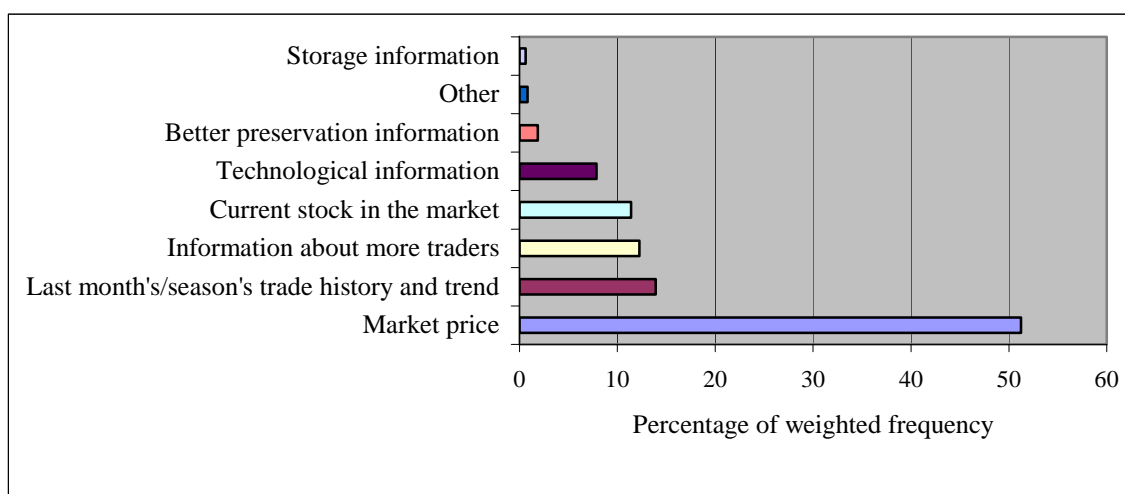


Figure 5-4: Kinds of information needed for better access to NTFP markets (N= 209).

The single most-valued piece of information is market price. Other kinds of information that would be of assistance to the villagers include the current stock of NTFPs in the market, technological information, and better NTFP preservation information about how to extend the self-life of the collected NTFPs.

5.5 Domestication of NTFPs

The domestication of NTFPs could play a vital role in better conserving resources and providing an enhanced income to villagers. Although few domestication initiatives exist, 76% of the villagers believe that domestication of NTFPs could put less pressure on the natural forests. In support of this belief, the villagers assert that they would not have to go to distant forests if NTFPs were grown nearby as domesticated varieties. They also note that domestication would encourage more natural regeneration of NTFPs and reduce disturbance to natural forests. Further, the villagers also state that it would be easier to harvest more NTFPs from the plantations near their households than from distant natural forests.

Although natural stocks of NTFPs are degrading in CHT day by day, there are few domestication initiatives. This is so for a number of reasons. Among the villagers, 93% of respondents don't domesticate any NTFPs, and they gave several reasons for not doing so. The main reasons are lack of land, lack of financial support, lack of training, and lack of awareness (Figure 5-5). Land disputes sometimes arising from undefined land rights is one of the main problems contributing to resource degradation and creating an uncertain setting for domestication initiatives. The poor economic condition of the households in CHT is also not supportive, and there is little incentive for encouraging domestication. The villagers have very little if anything in the way of savings, and there is no small-scale credit support to encourage domestication activities. Also, there is little government or NGO support for NTFP domestication activities. Because of the low literacy rate and lack of awareness-raising and domestication-training programs, the villagers do not know how to cultivate most of the NTFPs; nor do they realize the potential that such an approach has for generating more income.

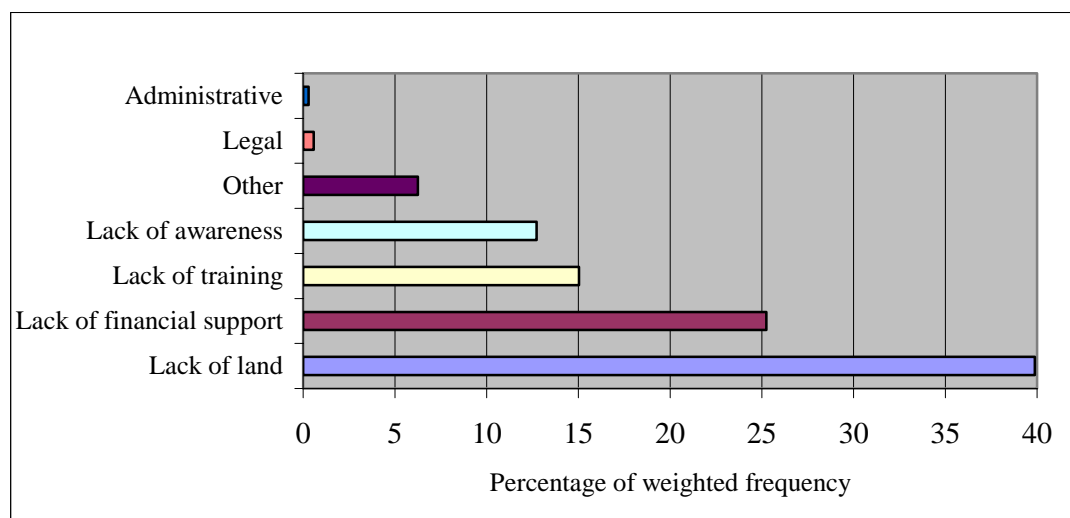


Figure 5-5: Reasons for not domesticating NTFPs (N= 209).

Bamboo is the main NTFP species that the villagers cultivate; that is, among the respondents who domesticate NTFPs, 75% planted bamboo. Although there are many planting methods for bamboo (Khisra, 2006), most of the villagers who cultivated bamboo did so using rhizomes in their own hills or in lands away from homesteads. The average size of the land devoted to cultivating bamboo was 0.47 acres per household. The villagers also domesticated some other NTFPs: a few medicinal plants, some wild vegetables and *Agar* trees (for resin). Most of these domestication initiatives by villagers are on trial basis and on a very small scale.

It is apparent that some NTFP species are not cultivated because the villagers are not educated in regard to the scientific cultivation techniques necessary to do so. For example, broom grass was not cultivated traditionally, as it had long been abundant everywhere around CHT. But the availability of this species is now declining at a sharp rate. Local people generally do not know how to cultivate broom grass, and, are reluctant to undertake it on a trial and error basis. However, there are a few examples of broom grass being cultivated on a few acres of land within CHT outside the study villages on a trial basis. Some of those broom grass plantations appear to be successful, and outside stakeholders and traders of broom grass are encouraging them as they have the potential to provide a continuous supply of the plant (personal communication with a broom grass trader).

In regards to menda bark, although the bark has industrial applications, these plants are not cultivated because lack of awareness, lack of education about scientific techniques, and lack of organizational support. Yet menda can be cultivated from seeds, and the seedlings can be raised in nurseries. Large mono or mixed plantations can be raised with the help of the forest department and the participation of local people. Such initiatives are needed for medicinal plants too. A few NGOs in concert with the Bangladesh forest department have already started planting some of the medicinal plants in nursery areas and some in mixed stands with other tree species. For example, Green Hill in Rangamati and Taimu in Bandarban have trial nurseries for medicinal

plants. These are promising initiatives, but a more comprehensive plan and dedicated management are required, if other areas are to respond and also play a role in providing a continuous supply of medicinal plants.

Currently, there are a few organizations that do support NTFP-based development in CHT, some of which are providing planting materials and developing awareness about the conservation of NTFPs with a view to initiating NTFP-based entrepreneurship at the village level. For example, Green Hill, Rangamati, and Graus and Taimu, Bandarban, distribute seeds and related planting materials for a number of NTFPs. The United Nations Development Program (UNDP) funded CHT Development Facilities Program also conducts horticultural activities, including cultivating medicinal plants, in the study areas. The CHT Development Board, a government organization, has taken initiatives to rehabilitate some landless villagers including establishing rubber tree plantations. The board gave the villagers the opportunity to manage the trees, extract latex from them, and sell it to the board's own rubber-processing factory. Similarly, the forest department, the other government department in CHT, undertook some initiatives to plant bamboo, cane, and medicinal plants on their own lands, although these initiatives were not successful as they lacked local people's participation.

Domestication of NTFPs appears to provide more income to the villagers concerned. Supported by the CHT Development Board, the rubber tree plantation in the ways noted provided an income opportunity to the villagers of Punorbason para (details in Appendix B). The NTFP income of the household in this village is much higher (Figure NTFP income ch-4) than that of any of the other villages in the study sites—this is because the other villages do not have any initiatives in place to domesticate an NTFP. Also, Punorbason para's people seem less dependent on other wild NTFPs for cash income. However, the villagers also collect various types of NTFPs, in large part because they are traditional subsistence foods. If the other villages were to follow Punorbason para's lead and establish their own domestication initiatives for NTFPs and

then over time if all the villages were to domesticate more NTFPs in order to supply emerging markets, the villagers could enjoy alternative income sources and the NTFP species could return to their former abundance in the natural forests.

5.6 Entrepreneurship development initiatives based on NTFPs

NTFP-based entrepreneurship development initiatives can play a vital role in generating alternative incomes for the villagers, and they would also encourage sustainable NTFP-extraction practices. Although the government had established a few bamboo- and cane-based cottage-industry development initiatives in CHT, most had failed because of lack of coordination between government departments (Bangladesh Cottage Industries Corporation, Forest Department, District Council, CHT Development Board, etc.), insufficient financial credit support, lack of product market information and linkages, and weak product development support and training. However, no such NTFP-based enterprise (cottage industry, cooperative, or small NTFP farm) was observed in the study villages. There are also no government or non-government organizational activities to organize villagers and encourage them to pursue entrepreneurship development activities through cooperative groups, technology transfer, and capacity building, with the exception of the one rubber plantation described earlier.

However, villagers are willing to participate in such entrepreneurship development initiatives. This study's results show that 99.5% of respondents want to be NTFP-based cooperative members. The key reason for the villagers' wish to join an NTFP-based cooperative is the belief that they will be able to learn more, earn more, and save more through engaging in cooperative activities (Figure 5-6). Another important reason is that the villagers view NTFP-based cooperative membership as giving them more organizational strength to bargain and hence obtain a better price.

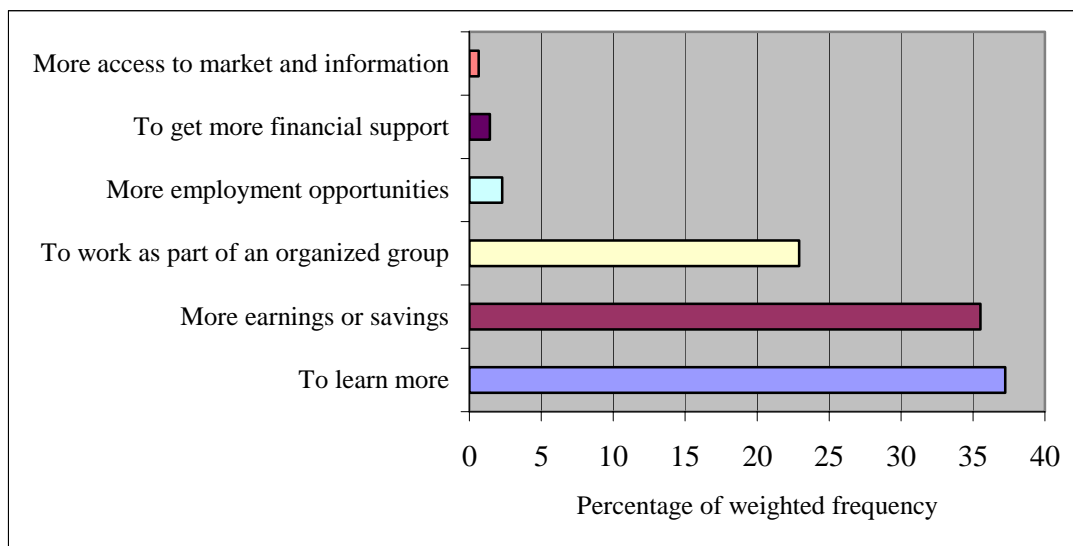


Figure 5-6: Reasons to be a cooperative member (N= 209).

In addition, villagers stated that certain organizational efforts could encourage NTFP conservation and NTFP-based income generation. Financial support, training, awareness development, and increased access to market information systems are seen as the most desirable organizational efforts by the villagers (Figure 5-7). The villagers also want improved communication systems, enhanced personal linkages, and more NTFP domestication initiatives.

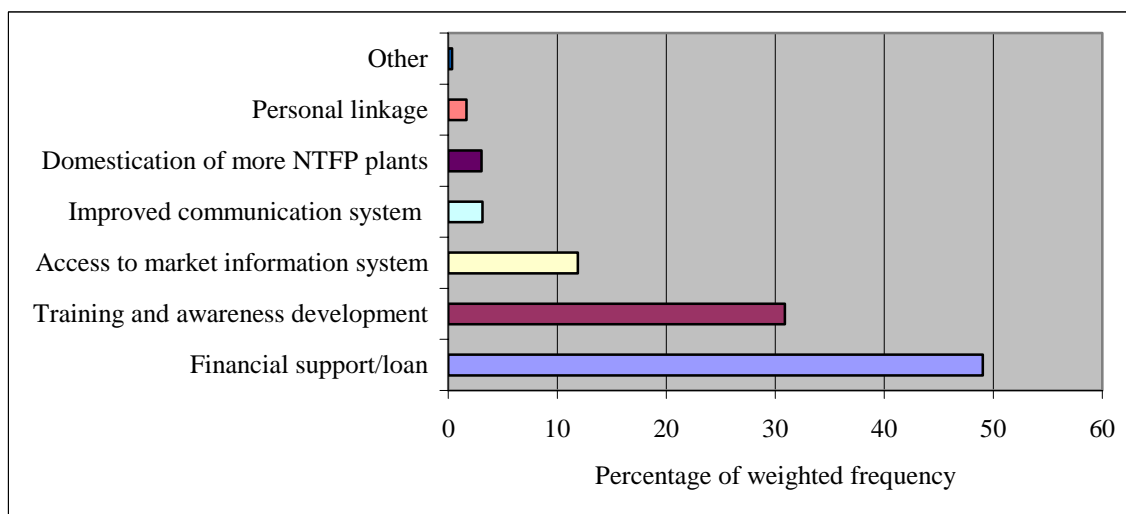


Figure 5-7: Initiatives/organizational efforts that will encourage NTFP-based development.

5.7 Observed impacts of NTFP commercialization

The commercialization of a few of the NTFPs created some opportunities for the villagers. Survey results indicate that overall commercialization of the selected NTFPs yielded three major positive effects. First, the NTFPs now provide alternative income opportunities that are enabling people to earn and save more money. Second, commercialization has enabled the villagers to acquire a larger supply of NTFP-based household materials and food, as substitutes of other products. Third, people outside the forest area, those in urban areas, for example, now have opportunities to consume and enjoy natural forest products; that is, those who do not themselves collect NTFPs have more access to NTFPs for their own uses (Figure 5-8).

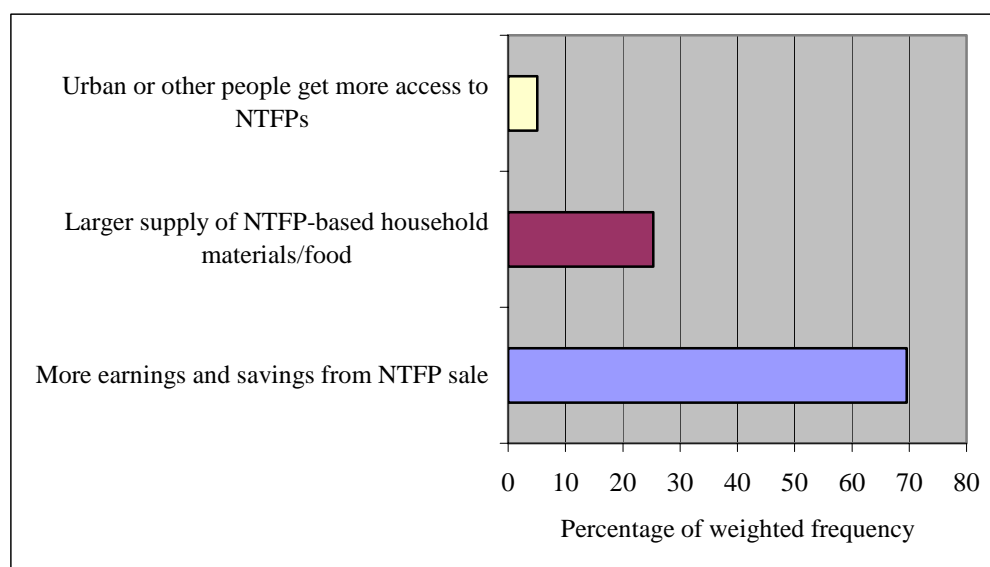


Figure 5-8: Positive impacts of NTFP commercialization (N= 209).

However, the commercialization of NTFPs has negative consequences also. According to the respondents, collectively the major negative impacts are NTFPs' stock reduction and degradation, the harvesting of more NTFPs by more people such that it becomes necessary for villagers to travel some distance to collect the NTFPs (Figure 5-9).

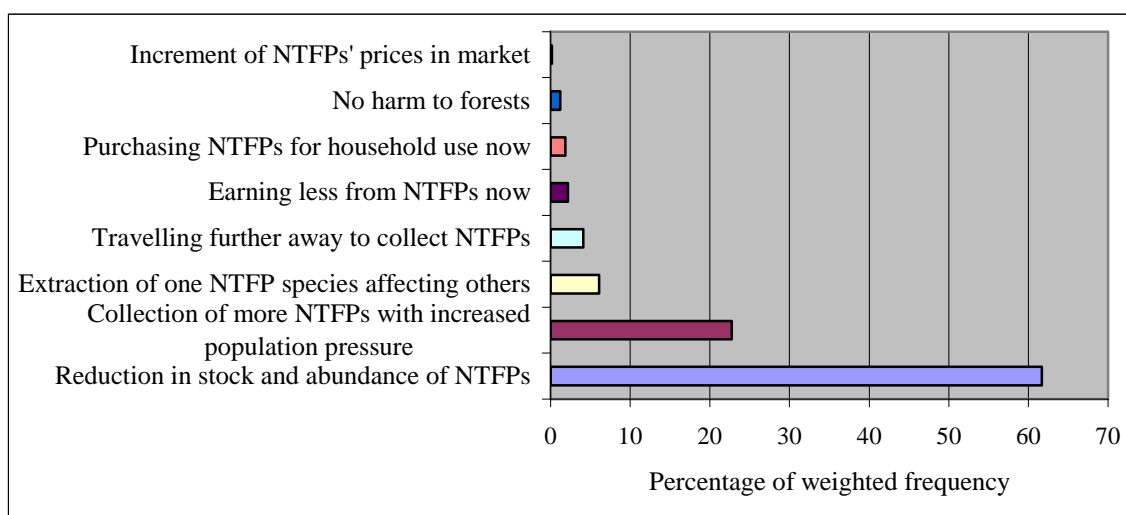


Figure 5-9: Negative impacts of commercializing NTFPs (N= 209).

Moreover, the negative impacts differ depending on the type of NTFP (Table 5-8). As respondents perceived, the commercialization of bamboo, wild vegetables, medicinal plants, and menda bark has generally resulted in stock reduction of the resources, more extraction of the NTFPs under increasing population pressure, and the villagers having to travel further to collect the NTFPs as the resources are not available nearby. On the other hand, in addition to the negative impacts noted, more bamboo shoot and broom grass extraction is also putting more pressure on the natural resource base such that other NTFP species are being affected.

Table 5-8: Negative impacts of commercializing different types of NTFPs.

| NTFPs | Three major negative impacts (based on percentage of weighted frequency) |
|------------------|---|
| Bamboo | Bamboo stock reduction, more harvesting, more competition for and pressure on NTFP resources, increased harvesting distance |
| Wild vegetables | Wild vegetable stock reduction, more harvesting, more competition for and pressure on NTFP resources, increased harvesting distance |
| Medicinal plants | Medicinal plant stock reduction, increased harvesting distance, more harvesting, more competition for and pressure on NTFP resources |
| Bamboo shoot | Bamboo shoot stock reduction, more harvesting, more competition for and pressure on NTFP resources, extraction of one NTFP species affects others |
| Broom grass | Broom grass stock reduction, more harvesting, more competition for and pressure on NTFP resources, extraction of one NTFP species affects others |
| Menda bark | Menda bark stock reduction, more harvesting, more competition for and pressure on NTFP species, increased harvesting distance |

5.8 Conservation, development, and sustainability issues for NTFPs

Although NTFP conservation is crucial, these resources are not extracted in a sustainable way. About 90% of respondents agree that NTFPs are not being utilized sustainably. They gave many reasons for their answers. The most important ones are undefined land rights, weak law enforcement, poverty and need for more income, lack of incentives, and harvesting by more people because of the high population growth (Figure 5-10).

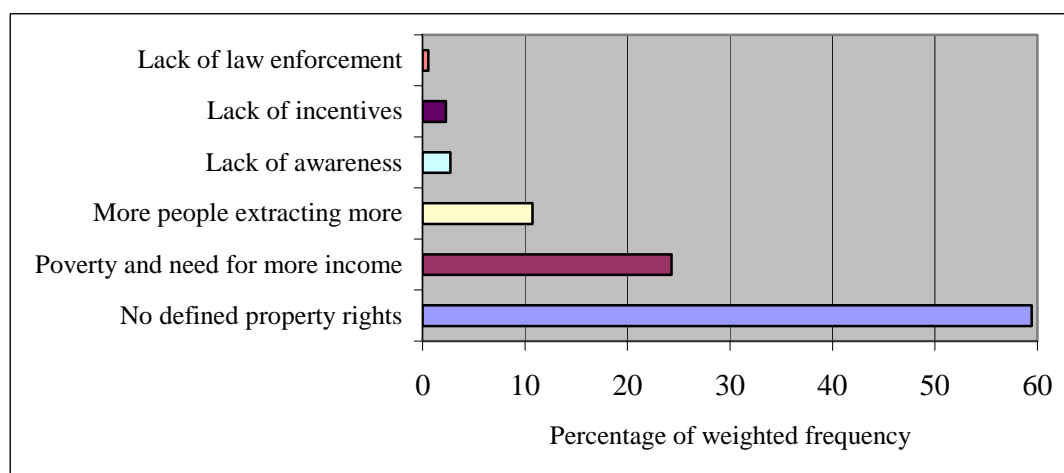


Figure 5-10: Reasons for unsustainable harvesting of NTFPs (N= 209).

People in CHT believe that NTFPs can be used in sustainable way, but that some important measures are put in place. The three most important suggestions for the sustainable use and conservation of NTFPs by the respondents are less extraction of NTFPs, awareness development and training, and more NTFP management practices (Figure 5-11). Other suggestions include training on more cultivation techniques, more financial support, and more government or forest department support. The villagers also emphasized the need for united effort among the people and the organizations.

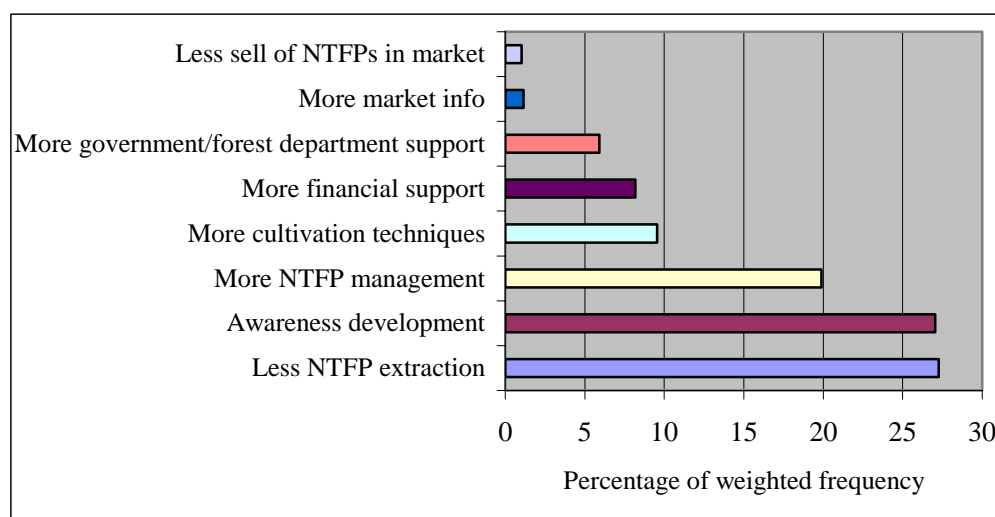


Figure 5-11: Respondents' suggestions for NTFP conservation (N= 209).

5.9 Discussion

CHT's existing formal and informal market systems for NTFPs are influenced by local traders and middlemen such that villagers usually do not receive a "good price"⁷. In the absence of credit support from the government or NGOs, the traders and middlemen often operate the informal money lending system, dadon, in an exploitative manner. However, lacking any organizational initiatives, the middlemen are key people who bring the market to the villagers. Villagers take dadon and earn some cash by collecting NTFPs and selling them to the middlemen. Although the price they receive is low, this credit system provides at least some income. However, this system compels the villagers to collect large amounts of NTFPs, which results in

⁷ According to the villagers in relation to other participants, they are not receiving "good price" for the NTFPs. A good price in a NTFP market system would prevail if there are willing buyers and willing sellers in a competitive market. But in CHT, the corruption, collusion, lack of market information and connections, advance money lending of some of the traders or middlemen that compels the villagers to sell the NTFPs to them at a pre-agreed price, lack of NTFP-related policy initiatives, higher transaction costs for lack of communication facilities- altogether result in market failure and deprive the villagers from a good price that they were supposed to get.

unsustainable practices. Several case studies on trade in NTFPs worldwide made similar observations regarding low prices and the unsustainable practices they lead to (Belcher et al., 2005; Marshall et al., 2006). The causes of such extraction practices could include organizational interventions, weak forest land policies and law enforcement, land right disputes, lack of NTFP management planning, and lack of people-oriented NTFP and forest management practices led by the forest department.

Market constraints and prospects: Lack of transport facilities, lack of financial support/capital and lack of market information are the major market constraints of NTFPs. Although all the villages are accessible by road or boat, transportation is limited and transporting forest goods, including NTFPs, is expensive. If more extensive transport could be made available through village cooperative initiatives that reduces transportation costs as joint initiative and bypass the local middlemen in some of the villages of Rangamati, for example, trade in NTFPs that yield higher prices would become possible. Lack of financial support or capital turns out to be a major barrier to NTFP-based initiatives that is common to all the villagers. Villagers know very little about the existing and potential markets for NTFPs; thus given the paucity of NTFP-based market information systems and no extension agents to facilitate market linkages and information, they are hindered from generating more income from NTFP trade.

The severity of the market constraints varies according to the type of NTFP because the different types have varied market orientations and economic values. Villagers appear to have better market information about widely traded NTFPs in the locality, such as bamboo, bamboo shoots, and wild vegetables, in comparison to less-traded NTFPs, like broom grass, medicinal plants, and menda bark. For the latter NTFPs, more extensive dissemination of market information could enhance trade. All these variations in market challenges for each NTFP need specific consideration when any initiatives are taken to address market problems (Marshall et al., 2006).

To eliminate market constraints, the villagers have suggested better and frequent transport facilities for better communication, more financial support to encourage cooperative based NTFP cultivation activities, and enhanced access to market as essential initiatives. Sufficient government or NGO interventions to eliminate constraints could play a positive role in assisting the villagers to generate more income. For example, micro-credit or small-scale loans from government departments, NGOs, or banks could be arranged to develop NTFP-based enterprises designed to generate income. Moreover, enhancing the villagers' access to market information relevant to NTFPs could be achieved through forest extension agents (currently no such personnel exist) appointed by the forest department. Taking such initiatives is particularly important for the market development of medicinal plants and menda bark. However, merely taking these initiatives without considering the policy issues, and taking related steps such as creating and effectively implementing people-oriented NTFP management plans and defining land and property rights, may only accelerate the current unsustainable extraction practices (Belcher & Schreckenberg, 2007). Moreover, when organizational interventions are undertaken, they should include plans for managing specific NTFPs. Strategies should target specific NTFPs in order to eliminate market constraints, as one set of interventions may not be sufficient to eliminate market constraints on all NTFPs.

Market knowledge and information source: More market knowledge tends to increase villagers' income from NTFPs, as observed in Mexico and Bolivia (Marshall et al., 2006). Thus, enhancing the villagers' market knowledge could be an effective avenue for NTFP-based interventions. My study results show that the current market knowledge of the villagers varies depending on the type of NTFP. Among the six types of NTFPs studied, the villagers are relatively well informed in regard to different stakeholders, steps and processes, destinations and end users, as compared to profit margins accruing from different traders and final prices at the

end of the market chains. The noted knowledge deficits could be due to the absence of effective information systems and disseminating mechanisms.

To compare more critically, in the case of wild vegetables and bamboo shoots, villagers are relatively well-informed about market stakeholders, steps and processes, and other market information. In the case of market knowledge about bamboo and broom grass, villagers have different types of market information, but their average knowledge score is less than half. However, the villagers' market knowledge of medicinal plants and menda bark is very low, scoring below 1. The market knowledge for wild vegetables and bamboo shoots is higher than for other NTFPs because of the former's shorter market chains and mostly local trade. One reason for the higher market knowledge of wild vegetables and bamboo shoots could be that the direct sale of collected vegetables and shoots at market involves few stakeholders and processes. Sometimes, traders and retailers buy these NTFPs as a whole lot and sell them for higher prices at retail locally. In addition, in a few cases, traders sell the NTFPs to regional markets in big cities like Chittagong and Dhaka, where they can get much higher prices.

For bamboo shoots and wild vegetables, although villagers are quite familiar with different market stakeholders and processes, they still lack much information about traders' profits at different stages and about final prices. If villagers knew more about alternative stakeholders, marketing options, profit levels and prices, they could have more bargaining options to generate NTFP-related more household income.

Villagers' market knowledge of medicinal plants and menda bark tends to be very low, as very few households have connections to the local healers or local traders who place orders for the particular parts of the plants. In the case of menda bark as well, villagers who have direct connections with local traders or middlemen focus on collecting bark. However, should the villagers become informed about the potential markets for medicinal plants and should sufficient domestication initiatives be encouraged and supported by the government and NGOs, there is a

very good chance that these markets could be significantly developed. Overall, for all potential NTFPs, developing a market information system would help disseminate market knowledge to the villagers such that they could make informed decisions about extracting, pricing, and conserving NTFPs.

The villagers' market knowledge is greatly influenced by different socioeconomic factors relating to households and markets (Marshall et al., 2006). Therefore, these factors should be carefully considered when designing initiatives to enhance market knowledge. Knowledge development strategies should be NTFP-specific, as different socioeconomic factors have particular effects on market knowledge. To assess villagers' market knowledge, estimations of the influences of different socioeconomic factors can be used (as shown in the model for estimating bamboo market knowledge in the results section).

The market information system (MIS) is important for NTFP-based enhance income and development (Banana, 1996; Binayee, 2005), as most of the villagers believe that more market information would help them earn more through the force of collective bargaining power. Taking into account the different sources that villagers use at present and those they would like to use in the future to gather market information is vital for developing an MIS. As results show, villagers, local traders, and karbari are the main sources of information for villagers currently engaged in NTFP trade. However, there is no MIS or market-knowledge-disseminating mechanism in the villages that is providing price information, the trade history of the NTFPs, or information about a large number of traders and stakeholders. Therefore, policy and institutional support should be given to local organizations and agencies for developing an information system to enhance market-information dissemination procedures (Zashimuddin, 2004).

Domestication and entrepreneurship: As an alternative NTFP production system, domestication can play a vital role in conservation and income generation for the forest-adjacent communities, especially where the wild resources are degraded (Leaky et al., 2005; Belcher et al.,

2005). Most of the villagers believe that domestication would put less pressure on forests and that they could easily harvest NTFPs from domesticated sites. The villagers also state that domestication would foster the natural regeneration of NTFPs. Nonetheless, there are very few domestication initiatives for wild NTFPs so far, and those that do exist focus on bamboo. However, if government and other local organizations were to address problems such as lack of land, financial support, and training, then the villagers would be eager to domesticate more NTFPs. This finding conforms to the domestication constraints stated by Belcher and Schreckenberg (2007).

From my field observations, I state that villagers have little incentive to encourage them to domesticate NTFPs. However, there are a few trial broom grass and medicinal plant cultivation initiatives on trial basis that appear to be promising. In addition, a few NGOs have started supporting NTFP domestication by providing planting materials and training. These kinds of more extensive domestication programs should be encouraged and launched by government departments as well.

Although the rubber tree is not an endemic wild NTFP species, Punorbason para's rubber plantation offers an encouraging example. Supported by the CHT Development Board, the domestication and management of rubber plantations to rehabilitate landless villagers has provided villagers with the means to support themselves. And, certainly, more initiatives of a similar kind should be encouraged. Yet, given that the rubber monoculture has been criticized as adversely affecting biodiversity (Gain, 2006), it may be necessary to conduct more research and trials in order to establish standard domestication techniques and management practices for other NTFPs and to explore their socioeconomic and environmental implications. Domestication systems for NTFPs could be compatible with trees and other crops as in agroforestry systems and/or by combining several management objectives that may also include recreation and environmental services (Belcher et al., 2005).

Almost all the menda tree's (*Lytsea glutinosa*) parts have medicinal value. In addition its bark is used industrially to produce mosquito repellent coils and incense sticks. It, therefore, offers an excellent focus for new plantations similar to the rubber plantation initiatives. Villagers could be engaged on a cooperative basis to establish plantations, manage them, and extract the bark and other plant materials in a scientific way. However, sufficient incentives in the form of making good arrangements with buyers and establishing market information systems could be effective, if the villagers are to work successfully within a cooperative structure. Similar kinds of domestication initiatives can be undertaken for bamboo-based products, broom grass products, medicinal plant parts, and wild vegetables as well, and, in fact, the few broom grass and medicinal plant domestication initiatives that exist appear promising.

Entrepreneurship development initiatives that may include domestication would be helpful for generating income and better using NTFPs (Kusters & Belcher, 2004). Although there are some government initiatives in CHT to establish bamboo- and cane-based cottage industries on a small scale, most of the cottage industries are not well-established given the lack of inter-departmental coordination, credit support, domestication initiatives, policy and planning, continuous product development training, and monitoring, and market information and linkages (personal field interview). The causes of these failures need further investigation before new attempts are made for entrepreneurship development; the lessons should be incorporated into future planning initiatives.

However, none of these cottage-industry development initiatives were tried in the study villages and most of villagers are willing to participate in NTFP-based cooperatives in order to learn techniques and to strengthen their bargain power and thus their ability to get a good price. To develop such enterprises, the villagers emphasized the necessity of government or NGO financial support, training and awareness development, and market information dissemination.

Special initiatives can be undertaken for bamboo crafters to organize them in village cooperatives and provide them with the training and technology to produce world-class bamboo products that will open up larger markets and more income opportunities (Belcher, 2005). Simultaneously, they can be engaged for conserving the natural bamboo clumps and cultivating in allotted lands in the hills by organizational support. Solving land disputes, affording access to credit, developing market channels, using weaving skills, and preserving the traditional knowledge of the crafters are crucial in this regard. The enterprise development would preserve skills and diffuse them from elderly people to a new generation and would also provide significant cash income to the villagers. Similarly, cooperatives based on medicinal plants, broom grass, menda tree bark, and wild vegetables have considerable income generation and conservation potential for engaging the villagers in domesticating, managing, harvesting, and marketing the products. In relation to that, to control the exploitative dadon system, local influential traders can be involved in successful entrepreneurship development with a set of rules and policies (te Velde et al., 2006).

Sustainability issues: Results show that commercialization of NTFPs has both positive and negative effects for livelihoods and conservation (Marshall et al., 2006); and finding out the balance between these two is crucial for sustainability (Arnold & Perez, 2001). The positive role of commercialization includes alternative income generation, a larger supply of NTFPs for consumption and an increased supply for sale, thus making the products more accessible to people who do not harvest them. On the other hand, the negative effects of commercialization include stock degradation, overly large harvests, and the fact that villagers must travel further to collect the NTFPs. In the current socioeconomic and policy context, with major interventions, villagers are gaining the positive benefits of commercialization, but the cost is considerable ecological destruction of the NTFP resources. Marshall et al. (2006) observed similar overharvesting trends influenced by increased commercialization in Mexico and Bolivia.

NTFPs are not used sustainably in CHT. Most of the villagers agree that, for most of the NTFPs, the alarming rate of depletion is mainly related to land and resource rights issues. They note too that there is no incentive to conserve for the future. Unsecured land rights, weak enforcement of laws, inappropriate policies, and a top-down approach to management practices cannot keep pace with market demands. Population pressure and related poverty issues are accelerating the resource degradation process; yet NTFP-based domestication and entrepreneurship initiatives, education and training, and appropriate policies, and the participation of the forest-adjacent communities could help to reverse this situation.

Villagers suggested less extraction of NTFPs, more awareness development and training on domestication techniques, more financial support, and more scientific and people-oriented NTFP management practices. They also emphasized updating forest and land policies and their effective implementation, restructuring forest department and forest management plans that could include NTFP management with the participation of forest-adjacent communities. Prasad and Kant (2003) also suggested similar policy initiatives and institutional reforms. If all the villagers' suggestions were put into action on a priority basis, they would do much to support the sustainable extraction of NTFPs and increase the NTFP stock. These will also create opportunities for alternate income sources and ensure sufficient subsistence use of NTFPs for a better livelihood.

5.10 Conclusion and recommendations

To conclude, CHT's existing market systems, both formal and informal, for NTFPs are not efficient enough to use and conserve the resources sustainably. The current extraction practices are accelerating resource depletion, and no appropriate organizational interventions or

sufficient policy measures currently exist to address this state of affairs. The forest-adjacent villagers identified many market constraints that include insufficient transport facilities, communication systems, financial support, and market information and linkages as major causes. However, these market constraints could be eliminated, as the villagers suggested, with effective interventions by government departments, NGOs, or the private sector.

The villagers' market knowledge of the different NTFPs is deficient and it varies between different NTFPs. Moreover, various socioeconomic factors impact market knowledge and warrant attention in any NTFP market-based development planning. Although there is good potential for NTFP-based income generation and a good linkage between NTFP market knowledge and income, there is no formal market information system to enhance villagers' market knowledge of NTFPs. The main informal sources of market information at present include villagers, local market traders, and village heads. Further, villagers believe that if there were an established MIS and new sources of market information, they would have more bargaining power and more sources through which to make informed decisions about selling and preserving NTFPs.

Of the very few NTFP domestication initiatives, bamboo is the main NTFP cultivated by villagers. Most of the villagers are not engaged in domestication, as they lack land, financial capital, and the relevant technical knowledge. However, they believe that if the government and local NGOs were to address the problems inherent in domestication that many people would come forward to domesticate NTFPs and that consequently there would be less pressure on the natural forests. This would also facilitate more natural regeneration and encourage the sustainable extraction of the resources. Besides bamboo, NTFPs such as broom grass, medicinal plants, menda, and some popular wild vegetables have good potential to provide more subsistence income and facilitate better conservation of the NTFPs, thus ensuring future sustenance.

Currently, few organizations are working in the study areas to support NTFP-based development and conservation (ADB, 2008; UNDP-B, 2009). However, most of the people are

eager to see more organizational involvement, including government and NGOs, to provide financial support and develop awareness about the potential of NTFPs through more technical support and market information. Almost all the villagers are willing to be NTFP-based cooperative members under properly supported conditions.

In the current socioeconomic and policy context, the commercialization of NTFPs is having both positive and negative impacts. The positive impacts include more earnings, a greater supply of NTFPs for household use, and improved access to NTFPs for people who usually do not collect them. Among the negative impacts, most notable are stock degradation, overly large harvests, and more disturbance to the forest ecosystem. In the absence of defined land and property rights, effective policy and law enforcement, and awareness and organizational interventions, it appears that people are earning more at the cost of a compromised ecosystem (Shankaar et al., 2004). Most of the villagers agree that, currently, the NTFPs are not being used in a sustainable manner. Lack of defined land rights, poor economic conditions, population pressure, and lack of awareness are the main causes. Yet, according to the villagers, NTFPs could be used sustainably if local people were engaged in NTFP-management practices and if organizational efforts were to focus on developing awareness about NTFP conservation and on creating opportunities for increased NTFP-based income.

Overall, the following initiatives should be undertaken for using and conserving the NTFPs in the study area in a sustainable way:

- Develop awareness among the forest-adjacent communities about NTFP-based opportunities and engage the villagers in NTFP-based product development activities.
- Establish NTFP-specific initiatives and target the pro-poor and less poor categories of villagers separately in the policy interventions (Arnold & Perez 2001) after investigating the implications for the forest communities and ecosystems.

- Implement a national MIS for NTFPs and develop effective strategies to disseminate market knowledge to people concerned, including information about products, market links, and international marketing potentials.
- Encourage NTFP-based domestication and conservation initiatives through small-scale credit and cooperative support.
- Develop nontimber forest plant species selection criteria for domestication and screen them ecologically considering community's preference and perception (Maraseni, 2008).
- Carry out more research on developing cultivation and marketing techniques for potential NTFPs and on combining the techniques in practice with multi-cropping technology such as agroforestry.
- Provide training to the concerned forest communities about specific NTFP-cultivation techniques.
- Define forest resource rights and provide economic incentives to put less pressure on natural NTFPs and to encourage regeneration that will help to conserve biodiversity and ecosystems (Bawa & Seidler, 1998).
- Support the continuation of traditional NTFP-related ethnic practices and livelihood enhancement and preserve traditional ecological knowledge pertaining to NTFPs.
- Provide NTFP-based entrepreneurship-development support, such as micro-credit and training, to generate more alternative income opportunities through enterprises including cottage industries, medicinal plant nurseries and processing centers, and local wild food-processing farms.
- Enhance communication systems and transport facilities in an environment-friendly manner for better market access.

- Execute other poverty reduction, education, health, and family planning programs along with NTFP-based initiatives.
- Develop a comprehensive NTFP management plan at the national level and local levels based on inventory and monitoring of current NTFP resources and management practices.
- Define land rights and mitigate all land-related disputes between different ethnic groups and government through the formation of an effective land commission for CHT and implement their suggestions (Tripura, 2008).
- Update forest and land use policies with more specific emphasis on NTFPs.
- Ensure more effective enforcement of the related policies and laws and enhance coordination among government, NGOs, and private and international organizations.
- Rearrange the current organizational structure of the forest department and other related government departments to follow more people-oriented forestry practices with the participation of local people.
- Strengthen forestry extension activities and re-educate forest officials through training and incentives for effective co-management of NTFPs with local communities.

Chapter 6

Production-to-Consumption Systems of Selected NTFPs: Market and Livelihood Analysis

6.1 Introduction

NTFP production-to-consumption systems (PCS), as discussed in Chapter 2, identify the type of NTFP for market, depict the flow of the products along the market chain, analyze the processes and the involvement of different stakeholders at each step of the market chain, explore constraints and opportunities, and finally suggest interventions. In CHT, although there are markets for some of the available NTFPs, no NTFP-based major market interventions are in effect. A significant cause of the paucity of market interventions is a corresponding lack of knowledge about how the market for a particular NTFP impacts the livelihoods of the stakeholders concerned involved in its market chain. Specifically, very little research on Bangladesh has focused on NTFP market issues with a view to better informing concerned stakeholders, policy makers and development practitioners about NTFP market potentials.

Several NTFP-based PCS investigations have been conducted in different parts of the tropics, Asia, Africa, and Latin America (Alexiades & Shanley, 2005; Kusters & Belcher, 2004; Sunderland & Ndoye, 2004). Yet, more case- and site-specific research on the PCS of different NTFPs is essential if market knowledge is to be improved and appropriate NTFP-based development and conservation strategies undertaken in the local context. This kind of NTFP research initiative would also be helpful for more comparative analysis between existing tropics-wide and new site-specific NTFP market data to enhance NTFP market related wisdom and literature.

To address the NTFP market issues, my study pursued the following research questions based on NTFP-related market data, stakeholder information, and field observations: (i) What path do NTFPs follow in their existing market chains? What are the existing steps and processes? And, what alternative market potential could be realized if NTFPs were used more effectively? (ii) In what ways are different types of stakeholders engaged in selected NTFP markets? And, how do NTFP income and other NTFP market-related factors impact the livelihoods of the stakeholders? In order to outline my research findings' answers to these questions, this chapter first gives an overview of the types of stakeholders involved in each NTFP market. The chapter then describes and analyzes the PCS of five types of NTFPs: bamboo, wild vegetables, broom grass, medicinal plants, and menda bark. The chapter's closing section focuses on a comparative analysis of the PCS of the NTFPs (e.g. vertical, horizontal, and intensity dimensions of the PCS) with particular emphasis on the stakeholders' NTFP-related income and livelihood linkages. The analysis is followed by discussion and concluding remarks.

6.2 Existing stakeholders of selected NTFPs in Chittagong Hill Tracts

Various types of stakeholders are involved in the NTFPs' market chains: Collectors collect the NTFPs, whereas producers process/produce the NTFP-based products. Agents/brokers/middlemen usually search out/or organize the NTFP supply for other people in the NTFP value chain. However, they do not buy and sell the products, but work on commission or under contract for a trader or other actors in the NTFP market chains. Transporters carry the NTFPs from one stakeholder to another using a vehicle or as head/shoulder load. Traders usually buy and sell NTFPs, but do not sell directly to consumers. Among the traders, there are wholesalers, who usually sell NTFPs to retailers or directly to consumers in bulk volume, whereas retailers sell NTFPs directly to consumers.

In order to address key research questions pertaining to market chains and systems, my NTFP market study focused on the five types of NTFPs that villagers identified as very important for their livelihoods in terms of subsistence and cash incomes. About 30 stakeholders for each type of NTFP gave responses to a structured questionnaire (Appendix D); these numbers of interviewees were relatively proportional and consistent with the number of current stakeholders in the market for each type of NTFP (Table 6-1). Moreover, at least one focus group discussion (FGD) was conducted for each NTFP market chain in each of the two districts with the participation of market stakeholders of the NTFPs. The personal interviews and FGD revealed a lot of information about the market chains' steps and processes, the stakeholders' involvement in them, and the connections between the market chains and stakeholder livelihoods. Based on the collected information and market observations, the PCS for each selected NTFP is discussed and analyzed individually in the following sections.

Table 6-1: Number and categories of market stakeholders interviewed for each type of NTFP.

| Primary Business category | NTFPs | | | | | | Total |
|---------------------------|-----------|-----------------|------------------|-----------------|-------------|------------|------------|
| | Bamboo | Wild vegetables | Medicinal plants | Bamboo products | Broom grass | Menda bark | |
| Collector | 3 | 24 | 3 | | 13 | 18 | 61 |
| Producer | - | - | 14 | 22 | - | - | 36 |
| Agent/broker | 2 | - | - | - | 4 | 1 | 7 |
| Transporter | 6 | - | - | - | - | - | 6 |
| Trader | 10 | 1 | 6 | - | 5 | 13 | 35 |
| Wholesaler | 1 | - | 4 | - | 1 | 1 | 7 |
| Retailer | 8 | 2 | 5 | 12 | 3 | - | 30 |
| Total | 30 | 27 | 32 | 34 | 26 | 33 | 182 |

6.3 Bamboo production-to-consumption systems

6.3.1 Introduction

As for many other countries and regions in Asia, bamboo is one of the most important NTFPs found in CHT, as it contributes substantially to rural livelihoods in terms of subsistence and cash income. Bamboo is an integral part of the rural culture and day-to-day life; given that it has multiple uses, it is vital to the economy of all the CHT's households (Gain, 2006; Chakma, 2002; Banik, 1998). In a bamboo-related study on CHT, Khisa recorded about 50 types of bamboo uses by different ethnic groups in Rangamati district of CHT (2006). Among them, the most important uses are constructing houses, fences, agricultural implements, household crafts, utensils, and souvenir crafts. Therefore, the bamboo sector is crucial to supporting the livelihoods and household economy of CHT, and it has potential in terms of natural resource-based development and conservation.

Usually harvested every three or four years, bamboo is found throughout the CHT as 6 types of naturally occurring species: Muli (*Melocana baccifera*), Mitinga (*Bambusa tulda*), Ora (*Dendrocalamus longispathus*), Dalu (*Schizostachyum dullooa*), Kali (*Oxytenanthera nigrociliata*), and Lata (*Melocalamus compactiflorus*) (Banik, 1998). Among the bamboo species, Muli is very common, consisting of more than 70% of CHT's bamboo; however, the current practice of deforestation and overharvesting is compromising its stock. Lata and Dalu bamboo both became threatened species in CHT long ago (Banik, 1998). There are a few types of domesticated bamboo species as well, but the extent of domestication is limited to certain households and institutions. Among the cultivated bamboo, Baijja (*Bambusa vulgaris*) is seen in some areas of CHT because the higher demand for this bamboo means that it commands a higher

price than does natural bamboo as well as these bamboos are strong and lasts long to use as poles and for different construction purposes.

Different kinds of stakeholders are engaged in harvesting bamboo in CHT. For example, Karnaphuli Paper Mills (KPM) harvests bamboo for pulp through different contractors from licensed areas, and some agencies bid on and purchase bamboo at government auctions and harvest bamboo from designated forests engaging local and/or outside labor (Khisra 2006). Moreover, the local villagers and other permit holders also harvest bamboo for domestic uses and trade. From collection to use, bamboo goes through several market channels involving numerous market steps, processes, and stakeholders. There are four types of market systems for bamboo and bamboo-related products: raw bamboo, bamboo-made products, pulp for KPM, and bamboo shoots. These market systems are described separately here because different kinds of stakeholders are involved with each of these systems although there may be some overlap between the systems. Moreover, each type of system involves different types of transformation and market processes. The following sections analyze each bamboo market system in accordance with stakeholders' descriptions of their involvement in, and the steps and processes, of the market.

6.3.2 Production-to-consumption system of raw bamboo

Many types of stakeholders are involved in the market chain for the market that supplies whole raw bamboo for household use, commercial construction, and other uses involving bamboo that has been transformed in some way. The principal stakeholders in the raw bamboo market include collectors, middlemen, local traders, regional traders, wholesalers, and rural and urban consumers (Figure 6-1).

6.3.2.1 Vertical dimension of the raw bamboo production-to-consumption system

The bamboo collectors in CHT are mainly hill people from different indigenous ethnic groups. Almost all the households harvest bamboo throughout the year either for household use or to use for cash income. Collectors gather most of the bamboo from naturally occurring hills adjacent to their households. These lands are owned by government: they are either district commission–owned Unclassed State Forests (USF) and khas lands or forest department–owned reserve or protected forests. In most cases, the district commission leases the USF land to the local people. However, some of the USF lands are allotted as community basis or practically these lands are under control of the communities. Further, some of the USF lands instead of being evenly allotted are under the control of a few influential people in the locality. Although villagers usually collect the bamboo from their own lease land where bamboos occur naturally, sometimes those without land are allowed the usufruct right of harvesting bamboo from others' land for household use only. Some people also illegally harvest bamboo from other government land, such as the forest department's land. In addition, some villagers domesticate bamboo on their own lease land and harvest it there. Usually, after cutting the bamboo from the culm, the collectors cut the top of the bamboo and trim and clear the branches. Then the felled bamboo is dragged to an open space where it is made into bundles suitable for shoulder loads. The same people who harvest the bamboo usually also take care of all this post-harvest semi-processing work.

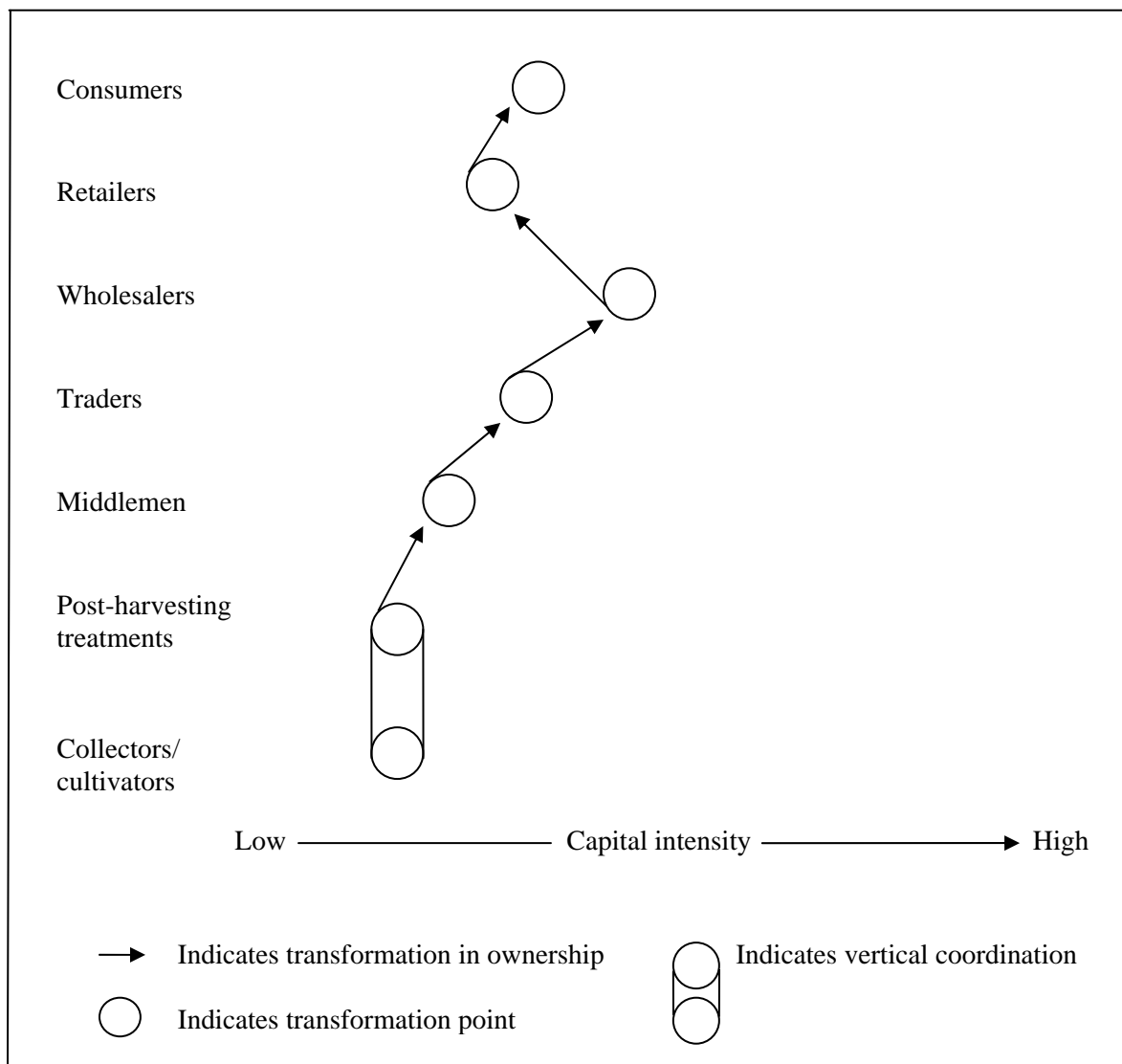


Figure 6-1: PCS of raw bamboo in Chittagong Hill Tracts.

The collectors carry the bamboo in bundles as shoulder-loads to a specific place to give them to middlemen. The middlemen or brokers usually employ laborers to sort the bamboo and construct bamboo rafts when the loads are to be transported by river, or load trucks when transportation is to be by road. The bamboo is then carried to the local traders or sometimes directly to the regional traders. Up to this point, the raw bamboo undergoes no major transformation; its ownership simply changes from local trader to regional trader and then wholesaler. The local traders are mainly based in the district towns of Rangamati and Bandarban,

and the middlemen usually bring the bamboo with the help of transporters to the local or regional traders at the district market level. Local traders sell some bamboo at this level to consumers, but most of the bamboo goes to the wholesale markets. In the case of Bandarban, district level traders bring bamboo to the wholesale markets in *Dohazari* and *Chakaria*, where it is bought by wholesale traders from other regional district markets, such as in *Chittagong*, *Comilla*, and *Dhaka*. Similarly bamboo from Rangamati is taken by truck to wholesalers in Chittagong and other major cities. In the major cities and *upazela* (sub-district) areas, retailers sell the bamboo to local consumers. This is the general process by which bamboo from the remote hilly areas of CHT reaches the urban districts and upazela.

In addition, there are some shorter chains involved in the raw bamboo market. In these cases, local collectors sometimes collect bamboo from the forest and sell it directly to the local market at retail or to local traders who store sell it to local urban consumers in CHT at higher prices.

The earnings of the different stakeholders in the raw bamboo market are highly disparate. The middlemen and traders in the bamboo business tend to make much higher incomes than other stakeholders such as collectors and wholesalers (Table 6-2). My field observations account for this fact by noting that the middlemen and traders invest more time and money in the market than do the other stakeholders. Most of the stakeholders in lower level of bamboo PCS take this occupation as a sole business compared to wholesalers or retailers who are usually engaged with multiple businesses. However, the collectors do not realize much income given the hard work of collecting raw bamboo from forests. In many cases, collectors take advance money (*dadon*) middlemen or traders to whom they are then informally bound to supply bamboo. In practical terms, the middlemen usually create the market through which collectors in the remote hilly areas are able to obtain some income. However, the collectors are usually paid as day labor since harvesting bamboo requires little skill.

Table 6-2: Different stakeholders' mean monthly household income and mean income from raw bamboo.

| Raw bamboo market stakeholders | N | Mean monthly income from raw bamboo (BDT) | Mean monthly household income (BDT) |
|--------------------------------|----|---|-------------------------------------|
| Collector | 3 | 2,500 | 4,167 |
| Agent/broker | 2 | 8,000 | 10,000 |
| Transporter | 6 | 4,583 | 6,250 |
| Trader | 10 | 9,880 | 15,000 |
| Wholesaler | 1 | 1,400 | 4,000 |
| Retailer | 8 | 3,250 | 6,750 |

6.3.2.2 Horizontal dimension of raw bamboo production-to-consumption system

There are more horizontal coordination and linkages at the upper level of the market chain of raw bamboo. For example, there are bamboo trade associations at both the Rangamati and Bandarban district levels that provide the traders and wholesalers with more unity, strength, and power to deal with the forest department and local market committee. On the other hand, there is no association at the collector level or middleman level of the bamboo market. Most often, the collectors and middlemen use their own informal linkages with others at the same level. For example, the collectors sometimes work together to cut bamboo under the leadership of an influential person in the village, but rarely do they have the bargaining power to establish a good price for their harvest. The middlemen usually take money from big traders and distribute it to the collectors. Those who take this advance money must then sell to these same middlemen at a price ceiling set by the latter.

The middlemen also take significant risk. Sometimes, for example, having distributed money from the big traders to the collectors, the middlemen do not receive a bamboo harvest from the collectors; nor, is there any way for the middlemen to retrieve the money they have advanced. In such cases, the middlemen come into conflict with the traders, such that their ability

to continue to earn a living in this way is jeopardized. As could be expected, the middlemen lack any kind of association or cooperative to support them, and so they do not have any bargaining power in negotiating the commission that constitutes their principal income.

6.3.2.3 Intensity dimension of raw bamboo production-to-consumption system

The collectors and middlemen invest less money, labor, and skill than do the traders and wholesalers who are higher up the market chain (Figure 6-1). In the raw bamboo PCS, little investment is needed in terms of tool and machinery, as the processing to which the bamboo is subjected at this stage is limited to cutting its top and branches, sorting, and constructing and loading rafts or loading trucks. Moreover, in general not much skill is necessary in the bamboo business overall, other than the upper-level work of managing linkages among the stakeholders.

6.3.2.4 Seasonality, changes, trends, constraints, and potential of the bamboo (raw) market

Seasonality: For the bamboo market, the peak season is September to December (Figure 6-2). This is the end of the rainy season and the start of the dry season. There is higher market demand for bamboo collected during this period because of its durability and longevity. This bamboo is not infested with insects; therefore, it is more durable compared to bamboo collected at other times. It is easier to collect bamboo during the dry season. And, given that the river remains sufficiently high for a few months after the rainy season, transporting the bamboo by raft is also easier at this time. .

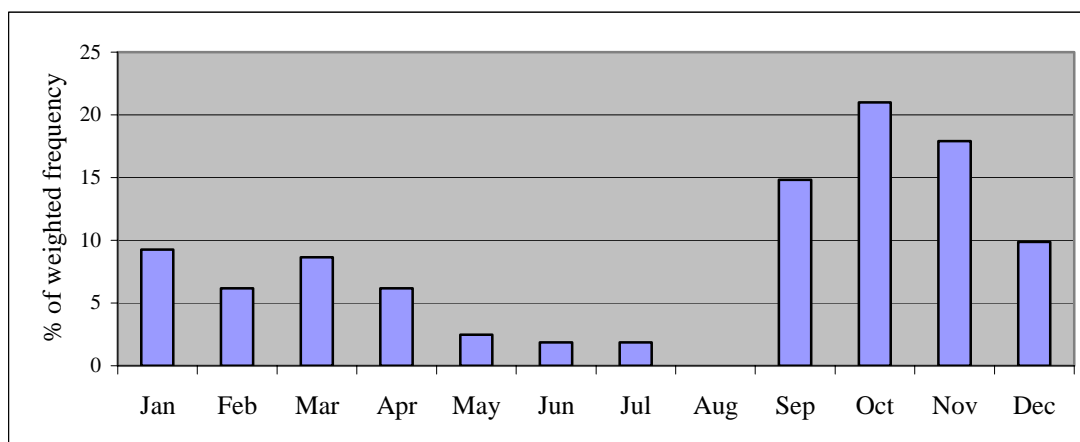


Figure 6-2: Peak and off-peak season for bamboo sale at market.

The off-peak time for collecting bamboo is the predominantly rainy season of June to August (Figure 6-2). During this season, it is difficult to collect and carry bamboo, the bamboo is generally infested with pests and is less durable than bamboo collected at other times, and the demand for bamboo is low, as little construction work using bamboo is carried out. However, the traders usually maintain stock from an earlier season so that they can sell raw bamboo during the rainy season at a higher price than they can obtain at other times of the year.

Bamboo business problems: For all stakeholders, the three major problems in the bamboo trade are lack of capital (including financial support and loans), lack of transportation, and lack of communication facilities (Figure 6-3). Among the other problems, lack of administrative support, lack of collectors' commitment to supply raw bamboo, and low profit margins are also important.

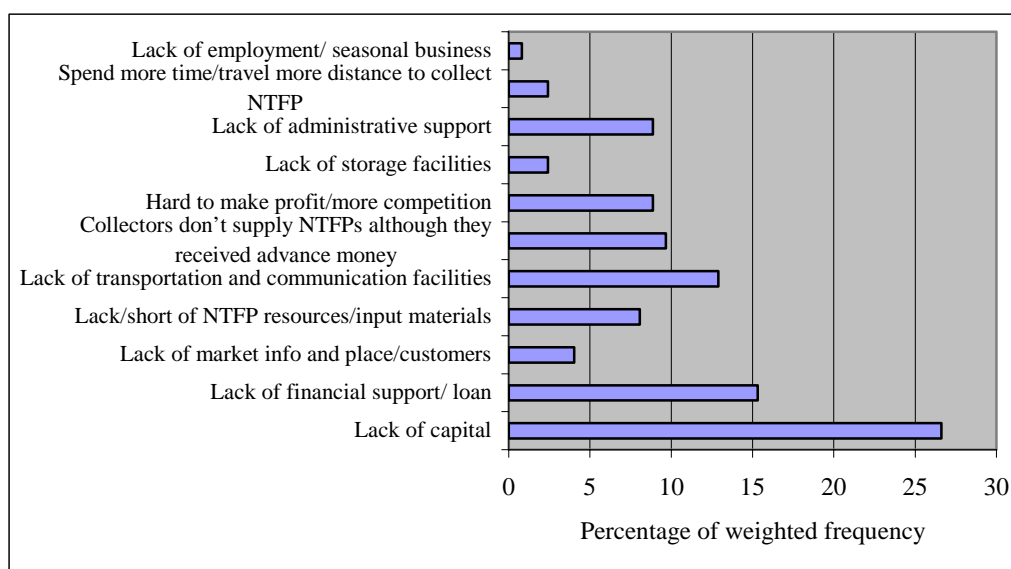


Figure 6-3: Major problems in the raw bamboo market.

Changes in the bamboo business during the last 5 years: The overall number of stakeholders in each of the stakeholder categories involved in trading raw bamboo has increased over the last five years (Table 6-3). The three most common reasons for the increase, as reported by the stakeholders, are lack of employment or no opportunity for alternative income, bamboo provides income opportunities although only seasonally, and it is easy to make profit given that there is a local demand for bamboo. On the other hand, about one-third of the stakeholders reported that their respective number in each stakeholder categories decreased in the last five years mainly because of the lower availability of bamboo as an input material, the degraded condition of the bamboo stock, collectors' lack of commitment to suppliers, and weak market information leading to lower prices and sales.

Table 6-3: Change in number of raw bamboo stakeholders.

| Raw bamboo market stakeholders | Current number at every market reference point (Mean) | Responses about change in number of stakeholders since 2003 (%) | | | Main reasons for decrease* | Main reasons for increase* |
|--------------------------------|---|---|-----------|----------|----------------------------|----------------------------|
| | | Decrease | No Change | Increase | | |
| 1. Collectors | 89 | 37.50 | 12.50 | 50.00 | 1, 10, 5 | 5, 6, 7 |
| 2. Producers | 7 | - | - | 100.00 | - | 5 |
| 3. Agents/brokers/middlemen | 9 | 38.46 | 23.08 | 38.46 | 1, 10 | 6, 11, 12 |
| 4. Transporters | 14 | 14.29 | 42.86 | 42.86 | 1, 3, 10, | 5, 6, 11 |
| 5. Traders | 9 | 22.73 | 31.82 | 45.45 | 1, 7, 10 | 6, 12, 5 |
| 6. Wholesalers | 7 | - | 33.33 | 66.67 | - | 12 |
| 7. Retailers | 9 | 30.00 | 15.00 | 55.00 | 1, 14, 10 | 6, 5, 1 |

* **Codes:** 1 = lower availability of NTFPs as input materials/degraded NTFP stock, 3 = weak market information and links, 5 = lack of employment/alternative income, 6 = income opportunity even seasonally/easy to make profit, 7 = lack of capital/support, 10 = no NTFP supply although collectors take cash advance, 11 = long-term business relationship, 12 = more demand for local needs, 14 = necessity of more time/more hard work.

Moreover, the prices of raw bamboo both in the rainy and dry seasons have increased compared to those of the last 5 years (Table 6-4). The general availability of bamboo has decreased and, therefore, collectors must now travel farther to collect it, but the demand for bamboo has also increased. However, there have been no changes in the rules and regulations that govern the transporting and selling of bamboo. For the changes in price, availability and demand of bamboo, the market stakeholders pointed to several important reasons, including the higher prices of other commodities, higher demand for bamboo fuelled by larger numbers of buyers from outside the CHT area, lower availability of bamboo given that more people are harvesting it, increased forest clearing for shifting cultivation and/or tree plantations (details of reasons for the change are in Table 6-4).

Table 6-4: Major trends/changes in the bamboo business during 2003–2008.

| How have the following changed in the last 5 years: | Majority of responses about the general trend (1 = Decreased, 2 = No change, 3 = Increased) | Main reasons for change |
|--|---|---|
| 1. The price of a standard unit of bamboo during the rainy season | 3 | Prices of other commodities went up; more demand for NTFPs/ more big buyers from outside; lower availability of NTFPs/lower supply of NTFPs as people extract more; more collectors |
| 2. The price of a standard unit of bamboo during the dry season | 3 | Lower availability of NTFPs/lower supply of NTFPs as people extracting more; communication problem/lake water dries out in winter; more demand for NTFPs/more big buyers from outside |
| 3 The general availability of bamboo. | 1 | Bamboo flowering; land/ forest clearing for jum/ plantation; lower availability of NTFPs/lower supply of NTFPs as people extract more |
| 4. The distance that bamboo is transported from forest gate to end market. | 3 | Land/forest clearing for jum/plantation; lower availability of NTFPs/lower supply of NTFPs as people extract more; communication problem/lake water dries out in winter |
| 5. The demand for bamboo by consumers. | 3 | More demand for NTFPs/more big buyers from outside; lower availability of NTFPs/lower supply of NTFPs as people extract more; land/forest clearing for jum/plantation; more people, more demand/more construction |

Bamboo conservation practices and constraints: Survey results show that most (73%) of the stakeholders do not think about conservation practices in their business. The rest (27%) of the stakeholders stated that they do care about the conservation of bamboo stock and abundance, and these stakeholders mostly participate in awareness development initiatives (Figure 6-4). The stakeholders who care about conservation practices also noted that they do not destroy other plants when collecting bamboo.

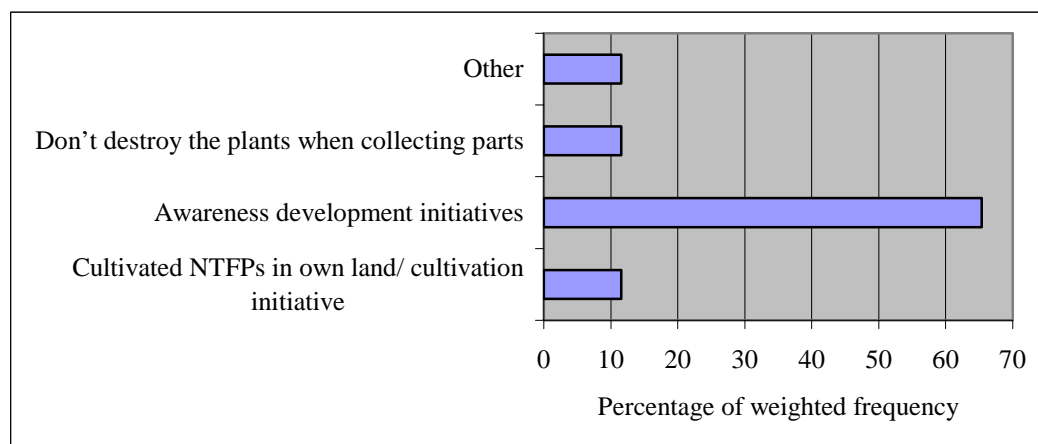


Figure 6-4: Conservation actions taken by bamboo market stakeholders.

Further, survey results show that only about 45% of the bamboo market stakeholders are aware of the future implications for the environment and the bamboo stock in particular if steps to conserve natural resources are not taken. However, the majority of the stakeholders are not taking any conservation action for several main reasons (Figure 6-5). Most think that they do not need to do anything to conserve the bamboo. Some, though, are unable to take an important step such as cultivating bamboo themselves because they have no land or financial capital.

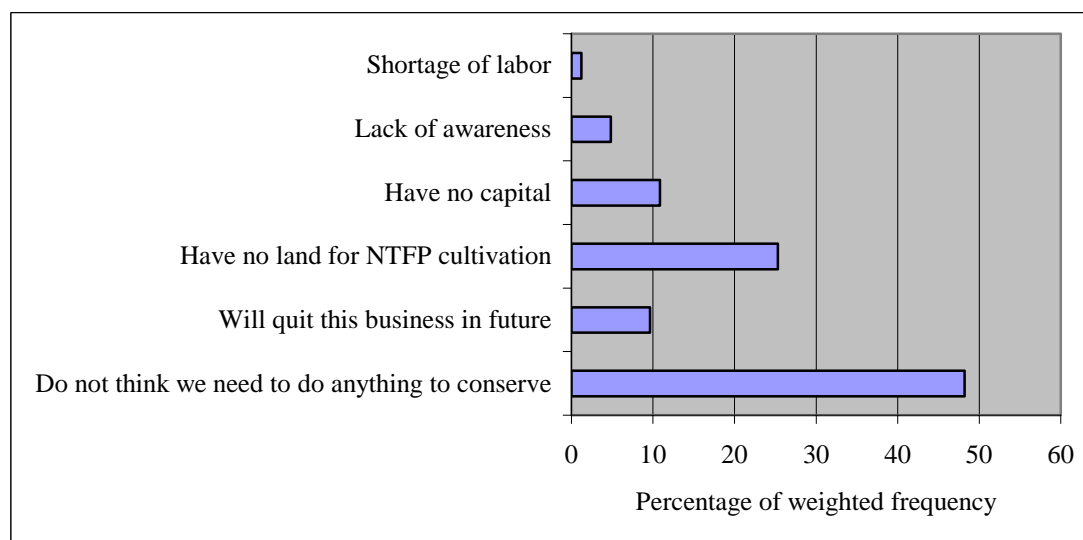


Figure 6-5: Why collectors are not taking action to conserve bamboo.

Possible interventions: Considering the trends, changes, constraints, and conservation challenges of bamboo, several initiatives can be taken to better manage natural stocks of bamboo and to encourage the domestication of the bamboo such that stakeholders can rely on a continuous supply. Carefully designed local policy initiatives that ensure transparency in the bamboo business, define land rights, and give more market information to the villagers would help ensure that all stakeholders receive a good price for the bamboo. Providing land rights and teaching the villagers cultivation techniques would also encourage more domestication that would help the local poor earn more. Such measures would also help to maintain forest stocks on a long-term basis.

6.3.3 Production-to-consumption system of bamboo-made products

Because different types of bamboo are available in different areas, the indigenous peoples make different bamboo products mostly for their own household use and more recently as souvenirs for tourists. The bamboo products differ in terms of type and design from one ethnic group to another. People aged 40 and older who usually do not do fieldwork or collect NTFPs make these products, although others add the activity of making products to their farm and collecting work. Many female household members have weaving skills and are also engaged in making these products. The skill and practice of weaving bamboo-made baskets and other products helps a household save money as they need not purchase these same products from others, and in many cases, it also provides extra cash income.

On the other hand, fewer and fewer people have these traditional skills, and my study finds that today it is only older people who have the ability to weave traditional bamboo products. Although there is a good opportunity to promote this sector, there are few government or private initiatives in place to encourage the new generation to engage in this work even though it would

enable them to earn extra cash income. Inevitably, then, if such conditions continue to prevail, these time-honored skills and the ethnic designs and traditions that are part and parcel of them will eventually be lost.

However, there are several types of stakeholders involved in the PCS for the markets for bamboo-made products. The details of the market chain for bamboo-made products as it applies to different stakeholders and the level of coordination, investment, and skills necessary are described in the bamboo products PCS diagram (Figure 6-6).

6.3.3.1 Vertical linkages of bamboo products' production-to-consumption system

The different types of stakeholders engaged in the bamboo-made products business include collector, producer, middlemen, retailer, and local consumers including urban tourist. At the lower level of the market chain, villagers collect the bamboo from natural or cultivated stands and clear the branches and tops. They then carry the raw bamboo to the respective households. In most cases, the producer of the bamboo products, or household members, collects the bamboo; only in a very few cases does a producer order and purchase raw bamboo from other villagers, or purchase it from a local market.

After obtaining a supply of raw bamboo, the producers usually semi-process it and manufacture products they need, for which they have received an order, and/or that are in demand at local markets. Once the products are prepared, those intended for household are delivered to other household members; those made to order for other villagers are sold for cash or exchanged for goods; those made for market are delivered to the retailers and sold for cash or exchanged for credit. Depending on the quality of the products, the retailers may place further orders. The retailers then sell the items to consumers who come from both urban and rural areas.

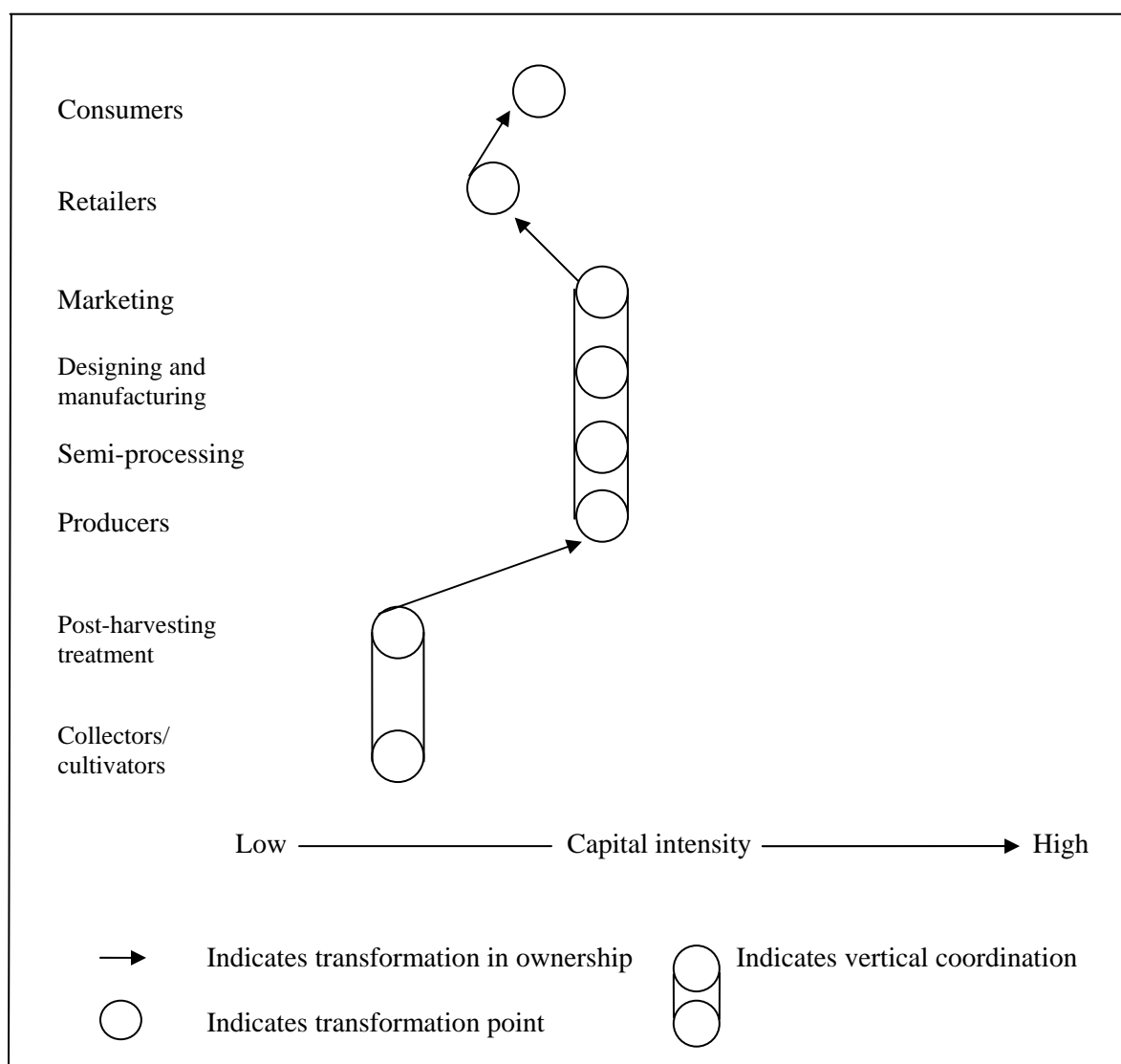


Figure 6-6: Production-to-consumption system of bamboo-made products.

Bamboo collectors' income was discussed in the previous section. Data from interviews with the other types of bamboo market stakeholders show that retailers of bamboo products on average make much higher income (almost double) from the business than do the producers (Table 6-5). The household incomes of the producers are much lower than those of the retailers too. The PCS shows that although the producers invest more traditional knowledge, skills, time, and labor in comparison to the retailers, who usually conduct this as a side business, the producers do not receive good returns on their investment. However, in an overall situation in

which villagers lack plentiful income opportunities, those who have weaving skills try to make some cash income from this business, although they usually shift to other occupations if they can find them. Therefore, there is lack of incentives for the new generation and new villagers to engage in weaving bamboo as a profession; thus, knowledge and skills relating to bamboo crafts are depleting day by day.

Table 6-5: Monthly average household income and income from bamboo products for different stakeholders.

| Primary business category | N | Av. household income/month (BDT) | Income from bamboo products/month (BDT) |
|---------------------------|----|----------------------------------|---|
| Producer | 22 | 4,595.45 | 2,070.45 |
| Retailer | 12 | 18,375.00 | 4,725.00 |

6.3.3.2 Horizontal dimension of bamboo products' production-to-consumption system

Producers, who are at the lower level of the market chain, do not have the organizational strength of a cooperative to draw on. Nevertheless, in each of the study villages, the producers have some informal linkages through which to share market knowledge and ideas to improve efficiency. Sometimes, one villager takes responsibility for another's products by selling them directly to consumers in a local market or to the local retailers if they cannot sell directly to consumers. This minimizes the costs incurred by the producers, as well as their time investment. However, at the upper level of the chain, the retailers do have some market committees which can negotiate prices and share information. However, retailers also often lack information about opportunities in the wider market and the level of demand for bamboo-made products.

6.3.3.3 Intensity dimension of bamboo products' production-to-consumption system

The collectors' work consists of traveling as necessary to a forest and using simple knife skills (*dao*) to harvest the bamboo and cut it to size for easy carrying. Producers, though, draw on considerable skill and knowledge and devote long periods of time to designing and making their bamboo products. The retailers do not usually invest much time or money, as for most of them trading in bamboo is just one part of a business that also includes similar trade in, for example, earthenware products and brooms. No modern technology or machinery is used at the production and marketing levels; however, it is vital that such be introduced if producers are to see an increase in their income and if traditional bamboo items are to continue to be produced.

6.3.3.4 Seasonality, changes, trends, constraints, and opportunities for bamboo products

Seasonality: Bamboo products are in demand and transacted for all year round. However, demand is a bit lower than at other times during the rainy season (June to August) (Figure 6-7). Demand increases during the agricultural harvest season of September to January. Then there is again relatively low demand during February and March. However, bamboo products are again in high demand before the rainy season when the villagers harvest the rest of the jum (shifting cultivation) crops and carry many materials including seeds and implements to the hills and fields to prepare the land for jum or other agricultural cultivation.

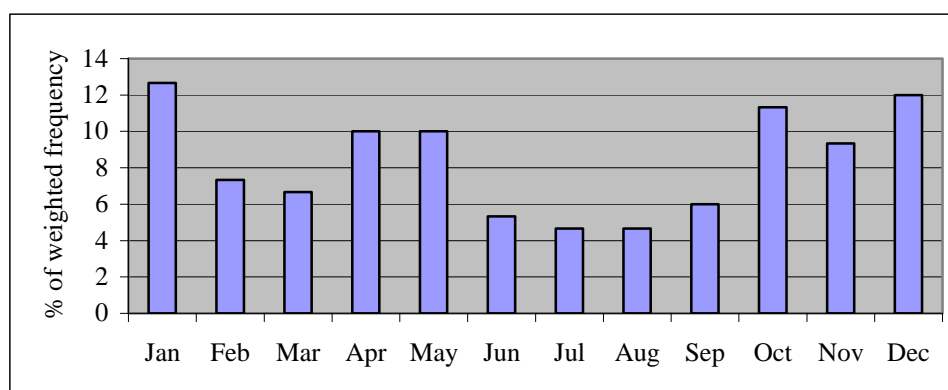


Figure 6-7: Peak season for bamboo-made products sale in market.

Market constraints: The existing market systems for bamboo-products are constrained by various market problems. The major market constraints, as noted by different stakeholders, include lack of financial capital, lack of market information/places to sell/customers, lack of input materials and their supply, and the difficulty of making profit given increased competition. Among other market constraints, lack of transportation and communication facilities, lack of financial support or credit and lack of training are also worth mentioning (Figure 6-8). Given these constraints, the producers, therefore, lack any incentive to bring more items to market.

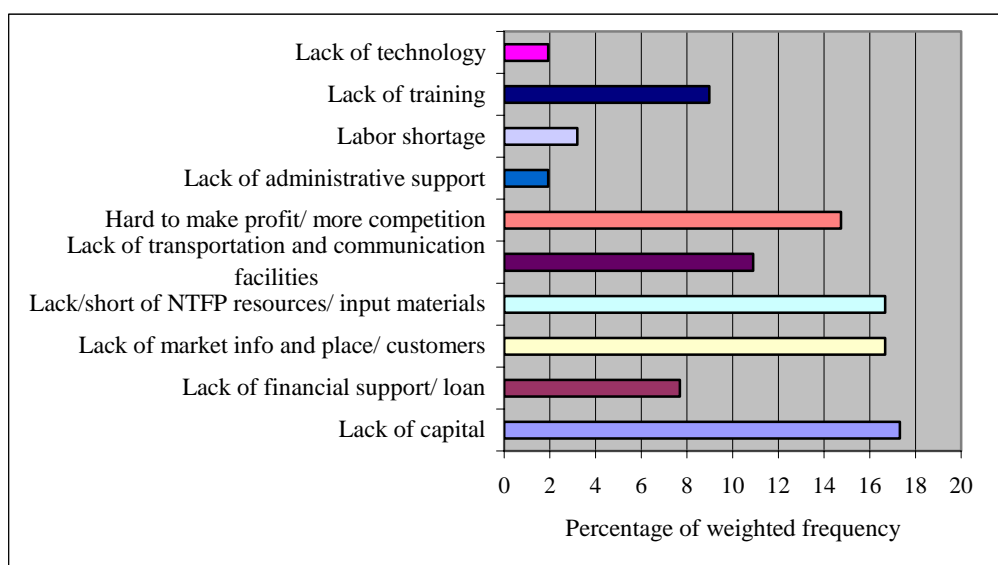


Figure 6-8: Major problems in the bamboo products market.

Changes in the stakeholders in the bamboo product market: In the last five years, there has been an increase in the number of stakeholders of all kinds in the bamboo product business. The main reasons for increasing the number of stakeholders are lack of employment opportunities, opportunities for income limited to certain seasons, greater demand from the increased population (Table 6-6). However, although the numbers of stakeholders are increasing, traditional knowledge and skills are being lost, as most of the producers are engaged in making very common items that though used on a daily basis are not necessarily traditional or do not reflect the richness of tradition.

Table 6-6: Change in number of bamboo product stakeholders and reasons.

| Stakeholders | Current number at any market reference point (Mean) | Responses about change of stakeholders' number in last five years (%) | | | Main reasons for decrease* | Main reasons for increase* |
|-----------------------------|---|---|-----------|----------|----------------------------|----------------------------|
| | | Decrease | No Change | Increase | | |
| 1. Collectors | 11 | 6.7 | 13.3 | 80.0 | 1 | 6, 14, 5 |
| 2. Producers | 7 | 17.2 | 37.9 | 45.0 | 1, 17 | 4, 5, 6 |
| 3. Agents/brokers/middlemen | 6 | 0 | 0 | 100.0 | NA | 13 |
| 4. Transporters | 1 | 0 | 100.0 | 0 | NA | NA |
| 5. Traders | 2 | 0 | 50.0 | 50.0 | NA | 12 |
| 6. Wholesalers | 4 | 0 | 25.0 | 75.0 | NA | 4, 6, 14 |
| 7. Retailers | 3 | 4.0 | 44.0 | 52.0 | 2, 3, 18 | 6, 14, 12 |

* **Codes:** 1 = lower availability of NTFPs as input materials/degraded stock of NTFPs, 2 = availability of other alternative goods, 3 = bad market information and links, 4 = more demand from outside buyers (from Dhaka/Chittagong), 5 = lack of employment/alternative income, 6 = income opportunity even seasonally/easy to make profit, 12 = more demand for local needs, 13 = people are producing more products, 14 = have to spend more time/more hard work, 17 = don't get good price, 18 = lack of skilled manpower.

Trends in the bamboo products business: In the last five years, prices for bamboo products have increased in both the peak and off-peak seasons, and the main reasons for this are population growth in the area, increased prices of other commodities, and more visitors from outside areas (Table 6-7). However, the general availability of the raw material of bamboo is decreasing because of land clearing for shifting cultivation and plantation, bamboo flowering, and more extraction by the increased population. For the same reasons, the harvesting distance has increased, and overall the demand for the products has increased because of more people and more visitors from outside in the study areas.

Table 6-7: Major trends/changes in the bamboo products business during 2003–2008.

| Since 2003, how have the following been changed: | Majority responses about general trend (1 = Decreased, 2 = No change, 3 = Increased) | Main reasons for change |
|--|--|--|
| 1. The price of a standard unit of NTFP during the rainy season | 3 | More people, more demand; prices of other commodities went up; more demand for NTFP/more visitors from outside |
| 2. The price of a standard unit of NTFP during the dry season | 3 | More people, more demand; prices for other commodities went up; more demand for NTFP/more visitors from outside |
| 3. The general availability of NTFP | 1 | Land/forest clearing for jum/ plantation; lower availability for NTFP/ lower supply for NTFP as people extract more; bamboo flowering |
| 4. The distance that NTFP is transported from forest gate to end market (i.e. where the consumer buys) | 3 | Land/forest clearing for jum/plantation; more plantations or settlements in or nearby forests; lower availability of NTFP/lower supply of NTFPs as people extract more |
| 5. The demand for NTFP by consumers | 3 | More people, more demand; more demand for NTFP/more visitors from outside; land/forest clearing for jum/ plantation |

Possible interventions: Many initiatives could be undertaken to eliminate the market constraints on bamboo products. Government, NGOs, and other organizations can play a vital role in disseminating more market information, promoting small-scale community-based enterprises for bamboo products, providing new technology and training that builds on current skills, and promoting new-product development. Institutional programs for producers should focus on financial support and infrastructure development. Further, technical support and training should be arranged for more bamboo domestication initiatives in order to ensure a supply of raw materials. More policy support and coordination between government organizations and NGOs would be helpful to promote bamboo products and preserve traditional knowledge and skills as well as providing the villagers with more income. Previous government efforts to promote bamboo-based cottage industry should be re-examined to identify the factors that caused them to fail. New interventions that draw on lessons from the past would help the producers and to some extent retailers earn more from this sector.

6.3.4 Production-to-consumption system of bamboo pulp

KPM is situated on the banks of the Karnaphuli River in Kaptai of Rangamati and depends on bamboo for producing pulp and paper. KPM was established by Pakistan's government in 1953, and it was originally designed to process an annual total of 90,000 air dry tons (ADT) of fibrous raw materials, that is, bamboo, to be collected from CHT (Khisa, 2006). To meet the annual requirement of bamboo for the mills, the government granted KPM an exclusive 99-year-long license of 17,349 hectares in the Kassalong Reserved Forest and 33,351 hectares in the Rankheong Reserved Forest in 1953 (Khisa, 2006; Gain, 2006). The KPM bamboo harvest is based on harvesting from their designated sites on a 3-year rotation, employing contractors under the supervision of its own forest officers. The felling usually starts in October and continues for all year, except for the predominantly rainy season from the middle of June to the middle of August when bamboo harvesting ceases. The contractors employed by KPM, therefore, supply the harvested bamboo to the mill where it is used for making pulp and finally paper. The PCS of the bamboo for pulp (Figure 6-9) is discussed in the following section with attention also given to the various stakeholders involved in it and the processes and flow.

6.3.4.1 Vertical dimension of bamboo pulp's production-to-consumption system

Bamboo collectors are usually day laborers hired by KPM-designated contractors to cut bamboo from the licensed sites. Most of the collectors are local people who live close to the licensed forest areas. However, sometimes laborers from outside CHT are hired on contract basis for the whole harvest season. The bamboo harvesting is of two kinds: roadside bamboo cutting and ropeway bamboo cutting. From the roadside, the hired laborers cut bamboo along the road extending to an average lead of 90 m to 150 m. Ropeways are used for collecting bamboo from

remote areas that are difficult to access on foot. In ropeway harvesting, laborers cut the bamboo extending to an average lead of 90 m on each side of the ropeway (Khisa, 2006).

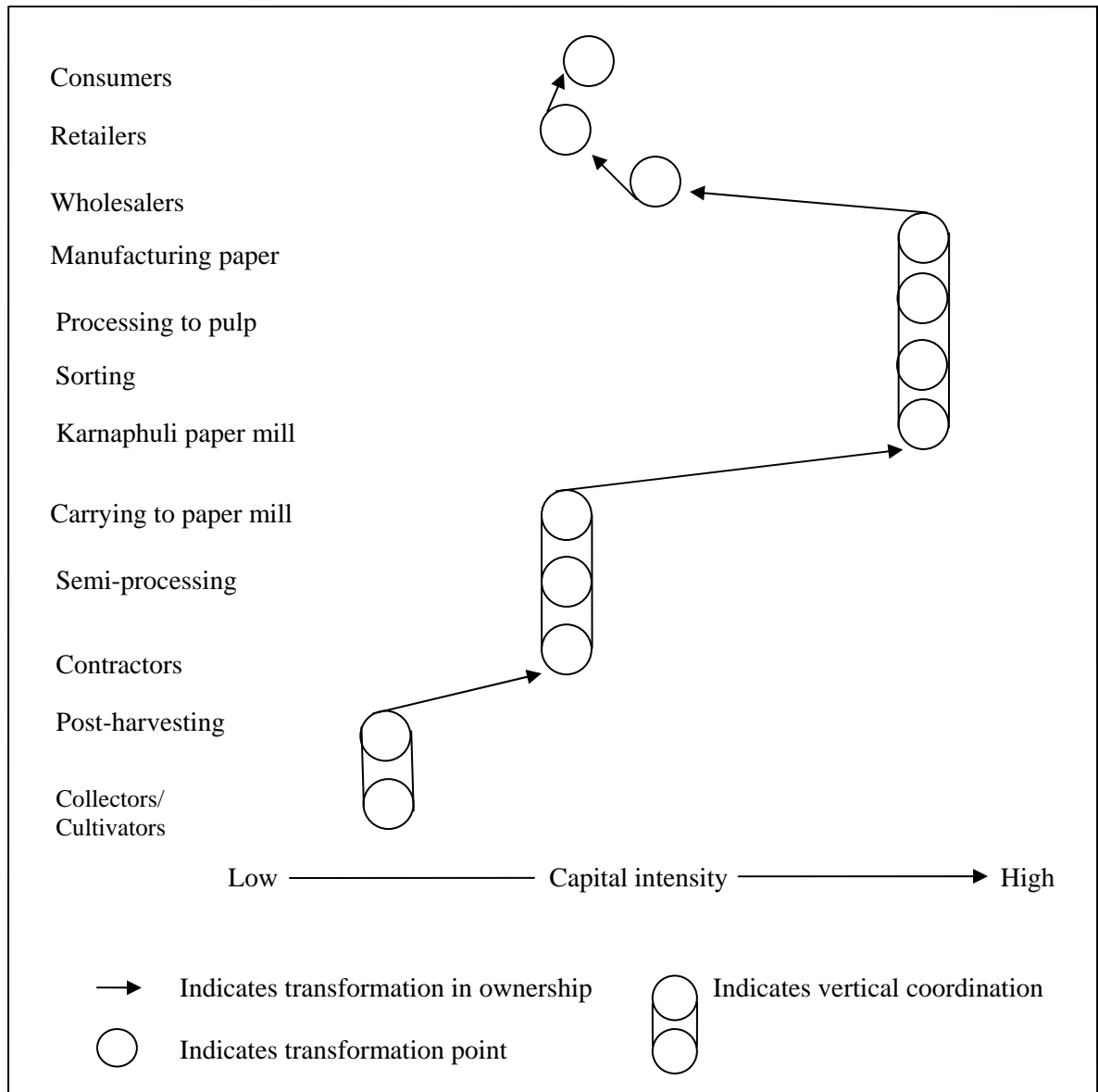


Figure 6-9: Bamboo pulp and paper production-to-consumption system.

At the KPM bamboo-harvesting sites, bamboo cutting is paid per piece with no consideration of age, size, or quality of the bamboo. On each day in the harvesting season, a

laborer can cut, trim, carry, and stack an average of about 100 bamboo pieces that can weigh a total of about 210 kg. The more pieces of bamboo the laborers cut, the more they earn. Felling of bamboo is purely manual, and the collectors often use a sharp tool (bill hook or dao) for cutting bamboo stems that are three years old at or above 15–35 cm from ground level (personal communication to the author; Khisa, 2006). Then the laborers clear the branches and cut the top-most portion of felled bamboo and sort them into stacks.

Once collected, the bamboo is carried by raft on the river to KPM's storage facilities. The mills use manual labor and mechanical power to collect the bamboo from the yard to the mill deck, where these are cut into a particular size before they are put in the boiler to be made into pulp. With the addition of some chemicals, paper is made out of that pulp and subsequently sold to wholesalers based in major cities. From there, the retailers purchase the paper and sell it at the local markets in every sub-district of Bangladesh.

6.3.4.2 Horizontal dimension of bamboo pulp's production-to-consumption system

There are no associations or cooperatives at the bottom level or collector level of the PCS. However, at the contractor level, the stakeholders draw on some informal linkages to negotiate prices and establish harvesting policies each year. At the industry level, there are no such associations, as the bamboo is supplied to only one paper mill. However, there are some labor unions, whose members work for the paper mills. These unions are sometimes influential in guiding the management of paper production as well as for upholding rights of the laborers who carry out the work of bamboo sorting, pulping, and paper making.

6.3.4.3 Intensity dimension of bamboo pulp's production-to-consumption system

There is no investment of money, machinery, or skill at the collector level. However, the contractors invest significant amounts of money to harvest the bamboo from the designated areas by employing laborers and using machinery and other materials. Some ropeways are also installed to make the harvesting procedure faster. To transport the bamboo by river, the laborers use rafts and sometimes tug boats. To transport the bamboo by road, the contractors rent big trucks that get the harvest to the paper mill. At the mill level, there is clearly a very large investments in the high technology, machinery, and laborers that produce the pulp and paper.

6.3.4.4 Constraints and potentials in pulp and paper production-to-consumption system

The KPM and its past and current practices are based on the CHT's bamboo resources as of 60 years ago; yet, unsustainable harvesting practices—including mismanagement of felling and unplanned deforestation in adjacent forests—have compromised the stock and regeneration rate of the bamboo stands. Therefore, the mills frequently report that they do not receive sufficient supplies of raw bamboo to meet the requirements of their industry. Although there is a set of rules for bamboo harvesting, not all of them have been enforced fully. From my personal communications with some key informants in CHT, I came to understand that KPM's license to harvest bamboo from some designated sites allows contractors and outsiders to enter reserve forests (an exception to Bangladesh Forest Law that prohibits entering any persons to reserve forest) and is one of the main causes of the accelerated deforestation. Besides cutting bamboo, some laborers, with the help of some traders, illegally fell timber from reserve forests areas that lie outside KPM's license. Given the remoteness of the sites, forest department officials provide little supervision and, therefore, do not enforce the forest laws. Moreover, although bamboo

felling is beneficial to some of the indigenous peoples in the locality near the KPM bamboo harvesting sites, many claim that outsiders create disturbances and constitute a threat to the indigenous communities. Further, the practice of paying for the bamboo by the piece with no consideration of other factors can be unfair, as some laborers must cut bamboo from deep in the forest or from a slope and so they necessarily cut less bamboo in any given period of time. Certainly, the laborers work hard, but the pay they receive is no reflection of this labor.

At the contractor level, some influential contractors usually manage to win the auction for harvesting bamboo at the mills using behind-closed-doors tactics that are not fair to other contractors. Although controversial, it is claimed that some of the contractors are involved in illegally collecting other forest products in CHT. Within KPM itself, management is inefficient and a continuous large demand for bamboo is accelerating the rate at which it is depleting in CHT, therefore, putting KPM at risk of experiencing a shortage of raw materials. To date, no major interventions have been tried to create a convenient undisturbed environment for the natural regeneration of bamboo sites. Similarly, there are no initiatives to cultivate bamboo in the degraded sites of CHT.

In the current context of degraded bamboo stock and abundance in CHT, the Bangladesh government needs to rethink bamboo management issues, including the leasing of bamboo stands and the supply of bamboo to KPM. To reduce pressure on bamboo, the mills could turn to complementary raw materials, such as soft wood, jute, and recycled papers. More interventions are essential to facilitate the natural regeneration of bamboo in CHT and to adopt measures for the mass cultivation of bamboo in CHT's degraded sites. Labor issues in regard to price and disturbance to the local indigenous communities by outsiders should also be reconsidered in establishing new harvesting and management strategies for KPM. The Forest Department should reconsider local peoples' participation in stopping illegal felling by outsiders by providing more incentives for them to allow designated forest areas to remain undisturbed.

6.3.5 Production-to-consumption system of bamboo shoot overview

The structure and systems of the bamboo shoot PCS, including its stakeholders and processes, is quite similar to that for wild vegetables. It will, therefore, be discussed under the wild vegetables PCS in the following section.

6.4 Wild vegetables production-to-consumption systems

6.4.1 Introduction

Wild vegetables are an important NTFP group on which forest-adjacent people depend heavily for their livelihoods, but their importance is often neglected in forest management policies (Delang, 2006). Like other forest-adjacent communities worldwide, the forest-adjacent communities in my study sites collect vegetables that occur naturally in the forest. These people depend on those vegetables mainly for their day-to-day household consumption and for some cash income. A variety of wild vegetables including bamboo shoots is available in CHT, and their consumption is closely related to the traditions of the different indigenous peoples (Personal field observation; Banik, 1997). Because of acute poverty in the region, some of the villagers collect the vegetables and sell them to nearby market places for cash so that they can then purchase other necessary commodities for their households. However, these natural resources are being overexploited and gradually being depleted for many reasons. In the following section, therefore, the PCS of wild vegetables (Figure 6-10) in CHT, which involves several kinds of stakeholders and processes, will be discussed first, followed by a consideration of constraints, trends, changes, and potentials in a later section.

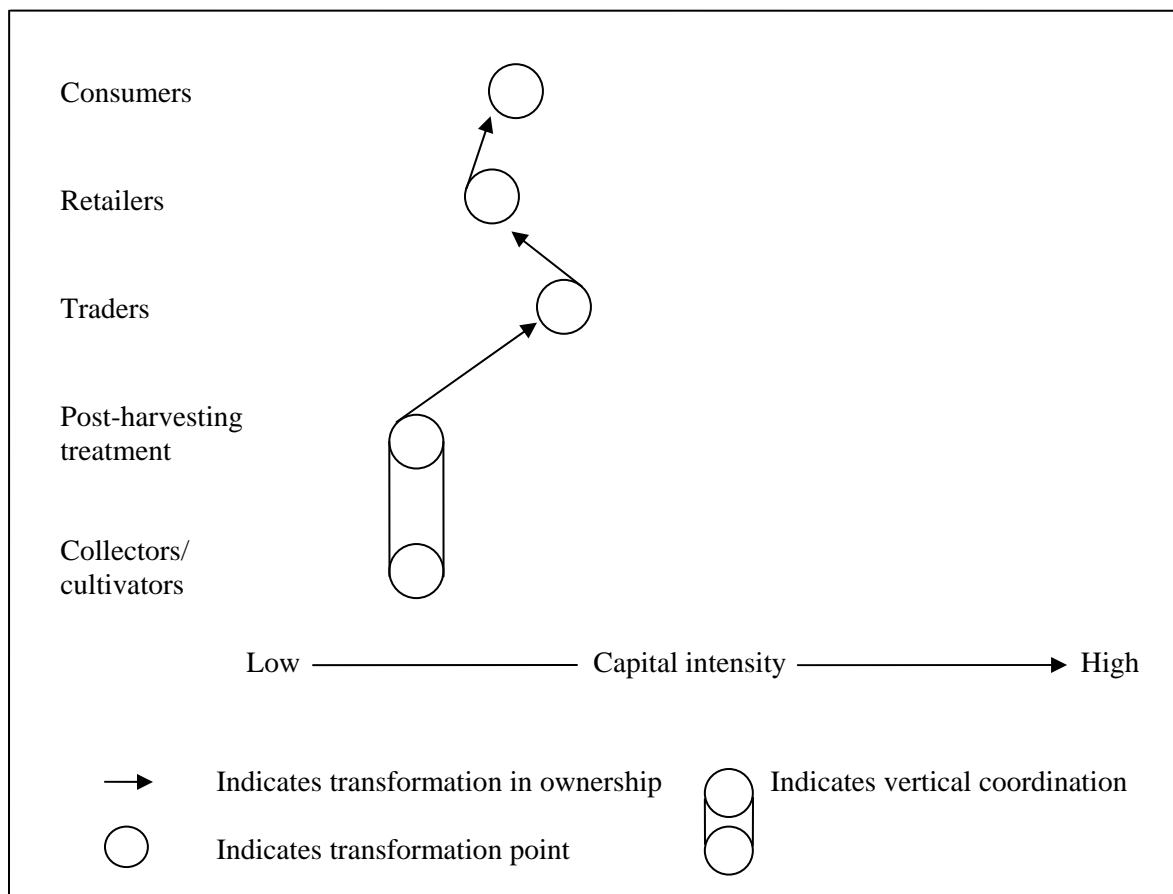


Figure 6-10: Production-to-consumption system of wild vegetables.

6.4.2 Vertical dimension of wild vegetables' production-to-consumption system

At the village level, the collectors collect wild vegetables and mostly use them for household consumption. However, some collectors sell them, either at market or to other villagers. Before taking the vegetables to market, they sort them and make bundles and pack them in a basket with wet spray to keep them fresh longer. The collectors carry the vegetables as shoulder loads, and they sometimes also use a local vehicle. At market, some of the collectors sell the vegetables directly to consumers at retail, and others sell to local traders at a lower price than

retail. The traders, in turn, sell to the retailers, and some sell them in big cities where there is a good demand for wild vegetables, especially from some of the indigenous people living in urban areas who originally came from CHT. Of course, there is a good number of consumers who though not from CHT enjoy wild vegetables.

In terms of income from wild vegetables, as shown in Table 6-8, although collectors depend on wild vegetables for a significant portion of their household cash income and spend considerable time collecting vegetables from the forests, traders and retailers make more income from selling the wild vegetables. The monthly income of collectors is the lowest (BDT 1,850 per month). However, this income is crucial for the survival of the household members in the absence of other income-generating opportunities. The collectors who sell vegetables at the local market at retail prices can earn slightly more (BDT 2,400/month). However, the traders who purchase vegetables from collectors and sell to other retailers, earn about double of what the collectors can make from wild vegetables. But it is important to note that the traders usually invest more money into the business and have more business skill, knowledge, and connections.

Table 6-8: Monthly household income and wild vegetable income of different stakeholders.

| Wild vegetable market stakeholders | N | Mean monthly household income (BDT) | Mean monthly household income from wild vegetables (BDT) |
|------------------------------------|----|-------------------------------------|--|
| Collector | 24 | 3,646 | 1,850 |
| Trader | 1 | 7,000 | 4,500 |
| Retailer | 2 | 4,750 | 2,400 |

6.4.3 Horizontal dimension of wild vegetables' production-to-consumption system

There is no horizontal coordination and no formal cooperative or association for any of the stakeholders in the PCS of wild vegetables except for traders. However, collectors do have some informal linkages regarding business, at least within the same village. For example, they

usually share the same vehicle when transporting vegetables, and they also share market information. They also sometimes bargain collectively when selling to the local traders. At the trader level, there is no association except for at the general market level, where there is a district-based market committee for all raw material traders' association. The retailers also have informal linkages with each other, but no formal cooperatives exist based on the wild vegetable business.

6.4.4 Intensity dimension of wild vegetables' production-to-consumption system

No significant intensification in terms of investment or initiatives to domesticate wild vegetables at the collectors' level were observed. At the trader level, there is a financial incentive to purchase the vegetables and take them to big cities. More knowledge and linkages are also utilized at this stakeholder level. However, retailers invest more than do traders. There are no cold-storage facilities to preserve the vegetables or major domestication initiatives to cultivate vegetables to create a sustained supply and reduce pressure on natural stocks. There are no government or NGO initiatives to promote wild vegetable production and management or to help market them through different channels that would help the villagers in making more cash income.

6.4.5 Seasonality, changes, trends, constraints, and potential of wild vegetables

6.4.5.1 Seasonality

Although different wild vegetables are available year round, the beginning of rainy season (April to June) is the peak season for collecting and selling wild vegetables (Figure 6-11). After the dry season, the wild vegetables start regenerating in the rainy conditions. This trend

continues until June and starts decline in July when the rain becomes heavy, which makes collecting the wild vegetables difficult. Again, the off-peak season for wild vegetables is October to January, when the weather is mainly dry and few wild vegetables are ready to be harvested.

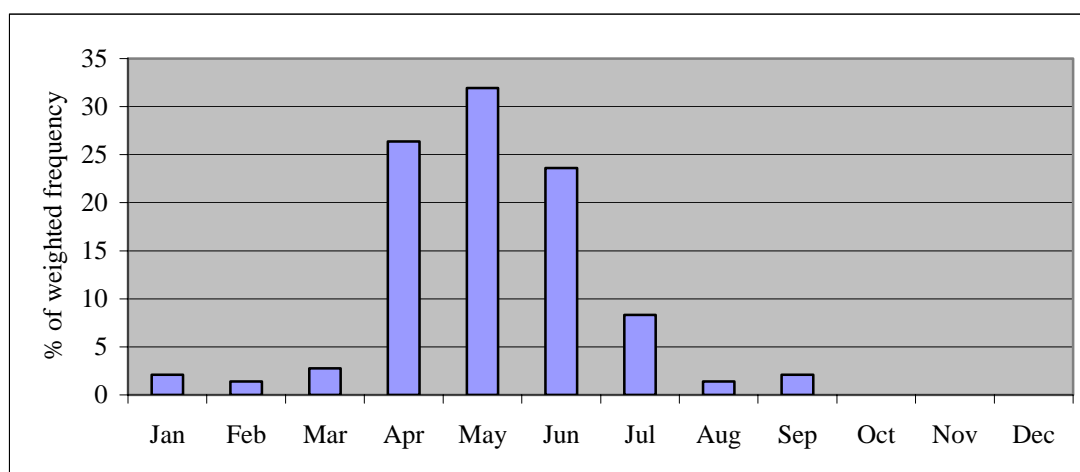


Figure 6-11: Peak season for wild vegetable market activities.

6.4.5.2 Market constraints

There are many problems associated with wild vegetable market (Figure 6-12). According to the villagers, lack of transportation and communication facilities is the number one problem. They think that if the transportation and communication systems were good, they could earn more by collecting and selling more wild vegetables at the local market. A general shortage of wild vegetables or lack of natural stock is another major problem. As stated earlier, stocks of wild vegetables are depleting day by day, and there is no incentive for the villagers to domesticate the wild vegetable species. In addition, it is also difficult for villagers to get a price that is high enough to justify the time and effort that goes into collection. The difficulty of obtaining a good price is a problem that besets stakeholders at every level for this NTFP. Part of the problem is a lack of market information about customers for wild vegetables and where best to sell them. A

lack of storage facilities is another problem that limits the income that stakeholders are able to make.

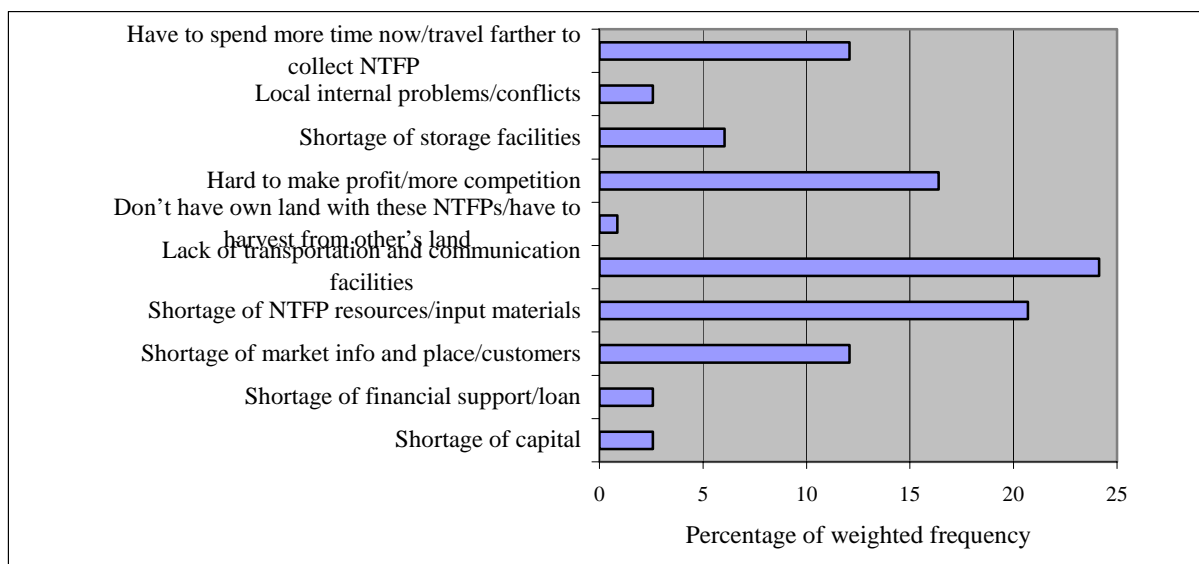


Figure 6-12: Major constraints in the wild vegetable business.

6.4.5.3 Changes in stakeholders

Although the alarming rate at which the wild vegetables are being depleted constitutes a serious threaten to the livelihoods of the poor villagers, the number of both collectors and retailers of wild vegetables has increased during the last five years (Table 6-9). However, the number of other stakeholders has not increased. The main reason for the greater number of collectors and retailers is the lack of other employment opportunities. On the other hand, the wild vegetable business provides the collectors and traders with at least some cash income opportunity. Further, the collectors are harvesting more vegetables in order to meet the increasing needs. Retailers also indicated that the lack of capital support is another problem. Some people also noted that there are more traders at present because of more demand from outside buyers.

Table 6-9: Changes in the numbers of wild vegetable stakeholders and reasons.

| Stakeholders | Current number at any market reference point (Mean) | Responses about changes in stakeholder numbers in the last five years (%) | | | Main reasons for decrease* | Main reasons for increase* |
|-----------------|---|---|-----------|----------|----------------------------|----------------------------|
| | | Decrease | No Change | Increase | | |
| 1. Collectors | 57 | 14.81 | 22.22 | 62.96 | 1, 14 | 5, 6, 12 |
| 2. Transporters | 4 | | 80.00 | 20.00 | - | 5 |
| 3. Traders | 12 | 9.09 | 45.45 | 45.45 | 3 | 7, 6, 4 |
| 4. Wholesalers | 10 | - | 100.00 | - | - | - |
| 5. Retailers | 50 | 11.76 | 17.65 | 70.59 | 1, 5 | 5, 6, 7 |

* **Codes:** 1 = lower availability of NTFPs as input materials/degraded stock of NTFPs, 2 = availability of other alternative goods, 3 = bad market information and links, 4 = more demand from outside buyers (from Dhaka/Chittagong), 5 = lack of employment/alternative income, 6 = income opportunity even seasonally/easy to make profit, 12 = more demand for local needs, 13 = people are producing more products, 14 = have to spend more time/more hard work, 17 = don't get good price, 18 = lack of skilled manpower.

6.4.5.4 Trends and changes in the last five years

During the last five years, the price of wild vegetables showed an increase in the dry season (Table 6-10); this is because this NTFP is less available in this season and yet the demand for it does not show a corresponding decrease. In addition, land clearing for shifting cultivation and plantation, higher demand, and the necessity for collectors to travel farther to collect them have resulted in wild vegetables being less available now than five years ago. Gradually, too, the demand for wild vegetable is increasing, as people become more interested in wild products and people from outside CHT buy more. However, no major changes in rules and regulations or their enforcement by government agencies have taken place in the last five years.

Table 6-10: Major trends/changes in the wild vegetable business during 2003–2008.

| Since 2003, how have the following changed? | Majority responses about general trend (1 = Decreased, 2 = No change, 3 = Increased) | Main reasons for change |
|--|--|--|
| 1. The price of a standard unit of NTFP during the rainy season | 2 | NA |
| 2. The price of a standard unit of NTFP during the dry season | 3 | Lower availability of NTFP/lower supply of NTFP as people extract more; more demand for NTFP/more big buyers from outside; people like natural or wild products; prices of other commodities went up |
| 3 The general availability of NTFP | 1 | Land/forest clearing for jum/ plantation; more people, more demand and more construction; more plantation/ settlements in or near forests and more collectors |
| 4. The distance that NTFP is transported from forest gate to end market (i.e. where the consumer buys) | 3 | Land/forest clearing for jum/ plantation; more plantation/settlements in or near forests; communication problem/lake water dries out in winter |
| 5. The demand for NTFP by consumers | 3 | More people, more demand; people like natural/wild products; more demand for NTFP/more big buyers from outside |

6.4.5.5 Conservation of wild vegetables

When the respondents were asked about the challenges likely to be faced by stakeholders in the wild vegetable market in the future, only 26% indicated awareness of any future challenges. Very few respondents cultivate wild vegetables on their own land (Figure 6-13). Among the stakeholders who consider environmental and wild vegetable conservation to be an issue, most (about 90%) of those stakeholders indicated that they do not destroy the whole plant when they collecting parts of it.

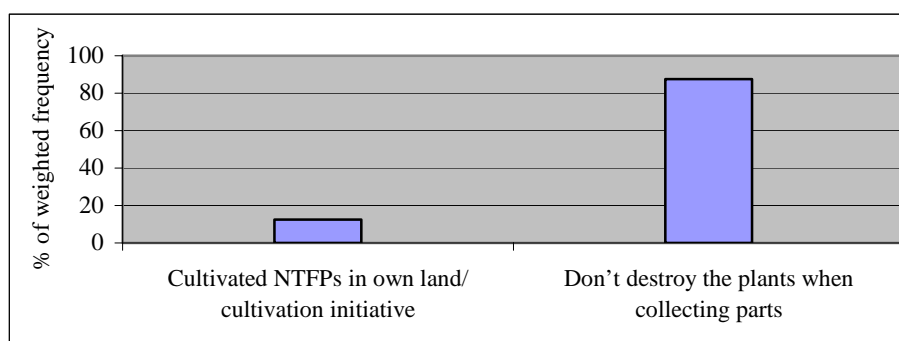


Figure 6-13: Major conservation initiatives in wild vegetable business by stakeholders.

On the other hand, among the stakeholders who do not take any conservation action, 87% don't feel that they can or need to do anything to conserve the wild vegetables (Figure 6-14). However, some of the stakeholders mentioned their ignorance of cultivation techniques, and some indicated an intention to quit the business if they could identify alternate income options. Overall, it appears that most of the wild vegetable stakeholders are not aware that the continuation of current unsustainable extraction practices will result in severely depleted stock in the future. They also lack knowledge and training in regard to cultivation techniques as well as the supplies of planting materials necessary to begin their own domestication work. The undefined land rights, lack of capital support, and lack of incentives could also be the underlying causes for not conserving and domesticating the wild vegetables.

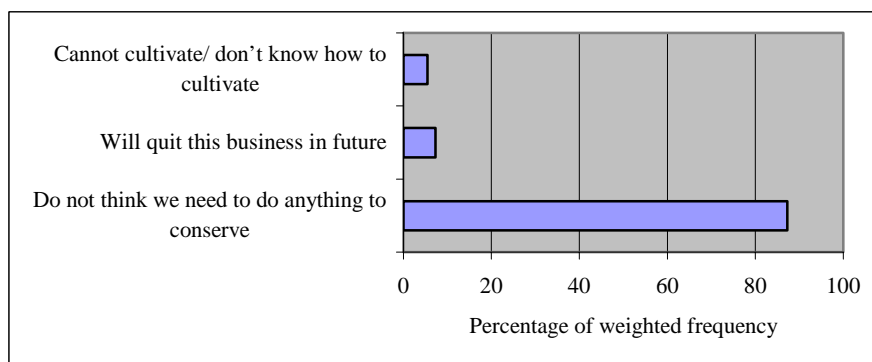


Figure 6-14: Why wild vegetable stakeholders do not take any action?

Possible interventions for the wild vegetable market: The current alarming rate of wild vegetable depletion in CHT poses a threat to the food security of forest-adjacent communities (Pimentel et al., 1997). In fact, the rate of depletion is such as to warrant government and NGO intervention. The organizations could promote cooperative-based wild vegetable cultivation, providing planting materials and instruction on techniques, practical training for utilizing and adapting indigenous peoples' current agricultural crop cultivation skills to the purpose of domesticating the wild vegetables. Such measures would reduce pressure on stocks of wild vegetables, enhance natural regeneration, increase the supply of vegetables for more cash income, and provide more food security to the forest-adjacent households. Easy access to credit, infrastructure for cold-storage facilities, and better communication systems with enhanced market information and dissemination mechanisms would help keep the vegetables fresh longer, enabling them to command a higher market price and increasing sale opportunities. Vegetables could be grown in degraded forest areas and integrated with other agricultural crops and trees in order to intensify production. However, it is of the utmost importance that villagers must fully participate in all these steps; sufficient education and incentives must be offered, including a participatory joint-management approach with defined land tenure and property rights.

6.5 Medicinal plants production-to-consumption systems

6.5.1 Introduction

CHT has a diversity of medicinal plants, but its stocks are declining sharply because of accelerated forest degradation caused by human interference. However, in comparison to other NTFPs, medicinal plants are extracted less as few villagers know how to make medicines from them and likewise few are aware of their cash value. That said, though, the majority of villagers

depend on herbal treatments for their primary health care provided by local herbal healers (*Baiddyas/kabirajis*) and medicinal plant-based treatment producers. Villagers rely on local healers for their primary healthcare because of tradition, lack of modern healthcare facilities, and poor transport and communication systems (personal field observation; Shahidullah, 2007).

In a recent study focusing on medicinal plants and CHT healers' pharmaceutical knowledge, Biswas et al. (2010) recorded 190 medicinal plant species under 147 genera and 57 families that are used to treat 60 different diseases. Such diverse medicinal plant use is also evident from my personal field observations and from other studies (e.g., Rashid & Khan, 2006). Some regional herbal-medicine producers also use different parts of the medicinal plants to prepare medicines and obtain most of their raw materials supply from CHT. Although villagers could improve their income by collecting and selling medicinal plants and from conserving them for future use, no major initiatives are yet in place, except for a few NGO-level initiatives for developing medicinal plant nurseries designed to raise seedlings for plantations.

As outlined, two types of PCS for medicinal plants have been observed in CHT: one focuses on production of herbal medicines by local healers or producers, and the other focuses on regional and national herbal medicine production by various herbal medicine companies. There may be some overlap between these two systems, but in most cases the stakeholders are distinct given the two separate PCS of medicinal plants in terms of their roles and earnings.

6.5.2 Production-to-consumption system of medicinal plants at the local producer level

6.5.2.1 Vertical dimension of medicinal plants' production-to-consumption system (local)

The major stakeholders in the medicinal plant PCS are local medicine producers or healers who are collectors, producers, wholesalers, retailers, and consumers (Figure 6-15).

Villagers collect certain species of medicinal plants, their fruits or other specific parts, as ordered by the local producers/healers. In most cases, these villagers have direct linkages with the local producers. Sometimes, the collectors who know that a particular plant is valuable for preparing medicine, collect that and take it to the local market. Traders then purchase the plants from the collectors for cash. The producers sometimes also give advance money to certain reliable villagers in exchange for the latter's labor in collecting the medicinal plants for them.

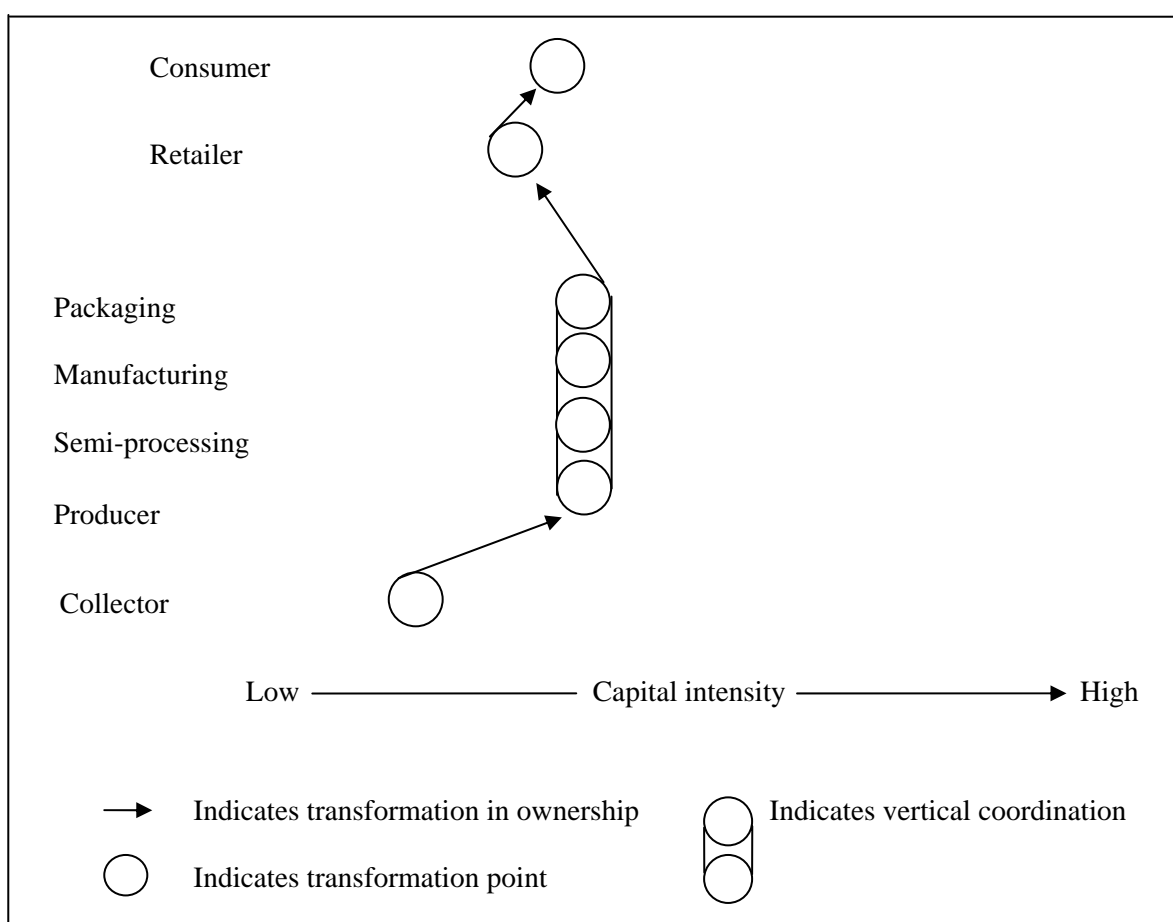


Figure 6-15: Production-to-consumption system of medicinal plants focusing on local level herbal medicine production.

After obtaining the supply of desired medicinal plants, the local producers of herbal medicine prepare different kinds of medicines by drawing on their traditional knowledge and skills. The producers take care of all the necessary processing, manufacturing, and packaging in order to sell to the medicines to the retailer or directly to consumers. The retailers usually buy in bulk from the producers and retail those medicines to the local market in remote areas. Most of the consumers are local people, but sometimes the producers/healers sell their herbal medicines to people from outside CHT.

6.5.2.2 Horizontal dimension of medicinal plants' production-to-consumption system (local)

There is no overall association that protects the rights and preserves the traditional knowledge of producers/healers in an integrated way at the collector level. However, there are several fragmented associations. For example, during my field study, I identified at least two healers' associations in the Rangamati district market—associations that far from cooperating appeared to be in conflict with each other. The associations do not share their traditional knowledge of manufacturing herbal medicines, nor do they work together to promote an agenda of obtaining government support for large-scale plantations to grow medicinal plants and manufacture medicines. Most of the local producers are retailers; however, there are also some retailers who purchase medicines from these local producers to sell in remote areas along with their own medicines or other products. However, there is no association or organization at the retailer level.

6.5.2.3 Intensity dimension of medicinal plants' production-to-consumption system (local)

There is no major domestication or intensification process at the collector or local level. The producers of local medicines tend to use a traditional simple hand-made procedure to prepare herbal medicines and do not have any mechanized or intensive manufacturing procedures or facilities. However, the producers usually invest more money than other collectors or retailers and employ several laborers to process, manufacture, and package the medicines. On the other hand, the retailers also make an investment in the trade by using limited marketing strategies such as advertising via loud speakers or renting a place in the local market. Sometimes, the retailers' investment extends to hiring labor as well depending on the size of the market and the amount they have to sell.

6.5.3 Production-to-consumption system of medicinal plants at the regional or national level

6.5.3.1 Vertical dimension of medicinal plants' production-to-consumption system (regional)

The vertical integration appears to be more at the producer level with all processes related to medicinal plants. The main stakeholders involved in the PCS of medicinal plants (regional medicine manufacture) include collectors, middlemen, local traders, wholesalers, producers, retailers and customers (Figure 6-16). The collectors, mostly the forest-adjacent villagers in CHT, collect the medicinal plants and sell them to the local traders. Sometimes the local traders based in CHT pay the village head or other key local people to collect the desired plants for them on a commission basis. Quite often, the traders even provide some advance money in order to obtain their supply.

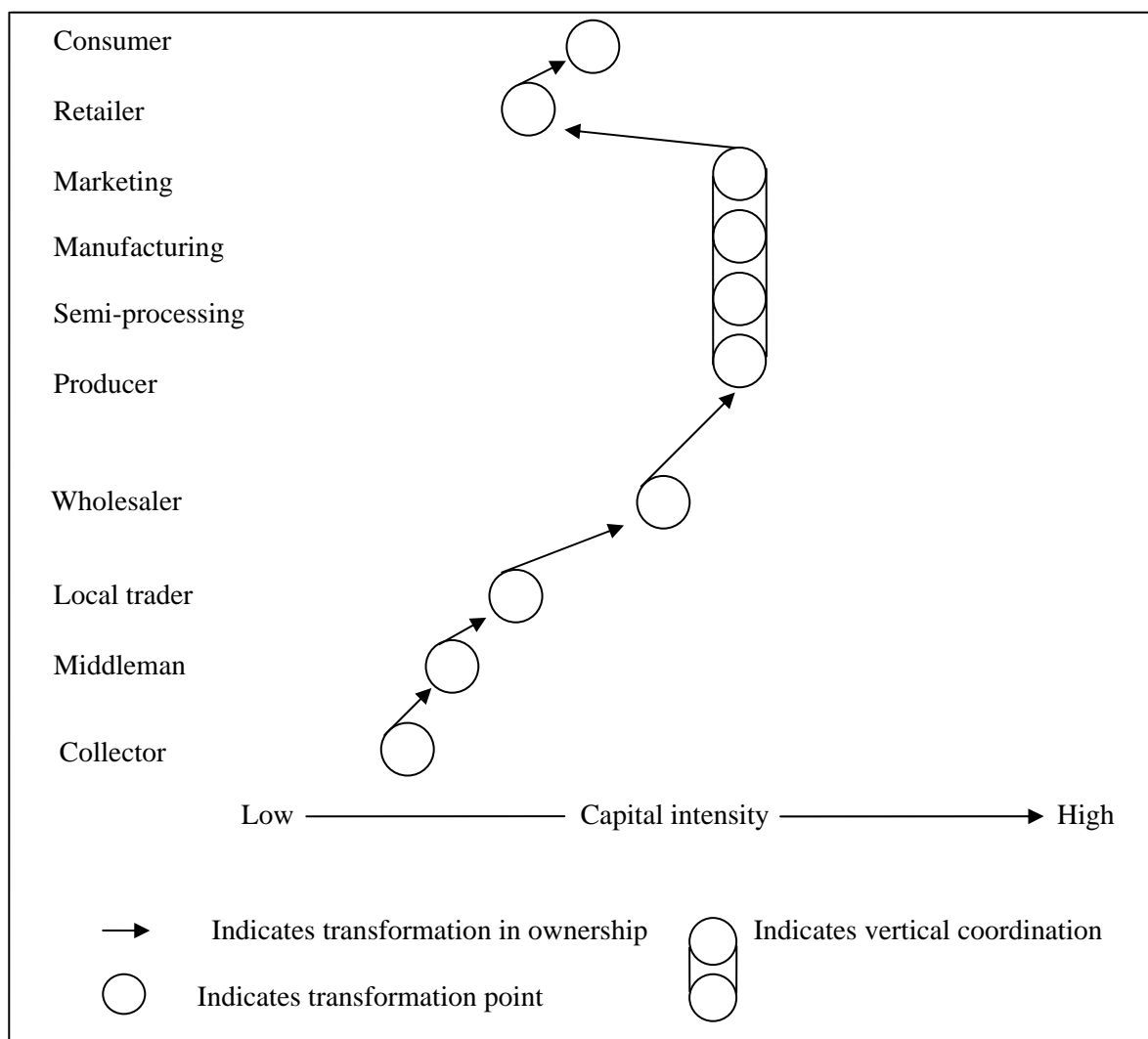


Figure 6-16: Production-to-consumption system of medicinal plants focusing on regional- or national-level herbal medicine production.

The local traders have good connections with wholesalers in Chittagong, Dhaka, and other major cities. These wholesalers supply the regional herbal medicine factories, such as Modern Oushodhaloy, AP Oushodhaloy, Sadhana Oushodhaloy, Kundeswari Oushodhaloy, Sri Durga Oushodhaloy, Hamdord and some others that produce medicines using these medicinal plants. Some of the herbal medicine companies also have their own stocks of some of the ingredients either from domesticated medicinal plant plantations or from import. After receiving supplies, the factories semi-process (sort, grade, and dry) the materials and manufacture the

herbal medicines according to their own unique traditional formulas. The manufactured medicines are then packaged and marketed through retailers. Sometimes, the companies that manufactured the medicines have their own retail outlets located in various districts and sub-districts through which the products are marketed to consumers.

6.5.3.2 Horizontal dimension of medicinal plants' production-to-consumption system (regional)

At the collector level, there are no formal organizations and no formal coordination. However, the traders have some informal linkages among them and share certain information about products' availability, price, and demand. At the producer level, the individual firms usually maintain their own knowledge and patent for herbal medicine production. They have some informal linkages to help them deal with national policies and promote their medicines.

6.5.3.3 Intensity of medicinal plants' production-to-consumption system (regional)

There is little in the way of intensification efforts in terms of the domestication and production of medicinal plants. The middlemen invest more money (often borrowed from local traders) and market knowledge than do the collectors, and the local traders invest more money, time, and labor than do the middlemen in order to obtain their supplies of medicinal plants. However, wholesalers invest more than do local traders. The producer herbal firms, however, invest significantly more money than do the other concerned parties given the laborers they employ and the machinery and technology they use to create refined products ready for final sale. However, the technology and machines are far from up to date. Further, the retailers invest less money in comparison to the producing firms, but they still have to invest a large amount of money for shops and displays and for employing other necessary marketing strategies and labor.

6.5.4 Income from medicinal plants at both the local and regional producer levels

Medicinal plant traders have the highest income, followed by wholesalers and then producers (Table 6-11); collectors have the lowest income. However, retailers realize slightly more income than do collectors. This is because traders in the medicinal plant business only work with this product as their whole livelihood, and they make a greater profit margin than do the other stakeholders. They have direct connections with the collectors, producers, and wholesalers. The higher the household monthly income, the more income they get from medicinal plants. Traders and wholesalers obtain more than half their monthly household income from medicinal plants.

Table 6-11: Income of different stakeholders in the medicinal plant business.

| Primary business category | N | Av. household income/month (BDT) | Income from medicinal plants/month (BDT) |
|---------------------------|----|----------------------------------|--|
| Collector | 3 | 8,000 | 4,167 |
| Producer | 14 | 11,536 | 5,607 |
| Trader | 6 | 24,250 | 11,667 |
| Wholesaler | 4 | 15,250 | 8,000 |
| Retailer | 5 | 8,300 | 2,500 |

6.5.5 Seasonality, changes, trends, constraints, and potential of medicinal plants

Seasonality: My study results show that the peak season for collecting medicinal plants and processing medicines runs from December to May (Figure 6-17). It is easy to go into the forest in this dry period and preserve the plants parts after drying in the sun. In addition, some of the plants only bear fruit during this season. It becomes harder to collect medicinal plants/parts during the months from June through November, which comprise the rainy season.

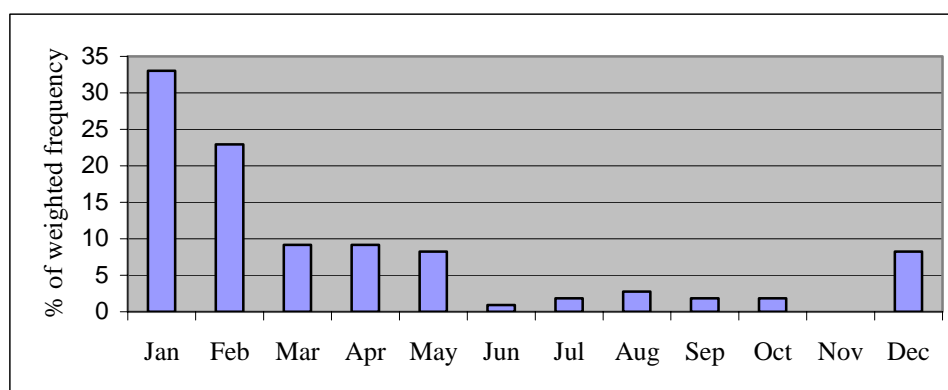


Figure 6-17: Peak and off-peak seasons for the medicinal plant market.

Major problems in the medicinal plant business: Lack of market information, place, and/or customers; lack of administrative initiatives; and shortage of medicinal plants are the main market constraints for medicinal plants (Figure 6-18). It is likely that more villagers would become collectors, if they knew which plants to collect, where to sell them, who to sell to, and what prices to expect. Yet, there are no government or NGO initiatives to promote a medicinal plant market and no significant initiative to domesticate identified medicinal plants species.

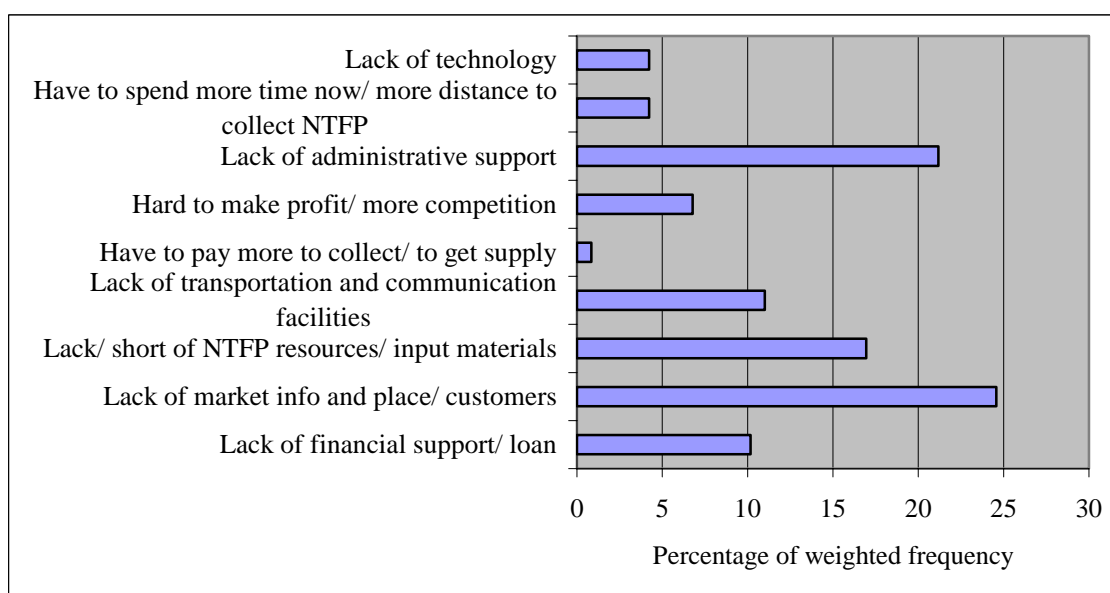


Figure 6-18: Major problems in the medicinal plant business.

Change of stakeholders: During the last five years, according to the respondents, the number of people collecting medicinal plants increased. The number of brokers or agents, as well as wholesalers and retailers, engaged in this business also increased in the last five years (Table 6-12). According to most of the respondents, though, the number of producers and traders remains unchanged. The reasons most frequently given for the increases are lack of other employment opportunities and the ability of the medicinal plants business to provide cash income although only on a seasonal basis. The numbers of outside buyers and local buyers for these items are also increasing. The overall trend toward higher numbers of stakeholders would be likely to continue at an accelerated pace if government, NGO, and/or private interventions were to create more income opportunities by taking measures to properly conserve the plants and promote the market.

Table 6-12: Changes in numbers of medicinal plant market stakeholders and reasons.

| Stakeholders | Current number at any market reference point (Mean) | Responses about change of stakeholders' number during 2003-2008 (%) | | | Main reasons for decrease* | Main reasons for increase* |
|----------------|---|---|------------------|-----------------|----------------------------|----------------------------|
| | | <i>Decrease</i> | <i>No Change</i> | <i>Increase</i> | | |
| 1. Collector | 17 | 33.33 | 30 | 36.67 | 1, 6, 21 | 6, 12, 4 |
| 2. Producers | 9 | 19.05 | 47.62 | 33.33 | 15, 1, 16 | 6, 20, 12 |
| 3. Transporter | 30 | - | - | 100 | - | 6, 5, 12 |
| 4. Trader | 4 | - | 69.23 | 30.77 | - | 5, 6, 7 |
| 5. Wholesaler | 9 | - | 46.15 | 53.84 | - | 5, 12, 6 |
| 6. Retailer | 15 | 3.45 | 34.48 | 62.07 | 22 | 6, 5, 12 |

*Codes: 1 = lower availability of NTFP as input materials/Degraded stock of NTFP, 4 = more demand from outside buyers (from Dhaka/Chittagong), 5= lack of employment/alternative income, 6 = income opportunity even seasonally/easy to make profit, 7 = lack of capital/ support, 12 = more demand for local needs, 15 = less demand cause people don't trust the product, 16 = less sale, 20 = to maintain the tradition of indigenous herbal uses, 21 = don't know the usefulness of the NTFP, 22= lack of government support.

The price of medicinal plants both in the dry and wet seasons has increased during the last five years (2003-2008) mainly because of more local and outside demand of the herbal products and lower availability of the wild medicinal plants (Table 6-13). Simultaneous with this increased demand is a decrease in the availability of medicinal plants mainly because of land clearing for shifting cultivation and tree plantations, plantations and human settlements near

forests, and over-harvesting by a larger population. These same reasons have resulted in villagers having to travel farther in order to harvest medicinal plants. In addition, communication problems including the fact that the lakes dry out in the winter that increases difficulty in commuting by boat, also cause difficulties. The demand for medicinal plants increased as some people believe that these are effective for intricate diseases and also more people have more demand. However, there are no major changes in the rules and regulations and in their enforcements in terms of selling and transporting medicinal plants or products.

Table 6-13: Major trends/changes in the medicinal plant business during 2003–2008.

| Since 2003, how have the followings changed: | Majority responses about general trend (1 = Decreased, 2 = No change, 3 = Increased) | Main reasons for change |
|---|---|---|
| 1. The price of a standard unit of NTFP during the rainy season | 3 | More demand for NTFP/more big buyers from outside, scope of making more profit, lower availability of NTFP/lower supply of NTFP, as more people extract more |
| 2. The price of a standard unit of NTFP during the dry season | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP, as people extract more, scope for making profit |
| 3 The general availability of NTFP | 1 | Land/forest clearing for jhum/plantation, more people, more plantations/settlements in or near forests and more collectors, lower availability of NTFP/lower supply of NTFP, as people extract more |
| 4. The distance that NTFP is transported from forest gate to end market (i.e., where the consumer buys) | 3 | Land/forest clearing for jhum/ plantation, more plantation/settlements in or near forests, communication problem/lake water dries out in winter |
| 5. The demand for NTFP by consumers | 3 | Cure intractable diseases, more people, more demand, lower demand for medicinal plant use |

Conservation aspects: Most of the stakeholders (75%) responded “yes” to the question of whether they are concerned about future environmental and medicinal plant product supply challenges. Among the respondents who do think about these challenges, most cultivated a few species of medicinal plants on their own land that are in high market demand (Figure 6-19).

Those respondents who recognized that there will be future challenges in terms of conserving medicinal plants but who do not cultivate medicinal plants said that they tried to make others aware of conserving the medicinal plants resources.

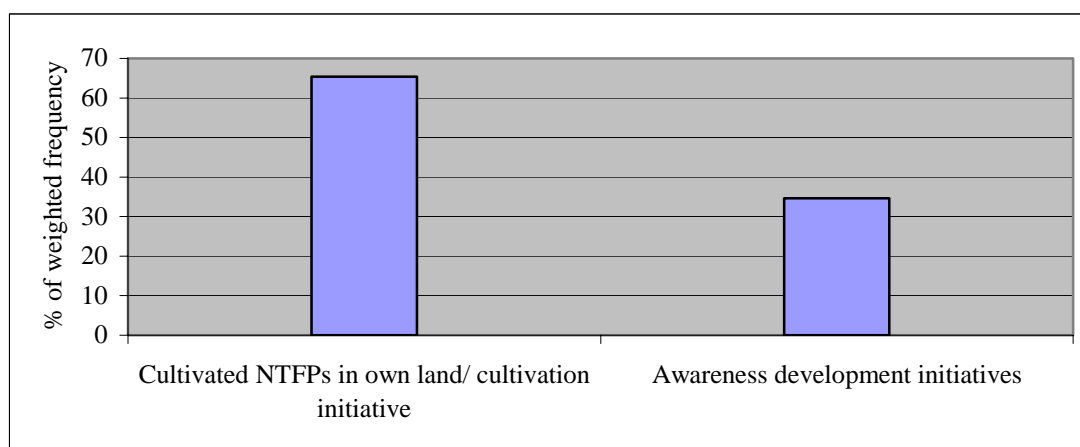


Figure 6-19: Medicinal plants conservation actions by stakeholders.

Moreover, the respondents who did not cultivate medicinal plants answered that they did not do so because they lacked land (Figure 6-20), because they did not know how to, and/or because they did not see the need for it. Most of the stakeholders also indicated that they lacked sufficient financial capital to do anything to help offset the predicted stock challenges.

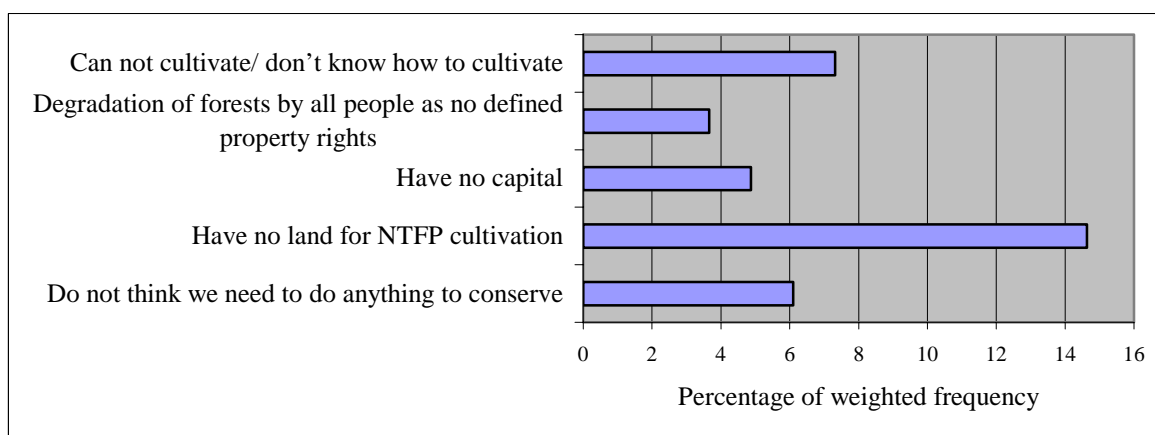


Figure 6-20: Reasons why stakeholders do not take action to preserve medicinal plants

Possible interventions: Many initiatives could be established to increase the cash income opportunities of the forest-adjacent communities and conserve the diversity of medicinal plants. Like wild vegetable-related initiatives, government departments and NGOs could provide support for programs to domesticate medicinal plants. One study focusing on medicinal plant-related interventions in Bangladesh showed that households can increase the amount of income they generate by being involved in the medicinal plant PCS (Shahidullah, 2007). Diederichs suggested that initiatives be put in place for commercializing medicinal plants in Southern Africa (2005). And, certainly, with the participation of villagers, local NGOs and government departments could support cooperative-based medicinal plant cultivation by providing planting materials for those medicinal plants that are in great demand, by providing training for cultivation techniques, and conserving natural stocks of medicinal plants. More training and facilities should be developed to add value to the products, control quality, and supply segregated medicinal products to different kinds of markets. Access to adequate credit facilities, accurate market information, and an improved communication system are also essential to increasing the income of forest-adjacent communities.

Cultivation initiatives for medicinal plants, as for wild vegetables, would also reduce pressure on stocks, thus facilitating natural regeneration and increasing the supply of plants for more household income. Medicinal plants could be grown in degraded forest areas by integrating agroforestry systems (Rao et al., 2004), which appears to be a good alternative to current form of destructive shifting cultivation practices with reduced fallow period. That is, such integration would help increase fallow period of shifting cultivation, and in the current CHT context, this would help address land and resource scarcity in the face of a significantly increased population (Rahman et al., 2007). It would do much to ensure that households get food from crops, enhanced cash and subsistence income from medicinal plants and also more cash income from trees in the long term. As Belcher et al. (2005b) suggested, medicinal plants could also be incorporated into

community forest gardens—another integrated land use system designed to simultaneously increase household income and conserve biodiversity. Also crucial to the success of any such programs, though, are defined land tenure and property rights, the participation of villagers in decision making, and appropriate policy support for promoting the medicinal plant market both domestically and in terms of exports.

6.6 Broom grass production-to-consumption systems

6.6.1 Introduction

Broom grass (*Thysanolaena maxima*), under family *Poaceae*, is a perennial that usually reaches a height of less than 3 meters. This plant grows almost everywhere in CHT, but is especially abundant in open spaces and in the proximity of hill cliffs. It grows in tussocks and culm grows centrifugally as new shoots during the period of April to July. At the end of its growth, broom grass bears an inflorescence at its shoot apex, and the inflorescence matures during December to February. Once the inflorescences have matured, they are cut, dried, and sorted into bundles from which brooms are subsequently made. Given the widespread growth of broom grass in CHT, this region meets almost all Bangladesh's broom-grass needs. Although some broom grass grows in the Chittagong, Sylhet and Mymensing, the supply is negligible in comparison with that from CHT.

The hill people collect the broom grass for household uses and for cash income. Almost all Bangladesh's households use brooms made from broom grass for cleaning purposes and offices also use them extensively. Other important uses to which broom grass is put include fuel, fodder, furniture and decorative items, paper manufacturing, wall building, and soil conservation (Khisa et al., 2004; Morung Express, 2009). During the broom grass harvesting season

(December to February), the villagers in CHT can earn some extra cash by selling broom grass at market. Many stakeholders are involved in the broom grass market system, which extends from the local to the national level. Details of the PCS of broom grass are outlined and analyzed in the following sections.

6.6.2 Vertical dimension of the broom grass production-to-consumption system

The main stakeholders in the broom grass business are village-level collectors, middlemen, traders, wholesalers (mostly regional), and retailers (local and regional) (Figure 6-21). At the beginning of the PCS, the villagers collect the broom grass. After cutting the grass, they clean the stems by removing the branches and sheaths and cutting them to a particular length. Next, the collectors select the inflorescences, which are both durable and in demand. Most of the collectors who sell the broom grass have some connections with the middlemen or local traders, who sometimes supply advance money in order to receive a supply of broom grass from the collectors. The collectors usually carry the cleaned and cut stems from the forest as shoulder loads, and sometimes use a local vehicle to transport them to the market place from home. At other times, the middlemen pick up the broom grass from the collectors through the village head or other influential villagers and deliver it to the traders using a local vehicle.

Upon receiving the broom grass, the local traders usually employ laborers to dry it under the sun in an open space; then they gather it into small bundles of 50 inflorescence sticks, which they subsequently bind into bigger bundles. When these bundles are ready to pick up, representatives of the wholesalers take them by truck or on the top of a public bus to Chittagong, Dhaka, or some other districts. The representatives usually have the necessary permit from the Forest Department that allows this product to be taken out of CHT.

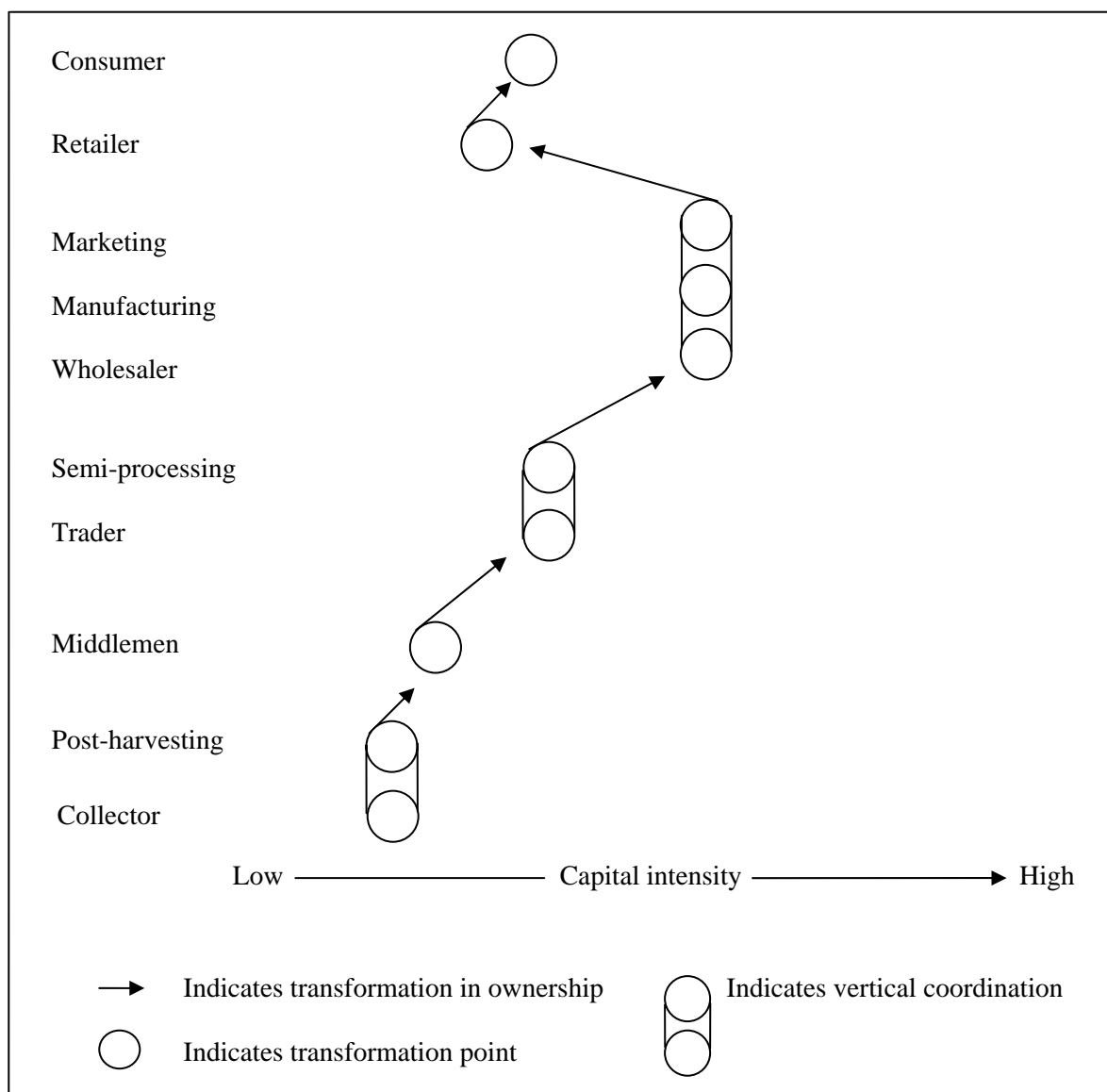


Figure 6-21: Production-to-consumption system of broom grass.

After the broom grass has reached the regional/district markets, the wholesalers store it and employ laborers who again sort and/or dry the bundles and bind them, thereby making brooms in different designs as per market demand. Each wholesaler has a kind of shed and factory where they employ two to ten people to produce the brooms. Retailers usually take these prepared brooms and sell them to the urban and rural households. In addition, the market chain also includes some people who purchase broom grass from the wholesalers and prepare brooms

themselves, subsequently selling them to households at retail. It also includes some retailers who purchase the prepared brooms from the wholesalers and sell them along with other commodities at village or urban markets.

In the broom grass market chain, wholesalers earn the most (BDT 18,000/month) from the broom grass business, followed by traders (BDT 16,900/month) (Table 6-14). The earnings of the other stakeholders range from BDT 2,000 to BDT 3,000 per month. The data show that although collectors work hard and take risks collecting broom grass from steep slopes, they earn very little for such effort and risk. Agents as well work hard to gather and coordinate a supply of broom grass from various traders, but their earnings, too, are low. The retailers earn slightly more than do collectors or agents, but their earnings are much lower than those of the traders and wholesalers. Although the retailers do not invest a lot of money, they do need to use some marketing techniques if they are to sell the brooms to consumers. On the other hand, the traders and wholesalers usually invest a lot of money and effort in the business, and they also take the risk of advancing money to the agents and collectors in order to obtain their broom grass supply. For all the stakeholders, though, their involvement in the broom grass business provides them with almost half their household income.

Table 6-14: Monthly average household income and income from broom grass by different stakeholders.

| Primary business category | N | Average household income/month (BDT) | Average income from broom grass/month (BDT) |
|---------------------------|----|--------------------------------------|---|
| Collector | 13 | 5,039 | 2,254 |
| Agent/broker | 4 | 5,875 | 2,625 |
| Trader | 5 | 39,700 | 16,900 |
| Wholesaler | 1 | 37,500 | 18,000 |
| Retailer | 3 | 7,000 | 3,000 |

6.6.3 Horizontal dimension of the broom grass production-to-consumption system

Like many other NTFPs, there is no association or cooperative for broom grass collectors, middlemen, or traders. Usually each regional wholesaler gives advance money or buying assurance to district-level traders in CHT. Each trader works with several middlemen to distribute some advance money to the villagers who collect the broom grass. Under each trader, the middlemen do not have horizontal linkages that are strong enough to support their own interests. Similarly, the collectors under the same trader whom they have to supply broom grass for giving them advance money, have informal linkages with each other and sometimes share the cost of transporting the broom grass to the local trader. Neither are there any formal associations or strong connections for the wholesalers, who mostly work in the regional markets of Chittagong and Dhaka. However, the retailers, who work under the wholesalers, do have some informal horizontal linkages between them and negotiate their profit margins with the wholesalers accordingly.

6.6.4 Intensity dimension of broom grass production-to-consumption system

There is no intensification in terms of broom grass production or domestication. The collectors usually collect the naturally occurring broom grass from the forest areas near their households, and using a simple knife (dao) harvest the grass and cut it to a specified marketable size. However, the present study recorded only a few instances in which an individual collector had domesticated broom grass, both of which took place in the Bandarban district. At the trader level, the financial investment is greater overall than at the collector level, and extends to hiring laborers to semi-process and sort the broom grass. The financial investment is greater again at the wholesaler level given that wholesalers must not only pay for rental space to store the raw

material and then to produce and store the brooms, but also pay laborers to make the products and transport them to the regional markets. Overall, brooms and other broom grass products are not created using any kind of modern machinery that would promote better design, increase production, and encourage export.

6.6.5 Seasonality, changes, trends, constraints and potential of broom grass

Seasonality: Findings from my field survey confirm that the main season for the broom grass business is from December to February when this plant's inflorescences flourish and mature sufficiently enough to harvest (Figure 6-22). The harvesting period coincides with the dry winter season; therefore, it is easy to harvest the broom grass and dry them in the sun. The off-peak season for the broom grass business at market is April to November. However, some trade still goes on at the upper level of the market chain even in the off-season. The traders, wholesalers, and retailers are involved in the business throughout the year, as the demand for brooms is constant rather than seasonal. In some cases, the wholesalers store the broom grass locally or regionally and sell it during the rainy season when raw broom grass is less plentiful and can, therefore, command a higher price at market.

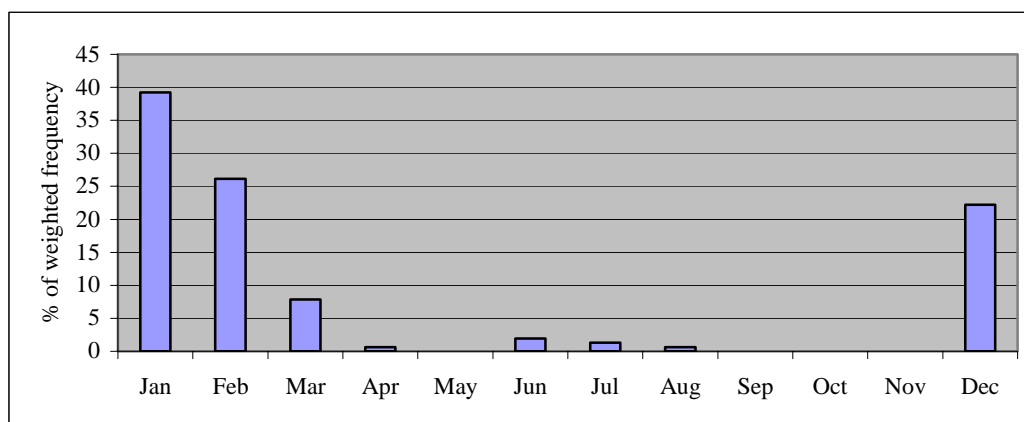


Figure 6-22: Peak season for the broom grass market.

Market problems: According to the different stakeholders, the main problems of the broom grass market are insufficient capital, inadequate transportation, a poor communication system, and too little market information (Figure 6-23). Other market problems that should be noted include the difficulty of making a profit, lack of financial support and loan provisions, and gradual decline of the broom grass stock in CHT.

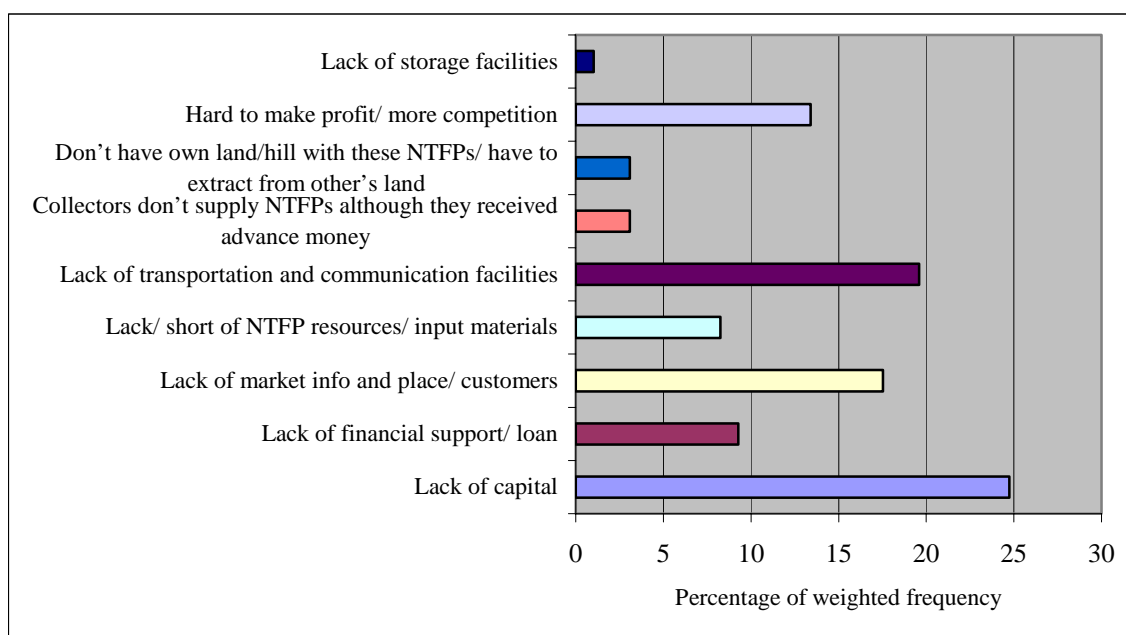


Figure 6-23: Major problems in the broom grass business.

Changes in stakeholders of broom grass: In the last five years, although there has not been a major change in the number of broom grass transporters, traders, or wholesalers, the number of collectors, brokers, and retailers has increased (Table 6-15). The main reasons for the influx of new people joining the business are lack of alternative income opportunities and the income opportunity this business affords though it is only on a seasonal basis. Other reasons include the increasing population, which is, in turn, increasing the demand for brooms, more business potential of supplying brooms, lack of sufficient capital to engage in any other business. The broom grass business continues to attract people at the collector level because collectors do not

need major capital to work in the business—only simple implements and their own manual labor are necessary. Yet, some of the collectors expressed the opinion that they could earn more by trading the broom grass and by offering it for sale in bulk quantities.

Table 6-15: Change in number of broom grass market stakeholders and reasons.

| Stakeholders | Current number at any market reference point (Mean) | Responses about change of stakeholders' number in last five years (%) | | | Main reasons for decrease* | Main reasons for increase* |
|----------------|---|---|------------------|-----------------|----------------------------|----------------------------|
| | | <i>Decrease</i> | <i>No Change</i> | <i>Increase</i> | | |
| 1. Collector | 34 | 3.8 | 26.9 | 69.2 | 1 | 6, 5, 4 |
| 3. Middleman | 13 | - | 27.3 | 72.7 | - | 5, 6, 7 |
| 4. Transporter | 4 | - | 75.0 | 25.0 | - | 6 |
| 5. Trader | 8 | 6.3 | 50.0 | 43.8 | 4 | 6, 5, 4 |
| 6. Wholesaler | 4 | - | 80.0 | 20.0 | - | 5 |
| 7. Retailer | 56 | 5.9 | 23.5 | 70.6 | 6 | 6, 5, 7 |

*Codes: 1 = lower availability of NTFPs as input materials/degraded stock of NTFPs, 4 = more demand from outside buyers (from Dhaka/Chittagong), 5 = lack of employment/alternative income, 6 = income opportunity even seasonally/easy to make profit, 7 = lack of capital/ support.

The price of broom grass, in both the dry and wet seasons, has increased in the last five years along with the increasing demand (Table 6-16). The main reasons for this trend are the increasing numbers of big buyers from outside CHT who are purchasing the broom grass, the decreasing stocks of broom grass resulting from unsustainable harvesting practices and other socioeconomic pressures, and the escalated land clearing for shifting cultivation and monoculture tree plantations. The availability of broom grass also decreased during this same period for many of the same reasons associated with the price increases: land clearing, more settlements and plantations in CHT, and more big buyers from outside. Likewise, that villagers must travel farther and farther in order to collect broom grass can be accounted for by reference to many of these same reasons.

Table 6-16: Major trends/changes in the broom grass business during 2003–2008.

| Since 2003, how the followings changed: | Majority responses about general trend (1 = Decreased, 2 = No change, 3 = Increased) | Main reasons for change |
|---|---|--|
| 1. The price of a standard unit of NTFP during the rainy season? | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP, as people extract more, more collectors |
| 2. The price of a standard unit of NTFP during the dry season | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP, as people extract more, more collectors |
| 3 The general availability of NTFP | 1 | Land/forest clearing for jhum/ plantation, lower availability of NTFP/lower supply of NTFP, as people extract more, more demand for NTFP/ more big buyers from outside |
| 4. The distance that NTFP is transported from forest gate to end market (i.e., where the consumer buys) | 3 | Lower availability of NTFP/lower supply of NTFP, as people extract more, more plantations or settlements in or near forests, more demand for NTFP/more big buyers from outside |
| 5. The demand for NTFP by consumers | 3 | More demand for NTFP/more big buyers from outside, lower availability as of NTFPs/ less supply of NTFPs as people extract more, more plantations or settlements in or near forests |

Conservation issues in broom grass: When asked whether they considered environmental and broom grass conservation issues in their business, about 27% of the stakeholders said that they did take action in this regard. Among the respondents who answered that they did consider broom grass conservation issues, 43% tried to develop awareness among collectors that they should be moderate in their harvesting and not destroy the whole plant when collecting parts (Figure 6-24). Very few said that they were cultivating broom grass on their own land.

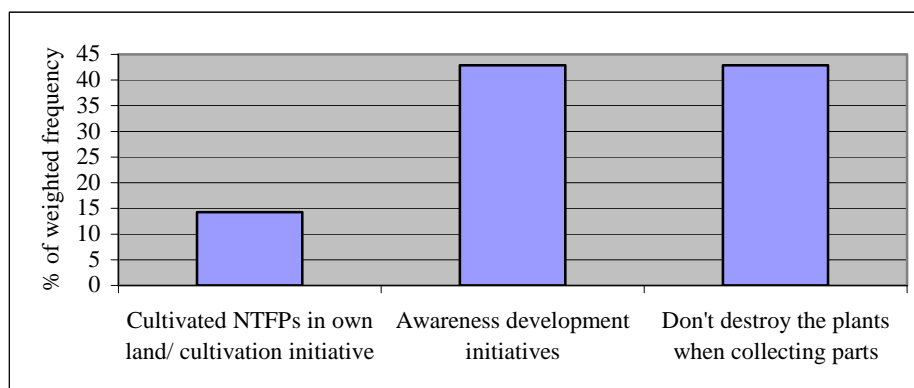


Figure 6-24: Broom grass conservation actions taken by stakeholders.

Further, the broom grass market stakeholders who did not take any conservation action stated that they did not see the necessity for doing so. Specifically, broom grass grows naturally; therefore, they reasoned that it would continue to be plentiful in the future (Figure 6-25).

However, some of the respondents also pointed to lack of capital, lack of knowledge and training in cultivating broom grass, and undefined property rights as auxiliary causes for lack of conservation action.

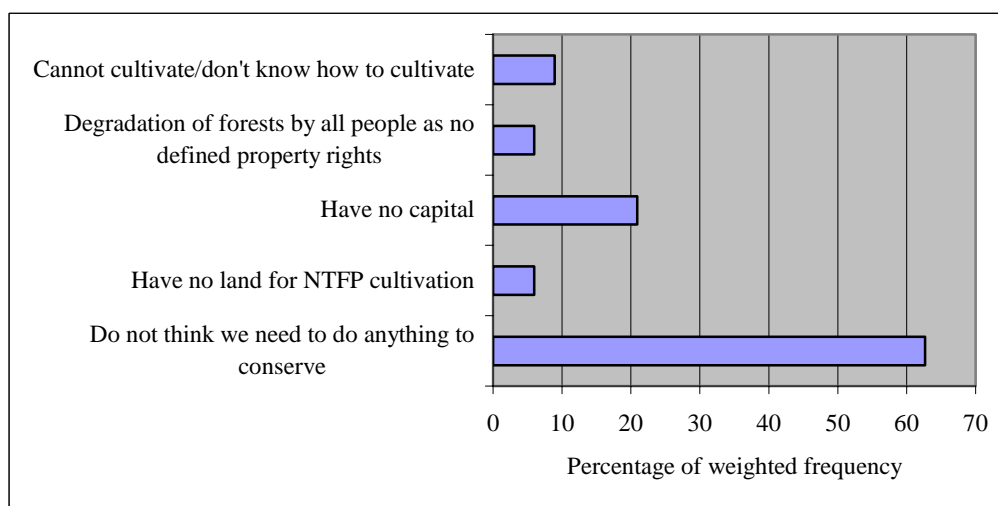


Figure 6-25: Reasons why stakeholders do not take action to conserve broom grass.

Possible interventions: Stocks of broom grass are decreasing day by day; natural stocks are coming under increasing pressure thanks to destructive harvesting practices in the face of no major domestication initiatives. To ensure the maintenance of sufficient natural stocks of broom grass for sustainable harvesting practices and to increase the cash income opportunities of forest-adjacent communities, I suggest several possible interventions. Local NGOs and government agencies, such as the Forest Department, could organize broom grass-based cooperatives with the participation of forest-adjacent villagers to undertake broom grass cultivation initiatives. The domestication of broom grass would increase the supply of brooms and other broom grass products that are in demand at market. Since broom grass can generate more household income to the involved households (Khan et al., 2003) as well as play an important role in controlling soil erosion and facilitating slope stabilization (Khisra et al., 2004), the implementation of domestication initiatives focusing on both income generation and environmental conservation objectives is crucial. However, broom grass entrepreneurship development support should be provided by financial capital or easy access to credit support, supplies of planting materials, training on cultivation techniques, and programs to develop awareness about the necessity of conserving natural stock. Better access to broom grass market information and improved transport and communication systems would also have a major positive impact on the income of all the stakeholders. In addition, there is no question that defined land and property rights are essential to sustaining any domestication and management initiatives.

Equally important are training programs and facilities that foster the design of and encourage the production of more value-added broom products with a view to targeting national and international markets. More intensified production of broom grass through cultivation and the mechanized production of brooms and other broom grass products through the use of modern technology and machinery would also allow the stakeholders to realize higher income. My personal interviews with some stakeholders established that some initiatives to export brooms to

Pakistan, Thailand, and some other countries had been put in place; however, in the face of a lack of government support, these initiatives did not continue. This kind of initiative has to be reconsidered to capture a wider market and benefit a wide range of stakeholders.

6.7 Menda bark production-to-consumption systems

6.7.1 Introduction

Menda (*Litsea glutinosa*) is a medium-size evergreen tree, the bark of which is used predominantly for manufacturing mosquito repellent coils and incense sticks. This plant is also used for therapeutic purposes, as its leaves can be used to treat diarrhea and dysentery, and essential oil is extracted from its fruits and berries (Chowdhury et al., 2008; Ghani, 2003). This tree grows naturally in the forests of CHT and other parts of Bangladesh. Because of its low-density soft wood, the tree used to be harvested for fuel wood only rather than as timber. However, during the last few decades, a market for the menda tree's bark has emerged such that the bark is now sporadically traded in local CHT markets. Although this tree also grows naturally in other parts of Bangladesh, the quality of the bark from CHT trees is superior to the bark from trees from other regions in that the former's higher degree of stickiness is helpful for binding mosquito coil raw materials. The mosquito coil industry had previously imported menda bark from other countries, such as Malaysia, Indonesia, Cambodia, and Thailand, but once it had been observed that a supply of menda bark could be obtained locally, the industry concentrated its buying in Bangladesh. Many stakeholders are involved in the bark's market chain, and several steps, processes, and transformations are required from collection through final mosquito coil production, as described in the following section.

6.7.2 Vertical dimension of menda bark production-to-consumption system

The main stakeholders in the menda bark PCS are collectors, middlemen, local traders, wholesalers, and industries that use menda bark powder (*tabu* powder) as raw material (Figure 6-26). The villagers who can identify the tree and have linkages with middlemen or local traders working in the bark market are usually involved in the business. These villagers collect the bark, take it to the market place, and sell it to local traders for cash. As a general rule, the collectors either peel the whole standing tree or fell the tree, and collect all its bark. The trunk and branches of the menda trees are then used as fuel wood. These bark harvesting practices are very destructive and are, without doubt, contributing to the rapid stock degradation of CHT's menda trees.

It is also relatively commonplace for middlemen to receive a commission to collect bark from the villagers on behalf of local traders. Since dried bark commands a higher price than does raw bark, most of the collected bark is spread over the roofs of buildings and dried in the sun by local traders before it reaches the regional traders or wholesalers. The drying process shrinks the volume of the bark by almost two thirds. Then the local traders with the help of laborers fill jute-made bags with menda bark (about 80 kilogram in each bag) and load them into the truck (5 ton capacity) to send to the regional or national market in Chittagong (at *Khatunganj*) and Dhaka (at *Bhairob, Shonir Akhra*).

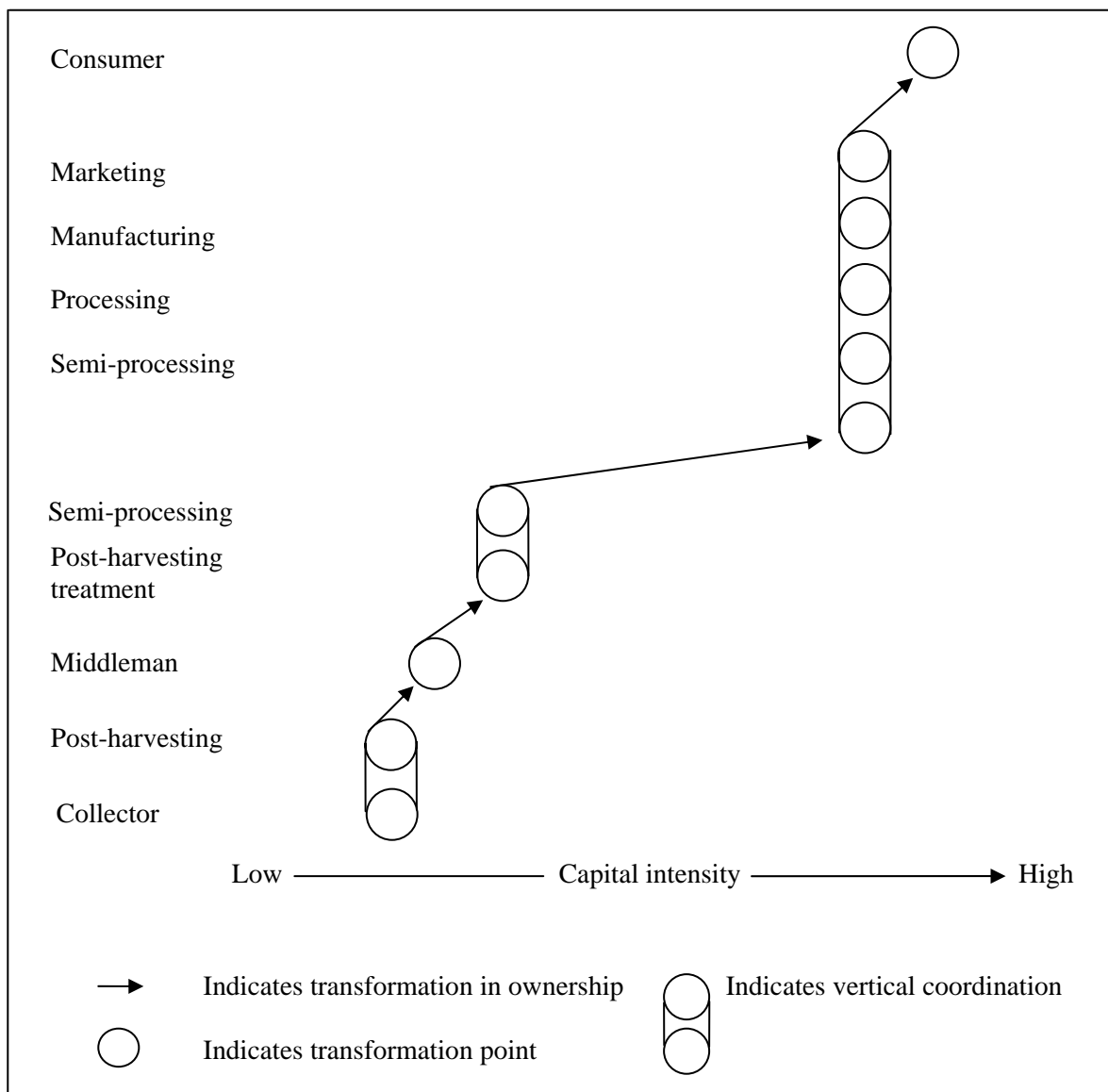


Figure 6-26: Production-to-consumption system of menda bark.

Wholesalers purchase their supply of bark at the regional and national markets. They then employ laborers to sort and grade the bark, to conduct further drying if necessary, and finally to grind the bark into powder. Known as *tabu* commercially, the powder is packed into 50 Kg bags and supplied to different mosquito repellent manufacturing companies (such as ACI Mortein, Globe and Reckit-Benckiser) in Dhaka and Chittagong. The companies mix the powder with other chemicals and materials in order to produce repellent coils. The *tabu* powder's principal

function is to burn as well as act as a binding agent in the coil. The mosquito coils are then supplied to regional traders at the district and sub-district level, who supply it to stores in both urban and rural areas. Finally, the stores sell the coils to everyday consumers, as mosquito bites are a problem everywhere in Bangladesh (urban or rural) so that repellents are necessary in all areas and circumstances. The market for the repellent coils is built on the fact that many people cannot afford to buy mosquito net; therefore, they buy repellent coils as a cheaper alternative, which are essential for protection against mosquito bites especially at night.

Income data show that the menda bark collectors earn about BDT 4,500/month from this source and are, therefore, better off than average villagers (Table 6-20). The middleman system is not well established yet for the bark trade, and middlemen in this market appear to earn less than do the collectors. The local traders in bark usually work with this item as a side business. The traders earn approximately BDT 6,000/month from the menda business alone. Given that they must purchase a permit from the Forest Department's and pay other fees, wholesalers invest more money in this business than do those at the other levels. The wholesalers also take more risk of the business in terms of investment. With average earnings of about Tk.12,000/month, most of the wholesalers derive all their income from this one business.

Table 6-17: Monthly average household income and income from menda bark by different stakeholders.

| Primary Business category | N | Av. household income/ month (BDT) | Income from menda bark/month (BDT) |
|---------------------------|----|-----------------------------------|------------------------------------|
| Collector | 18 | 11,889 | 4,511 |
| Middleman | 1 | 10,000 | 1,000 |
| Trader | 13 | 13,846 | 5,846 |
| Wholesaler | 1 | 12,000 | 12,000 |

6.7.3 Horizontal dimension of menda bark production-to-consumption system

There are no strong linkages among the collectors of menda bark, and no association or cooperative based on menda bark exists at the collector level in CHT. The middlemen tend not to be connected to each other even informally; instead, each is connected with an individual local trader. There is, however, a horizontal linkage at the local trader level, evinced by information sharing, working together to fill regional orders, and transporting bark together in order to share expenses. The wholesalers have formal trade associations through which they negotiate prices for tabu powder with industry buyers. In addition, buyers within the industry also work together in order to establish an agreement on the price to pay for and the amount of local tabu powder to buy versus importing it from other countries.

6.7.4 Intensity dimension of menda bark production-to-consumption system

No investment in domesticating menda trees in order to obtain a sustainable supply of the bark was observed at the collector level. Neither is there such an effort or investment at the middleman level. However, the local traders do make some financial investments in organizing the middlemen and collectors in certain areas of CHT in order to ensure a supply of bark. The traders also take some advance money from the wholesalers to whom they are thereby obliged to supply bark obtained from the middlemen. To transform the bark into tabu powder and to supply the powder to companies that will use it to manufacture mosquito coil, the wholesalers invest money in machinery and laborers. The companies also invest intensively in terms of capital, machinery, and laborers to produce their mosquito-repellent products. However, in the absence of any intensified cultivation effort, stocks of menda trees are depleting at an alarming rate in CHT

and other parts of the country. There is, therefore, a very real chance that in the near future, companies will no longer be able to meet their production needs through local supplies.

6.7.5 Seasonality, changes, trends, constraints, and potential of broom grass

Seasonality: Menda bark supplies are available until well after the rainy season (September to February) (Figure 6-27). There is increased demand in September to October and after that the demand for bark decreases a little because of more collected stock of the bark by traders or wholesalers and because these stakeholders become busy with processing and storing. From January, the bark traders again start to purchase more in order to be well-stocked for the rainy season. However, industrial consumption continues throughout the year.

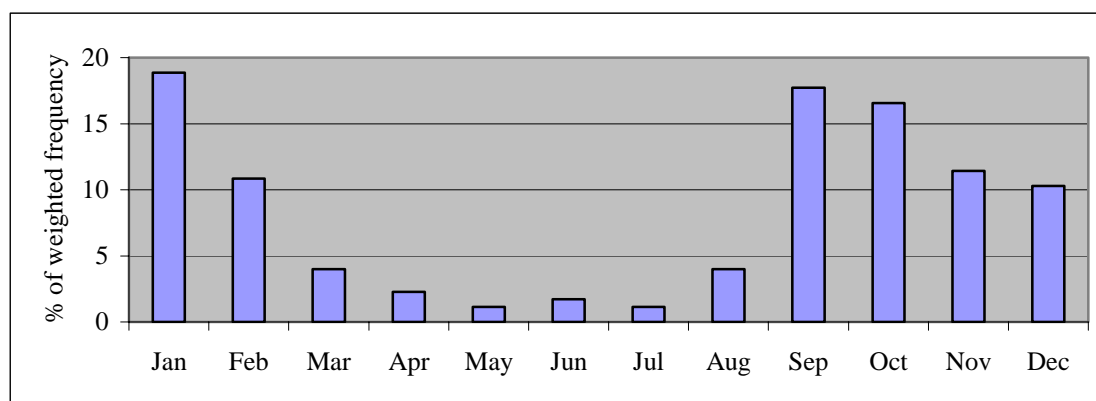


Figure 6-27: Seasonal demand in the menda bark market.

The problem of mosquito bites is at its worst just before and after the rainy season but not in the rainy season. Therefore, the off-peak season for the bark is May to July (during rainy season). During the rainy season, the demand for the bark is low because it is difficult to harvest it and dry it within few sunny days in rainy season. Another reason is that the bark's moisture content is much higher at this time of year and so drying it is a time-consuming process.

Market problems: Stakeholders in the menda bark market have identified a number of market problems (Figure 6-28). Although local collectors have a good chance to earn extra income, no government support or initiatives exist to encourage this trade. Although the Forest Department issues permits for this business, they allow only limited trade and offer no incentives for domestication or large plantation activities. The second major problem is that stakeholders, especially at the lower level of the PCS chain, do not get a good price because they lack the necessary market information to negotiate effectively. Lack of transport and communication facilities is another major problem. Most of the stakeholders at the local level lack the financial capital to expand their business. In addition, a shortage of menda trees in CHT caused by deforestation and balanced by no compensating cultivation initiatives present a huge problem for the long-term survival of this market.

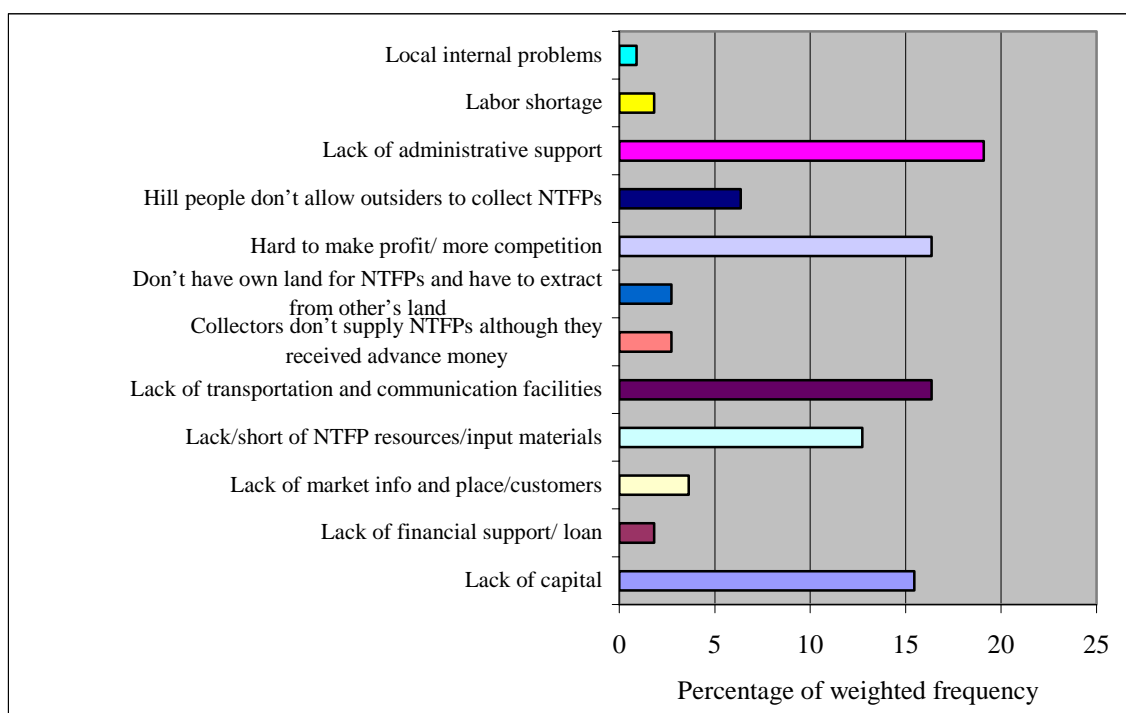


Figure 6-28: Major problems in menda bark business.

Changes in stakeholders: Many stakeholders are involved in the menda bark business, and about 38 collectors are engaged in both study sites. The number of both collectors and traders has increased in last five years (Table 6-18). The main reasons for these increases are sustained demand from local industry and more income opportunities from more outside buyers. It is also worth noting that many traders operate a menda bark business in conjunction with other business interests in items such as ginger, turmeric, and grains. On the other hand, the number of middlemen has dwindled, as more traders have developed direct connections with collectors.

Table 6-18: Change in number of menda bark market stakeholders and reasons.

| Stakeholders | Current number at any market reference point (Mean) | Responses about change of stakeholders' number in last five years (%) | | | Main reasons for decrease* | Main reasons for increase* |
|----------------|---|---|------------------|-----------------|----------------------------|----------------------------|
| | | <i>Decrease</i> | <i>No Change</i> | <i>Increase</i> | | |
| 1. Collector | 38 | 25.8 | 9.7 | 64.5 | 1 | 6, 4, 3 |
| 2. Producer | 3 | - | 100 | - | - | - |
| 3. Middlemen | 6 | 50 | 16.7 | 33.3 | 1, 16 | 6, 4 |
| 4. Transporter | 3 | 50 | 50 | - | 1 | - |
| 5. Trader | 3 | 3.8 | 34.6 | 61.5 | - | 6, 4, 3, 9 |
| 6. Wholesaler | 1 | - | 100 | - | - | - |
| 7. Retailer | 10 | - | 100 | - | - | - |

*Codes: 1 = lower availability of NTFP as input material/degraded stock of NTFP, 3 = bad market information and links, 4 = more demand from outside buyers (from Dhaka/Chittagong), 6 = income opportunity even seasonally/easy to make profit, 9 = conduct along with other trades, 16 = lower sales

In the last five years, the price of bark increased in both the rainy and dry seasons (Table 6-19). This is because big buyers are now purchasing more at a time when the menda trees' stock is depleting day by day as forest lands continue to be cleared. In the dry season, though, prices have traditionally been higher because Rangamati Lake dries up so that bark cannot be transported from remote areas. Moreover, survey results show that the availability of the bark is decreasing day by day because of unsustainable harvesting practices and high market demand—factors that also combine to provide an incentive for and, therefore, necessitate that collectors travel farther and farther in order to collect the bark. Similar destructive menda bark harvesting

practices with similar depletion trends have been observed in Rema-kalenga forests located in Bangladesh (Uddin & Roy, 2007). Further, in the face of forest clearing in many regions, demand is continuing to increase for bark nationwide, as more mosquito repellents must be produced to meet the needs of the increasing population. Because of the unsustainable practices used to extract the bark and the lack of any domestication initiative, natural stocks are gradually decreasing. Without some new initiatives, the domestic supply of bark will almost certainly be severely compromised in the near future.

Table 6-19: Major trends/changes in menda bark business during 2003–2008.

| Since 2003, how the followings changed:? | Majority responses about general trend (1 = <i>Decreased</i> , 2 = <i>No change</i> , 3 = <i>Increased</i>) | Main reasons for Change |
|--|---|--|
| 1. The price of a standard unit of NTFP during the rainy season | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP, as people extracting more, good quality of menda bark in CHT |
| 2. The price of a standard unit of NTFP during the dry season | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP, as people extract more, land/forest clearing for jhum/plantation, communication problem/lake dries out in winter |
| 3 The general availability of NTFP | 1 | Lower availability of NTFP/lower supply of NTFP, as people extract more, Land/forest clearing for jhum/plantation. |
| 4. The distance that NTFP is transported from forest gate to end market (<i>i.e., where the consumer buys</i>) | 3 | Land/forest clearing for jhum/plantation, lower availability of NTFP/lower supply of NTFP, as people extract more, communication problem/ lake water dries out in winter |
| 5. The demand for NTFP by consumers | 3 | More demand for NTFP/more big buyers from outside, lower availability of NTFP/lower supply of NTFP as people extracting more and more, good profit |

Conservation issues: Although stocks of menda trees are degrading day by day, only a few stakeholders reported taking action to conserve the trees. Among the stakeholders who said that they took conservation action, most (65%) (Figure 6-29) tried to develop awareness among

collectors by suggesting that they not cut the whole tree or peel the whole tree when harvesting bark. However, very few answered that they planted menda trees, conserved menda trees, or took care of naturally regenerated seedlings of menda tree in forests for future.

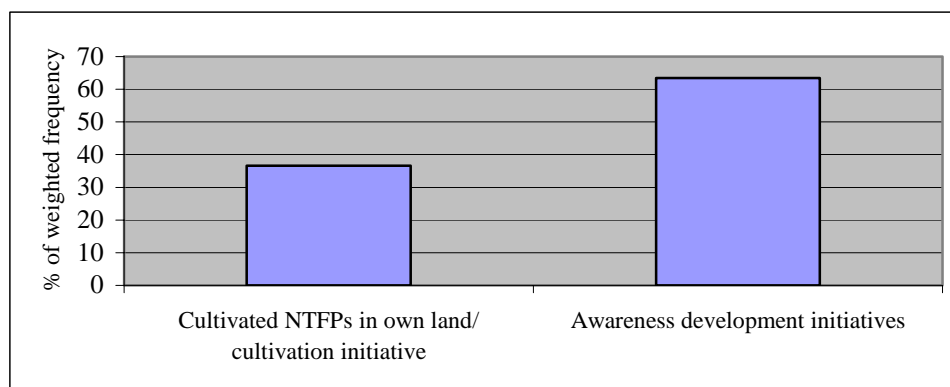


Figure 6-29: Stakeholders' actions to conserve menda bark.

My study results show that most of the stakeholders do not take any action to conserve menda bark (Figure 6-30), as they are either not aware that stock depletion is taking place or think that it is not necessary to address it. Many do not have any incentive, such as defined land and property rights, to do anything to conserve the plants. Further, some respondents reported that they lacked the capital and income to pursue alternative ways to make a living, and, therefore, they could not contemplate giving up working in this market as a way to reduce the pressure on menda tree stocks.

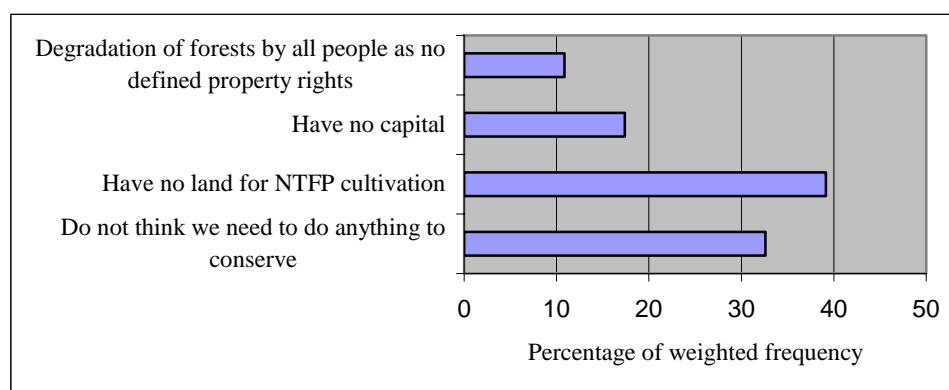


Figure 6-30: Why stakeholders do not take action to conserve menda bark.

Potential interventions: As my field study shows, the process of menda bark harvesting is clearly destructive and unsustainable. Stocks of these trees that grow naturally in CHT will be depleted completely very soon, if no scientifically designed harvesting practices are developed and prescribed. A participatory or collaborative forest management approach has been used with some success already in Bangladesh, India, and Nepal (Binayee, 2000; Fox et al., 2007; Khan, 1998; Prasad, 1999; Subedi & Binayee, 2000) and could be a viable option for engaging the forest-adjacent villagers in developing and managing menda tree plantations. However, it is necessary to secure land tenure and property rights, if sustainable harvesting is to take place. Sufficient market information can be provided by establishing a market information system so that menda bark stakeholders at different levels can have easy access to the information they need to negotiate effectively (Binayee, 2005). Small-scale entrepreneurship development initiatives should be taken with financial capital or credit support and local infrastructures should be created to improve communications. Initiatives to add value to and control the quality of bark processing and packaging should be encouraged for domestic and export markets to enhance stakeholders' income. Like medicinal plants, menda tree plantations can be developed in a way that integrates other valuable agricultural or forest crops in degraded forest lands. However, more pilot trials are necessary before large-scale plantations are established.

6.8 Comparative analysis of the NTFP production-to-consumption systems and discussion

6.8.1 Comparison of the different types of NTFP production-to-consumption systems

My market survey analysis and personal field observations confirm that NTFPs differ in terms of PCS: they have a varied number of stakeholders and distinct processes; their stakeholders also have varied income opportunities. The market chains also differ: some market chains are short and confined to the locality; some are long, encompassing local, regional, and national markets. The average number of collectors for all the selected NTFP market chains is much higher than the number of traders, and the number of traders is much higher than the number of producers and higher than the number of retailers. However, the average number of middlemen/brokers and wholesalers in the market chains is very low.

Further, in terms of the vertical linkages of the PCS of the selected NTFPs, there are many similarities. The majority of collectors in each market are poor forest-adjacent villagers who collect a variety of NTFPs for subsistence and sell them to obtain extra income. Several studies on NTFP collection and its contribution to the household economy in other forest areas of Bangladesh show a similar pattern (Akhter et al., 1997; Almagir et al., 2006; Miah, 2007; Riadh, 2007; Uddin & Mukul, 2007). The collectors have some informal arrangements between them and work with either middlemen or local traders to harvest and supply the products. Local traders who participate in the bamboo or broom grass PCS usually advance money to the collectors directly or through middlemen in order to ensure a sufficient supply of the NTFP. This arrangement compels a collector to sell the NTFP to the trader who advanced the money often at a pre-fixed price. This arrangement is prevalent for bamboo and broom grass, but by no means confined to these markets (Adnan, 2004).

Collectors involved in the PCS of wild vegetables, medicinal plants, and/or menda bark, harvest the NTFPs and sell them at a market to local traders. For menda bark, only a few villagers have direct linkages with the traders; therefore, only these few collect the bark and sell it to the traders. For all the PCS, the informal linkages between the collectors and producers are the only basis for sharing market information. However, at the trader level, information sharing is more formal, as traders tend to have strong links with upper-level traders and wholesalers. Collectors of bamboo and wild vegetables are directly linked with retailers who eventually sell the products to end consumers. For the rest of the NTFP PCS, since the raw products go through several processing steps and the end products are manufactured, the links between the producers, wholesalers, and retailers are strong and long-term, which is a necessary factor in maintaining market activities.

Horizontal linkages are very weak at the lower level of each PCS and stronger at the mid to upper levels. My survey data also show that most (95%) of the collectors and producers are not members of any cooperatives, but would join if an NTFP-based cooperative were to be initiated. The weak linkages at the collector and producer levels mean that these stakeholders have little bargaining power. The result: little chance of obtaining a good price. The stakeholders in the upper levels of the PCS are more organized and participate in some kind of information sharing mechanism. The middlemen, though, have strong vertical linkages with traders and wholesalers; yet, they are not horizontally connected with other middlemen. However, they create more links between collectors and traders and provide market information to the collectors. Thus, middlemen take advantage of existing market inaccessibility to earn their living, whereby they also help traders to find a ready supply of the desired NTFP.

In terms of intensity, there is no intensification initiative for producing NTFPs as a raw material. Except for a few bamboo-cultivation initiatives, there are no mentionable domestication initiatives in the PCS of other NTFPs. For harvesting, the collectors of all NTFPs use simple

technology and implements. Most of the collectors invest time and labor, rather than skill, in their work. Producers of bamboo products, though, do use a high level of skill in their craft. The middlemen invest more time and some money to maintain the connections with the collectors and traders. However, in order to get the flow of the NTFP supply going, the traders invest more money than the middlemen do, and the traders also invest their own time and their own labor. The producers of bamboo crafts and medicinal plants at the local level use very simple traditional technology, as they invariably make their products by hand. Broom producers, for example, make their products in a way best defined as both simple and labor-intensive. However, at the regional level, producers of herbal medicines and menda bark processors do use some mechanized machinery in their work. At the local level, producers make their herbal medicines by hand, and they capitalize on a combination of skill and knowledge in order to do so. Wholesalers at the regional level, however, use the relatively high-tech innovation of the grinding mill to turn menda bark into tabu powder. Yet, many laborers are also needed to grind, pack, sort, and load the powder into vehicles in order to prepare it for the consuming industries. The companies that use the powder to make mosquito coils and incense sticks also use highly mechanized machinery at their factories; yet, despite this comparatively high level of mechanization, these processes still require considerable manpower as well as necessitating a large financial investment.

Since NTFP business intensification depends on financial capital to adopt a particular technology or buy efficient machinery, it is crucial to have access to cash credit or financial capital (Ruiz-Pérez et al., 2004). My survey results show that most of the stakeholders (93%) do not have access to credit, but about 10% of the stakeholders reported that they were obliged to extend credit in conducting their NTFP business. In addition to the lack of credit and financial capital support, stakeholders reported that other NTFP-related market problems included lack of market information about place, price, and customers; shortage of NTFP resources; and lack of transportation and communication facilities.

Moreover, the results also show that for all the selected NTFP PCS, the average number of collectors, middlemen, traders, and retailers increased in the last five years, but there was little change in the numbers of producers, wholesalers, and transporters. The main reasons behind these changes include lack of employment opportunities and alternative income, seasonal income opportunity from the NTFP businesses, more local demand for the NTFP but a gradual decline in the NTFP's availability. Further, stakeholders observed other NTFP business trends in the last five years as including increases in NTFP price, demand, and harvesting distance, and decreases in NTFP supply. These changes can be sufficiently accounted for by referencing the increasing demand for NTFPs as more buyers come from outside CHT; lower availability and supply of NTFPs as the increasing population harvests more for subsistence and cash; forest clearing for jhum or tree plantations; and insufficient infrastructure and communication systems. Sometimes, too, natural events, such as bamboo flowering after which all the bamboo in the region dies off for a period, can also have a notable effect. However, the current study identified no major policy changes or events that could have impacted the NTFP business during the stated period.

6.8.2 Comparison of the NTFP income of different stakeholders in various production-to-consumption systems and impacts of the business on their livelihoods and NTFP conservation

The average monthly NTFP income of the stakeholders of the selected NTFPs ranges from BDT 2,000 to BDT 6,500 (Table 6-20). The average monthly income from wild vegetables is the lowest (BDT 1,989), and that for medicinal plants is the highest (BDT 6,422). Average income from bamboo and broom grass are similar; however, the average income from menda bark is slightly lower than for these two. Although the average income of the stakeholders trading in bamboo products is more than the average income that stakeholders derive from wild vegetables, it is still less than half of the income that stakeholders realize from bamboo.

Nonetheless, a more precise comparison between the NTFP income of each type of stakeholder under different types of the selected NTFPs is detailed and analyzed in the following discussion.

Table 6-20: Average monthly NTFP income of different types of stakeholders.

| NTFP Types | N | Primary Income Average (BDT*) | Standard Deviation | Minimum | Maximum |
|------------------|----|-------------------------------|--------------------|---------|---------|
| Bamboo | 30 | 5,907 | 7,730.68 | 300 | 40000 |
| Bamboo products | 34 | 3,007 | 2,931.75 | 200 | 15000 |
| Wild vegetables | 27 | 1,989 | 718.08 | 1000 | 4500 |
| Medicinal plants | 32 | 6,422 | 10,516.58 | 1000 | 50000 |
| Broom grass | 26 | 5,819 | 9,985.79 | 500 | 40000 |
| Menda bark | 33 | 5,158 | 5,073.89 | 1000 | 25000 |

* 1 USD = 68.50 BDT (2008).

Among the collectors of all the selected NTFP PCS, those who collect menda bark and medicinal plants realize the highest average monthly NTFP income followed by those who collect bamboo and broom grass, with collectors of wild vegetables accruing the lowest monthly income (Table 6-21). The collectors all secure almost half their monthly household income from the respective NTFP. Of the producers, those in local herbal medicine (herbalists) earn almost double the income of those in bamboo products. No middleman activities were recorded for wild vegetables, medicinal plants, and bamboo products. However, the middlemen agents of bamboo tend to have a much higher income than the agents of broom grass and of menda bark. Of the NTFP transporters, only mentionable bamboo transporters were observed in the field (transporters of other NTFPs were very few and was hard to identify and talk to them), and, therefore, these were the only NTFP transporters who were interviewed. Easily recognized by their carts or head loads, bamboo transporters earn most of their income from this source. Among the traders, those trading in broom grass tend to have considerably more income than the others, followed by traders of medicinal plants and bamboo. Traders of menda bark and wild vegetables tend to have a much lower income than the others. Wholesalers of broom grass were reported to have the highest monthly NTFP income followed by wholesalers of menda bark and medicinal plants.

However, bamboo wholesalers reported a much lower income than the others. Among all the PCS of NTFPs, retailers' NTFP income appears to be slightly higher than that of the respective NTFP collectors.

Table 6-21: Comparison of household income and NTFP income of all stakeholders of selected NTFPs.

| Market stakeholders | NTFPs | Average household income/month (BDT) | Average NTFP income/month (BDT) |
|-------------------------------|------------------|--------------------------------------|---------------------------------|
| Collector | Bamboo | 4,167 | 2,500 |
| | Wild vegetables | 3,646 | 1,850 |
| | Broom grass | 5,038 | 2,254 |
| | Medicinal plants | 8,000 | 4,167 |
| | Menda bark | 11,889 | 4,511 |
| | Bamboo products | NA* | NA |
| Producer | Bamboo | NA | NA |
| | Wild vegetables | NA | NA |
| | Broom grass | NA | NA |
| | Medicinal plants | 11,536 | 5,607 |
| | Menda bark | NA | NA |
| | Bamboo products | 4,595 | 2,070 |
| Agent/broker/middleman | Bamboo | 10,000 | 8,000 |
| | Wild vegetables | NA | NA |
| | Broom grass | 5,875 | 2,625 |
| | Medicinal plants | NA | NA |
| | Menda bark | 10,000 | 1,000 |
| | Bamboo products | NA | NA |
| Transporter | Bamboo | 6,250 | 4,583 |
| | Wild vegetables | ND* | ND |
| | Broom grass | ND | ND |
| | Medicinal plants | ND | ND |
| | Menda bark | ND | ND |
| | Bamboo products | ND | ND |
| Trader | Bamboo | 15,000 | 9,880 |
| | Wild vegetables | 7,000 | 4,500 |
| | Broom grass | 39,700 | 16,900 |
| | Medicinal plants | 24,250 | 11,667 |
| | Menda bark | 13,846 | 5,846 |
| | Bamboo products | NA | NA |
| Wholesaler | Bamboo | 4,000 | 1,400 |
| | Wild vegetables | NA | NA |
| | Broom grass | 37,500 | 18,000 |
| | Medicinal plants | 15,250 | 8,000 |
| | Menda bark | 12,000 | 12,000 |
| | Bamboo products | NA | NA |
| Retailer | Bamboo | 6,750 | 3,250 |
| | Wild vegetables | 4,750 | 2,400 |
| | Broom grass | 7,000 | 3,000 |
| | Medicinal plants | 8,300 | 2,500 |
| | Menda bark | NA | NA |
| | Bamboo products | 18,375 | 4,725 |

*NA= Not applicable; ND= No Data

My study results also show that the NTFP income of different stakeholders under various PCS is influenced by different socioeconomic factors. For all types of stakeholders of raw bamboo, the average monthly household income, value of household assets and total number of household members are positively significantly related to the monthly average income from raw bamboo (Table 6-22). This suggests that the higher the stakeholder's household income and/or the higher the value of household assets, the more income they derive from raw bamboo. Further, the more members in the stakeholder's household, the more is their bamboo business income. On the other hand, the amount of rural land area acreage that the stakeholder's household owns is negatively correlated with the monthly average income from raw bamboo; that is, the more rural land the stakeholders have, the less income they derive from bamboo. Positively, though not significantly, correlated is the relationship between the stakeholders' education and monthly bamboo income as well as between sex of the stakeholders and their monthly average bamboo income. This finding indicates that stakeholders with higher education tend to have more bamboo income than their peers, and female stakeholders appear to realize more monthly income from raw bamboo than that of male. However, age tends to be negatively related to the monthly NTFP income of the stakeholder, indicating that the stakeholders' income is likely to decrease with age. However, this relationship is not significant.

Similarly, stakeholders with higher household income tend to have increased income from respective NTFP sources in the case of bamboo products, wild vegetables, broom grass and medicinal plants; however, this does not hold for menda bark, for which the relationship is negative. The value of the stakeholders' household assets is positively significantly related with NTFP income for bamboo and wild vegetables only. However, the relationship between household asset and respective NTFP income is not significant for bamboo products, broom grass, medicinal plants, and menda bark. Further, the household asset-NTFP income relationship is negative for bamboo products and broom grass, but positive for medicinal plants and menda

bark. The correlation between the total number of household members and NTFP income is only positively significant for bamboo; but non-significant for bamboo product, wild vegetables, medicinal plants, broom grass and menda bark. Further, except for broom grass and medicinal plants, the relationship is positive.

Table 6-22: Bivariate correlation⁸ of different socioeconomic factors with monthly average NTFP income of various stakeholders.

| Explanatory variables | Correlation (r-value) with monthly average NTFP income (N= 30) | | | | | |
|---|--|-----------------|-----------------|-------------|------------------|------------|
| | Bamboo | Bamboo products | Wild vegetables | Broom grass | Medicinal plants | Menda bark |
| Monthly average household income | .973** | .633** | .685** | .984** | .747** | -.018 |
| Value of household assets | .570** | -.062 | .643** | -.104 | .095 | .242 |
| Total number of household member | .448** | .159 | .244 | -.380 | .044 | -.086 |
| Rural land areas possessed by household | -.156 | .014 | .496** | .050 | -.021 | -.031 |
| Education of respondent | .152 | -.034 | -.012 | -.249 | .101 | .265 |
| Sex of respondent | .149 | -.152 | -.164 | .036 | .548** | .171 |
| Age of respondent | -.102 | .010 | .052 | .263 | -.196 | -.182 |

** Correlation is significant at the 0.01 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed).

Rural land acreage tends to be positively correlated with NTFP income for bamboo products and wild vegetables ($p < .001$); however, the relationship is negative for medicinal plants and menda bark. This demonstrates that in some cases ownership of more land area tends to increase NTFP income, whereas in others, the more rural land they have, the less income they accrue from the respective NTFPs. Further, the bivariate correlation between the education, sex, and age of the stakeholders to their NTFP incomes is not significant except for medicinal plants. However, whether the correlation is positive or negative varies between types of the NTFPs.

Overall, as we have observed, different socioeconomic factors affect NTFP income in different ways, and the trend, strength, pattern of the relationship differ between types of NTFPs.

⁸Since the samples of NTFP market stakeholders were selected using snowball sampling method which was not a complete random procedure, the assumptions for correlation analysis is thus not met properly. Moreover, the number of observations (N) was about 30 for all NTFP PCS cases which is also a small number of observations to analyze correlation of so many variables. Yet, the purpose of this correlation analysis is just to show some indication about how different socioeconomic factors may have influence on NTFP-based stakeholders' livelihood income. However, no definite prediction could be made from these samples.

As well as these factors, there are many other institutional, governance, and policy factors that accelerate the sharp NTFP depletion and degradation trends that many of the NTFPs are showing. Although all the stakeholders depend on the NTFPs for the supply to their respective markets, the majority (53%) of the stakeholders do not consider future NTFP supply and forest conservation issues when conducting their business. However, among the stakeholders who do consider the sustainable NTFP supply and conservation issues took several actions including not destroying the plants when they collect the parts and developing awareness among all stakeholders about the need for NTFP conservation. However, the stakeholders who reported that they do not take any conservation actions, stated that they did not see the need to conserve, or that they lacked financial capital to take action to address conservation needs.

Finally, investigation of the PCS of all the selected NTFPs shows that the market is constrained by many factors. Given the degraded forests in CHT, the increasing trend of market exposure is putting a lot of pressure on natural NTFP stock (Wollenberg & Ingles, 1998); therefore, a detailed NTFP management plan with forest-adjacent people's participation is essential. NTFP-based interventions would thus require more market institutions and incentives as well as more focus on NTFP cultivation, scientific harvesting techniques, and preservation to increase and sustain supplies. Similarly, Maraseni (2009) also urged the need to put sufficient policies in place and implement them in order to establish sustainable NTFP harvesting techniques in Nepal.

6.9 Conclusion

This investigation into and comparison of five PCSs of NTFPs in CHT demonstrates that the NTFP markets generally share a set of distinct market chain characteristics, stakeholders, and processes. The collectors are mostly local forest villagers who are actively involved in harvesting

the NTFPs in order to make a living. They principally collect the naturally growing NTFPs from the forests near their households. The villagers, as collectors, usually become connected to local traders through middlemen, but sometimes they contact the local traders and sell directly to them.

The flow of market knowledge is very poor at the lower levels (e.g. in case of such as collectors or producers and transporters levels) of all the PCSs of NTFPs. Moreover, at these levels, the stakeholders do not have any major association or organization through which to unite and negotiate prices or to create and support programs for sustainable harvesting and the like. The traders usually have stronger informal linkages with the middlemen, and these linkages mean that the groups exchange market information with other and so are able to bolster their respective bargaining positions, maintain sustainable stock, and manipulate market price. The retailers usually only have linkages with wholesalers, yet these connections are not as strong as those between the traders and middlemen. It should be noted here, though, that collectors of wild vegetables are also retailers of this NTFP, and that producers of medicines and producers of broom grass products are also the retailers of these respective products.

In terms of NTFP intensification, except some sporadic bamboo cultivation initiatives, there is no mentionable cultivation of other NTFPs to intensify the production and market supply of NTFPs. Collectors use very simple techniques and tools to harvest the NTFPs. This pattern of simple technique and tool usage also applies at the local level of producers who make bamboo crafts, brooms and herbal medicines. Wholesalers and traders usually invest in NTFP business in terms of money, tools and machineries to continue their NTFP business and supply; however, this type of investment is almost absent in case of NTFP collector, producer and retailer levels.

The percentage of income that working in an NTFP market contributes to any given stakeholder's total earnings depends on the kind of work that he or she does and on the particular NTFP. Collectors of wild vegetables tend to have the lowest earnings, and collectors of medicinal plants and menda bark have the highest earnings. Different socioeconomic factors influence

stakeholders' involvement in the market system and, therefore, their subsequent earnings. In addition, institutional and policy-oriented market problems hinder NTFP market development. In almost every instance, the NTFP supplies come from wild growth. And, to date, few interventions have been undertaken to domesticate the NTFPs, and likewise little research has been conducted on this issue. Likewise, no major incentive or supports have been offered to intensify NTFP production to increase stakeholders' income and to ensure sustainable supplies. This paucity of research and interventions, given the lack of incentives, there has been correspondingly little scientific and technological progress in regard to promoting cultivation techniques for NTFPS.

Although there is much potential to use NTFPs in a better way—one that would help improving the livelihoods of stakeholders at all levels—many constraints must be addressed to enhance stakeholders' livelihood and better conserve NTFP resources. These include insecure land tenure and undefined property rights (Adnan, 2004; Roy, 2002) and the conversion of forest lands to other uses. Equally important is the lack of the following factors: market information at all levels, NTFP domestication, infrastructure and communication systems, organizational support, access to credit, lack of awareness, technology transfer and training, and administrative and policy supports.

Therefore, the following recommendations should be considered to eliminate NTFP market constraints and to provide stakeholders with more NTFP-related income based on sustainable harvesting practices:

- Solve land disputes in CHT between indigenous peoples and Bengali people, and define their property rights.
- Provide incentives, access to capital and/or credit with organizational support.
- Encourage better use of the NTFPs through detailed NTFP management plans and policy support.

- Domesticate and intensify NTFPs in demand after consulting with concerned stakeholders, and pursue an integrated land use approach, such as agroforestry, to NTFP cultivation.
- Develop infrastructure including a communication system and market information system with a detailed database recording a range of information about the NTFPs.
- Provide technological and awareness development and training support to promote entrepreneurship through NTFP-based cooperatives or associations that would enable people to earn more while conserving NTFPs.
- Develop the skills of the NTFP stakeholders in terms of generating NTFP-based income and aiding in conservation work (ADB, 2008; UNDP-B, 2009).
- Ensure more coordination between government, local NGOs, research and other organizations to enhance NTFP-related development and to enforce related laws effectively.
- Undertake various poverty-alleviation and alternative income-generation programs along with NTFP-based initiatives to increase the income of forest-adjacent communities and reduce pressure on and support the regeneration of natural NTFP stock.
- Minimize corruption, increase transparency, and encourage collaboration with local stakeholders in managing, using, conserving, and marketing the NTFPs in the interest of the stakeholders and the forest ecosystems.

Chapter 7

Overall Discussion and Conclusion

As global concern about rural poverty, deforestation, and sustainable development has emerged over the last few decades, interest in NTFP management has intensified. NTFPs must be given due consideration in any effort to address these problems, as they are crucial to the survival of people living in and around forest areas who have collected them for centuries and today depend on them for the local trade that constitutes their livelihoods. In some places, too, NTFPs act as the safety net that ensures the daily survival for forest-adjacent people. Exactly just such an NTFP-dependence pattern has been observed in Bangladesh, specifically in Chittagong Hill Tracts (CHT), where a number of indigenous peoples depend for their survival on diverse types of NTFPs in the face of extreme poverty.

Considering the importance and potential of NTFPs, establishing a better way to approach NTFP-based rural development and conservation has become a vital issue in current NTFP-related debate. There are concerns that ill-considered policies that fail to take full account of the socioeconomic and biophysical context of the locality will promote overharvesting of the NTFPs. To address this possibility, it is necessary to examine the problems and potential of NTFPs in regard to livelihood development and sustainability on a site-specific basis. In regard to Bangladesh's NTFP issues, very little research has been done to investigate the role and potential of NTFPs for livelihood development and forest resource conservation. Therefore, my study focused on the central research question of how to use NTFPs to simultaneously improve the livelihoods of forest-adjacent communities and achieve the goal of conserving forest resources in Bangladesh.

In pursuing this research question, the study used mixed methods that drew on both quantitative and qualitative approaches and different participatory rural appraisal (PRA) tools, such as structured questionnaire interviews targeting households and NTFP market stakeholders, focus group discussions (FGD), key informant interviews, and field observations. These methods were used to gather both numeric and qualitative data. After field data for an entire year had been collected, the data were managed by means of an electronic database, and various statistical methods were performed to analyze the data in ways that were relevant to the central research question.

This research has been conceptualized through a framework (Figure 2-5 as described in Chapter 2) to achieve the research goals of improving forest-adjacent peoples' livelihoods and conserving forest resources. In the context of CHT's declining trend of NTFPs, the forest-adjacent communities are becoming more vulnerable because of their large dependence on these resources for their daily living. In such vulnerability situation, peoples' livelihoods could be improved with interventions to enhance capital and policy supports with institutional changes. Based on the interactions between changed capital and institutions, villagers would undertake improved and efficient NTFP-based livelihood strategies to enhance their NTFP-related income for better livelihoods and would enhance conservation effort of NTFPs on which they depend much. Changes in different types of capitals, policy and processes would also influence the livelihoods of NTFP market stakeholders involved in different PCS of NTFPs. As a consequence, these market stakeholders would also be able to adopt new livelihood strategies to generate more income and to conserve the forest resources in a better way that eventually would accumulate as their natural capital to support their livelihoods.

Main research findings: To answer the central research question, I outlined specific research questions in Chapter 3 with some hypotheses; and in this section, I would address the research questions and discuss these hypotheses based on key findings in Table 7-1.

Table 7-1: Research questions, hypotheses and key findings.

| Research questions | Hypotheses | Findings |
|---|--|--|
| Objective 1: To examine linkages between NTFP utilization and the livelihoods of forest-adjacent communities. | | |
| (i) What are the different types of NTFPs gathered by different forest-adjacent households of multi-ethnic communities in CHT? Within the households, who do play most important role in collecting NTFPs? And, from where, how and why do they gather NTFPs? | NTFPs of the CHT are diverse and extensively used by forest-adjacent communities. Female members of households collect most of the NTFPs. | Forest-adjacent households of multi-ethnic communities in CHT collect diverse types of NTFPs such as bamboo, wild vegetables, and broom grass as most important ones. They use simple tools like knives with manual labor to collect the NTFPs from mostly degraded natural forests owned by either State or private leaseholds. NTFPs are most often used as food, followed by house construction and other household uses, and they are also sold for cash. These resources provide an important safety net to the forest-adjacent villagers especially when they do not have any alternative employment opportunities or agricultural food stock. In regard to NTFP collection, female household members play the most important role in collecting NTFPs followed by males and children. |
| (ii) What role do NTFPs play in terms of subsistence and cash income in the household economy? | NTFPs can provide more household income than other forest resources. | NTFP income of households in CHT is much higher than income from timber and pole or from firewood. Moreover, NTFPs provide more subsistence rather than cash income. |
| (iii) How does seasonal variation affect the NTFP dependence of the forest-adjacent community? | People depend on and gather more NTFPs in dry season. | Villagers in CHT depend on NTFPs to a greater extent in the long dry season that follows the rainy season. The reasons for this larger dependence during the dry season could be the inaccessibility of the forest during the rainy season and the unavailability of and lowered demand for certain forest products. Moreover, in rainy season, villagers are more engaged with agricultural activities and are less dependent on forest products having more stock of agricultural crops. |
| (iv) How do different socioeconomic factors influence the extent and patterns of forest-adjacent people's NTFP dependence? | Income poor households are more dependent on NTFPs than richer households. | In CHT, although the NTFP income of the households increases as total household incomes increase, relatively poor households depend on NTFPs more than richer households do. For the households in the study sites, forest income is their second largest income and all the households are involved in collecting forest products all year round. Households' NTFP income is influenced by varied socioeconomic factors and the income could be estimated from the measures of the socioeconomic variables that represent different capital of the households. |

| | | |
|---|---|--|
| <p>(v) What is the current stock condition of NTFPs and trend? How do the depletion and degradation of the current natural stocks of NTFPs in the study areas impact local livelihoods?</p> | <p>The gradual decline of NTFP stocks is putting pressure on concerned livelihoods.</p> | <p>The current NTFP stocks in CHT is much depleted and degraded and the main causes include population pressure that leads to overexploitation of the resources, land clearing for different crops, and poor economic conditions of the households. The degradation of NTFP stocks in a village's environs eventually compel the villagers to travel further to collect NTFPs and, therefore, to dedicate more time and energy to collecting NTFPs. As forest resources continue to decline at an alarming rate, the forest people are losing their last economic buffer.</p> |
| <p>Objective 2: To investigate potential NTFP-related initiatives and market strategies required for improved livelihoods, sustainable trade and resource conservation in Bangladesh.</p> | | |
| <p>(i) What are the constraints and potential impact inherent in the market development of NTFPs and how could NTFPs be better utilized?</p> | <p>Different market constraints retard more NTFP market development and access to improved livelihoods.</p> | <p>Lack of transport facilities, lack of financial support/capital and lack of market information are the major market constraints of NTFPs. To eliminate market constraints, the villagers have suggested improved transport facilities with better and frequent communication, more financial support for cooperative based NTFP-related initiatives and enhanced access to market as essential initiatives for generating more NTFP income. Moreover, sufficient government or NGO interventions and policy supports to eliminate the constraints could play a positive role in improving villagers' household economy and livelihoods with higher NTFP income.</p> |
| <p>(ii) How do various socioeconomic factors influence villagers' NTFP market knowledge and their focus in terms of income generation?</p> | <p>Levels of market knowledge of villagers depend on different socioeconomic factors.</p> | <p>Villagers' market knowledge, that helps generate more income, is greatly influenced by different socioeconomic factors and can be estimated from the measures of different socioeconomic factors such as market distance, education, ethnicity, sex and road access.</p> |
| <p>(iii) How do villagers gather NTFP market information currently and what kind of information would be more helpful?</p> | <p>Villagers are the main source of NTFP market information and NTFP market information through MIS could enhance income of households.</p> | <p>Currently, villagers use several market information sources, principal among them being other villagers, local market traders, and the village head; however, they also want to know more about current market prices, NTFP traders, and market history and trends that a MIS could provide for enhanced income of the villagers.</p> |
| <p>(iv) What are the current initiatives focused on domesticating NTFPs and NTFP-based enterprise development? And, what are villagers' opinions of them?</p> | <p>NTFP based enterprise development would create more opportunity to earn and learn for local people.</p> | <p>Most villagers are eager to become members of NTFP-based cooperatives/enterprises because they think it would foster higher earnings; however, no organizational effort to encourage such entrepreneurship development was recorded in the field. In terms of domestication initiatives, most of the villagers do not cultivate the NTFPs mainly because they lack land, financial capital, and/or access to credit, and they do not know how to cultivate NTFPs.</p> |

| | | |
|---|--|---|
| (v) Would NTFP-based entrepreneurship development initiatives both encourage sustainable use of NTFPs and yield higher incomes for villagers? | Entrepreneurship development initiatives would help conservation and better utilization of NTFPs for improved livelihood. | NTFP-based entrepreneurship development initiatives could play a vital role in generating alternative incomes for the villagers, and they would also encourage sustainable NTFP-extraction practices. Most of the villagers in CHT are willing to participate in entrepreneurship development initiatives such as NTFP-based cooperative cottage industry. The key reasons to be involved include to learn more, earn and save more, to have more organizational strength to bargain for a better price. |
| (vi) Is the current exploitation of NTFPs for household and commercial uses sustainable? If not, why? | Currently NTFPs are not being utilized and commercialized in a sustainable manner due to several socioeconomic reasons. | Most of the villagers agree that, currently, the NTFPs are not being used in a sustainable manner. Lack of defined land rights, poor economic conditions, population pressure, and lack of awareness are the main causes. In the current socioeconomic and policy context, the commercialization of NTFPs is having both positive and negative impacts. Among the negative impacts, most notable are stock degradation, overly large harvests, and more disturbance to the forest ecosystem. |
| (vii) What path do NTFPs follow in their existing market chains? What are the existing steps and processes? And, what alternative market potential could be realized if NTFPs were used more effectively? | The current NTFP market chains are constrained with many market factors needing further interventions. | Analysis of five NTFP market chains showed that the NTFP-market stakeholders' vertical linkages are stronger than the horizontal linkages, and there is little NTFP cultivation or investment. There are many NTFP market-related problems that hinder the concerned stakeholders' efforts to generate income; these include lack of capital and financial support, deficient market information, weak infrastructure and communication system, a shortage of NTFPs, and very limited administrative support. |
| (viii) In what ways are different types of stakeholders engaged in selected NTFP markets? And, how do NTFP income and other NTFP market-related factors impact the livelihoods of the stakeholders? | Collectors of NTFP earn the least among all stakeholders; however, middlemen and local traders keep the NTFP markets working for more earning. | The NTFP collectors have the lowest NTFP income, although they put in more time and labor than the other stakeholders did; and, although middlemen or local traders of NTFPs enhance the NTFP market links and offer some income opportunities to the villagers, the villagers are often trapped in the advance money lending system and do not receive a good price for their products. |

My study results show that the livelihoods of forest-adjacent people in CHT are directly connected to various types of NTFPs, among which the people consider bamboo, wild vegetables, and broom grass to be the most important. However, CHT's NTFP stocks are much degraded, mainly as a result of overpopulation, land clearing for shifting cultivation or tree plantation, and

financial crises as experienced by the households, and all of these warrant attention. Females collect the most NTFPs for their households, gathering the preponderance of the NTFPs from natural scrub forest owned by private leaseholds where villagers have usufruct right to collect NTFPs as is customary. Moreover, most of the time that households spend collecting NTFPs is dedicated to wild vegetables and bamboo shoots, followed by bamboo, broom grass, and other NTFPs. The households' NTFP income includes both subsistence value and cash income and is much higher than income from timber or firewood, and poor households were found to be more dependent on NTFPs than were richer households. NTFP income was found to be influenced by different socioeconomic and biophysical factors, and it is associated with the number of household members and value of the implements and furniture that the household owns.

This study identified a number of NTFP market-related constraints, and the villagers suggested initiatives to better support their livelihoods. The main constraints include insufficient transport facilities and communication systems, no access to financial capital or credit access, and shortage of NTFP market information. The most often suggested initiatives for eliminating these constraints are to improve transport facilities, access to financial capital, and market information. Market knowledge about various NTFP stakeholders and processes in the market chain was found to be very limited and influenced by various socioeconomic factors. The analysis also showed that market knowledge of the respondents is associated with the socioeconomic factors as independent variables.

Currently, villagers use several market information sources, principal among them being other villagers, local market traders, and the village head; however, they also want to know more about current market prices, NTFP traders, and market history and trends. In the face of degrading NTFP stocks, the researcher observed very few domestication initiatives, and most of the villagers do not cultivate the NTFPs mainly because they lack land, financial capital, and/or access to credit, and they do not know how to cultivate NTFPs. Most villagers are eager to

become members of NTFP-based cooperatives/enterprises because they think it would foster higher earnings; however, no organizational effort to encourage such entrepreneurship development was recorded in the field.

At present, most of the villagers understand that NTFP commercialization is providing them with income and supplies, but at the cost of overharvesting, stock reduction, and disturbance to the forest ecosystem. The villagers are also aware that the NTFPs are not being utilized in a sustainable way. They are aware, too, of the problems that current practices pose for sustainability, among them the lack of defined land and property rights, insufficient alternative livelihood income opportunities, and the absence of effective programs to control overpopulation. In considering interventions to address some of these issues, the villagers concentrated on (i) better NTFP management strategies with optimum (less) harvesting and (ii) awareness programs about the future impact of overharvesting and possible cultivation/regeneration alternatives aimed at the villagers.

The production-to-consumption (PCS) analysis of five NTFP market chains showed that the NTFP-market stakeholders' vertical linkages are stronger than the horizontal linkages, and there is little NTFP cultivation or investment. The analysis also reveals that most villagers are linked with NTFP markets directly or indirectly as stakeholders. There is much inequity in terms of the time, labor and capital investment that different types of stakeholders make in the NTFP market chains, and thus there is a considerable disparity in stakeholder income. However, the NTFP collectors were found to have the lowest NTFP income, although they put in more labor than the other stakeholders did; and, although middlemen or local traders of NTFPs enhance the NTFP market links and offer some income opportunities to the villagers, the villagers are often trapped in the advance money lending system and receive a low price for their goods. The results of the PCS analysis also show that there are many NTFP market-related problems that hinder the concerned stakeholders' efforts to generate income; these include lack of capital and financial

support, deficient market information, weak infrastructure and communication system, a shortage of NTFPs, and very limited administrative support.

Most PCS of the NTFPs show a pattern of an increasing number of various stakeholders, mainly because there are no alternative-income options. NTFPs provide earnings, even if only seasonally, and there is increasing demand for NTFPs from a growing population. The analysis also showed trends towards increasing NTFP demand, price, distance to forest base for NTFP collection but decreasing availability of NTFPs. The main reasons for these trends are land or forest clearing for jum/plantations, increasing demand for NTFPs from the locally growing population and from outside/national markets, overharvesting that has led to lower NTFP stocks, and infrastructure and communication problems. Most of the stakeholders do not consider NTFP conservation issues in regard to their work; and identified lack of land, capital, and awareness as reasons that they did not participate in any NTFP cultivation and/or conservation initiatives. They also gave lack of knowledge about planting techniques as another major reason for not taking any conservation-focused actions. However, a few do cultivate NTFPs, make other NTFP stakeholders aware of conservation issues, and/or practice nondestructive harvesting methods.

After investigation and analysis of PCS for five types of NTFPs, this study identified several major potential interventions. Some interventions that could prove fundamental to fostering better use of NTFPs and NTFP market development include more initiatives to domesticate NTFPs by arranging more land access, financial support, and training on NTFP cultivation techniques, NTFP-specific plans and policies including market strategies, defined land and property rights, more access to NTFP market information, and infrastructure development for better communication.

Implications of the research findings: My research findings strongly suggest that diverse NTFPs can support the livelihoods of forest-adjacent people to a greater extent than at present, even given that the forests are currently in a much-degraded condition. However, the

scope of subsistence and cash income both decline rapidly with forest degradation. In degraded forests, most forest income derives from NTFPs rather than from timber. It is evident from the findings that NTFPs are important as a safety net: when forest-adjacent villagers do not have any alternative employment opportunities or agricultural food stock, they go to forests to collect any available NTFPs either for household consumption or to sell at market in order to buy daily necessities. The study results also strongly suggest that poor people depend more heavily on NTFPs than do the rich—a point that clearly indicates the necessity of assessing any proposed NTFP intervention for its likely effects on people with different income thresholds. That is, the intervention should be examined in a segregated way.

The female household members play the most important role in NTFP collection, as quite simply it falls to them to do most of this work. Interventions, therefore, should be predicated on ensuring that females participate in a meaningful way in efforts to achieve development and conservation goals. Moreover, the study established in quite certain terms that the households spent most of their time collecting NTFPs on gathering food items, such as wild vegetables and bamboo shoots, and that they spend considerably more time on these items than on any of the other NTFPs. There can be little argument then that incentives and institutional and policy initiatives should target conserving and restoring the NTFPs used as food. Those initiatives that concentrate on encouraging natural regeneration and domestication, therefore, will, if successful, ensure that fewer villagers go hungry: the higher stocks will not only be used for food, they will also be sold at market. Moreover, since different socioeconomic factors impact the NTFP income of households, it is of great importance to establish the factors that are most determinative of NTFP-related income. My study results also showed that it is possible to determine which households are more NTFP-dependent prior to any NTFP-based intervention by investigating several factors; in particular the connections between NTFP income and the value of a

household's implements and furniture and between NTFP income and the total members of a household are the most marked.

My study results also identified the NTFP market constraints and possible initiatives for eliminating the constraints that might be useful for future interventions. The results showed that although NTFP market knowledge is crucial to increasing the households' NTFP income, most of the households have limited market knowledge or relevant information sources, and they are impacted by many socioeconomic factors. These findings also could be helpful in NTFP market-based interventions to consider.

This study reveals that current NTFP domestication initiatives are extremely limited, although targeted programs could be very helpful in ensuring a continued supply of NTFPs from forests in a degraded condition. The villagers indicated a number of reasons for why they did not cultivate NTFPs, among them lack of land, lack of financial capital and/or access to credit, and shortage of knowledge to cultivate particular NTFPs are mentionable. And, it is clear that they do not have the resources or knowledge to address these points by themselves. Organizational support for NTFP-based cooperatives and entrepreneurship development initiatives, therefore, are crucial if NTFP stocks are to be replenished and if villagers are to realize more NTFP income.

In the absence of any major NTFP-based interventions such as domestication initiatives, entrepreneurship development with defined land and property rights, access to credit, sufficient market information, incentives for conservation, detailed NTFP policies and reliable enforcement, the idea of commercializing NTFPs met with mixed reviews from the villagers: some perceive negative, and some perceive positive impact. However, more pilot research would be necessary to test these possible impacts of future NTFP commercialization initiative. That is, it would be both cost-effective and appropriate if development organizations would begin by working with a collective of villagers and measure the results before moving to large-scale interventions in CHT region as a whole. Moreover, careful consideration of the villager-identified causes of

overharvesting and the measures they suggested would be fundamental to designing policy initiatives and interventions.

Again in terms of NTFP market chains, my study identified a number of market problems. The study also established some of the causes of NTFP-derived income disparities among the stakeholders involved in the market chains. Future NTFP-based initiatives, therefore, would do well to work toward solutions to these problems. The study also identified possible reasons for the identified changes and trends in the number of stakeholders; NTFP price, demand, and availability; and the distance to market from the forest base as mentioned above. Any NTFP market development initiative seeking to increase the income of concerned stakeholders should take these possible reasons into account. My study also identified steps that stakeholders are currently taking to conserve NTFPs and the factors associated with taking and not taking such steps. Understanding of stakeholders' reasons for action or nonaction in this regard must surely be of great importance to interventions focusing on ensuring availability of NTFP stocks in the long term. Based in part on market chain analysis, my study also identified kinds of interventions that are likely to be necessary and effective in the future; these are outlined in the next section.

Overall, my research findings explored the NTFP–livelihood linkages of forest-adjacent people in CHT and identified how NTFPs could be managed to increase stakeholder income and restore and conserve forest resources. The study also identified different factors and causes that impact both the use of NTFP resources and the amount of income derived from them, some of which warrant full consideration if any NTFP-based development intervention is to meet development and conservation objectives. Finally, the need for NTFP-based interventions in Bangladesh is urgent. As forest resources continue to degrade at an alarming rate, the forest-dependent people are losing their last economic buffer. My study, therefore, stresses the critical importance of supporting the livelihoods of forest-adjacent communities and working toward long-term solutions. Thus, my study is pioneering in nature, and as such, more research on NTFP

issues, including in Bangladesh, is needed, as described and outlined in the following section of recommendations.

Recommendations and suggested interventions: As detailed in the preceding chapters, some of the key initiatives and incentives that warrant attention in establishing ways to better manage NTFPs for the purposes of increasing income and conserving forest resources are highlighted here:

- Address land disputes and ensure land rights and forest resource rights for the forest-adjacent communities.
- Focus particularly on protecting women's rights.
- Develop a detailed NTFP-management plan, update forest and land use policies with specific focus on NTFPs, including taking a detailed inventory; and enforce the policy measures and plan effectively.
- Adopt a more people-oriented forest-management approach by strengthening the forest-extension wing of the Forest Department, and facilitate collaboration and coordination between various government organizations including the Forest Department, the Forest Research Institute, university forestry departments, NGOs, and international organizations.
- Provide villagers with more incentives for NTFP-domestication initiatives that may include access to land and NTFP resources, credit, awareness programs, planting materials, and training on planting techniques.
- Develop a good MIS to inform all stakeholders concerned about the demand for and prices of NTFPs; develop market structures and strengthen market linkages and information-dissemination mechanisms; and set detailed NTFP-market strategies, including a NTFP certification if applicable to recognize optimum and sustainable use.

- Develop infrastructure and communication systems to facilitate the NTFP-based development process.
- Undertake NTFP cooperative-based enterprise development initiatives in conjunction with domestication initiatives that may include NTFP-based cottage industries for processing food or other raw materials.
- Focus on NTFP-product value addition by developing product quality using traditional indigenous knowledge combined with current advanced technologies.
- Target the pro-poor and the less-poor separately for NTFP-based interventions and emphasize NTFP species separately based on their importance for subsistence and high-market value.
- Undertake initiatives to reduce corruption, to enhance education, health and family-planning programs, and strengthen overall governance.
- Implement an NTFP-based development and conservation model proposed herein (Appendix F) to help development practitioners and forest managers undertake NTFP-related interventions.

Outline of possible future research on NTFPs: More research on NTFP-based development and conservation issues is needed both on a global and a local scale, and some recommended initiatives are outlined here:

Global perspective:

- Carry out a more comprehensive comparative analysis that can be done between this study and some of the case studies drawn from the tropics under CIFOR's NTFP project to explore and compare NTFP-livelihood linkages, especially where forest sites are very degraded.

- Compare NTFPs in terms of livelihoods and forest conservation in natural settings versus when cultivated and managed through integrated land use system such as agroforestry.

Bangladesh perspective:

- Perform a more detailed NTFP-specific socioeconomic study encompassing all 3 districts and 25 sub-districts in CHT focusing on NTFPs' role in and importance to subsistence and cash income in CHT and other major forest areas of Bangladesh, such as Sundarban, Sylhet, Modhupur forests.
- Undertake a more detailed market survey and stakeholder livelihood analysis on specific NTFPs that already have markets or have a potential market.
- Conduct a separate study on NTFPs in Sundarban following the same surveys as in CHT and carry out a comparative analysis.
- Perform a comparative NTFP-related ecological study concentrating on natural/less-disturbed and disturbed forests as well as domesticated plantations versus natural forests in Bangladesh.
- Carry out NTFP-related biodiversity conservation research with emphasis on population diversity, ecosystem structure, and in-situ and ex-situ conservation challenges.
- Conduct research on NTFP-related ecosystem restoration pilot projects in degraded forest areas and develop strategies for sustainable NTFP management.
- Carry out research on sustainability issues associated with KPM's current bamboo extraction and utilization practices in CHT and its impact on local livelihoods.

- Conduct more specific NTFP-market research focusing on issues such as food and other NTFP products processing, storage, transport systems, rules and permits, and entrepreneurship development.
- Investigate the national versus international market potentials of some of the high-value NTFPs, such as medicinal plants, menda bark, and bamboo products.
- Conduct specific research on medicinal plants, concentrating on using different parts of the plants, such as fruits, herbs, leaves, and roots.
- Undertake research investigating possible uses of essential oils, other chemicals, and spices from Bangladesh's forest areas.
- Carry out more research on developing nursery and plantation techniques for broom grass and on developing high-value broom grass craft for national and international markets.
- Conduct more research on nursery, plantation, and harvesting techniques for developing menda tree stands and for exploring national and international markets, as well as finding uses for other parts of the menda tree, such as fruits, leaves, and roots for their possible medicinal values.
- Conduct detailed socioeconomic and ecological studies on some particularly important NTFPs in Bangladesh: agar, khoir, lali, murta, nal-khagra, honey, and golpata.
- Perform more research on integrating NTFPs in different viable land-use systems to maximize the efficiency of each unit of land in Bangladesh given that the population is so high and land so scarce.
- Undertake research on the respective successes and failures of recent bamboo and cane plantation initiatives and to pursue further research on restoring the stock of these two very important NTFPs in Bangladesh's degraded forest areas.

- Conduct more research on the failure of bamboo- and cane-based cottage industry initiatives in Bangladesh and explore more viable options for entrepreneurship development.
- Explore more plant parts, such as the fruits of *Jatropha curcas*, Kerung (*Pongamia pinnata*), and conduct detailed research on using them in biofuel production.

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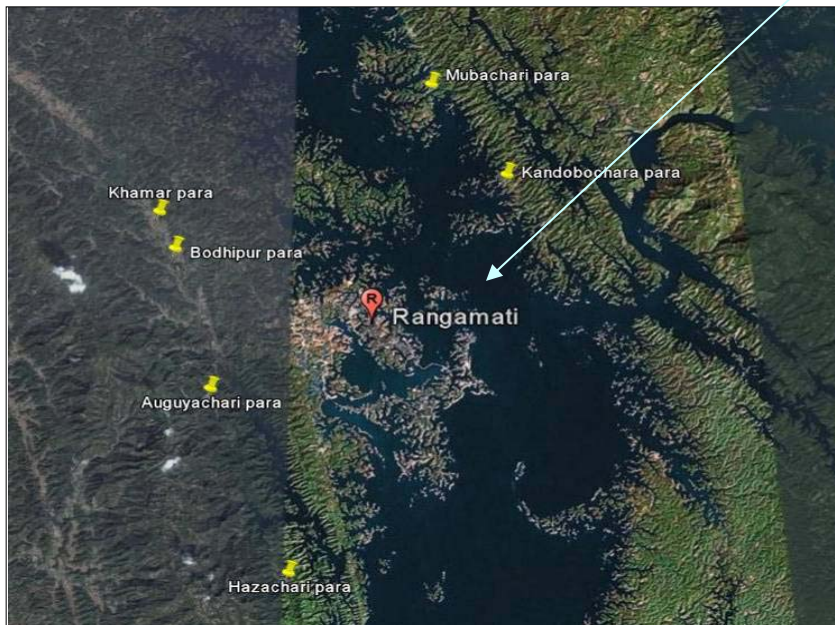
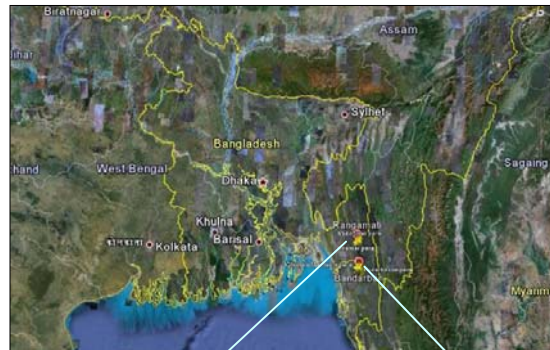
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Appendix A

Locations of Selected Villages in Chittagong Hill Tracts based on Recorded GPS Coordinates in the Field



Appendix B

Details on the Study Villages in Chittagong Hill Tracts

This study was carried out in 8 villages of Bandarban district and 6 villages of Rangamati district. The details of the study villages are described below one after another starting with Badarban first and followed by Rangamati. Most of the villages are hill hamlets consisting 30 to 120 households. Among them only three villages namely Thowaingya para, Bodhipur and Khamar para were fairly large having more than 70 households.

1. Study villages in Bandarban

(i) Lemujhiri Para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | Settled around 1705 by dominant Marma hill peoples of the region. |
| Demographics | Population estimate: 33 households, 167 people. Main ethnic groups: Maram (100%). |
| Main Economic Activities | Agriculture (rice is staple crop), forest-based employment (timber production through plantation and sale, logging and transportation for timber merchants), service in Bandarban town. |
| Main Source of Forest Products | Private plantation and managed forest surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables, thatching sun grass. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Balaghata is the small daily local market (1 km); twice-weekly market in Bandarban town (4 km). |
| Forest Product Markets | Variety of NTFPs mainly fuelwood and wild vegetables, broom grass are traded at local markets; bamboo and timber merchants buy directly from villagers mostly with advance money lending. |
| Land Cover and Land Use | High population density in the valley: one third of the village is occupied by either by a dwelling unit or a forest plantation, surrounded by cropland and agroforestry plantation in one side and the other side is dominant with plantation or managed forests covering the most areas of the village. |
| Conservation Areas | One village common conservation area of 5 acre size adjacent to the dwelling. However, because weak customary laws and institutional arrangement, these area are being degraded with much extraction of the timber, fuelwood and other NTFPs. |

| | |
|----------------------|--|
| Tenure | Most of the plantation and managed forest land is under private ownership either from lease from district commissioner or under control without lease. Customary village land under control of village headperson who allocates land to households and manages the very limited remaining village forestland. |
| Govt & Devt Projects | UNDP has launched some development programs including confidence building initiatives among the villagers. As the part of activities, the degraded village common forest (5 acre) is managed by a village community with training and material support from UNDP and NGOs for horticulture development. Moreover, education and awareness program and financial support for livestock and other income generating are being promoted by UNDP and local NGOs. |
| Recent Calamities | Crop failure (2008), not very serious in this village |

(ii) Thowaingya para

| Item | Brief Description |
|--------------------------------|--|
| Brief History | Settled around 1808 by dominant Marma hill peoples of the region. |
| Demographics | Population estimate: 85 households, 430 people. Main ethnic groups: Maram (100%). |
| Main Economic Activities | Agriculture (rice is staple crop), forest-based employment (timber production and sale from plantation, logging and transportation for timber merchants, bamboo based products sale), small trade, service in Bandarban town. |
| Main Source of Forest Products | Private plantations surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Balaghata is the small daily local market (3 km); twice-weekly market in Bandarban town (6 km). |
| Forest Product Markets | Variety of NTFPs mainly fuelwood and wild vegetables, broom grass are traded at local markets; bamboo and timber merchants buy directly from villagers mostly with advance money lending. |
| Land Cover and Land Use | High population density in the valley: very small portion of the village is occupied by dwelling units, majority area covered by plantation forests and one-fifth by cropland and agroforestry areas. |
| Conservation Areas | There is Temple in the village and the trees and bamboo groves around the temple are treated as common conservation area and sacred place. |
| Tenure | Most of the plantation forest land is under private ownership either from lease from district commissioner or under one's control without lease. Village headperson (Karbari) usually allocate the village common land to the households for dwelling. |
| Govt & Devt Projects | There are some NGO activities about health and education and microcredits. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious in this village. |

(iii) Prue Mong U para

| Item | Brief Description |
|---------------|---|
| Brief History | This village was settled and rehabilitated by headman Prue Mong U around 1991 as the people of this village lost their land in Kapatai lake inundation during hydroelectricity dam. |

| | |
|--------------------------------|--|
| Demographics | Population estimate: 45 households, 250 people. Main ethnic groups: Chakma (95%) and Marma (2%). |
| Main Economic Activities | Agriculture (rice is staple crop), forest-based employment (timber and fuelwood sale, small trade, day labour). |
| Main Source of Forest Products | Private plantations surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Balaghata is the small daily local market (4 km); twice-weekly market in Bandarban town (7 km). |
| Forest Product Markets | Variety of NTFPs mainly fuelwood and wild vegetables, broom grass are traded at local markets; bamboo and timber merchants buy directly from villagers mostly with advance money lending. |
| Land Cover and Land Use | Most of the areas of the village are hilly plantation and managed forest with households at top of the hills and at the valley near to a stream. |
| Conservation Areas | No common conservation area. |
| Tenure | Most of the villagers were allocated 5 acre hilly forest lands in the village by the rehabilitation initiative. However, still there are some villagers who only have dwelling but know forest land was allocated. |
| Govt & Devt Projects | There are some NGO such as UNICEF activities about health and education and microcredits. The CHT development board has also supportive activities to the rehabilitation process of the village. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious here. |

(iv) Uzi Headman para

| Item | Brief Description |
|--------------------------------|--|
| Brief History | This village was settled around 1700 in the valley and near to a big stream surrounded by hills. |
| Demographics | Population estimate: 44 households, 250 people. Main ethnic groups: Marma (100%). |
| Main Economic Activities | Agriculture is the main activity (rice, maize, beans, vegetables, sesame both in shifting cultivation and plough wet-rice cultivation), forest resources such as bamboo, poles, timber, fuelwood extraction and sale, small trade, day labour. |
| Main Source of Forest Products | Private plantations surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Balaghata is the small daily local market (5 km); twice-weekly market in Bandarban town (8 km). However, there are some shops and informal market structure near to the village along the stream. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; variety of other NTFPs mainly fuelwood and wild vegetables, broom grass are traded at local markets; |
| Land Cover and Land Use | Most of the areas of the village are hilly plantation forests with households at the valley near to a stream. |
| Conservation Areas | No common conservation area. However, there is a buddist temple and surrounding forest areas about 5 acre under the temple. |

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| Tenure | Most of the villagers were allocated 5 acre hilly forest lands in the village by the rehabilitation initiative. However, still there are some villagers who only have dwelling but know forest land was allocated. |
| Govt & Devt Projects | There are some NGO such as GRAUS activities about health and awareness. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious in this village. |

(v) No.1 Punarbason para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | This village was settled and rehabilitated by CHT Development board in 1994 by establishing rubber plantation and engaging them in rubber extraction and rubber tree plantation management. |
| Demographics | Population estimate: 43 households, 230 people. Main ethnic groups: Chakma, Marma, Tanchaingya, Tripura. |
| Main Economic Activities | Extracting latex from Rubber plantations, Agriculture mainly as shifting cultivation with rice and other vegetables, collection and sale of forest resources such as bamboo, poles, timber, fuelwood, small trade etc. |
| Main Source of Forest Products | Private plantations surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Balaghata is the small daily local market (5 km); twice-weekly market in Bandarban town (8 km). However, there are some shops and informal market structure withing the village along the road. |
| Forest Product Markets | Latex from rubber trees is collected and supplied to nearest processing industry. Bamboo and timber merchants buy directly from villagers mostly with advance money lending; variety of other NTFPs mainly fuelwood and wild vegetables, broom grass are traded at local markets. |
| Land Cover and Land Use | Most of the areas of the village are hilly plantation forests with households at the top of the ridges. There are some agroforestry and horticulture plantation near to the village besides large scale rubber tree plantation. |
| Conservation Areas | No common conservation area. |
| Tenure | Most of the villagers were allocated 5 acre hilly forest lands in the village by the rehabilitation initiative. However, still there are some complains among the villagers for not receiving documents about the lease from the CHT development board. |
| Govt & Devt Projects | Not much government or NGO activities except the rehabilitation initiative by CHT board through engaging in rubber plantation and extraction. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious in this village. |

(vi) Ghungru Madhyam para

| Item | Brief Description |
|--------------------------|--|
| Brief History | This village was settled around 1930. |
| Demographics | Population estimate: 57 households, 365 people. Main ethnic groups: Kheong (100%). |
| Main Economic Activities | Agriculture mainly as shifting cultivation with rice and other vegetables, agroforestry practices, collection and sale of forest resources such as bamboo, poles, timber, fuelwood, small trade etc. |

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| Main Source of Forest Products | Private plantations and government forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Bandarban sadar town is the main market (14 km) for agricultural products and usually go by bus. However, sometimes the other local markets such as Balaghata (10 km), Dowachari (7 km) are used. Also, there are some shops and informal market structures near to village and near Doluchara. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; variety of other NTFPs mainly fuelwood and wild vegetables, broom grass, sun grass are traded at local markets mainly in Dawachari (7 km). |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantation and managed forests with households at the top and edged of the ridges. There are some agroforestry and horticulture plantation near to the village besides some government forests nearby. |
| Conservation Areas | No common conservation area. |
| Tenure | Most of the plantations are private with lease from government. However, there are some government managed forests. |
| Govt & Devt Projects | There are some NGO activities in the village on health and awareness. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious in this village. |

(vii) Faruk para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | This village was settled around 1982. |
| Demographics | Population estimate: 50 households, 300 people. Main ethnic groups: Bawm (96%), Lushai (4%). |
| Main Economic Activities | Horticulture (mainly Pineapple, Orange), Agriculture mainly rice cultivation with other vegetables within agroforestry systems (shifting cultivation), collection and sale of forest resources such as bamboo, poles, timber, tourism, small trade, handloom and bamboo based products sale etc. |
| Main Source of Forest Products | Mostly private plantations (lease from government). |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass, medicinal plants. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Bandarban sadar town is the main market (8 km) for agricultural products and usually go by jeep. There is also some shops and informal market structures within the village along the main road. In most cases the trader/ middlemen pick the agricultural products from the roadside of the village. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Some trade of NTFPs mainly bamboo and fuelwood. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantation forests and horticulture and agroforestry lands. In some these agroforestry systems rice and other agricultural crops are grown. There is a major stream running beside the village along the valley and most of the households are at the edges of the hills. |

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| Conservation Areas | No defined common conservation area. However, the villagers are not allowed to extract trees from the edge of the streams by their customary laws. |
| Tenure | Most of the plantations are private with lease from government. |
| Govt & Devt Projects | There are some NGO activities in the village on health and awareness. UNDP is also working in this village on development issues and confidence building of the community through financial support, engaging community in awareness programs, livestock and other income generating activities. |
| Recent Calamities | Crop failure due to bamboo flowering (2008), not very serious in this village as well. |

(viii). Renikheong Bagan para

| Item | Brief Description |
|--------------------------------|--|
| Brief History | This village was settled around 1989. |
| Demographics | Population estimate: 32 households, 173 people. Main ethnic groups: Mro (100%). |
| Main Economic Activities | Agriculture mainly as shifting cultivation with rice and other vegetables, agroforestry and horticulture practices produce Mango, Papawa, Banana, Orange etc.; collection and sale of forest resources such as bamboo, timber etc. Other NTFPs such as wild vegetables and fruits, medicinal plants are used for household consumption. |
| Main Source of Forest Products | Private plantations and managed forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2800 mm. |
| Agricultural Markets | Bandarban sadar town is the main market (18 km) for agricultural products and usually go by jeep. However, in most of the cases the traders or middlemen come with vehicle to collect the agricultural products from them near to the roadside of the village. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs are not traded that much except some roadside trade along with agricultural products. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations and managed forests with households at mid-edge of the steep hills. Agroforestry within shifting cultivation, horticulture plantations also occupy half of the areas of the village. |
| Conservation Areas | There is a common conservation area (20 acre) as village common forest and all the villagers manage this forest with their regular efforts. |
| Tenure | Most of the plantations are private with lease from government. However, the households areas and village common forests are under control of the village chief and he allocates the land within the village for dwelling. Villagers have some user rights of collection NTFPs and building materials such as poles and timber for household uses only with the permission from the village head and forest user group of the village. |
| Govt & Devt Projects | There are some local NGO (such as World vision, GRAUS) activities in the village on education, health and awareness. |
| Recent Calamities | Crop failure due to bamboo flowering (2008) was also common in this village but the damage was not significant. |

2. Study villages in Rangamati

(i) Bodhipur Baro para

| Item | Brief Description |
|--------------------------------|--|
| Brief History | This village was settled around 1710 near to a big buddist temple. |
| Demographics | Population estimate: 105 households, 500 people. Main ethnic groups: Chakma (100%). |
| Main Economic Activities | Agriculture (shifting and plough cultivation) with rice as a main crop and other vegetables, some agroforestry practices with ginger, turmeric, banana; collection and sale of forest resources such as bamboo, timber etc. Other NTFPs such as fuelwood, wild vegetables and fruits, medicinal plants parts, broom grass are used for household consumption and sale in market. |
| Main Source of Forest Products | Private plantations and managed forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Ghagra (8 km) is the main market for agricultural trade. However, some of the products are sold in Rangamati town (8 km) at Banrupa bazaar or College Gate bazaar. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs such as wild vegetables, broom grass, fuelwood are sold to shops near to village along the roadside and in Banrupa or college gate bazaar in Rangamati town.. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations and some natural forests with households at the edge and valley of the hills. The rest of the area of the village is covered by agroforestry and agricultural land and wetlands (a large strem flows through the village). |
| Conservation Areas | There is no common conservation area except some surrounding vegetations of the temple. |
| Tenure | Most of the plantations are private with lease from government. However, the household areas are under control of the village chief and he allocates the land within the villagers for dwelling. |
| Govt & Devt Projects | UNDP has launched some development programs including confidence building initiatives among the villagers. The program includes education and awareness, financial support for livestock and other income generating activities, natural resource management. There are some other local NGOs initiatives as well towards livelihood improvements of the villagers. |
| Recent Calamities | Bamboo flowering (2008) causing more rat population affected crop production but the rate of destruction was low. |

(ii) Khamar para

| Item | Brief Description |
|---------------|--|
| Brief History | This village was settled around 1980 when some villagers from Bodhipur Baro para migrated here. This area used to be the crop lands and plantations of the villagers from Bodhipur para. |
| Demographics | Population estimate: 78 households, 320 people. Main ethnic groups: Chakma (100%). |

| | |
|--------------------------------|--|
| Main Economic Activities | Agriculture (shifting and plough cultivation) with rice as a main crop and other vegetables, some agroforestry practices with ginger, turmeric, banana; collection and sale of forest resources such as bamboo, timber etc. Other NTFPs such as fuelwood, wild vegetables and fruits, medicinal plants parts, broom grass are used for household consumption and sale in market. |
| Main Source of Forest Products | Private plantations and managed forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Ghagra (8.5 km) is the main market for agricultural trade. However, some of the products are sold in Rangamati town (8.5 km) at Banrupa bazaar or College Gate bazaar. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs such as wild vegetables, broom grass, fuelwood are sold to shops near to village along the roadside and in Banrupa or college gate bazaar in Rangamati town.. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations and some natural forests with households at the edge and valley of the hills. The rest of the area of the village is covered by agroforestry and agricultural lands. |
| Conservation Areas | There is no common conservation area. |
| Tenure | Most of the plantations are private with lease from government. |
| Govt & Devt Projects | There has been some development intervention by CHT development board with the help of some local NGOs to promote agricultural, horticultural and livestock production and to generate more income to the villagers. Some of them were successful. UNDP has launched some development programs including confidence building initiatives among the villagers. The program includes education and awareness, financial support for livestock and other income generating activities, natural resource management. |
| Recent Calamities | Bamboo flowering (2008) causing more rat population affected crop production but the rate of destruction was low. |

(iii) Agyachari para

| Item | Brief Description |
|--------------------------------|--|
| Brief History | This village was established around 1960. |
| Demographics | Population estimate: 62 households, 320 people. Main ethnic groups: Tanchangya (100%). |
| Main Economic Activities | Agriculture (shifting and plough cultivation) with rice as a main crop along with ginger, turmeric and other kind of vegetables; collection and sale of forest resources such as bamboo, poles, broom grass, timber, wild vegetables etc. Most of the NTFPs are used mainly for household consumption and subsistence income when going to the market place. |
| Main Source of Forest Products | Private plantations and natural forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass, medicinal plants parts, barks. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Ghagra (12 km) is the main market for agricultural trade. Villagers sell some products in Rangamati town at Tabalchari (6 km) and Banrupa bazaar (9 km). |

| | |
|-------------------------|---|
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Villagers sell other NTFPs such as wild vegetables, broom grass, fuelwood in Rangamati town at Tabalchari (6 km) and Banrupa bazaar (9 km). |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations (mostly with Teak, Gamari and other tree species) and some natural forests with households at the edge and valley of the hills. In one side the village is surrounded by Kapatai lake and the other side is high hills. In dry season when lake water goes down exposing more agricultural land, they produce plough rice and winter vegetables there. Fishing in the lake water is another source of subsistence income. |
| Conservation Areas | There is no common conservation area. |
| Tenure | Most of the plantations are private with lease from government. However, there are some hill forests under the control of individuals although they did not get the lease paper yet. The natural forests are also under private lease. |
| Govt & Devt Projects | Green Hills a local NGO works here and launched some development programs including water and sanitation, education and awareness etc. |
| Recent Calamities | Bamboo flowering (2008) caused more rat population that destroyed crops of the villagers to some extent. |

(iv) Hazachari para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | This village was established around several centuries ago. |
| Demographics | Population estimate: 61 households, 300 people. Main ethnic groups: Marma (100%). |
| Main Economic Activities | Agriculture (shifting and plough cultivation) with rice as a main crop along with ginger, turmeric and other kind of vegetables; collection and sale of forest resources such as bamboo, poles, broom grass, timber, wild vegetables etc. Most of the NTFPs are used mainly for household consumption and subsistence income when going to the market place. |
| Main Source of Forest Products | Private plantations and natural forests surrounding the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, sun grass, medicinal plants parts, barks. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Ghagra (14 km) is the main market for agricultural trade. However, some of the products are sold in Rangamati town at Tabalchari (7 km) and Banrupa bazaar (10 km). |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs such as wild vegetables, broom grass, fuelwood are sold in Rangamati town at Tabalchari (6 km) and Banrupa bazaar (9 km). |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations (mostly with Teak, Gamari and other tree species) and some natural forests with households at the edge and valley of the hills. In one side the village is surrounded by Kapatai lake and the other side is high hills. In dry season when lake water goes down exposing more agricultural land, they produce plough rice and winter vegetables there. Fishing in the lake water is another source of subsistence income. |
| Conservation Areas | There is no common conservation area. |

| | |
|----------------------|---|
| Tenure | Most of the plantations are private with lease from government. However, there are some hill forests under the control of individuals although they did not get the lease paper yet. The natural forests are also under private lease. The village chief has the control of the village settlements and distributes lands for dwellings to the villagers. |
| Govt & Devt Projects | Green Hills, a local NGO, is also working here and carrying out some development programs including water and sanitation, education and awareness, natural resource management etc. |
| Recent Calamities | Bamboo flowering (2008) caused more rat population that destroyed crops of the villagers to some extent. However, the damage was not that much significant in the locality. |

(v) Mubachari para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | This village was established around 1960. |
| Demographics | Population estimate: 42 households, 330 people. Main ethnic groups: Chakma (100%). |
| Main Economic Activities | Fishing from the lake and fish based trade is a major activity in the village. Agriculture (shifting and plough cultivation) with rice as a main crop along with ginger, turmeric and other kind of vegetables; collection and sale of forest resources such as bamboo, poles, broom grass, timber, wild vegetables etc. Most of the NTFPs are used mainly for household consumption and subsistence income when going to the market place. |
| Main Source of Forest Products | Private plantations forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, medicinal plants parts, Menda barks. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Banarupa bazaar (4 km) in Rangamati town is the the main market for agricultural trade. However, some of the products are also sold in Rangamati town at Reserve bazar (4 km). Fishes are usually sold to fishery ghat (4 km), Banarupa bazaar (4 km) and Kutukchar (15 km). All the transports to the village is by boat. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs such as wild vegetables, broom grass, fuelwood are sold in Rangamati town at Banrupa bazaar (4 km) mainly when they go to market for other purposes. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations (mostly with Teak, Gamari and other tree species) and the dwellings are at the top of medium level hills. The village is surrounded by Kapatai lake. In dry season when lake water goes down exposing more agricultural land, some of the villagers produce plough rice and winter vegetables there. Fishing in the lake water is another source of subsistence income. |
| Conservation Areas | There is no common conservation area. |
| Tenure | Most of the plantations are private with lease from government. However, there are some hill forests under the control of individuals although they did not get the lease paper yet. |
| Govt & Devt Projects | Some local NGOs work here and launched some development programs including water and sanitation, education and awareness, herbal gardening. |
| Recent Calamities | Bamboo flowering (2008) more or less affected the village crop production. |

(vi) Kandobachara para

| Item | Brief Description |
|--------------------------------|---|
| Brief History | This village was established about hundred years ago. |
| Demographics | Population estimate: 63 households, 450 people. Main ethnic groups: Chakma (100%). |
| Main Economic Activities | Fishing from the lake and fish based trade and labor is a major activity in the village. Agriculture (shifting and plough cultivation) with rice as a main crop along with ginger, turmeric and other kind of vegetables; collection and sale of forest resources such as bamboo, poles, broom grass, timber, wild vegetables etc. Most of the NTFPs are used mainly for household consumption and subsistence income. They usually take some available NTFPs to sell in the market when they go there with fish or other agricultural crops. |
| Main Source of Forest Products | Private plantations forests near to the village. |
| Forest Products Available | Timber, bamboo, fuelwood, wild vegetables and fruits, broom grass, medicinal plants parts, Menda barks. |
| Seasonal Calendar | Dry and cool: November to March; hot and sunny pre-monsoon: April to May; wet, cloudy and warm monsoon: June to October. Annual rainfall average 2500 mm. |
| Agricultural Markets | Banarupa bazaar (4 km) in Rangamati town is the main market for agricultural trade. However, some of the products are also sold in Rangamati town at Reserve bazar (4 km). Fishes are usually sold to fishery ghat (4 km), Banarupa bazaar (4 km) and Kutukchari (15 km). Boat is the only means of transport to get to the village. |
| Forest Product Markets | Bamboo and timber merchants buy directly from villagers mostly with advance money lending; Other NTFPs such as wild vegetables, broom grass, fuelwood are sold in Rangamati town at Banrupa bazaar (4 km) mainly when they go to market for other purposes. |
| Land Cover and Land Use | Most of the areas of the village are covered with hilly plantations (mostly with Teak, Gamari and other tree species) and the dwellings are at the top and edge of the medium types hills. The village is surrounded by Kapatai lake water. In dry season, in this village as well, when lake water goes down exposing more agricultural land, some of the villagers produce plough rice and winter vegetables there. Fishing in the lake water is a major of subsistence income source from the wetland. |
| Conservation Areas | There is no common conservation area. |
| Tenure | Most of the plantations are private with lease from government. However, there are some hill forests under the control of individuals although they did not get the lease paper yet. |
| Govt & Devt Projects | Some local NGOs work here and launched some development programs including water and sanitation, education and awareness, herbal gardening etc. |
| Recent Calamities | Bamboo flowering (2008) more or less affected the village crop production. |

Appendix C

NTFP-related Household Questionnaire

A. Identification

Interviewer: Date:.....
 Household name:..... Code:.....
 Village name: Code:.....
 District name:..... Code:.....
 Primary respondent:

B. NTFPs Status and utilization

1. What are the major NTFPs collected and/ or sold by your household round the year? *(Please tick and note their uses and status detail in the table below)*

| NTFPs | Most important 3 NTFPs for household use (rank 1-3) | Type/ parts of the plants collected | Used for what purpose | How far from household | | Time spent for collection of NTFPs by household members (Hours/ year) | NTFP resources base | |
|-------------------------------|---|-------------------------------------|-----------------------|------------------------|------|---|--|---|
| | | | | Km | Min. | | Stock condition compared to 10 years ago (0 to 10 scale) | Reason for degradation (rank 1-3) ¹ (please note below the table with reason in case of stock increased) |
| Bamboo | | | | | | | | |
| Bamboo shoot | | | | | | | | |
| Menda bark | | | | | | | | |
| Broom grass (Fuljharu) | | | | | | | | |
| Wild vegetables | | | | | | | | |
| Medicinal plants | | | | | | | | |

¹Codes: 1= over population and over exploitation, 2= increased NTFP trade, 3=increased bamboo shoot cutting, 4 = financial crisis of forest-adjacent households, 5 = land clearing for jhum and/ or plantation, 6 = lack of awareness, 7= lack of domestication initiative, 8= lack of administrative/ organizational support, 9 = lack of law and policy implementation, 10 = other, specify.....

C. NTFP income and trade

1. Do you sell NTFPs? Yes....No.....

If yes, what are the most important NTFPs in terms of income for **selling in the market** (name and rank 3)?

2. What are the marketing constraints for the major NTFPs and what needs to be done?

| NTFPs | Marketing constraints ¹ | What needs to be done to eliminate the constraints? ² |
|---------------------------------|------------------------------------|--|
| Bamboo | | |
| Bamboo shoot | | |
| <i>Menda</i> bark | | |
| Broom grass/ <i>Fuljharu</i> | | |
| Wild vegetables | | |
| Medicinal plants | | |

¹Codes: 1= poor road/ water communication, 2= lack of sufficient transport facility, 3= lack of phone communication, 4 = lack of capital/ financial support, 5 = lack of market information, 6 = lack of nearby market place/ middlemen linkage, 7 = Money lender cycle (Dadon system), 8 = lack of awareness and training, 9 = other, specify.....

²Codes: 1= roads and infrastructure development, 2= more transport facilities, 3= phone access, 4 = more financial support as grant/ loan, 5= enhanced access to market information (through extension officer, radio etc), 6 = make people aware of the NTFP market, 7 = govt./ private initiative for market place/ display center facility, 8= other, specify.....

D. NTFP market knowledge base

1. How much do you know about the NTFP markets? (Please score for each in the table)

| Are you aware of: | Score: | | | | | | |
|--|--|--------------|-----------------|----------------|------------------|-------------------|-----------------|
| | No market knowledge <0 1 2 3 4 5 6 7 8 9 10> Full market knowledge | | | | | | |
| | Bamboo | Bamboo shoot | <i>Fuljharu</i> | Wild vegetable | Medicinal plants | <i>Menda</i> bark | Other (specify) |
| a) different level stakeholders of the NTFPs trade | | | | | | | |
| b) different steps in the trade | | | | | | | |
| c) the profit margin between different traders | | | | | | | |
| d) destinations | | | | | | | |
| e) final price | | | | | | | |
| f) end users of the NTFPs | | | | | | | |

Please answer the following questions (in this section) **if you sell NTFPs**:

3. What are the **existing sources** of your information for marketing NTFP goods or raw materials? (please rank 1 to 3)¹

¹Codes: 1= radio/ television 2= news paper 3= villagers 4= karbari 5= local market 6= phone communication 7= direct contact with traders 8= leaflet, 9= patha natak, 10= govt./ NGO extension officers, 11= other, specify.....

4. What **could be the best source** for market information? (please rank 1 - 3, from above codes¹)

5. What **kind of information** do you need for better access to the NTFP market (rank 1 to 3 the priority)¹?

¹*Codes: 1= market price, 2= last month's/ season's trade history and rend, 3= current stock in the market, 4= information of more traders, 5= technological information, 6= better preservation info, 7= storage info, 8= other, specify.....*

6. If you know more about the NTFPs market and stakeholders will that be helpful for earning more from NTFPs? Yes.....No.....

If yes, how?

E. NTFP domestication and trade

1. Do you/ your household members plant/ domesticate any of the above NTFP for sustainable supply of the products/ raw materials? Yes..... No.....

If yes,

(a) What products?

(b) Where?

(c) What's the area of the NTFP domesticated land? (Decimal:.....)

(d) How cultivated? (*please circle...a) from seed, b) from rhizome/root, c) from cutting/ clone, d) other, specify.....*)

If No, why don't you domesticate? (*Please rank 1 to 3*)¹

¹*Codes: 1= lack of land, 2= lack of financial capital/ support, 3= lack of awareness, 4= lack of training, 5= administrative, 6= legal, 7= other, specify.....*

2. Is there any organization that provides technical support and extension services to encourage NTFPs domestication and commercialization? Yes.....No.....

If yes,

(a) Name of organization:

(b) How they are supporting your household for NTFPs domestication/ commercialization?

3. Does domestication activity of a commercialized NTFP species put less pressure on its natural resource base? Yes.....No.....

If yes, please describe how?

F. Empowering people for NTFP enterprises

1. Is there any NTFP based enterprise (*kutir shilpa, samity, small NTFP farm, cooperative etc*) in your village? Yes.....No.....

2. Is there any govt./ non-government organizational activities for organizing and managing NTFP based enterprises? Yes..... No.....

If yes, what are they?

3. What kind of initiatives/ organizational effort would encourage people concerned for NTFPs development activities? (please rank 1 to 3)¹

¹Codes: 1= financial support/ loan, 2= training and awareness development, 3= access to market information system, 4= improved communication system (infrastructure/ phone), 5= personal linkage, 6= domesticating more plants for raw materials, 7= other, specify.....

4. Would you like to involve yourself as a group member of an organized cooperative based on NTFPs? (yes= 1, No = 0)

If yes, why?

G. NTFP Commercialization and impacts

1. What are the impacts of NTFPs commercialization and trade?

| NTFPs | Impacts | |
|-------------------------------|----------|----------|
| | Positive | Negative |
| Bamboo | | |
| Bamboo shoot | | |
| <i>Menda bark</i> | | |
| <i>Broom grass (Fuljharu)</i> | | |
| Wild vegetables | | |
| Medicinal plants | | |

2. Are these NTFP plants being utilized in a sustainable manner? Yes....No...

If No, why?.

3. What are your opinion/ suggestions to make these NTFP plant resources more available for use and conservation?

4. Anything else you want to say regarding NTFP issues?

5. Overall comments of interviewer about the answers or respondent or any relevant issues:

Appendix D

NTFP-related Market and Livelihoods Study Questionnaire

Control Information

| Task | Date(s) | By who? | Status OK? If not, give comments |
|-----------------------------------|---------|---------|----------------------------------|
| Interview | | | |
| Checking Questionnaire | | | |
| Coding Questionnaire | | | |
| Entering data | | | |
| Checking and approving data entry | | | |

Identification

Identification and location of NTFP commodity specialist:

| | | |
|---|-------------|------------|
| Name of NTFP commodity (<i>use one questionnaire for each NTFP</i>) | | |
| Commodity specialist number | | |
| 3. Name of commodity specialist (<i>Optional</i>) | | |
| 3a. GPS Reference Point of Actor/Business (<i>UTM Format</i>) | | |
| | <i>Name</i> | <i>ID#</i> |
| 4. Location (<i>where producer or business is located</i>) | | |
| 5. Union | | |
| 6. Upazela | | |
| 7. Field Site/ District (<i>1=Bandarban, 2=Rangamati, 9=Other, specify</i>) | | |
| 8. Name of market (<i>if applicable</i>) | | |
| 9. Please describe your *role in the NTFP business? | | |

*Code: 1=Owner (sole); 2=Owner (shareholder); 3=Paid employee-manager; 4=Paid employee-other; 5=Contractor; 6=Family member; 9=Other, specify

A. General Information

1. How do you describe your involvement in the NTFP business?*

| <i>Actor Categories</i> | <i>0=No; 1=Yes</i> |
|--|--------------------|
| 1. Collector: Do you go and collect NTFP from forest? | |
| 2. Producer: Do you process/ produce the NTFP based product? | |
| 3. Agent/Broker/Middleman: Do you search out and/or organize the NTFP supply for other people in the NTFP value chain? (<i>i.e. does not buy and sell, but works on commission or contract for a trader or other actor in the marketing chain</i>) | |
| 4. Transporter: Do you transport the NTFP? | |
| 5. Trader: Do you both buy and sell NTFP, but don't sell directly to consumers? | |
| 6. Wholesaler: Do you sell NTFP to retailer/ directly to consumers in bulk volume? | |
| 7. Retailer: Do you sell NTFP directly to consumers? | |
| 8. Other, <i>specify</i> | |

*Indicate all that are applicable; actors may fall in more than one category.

2. Of the above categories in the NTFP business chain, which do you consider to be your primary/ secondary/ tertiary roles? (i.e. where does the largest share of your NTFP related income come from and how much?)

| Rank | Category: (1= Collector; 2= Producer; 3=Agent/broker/middleman; 4=Transporter; 5=Trader; 6=Wholesaler; 7= Retailer; 9=Other) | Average monthly Income (Taka) |
|--|--|-------------------------------|
| 1. Primary (i.e. largest share of NTFP related income is from...) | | |
| 2. Secondary (i.e. second largest share of NTFP related income is from...) | | |
| 2. Tertiary (i.e. third largest share of NTFP related income is from...) | | |

B. General Information about NTFP Business

1. Please provide the basic information about the NTFP business:

| | | | |
|---|--------|--------|--------|
| 1. How many years have you been engaged in the NTFP business? | | | |
| 2. During the past 6 months, how many people from your own household were employed or worked on your NTFP business? | | | |
| 3. During the past 6 months, how many people outside of your own household have you employed? (i.e. only those engaged in NTFP business) | | | |
| 4. What was the type of the employment? (1= full time; 2= part-time, 3= seasonal or contract basis; 4= day labor; 5= other, specify?) | | | |
| 5. Do you belong to a cooperative group or association that is focused on the NTFP trade? (0=No; 1=Yes) | | | |
| 5a. If not, would you like to form or be a member of such a cooperative group or association? (0=No; 1=Yes) | | | |
| 6. Is the NTFP business your primary source of income? (0=No; 1=Yes) | | | |
| 7. If No, what is your primary source of income? | | | |
| 8. What is your average monthly household income including subsistence and support? (in Taka) | | | |
| 9. Roughly how much of your average monthly household income is from NTFP business? (in Taka) | | | |
| 10. Has your business accessed formal <i>cash</i> credit at any time during the past 5 years? (i.e. banks, government/ NGO support, microcredit etc.) (0=No; 1=Yes) | | | |
| 11. Has your business accessed informal <i>cash</i> credit at any time during the past 5 years (i.e. moneylenders, other NTFP specialists etc.) (0=No; 1=Yes) | | | |
| 12. If yes, how much cash credit? (in Taka) | | | |
| 13. Roughly what percentage of the business that you do is on credit? | | | |
| | Rank 1 | Rank 2 | Rank 3 |
| 14. During which months is the demand for NTFP highest (pick)? | | | |
| 15. During which months is the demand for NTFP lowest (off-pick)? | | | |
| 16. Which places does the majority of NTFP that passes through your business come from? | | | |

2. What are the major problems/challenges your business currently faces (rank 1 to 3)?

| | |
|--------------------------------|--|
| 1. Main problem/challenge | |
| 2. Secondary problem/challenge | |
| 3. Tertiary problem/challenge | |

| | |
|-------------------|--|
| 3. Other, specify | |
| 4. Other, specify | |

*Note: the above table should only include costs that were not captured above in 3

D. Social Capital and Networks

1. Status of your social capital and business network

| | Colle- ctors | Produ- cers | Agents/ Brokers/ Middlemen | Trans- porters | Trad- ers | Whole- salers | Retail- ers | Consu- mers |
|--|-----------------|----------------|----------------------------------|-------------------|--------------|------------------|----------------|----------------|
| 1. How many of each of the following types of actors in the NTFP value chain have you done business with in the past 3 months? | | | | | | | | |
| 2. Of those, what number have you done business with before? (i.e. they are repeat customers) | | | | | | | | |
| 3. How many have you had a business relationship with for 1 year or more? | | | | | | | | |
| 4. How many have you had a business relationship with for 5 years or more? | | | | | | | | |
| 5. What is the dominant ethnic group of those that you do business with*? | | | | | | | | |

*Code: 1=Chakma; 2=Marma; 3=Tanchangya; 4=Tripura; 5=Bawm; 6=Kheyang; 7=Mro; 8=Pangkho; 9=Khumi; 10=Lusai; 11=Chak; 12=Bangali; 99=Other, specify

2. Please describe how does specific commodity supply chain related to your NTFP business work? (who buy/ consume your NTFPs and/ or who supply you the NTFPs- how does it work?)

E. Rights Associated with Collecting, Transporting and Selling NTFP

| | Collect | Transport | Sell |
|---|---------|-----------|------|
| De Jure or Formal Rights | | | |
| 1. Do you require permission to collect /transport or sell NTFP? (0=No; 1=Yes) | | | |
| 1a. If yes, who grants permission? (1=Forest Dept.; 2=District Commissioner; 4=divisional head; 9=Other, specify) | | | |
| 1b. Is the permission written or verbal? (1=Written; 2=Verbal) | | | |
| 1c. Do you have to pay to obtain permission? (0=No; 1=Yes) | | | |
| De Facto Rights | Collect | Transport | Sell |
| 2. Over the past 6 months have you collected/ transported or sold NTFP? (0=No; 1=Yes) | | | |
| 2a. If yes, did you obtain formal permission to do so? (0=No; 1=Yes) | | | |
| 2b. Who granted the permission? (1=Forest Dept.; 2=District Commissioner; 4=divisional head; 9=Other, specify) | | | |
| 2c. Was the permission written or verbal? (1=Written; 2=Verbal) | | | |
| 2d. Did you have to pay for the permission? (0=No; 1=Yes) | | | |
| 2e. During the past 6 months, how many times have you asked for permission to transport/sell NTFP? | | | |

| | | | |
|---|--|--|--|
| 2f. During the past 6 months, approximately how many times have you or a representative of your business interacted (<i>i.e. in person</i>) with representatives of the government organizations (FD, DC) regarding your NTFP business? | | | |
|---|--|--|--|

F. Major trends/changes in NTFP business since 2003 (last 5 years)

| Since 2003, how have the following changed: | General Trend <i>1=Decreased; 2=No change; 3=Increased</i> | Reason for Change <i>If applicable</i> |
|---|---|---|
| 1. The price of a standard unit of NTFP during the pick season? | | |
| 2. The price of a standard unit of NTFP during the off-pick season? | | |
| 3 The general availability of NTFP | | |
| 4. The distance that NTFP is transported from forest gate to end market (<i>i.e. where the consumer buys</i>) | | |
| 5. The demand for NTFP by consumers | | |
| 6. Number of rules and regulations regarding transporting | | |
| 7. Number of rules and regulations regarding selling | | |
| 8. The cost of obtaining permission to legally transport NTFP | | |
| 9. The cost of obtaining permission to legally sell NTFP | | |
| 10. The enforcement of rules and regulations regarding transporting NTFP | | |
| 11. The enforcement of rules and regulations regarding selling NTFP | | |

5. Since 2003, what major events or policies that have had either a positive or negative effect on the NTFP business?

| | |
|---------------------------|--|
| 1. Main event/policy | |
| 2. Secondary event/policy | |
| 3. Tertiary event/policy | |

G. Environment and forest conservation aspect of NTFP Business

1. Do you consider the environmental and forest conservation issues for your NTFP business (i.e environmental pollution and balance, forest biodiversity and stock for sustainable supply)? 0= No 1= yes

1a. If yes, what's your action taken for that:

1.b. If not, why not and are you aware of the future environmental and resource stock challenge for your business?

H. Demographic information

| | |
|---|--|
| 1. What year were you born? | |
| 2. How many years of formal education have you completed? | |
| 3. How many members do you have at your household? | |
| 4. What is the gender of the respondent? (0=Male; 1=Female) | |
| 5. What ethnic group do you belong to? (1=Chakma; 2=Marma; 3=Tanchangya; 4=Tripura; 5=Bawm; 6=Kheyang; 7=Mro; 8=Pangkho; 9=Khumi; 10=Lusai; 11=Chak; 12=Bangali; 99=Other (specify)) | |
| 6. What is your home District? (i.e. district of origin) | |
| 7. Where is your household located? | |
| 8. How many acres of land do you own? (i.e. in a rural setting) | |
| 9. How many urban plots do you own? (i.e. plots in urban centers) | |
| 10. What's the type of your house? (1= Kacha/bamboo made with grass thatching; 2= Kacha/bamboo made with tin/metal made; 3= Brickbuilt; 4= other, specify) | |
| 11. What's the total current value of other assets (eg. Electronic goods, Furniture, agricultural implements, others if you have? (in Taka) | |
| 12. Do you own a motorcycle? (0=No; 1=Yes) | |
| 13. Do you own a fixed/ mobile phone? (0=No; 1=Yes) | |
| 14. Do you own a truck or boat that is large enough to transport large volumes of NTFP over long distances? (0=No; 1=Yes) | |

I. Enumerator's comments on irregularities or interesting issues of note with interview:

Appendix E

ANOVA and Chi-square Tests Results Related to NTFP Collection Time, Stock Degradation and Market Constraints

Differences in time spent by households to collect different types of NTFPs (N= 731).

| | N | Mean time spent to collect NTFPs (Hour/year) | F-value | p-value |
|-----------------|-----|--|---------|---------|
| Types of NTFPs | | | | |
| Bamboo | 203 | 108 | 19.905 | .000 |
| Wild vegetable | 202 | 155 | | |
| Medicinal plant | 10 | 9 | | |
| Bamboo shoot | 147 | 144 | | |
| Broom grass | 163 | 28 | | |
| Menda bark | 6 | 17 | | |

ANOVA table for the relationships of ethnicity and types of NTFPs to NTFP collection time by households.

| Sources of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F | p-value |
|---------------------------|----------------|--------------------|-------------|--------|---------|
| Total | 15192444.616 | 730 | 20811.568 | | |
| Explained | 3895656.115 | 32 | 121739.254 | 7.522 | .000 |
| Ethnicity | 1270873.685 | 6 | 211812.281 | 13.087 | .000 |
| Types of NTFPs | 1816163.348 | 5 | 363232.670 | 22.443 | .000 |
| Ethnicity* Types of NTFPs | 790952.037 | 21 | 37664.383 | 2.327 | .001 |
| Unexplained | 11296788.500 | 698 | 16184.511 | | |

ANOVA table for the relationships of districts and types of NTFPs to NTFP collection time by households.

| Sources of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F | p-value |
|--------------------------|----------------|--------------------|-------------|--------|---------|
| Total | 15192444.616 | 730 | 20811.568 | | |
| Explained | 2743987.910 | 11 | 249453.446 | 14.408 | .000 |
| Districts | 514081.452 | 1 | 514081.452 | 29.692 | .000 |
| Types of NTFPs | 1773259.526 | 5 | 354651.905 | 20.484 | .000 |
| Districts*Types of NTFPs | 396076.066 | 5 | 79215.213 | 4.575 | .000 |
| Unexplained | 12448456.705 | 719 | 17313.570 | | |

Differences in NTFP stock condition score based on different types of NTFPs (N= 744).

| | N | Average scores of NTFP stocks | F-value | p-value |
|-----------------|-----|-------------------------------|---------|---------|
| Types of NTFPs | | | | |
| Bamboo | 208 | 4.45 | 3.346 | .002 |
| Wild vegetable | 205 | 4.63 | | |
| Medicinal plant | 10 | 4.90 | | |
| Bamboo shoot | 150 | 4.07 | | |
| Broom grass | 166 | 4.75 | | |
| Menda bark | 5 | 3.40 | | |

Interrelationship between reasons* for NTFPs' stock degradation and types of NTFPs

| NTFPs | Reasons under Rank1 | | | | | | | | | | Total frequency count |
|-----------------|---------------------|-------|------|------|-------|-------|-------|-----|----|-------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | | |
| Bamboo | 71.6% | 1.0% | 5.8% | 5.3% | 3.8% | | | | | 12.5% | 208 |
| Bamboo shoot | 67.3% | 2.0% | 7.3% | 8.7% | 6.0% | .7% | .7% | .7% | | 6.7% | 150 |
| Broom grass | 68.1% | 3.7% | 1.8% | 6.1% | 14.1% | 1.8% | .6% | .6% | | 3.1% | 163 |
| Medicinal plant | 60.0% | 20.0% | | | 10.0% | 10.0% | | | | | 10 |
| Menda bark | | 40.0% | | | 40.0% | | 20.0% | | | | 5 |
| Wild vegetable | 72.8% | 3.0% | 3.5% | 5.9% | 7.4% | 5.0% | 2.0% | | | .5% | 202 |

$X^2 = 145.180$; Degrees of freedom= 40; p-value= .000

| NTFPs | Reasons under Rank2 | | | | | | | | | | Total frequency count |
|-----------------|---------------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Bamboo | 14.1% | 21.5% | 30.7% | 6.8% | 11.2% | | 1.5% | .5% | 1.0% | 12.7% | 205 |
| Bamboo shoot | 15.5% | 16.2% | 11.3% | 29.6% | 18.3% | 2.8% | 1.4% | .7% | .7% | 3.5% | 142 |
| Broom grass | 17.3% | 14.1% | 5.8% | 24.4% | 34.6% | 2.6% | | | | 1.3% | 156 |
| Medicinal plant | 10.0% | | | 20.0% | 40.0% | 10.0% | 20.0% | | | | 10 |
| Menda bark | | | | | 25.0% | 50.0% | | 25.0% | | | 4 |
| Wild vegetable | 9.7% | 11.2% | 4.6% | 25.5% | 35.7% | 6.1% | 3.1% | .5% | | 3.6% | 196 |

$X^2 = 279.440$; Degrees of freedom= 45; p-value= .000

| NTFPs | NTFP stock degradation reasons* under Rank3 | | | | | | | | | | Total frequency count |
|-----------------|---|-------|-------|-------|-------|-------|-------|------|------|------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Bamboo | 7.6% | 7.6% | 31.2% | 22.4% | 20.0% | 1.8% | .6% | .6% | .6% | 7.6% | 170 |
| Bamboo shoot | 9.0% | 4.5% | 10.1% | 23.6% | 28.1% | 16.9% | 3.4% | | 1.1% | 3.4% | 89 |
| Broom grass | 11.5% | 18.3% | 5.8% | 19.2% | 25.0% | 10.6% | 4.8% | 1.9% | | 2.9% | 104 |
| Medicinal plant | | 33.3% | | 11.1% | 22.2% | | 33.3% | | | | 9 |
| Menda bark | | | | | | 50.0% | 50.0% | | | | 2 |
| Wild vegetable | 6.5% | 15.3% | 4.0% | 25.0% | 20.2% | 18.5% | 4.8% | 1.6% | | 4.0% | 124 |

$X^2 = 146.240$; Degrees of freedom= 45; p-value= .000

* Reasons' codes: 1= over population and over exploitation, 2= increased NTFP trade, 3=increased bamboo shoot cutting, 4 = financial crisis of forest-adjacent households, 5 = land clearing for jhum and/ or plantation, 6 = lack of awareness, 7= lack of domestication initiative, 8= lack of administrative/ organizational support, 9 = lack of law and policy implementation, 10 = other.

Interrelationship between types of suggested initiatives* to eliminate NTFP market constraints and types of NTFPs

| NTFPs | Initiatives under Rank1 | | | | | | | | Total frequency count |
|-----------------|-------------------------|-------|------|-------|-------|-------|-------|------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Bamboo | 18.1% | 46.3% | | 13.0% | 3.4% | 3.4% | 8.5% | 7.3% | 177 |
| Wild vegetable | 20.2% | 28.8% | | 10.4% | 8.0% | 14.7% | 11.0% | 6.1% | 163 |
| Medicinal plant | 7.7% | 5.1% | 2.6% | 2.6% | 20.5% | 15.4% | 43.6% | 2.6% | 39 |
| Bamboo shoot | 19.3% | 29.8% | | 14.9% | 8.1% | 11.2% | 10.6% | 5.6% | 161 |
| Broom grass | 16.6% | 21.7% | 4.5% | 15.3% | 10.8% | 11.5% | 14.0% | 5.7% | 157 |
| Menda bark | 10.2% | 15.3% | 8.5% | 23.7% | 16.9% | 15.3% | 6.8% | 3.4% | 59 |

$X^2 = 159.437$; Degrees of freedom= 48; p-value= .000

| NTFPs | Initiatives under Rank2 | | | | | | | | Total frequency count |
|-----------------|-------------------------|-------|------|-------|-------|-------|-------|------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Bamboo | 4.6% | 18.5% | 4.6% | 31.1% | 18.5% | 11.9% | 7.9% | 2.0% | 151 |
| Wild vegetable | 6.2% | 26.2% | 8.5% | 16.9% | 18.5% | 6.2% | 17.7% | | 130 |
| Medicinal plant | | 2.9% | 8.8% | 17.6% | 20.6% | 44.1% | 2.9% | 2.9% | 34 |
| Bamboo shoot | 3.8% | 24.2% | 1.5% | 23.5% | 21.2% | 9.8% | 15.2% | .8% | 132 |
| Broom grass | 5.7% | 24.4% | 2.4% | 17.1% | 24.4% | 13.0% | 12.2% | .8% | 123 |
| Menda bark | 1.8% | 12.3% | 1.8% | 24.6% | 17.5% | 26.3% | 15.8% | | 57 |

$X^2 = 97.243$; Degrees of freedom= 48; p-value= .000

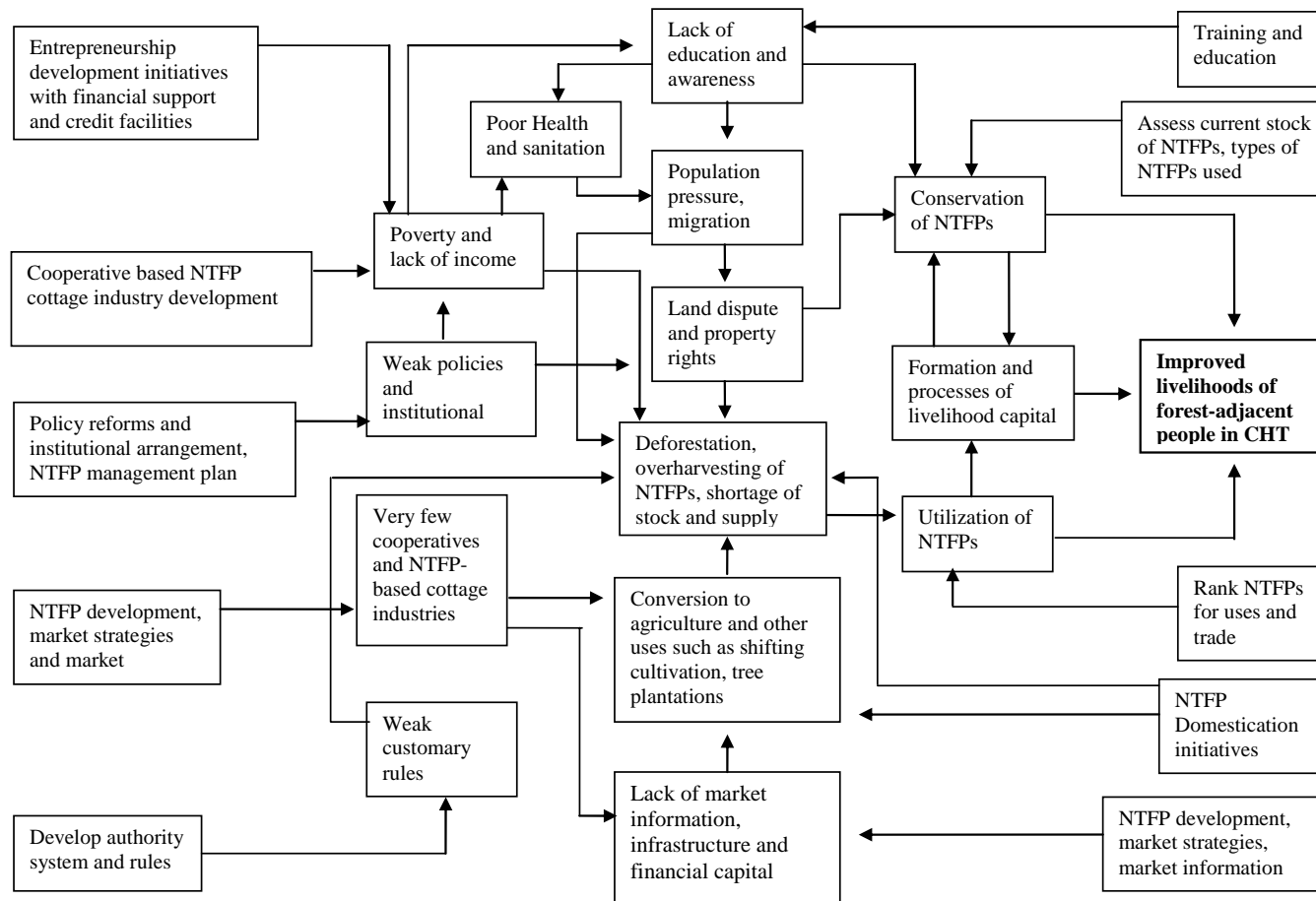
| NTFPs | Initiatives under Rank3 | | | | | | | | Total frequency count |
|-----------------|-------------------------|-------|-------|-------|-------|-------|-------|------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Bamboo | 6.1% | 3.1% | 1.0% | 24.5% | 28.6% | 27.6% | 9.2% | | 98 |
| Wild vegetable | 3.7% | 13.4% | 3.7% | 28.0% | 20.7% | 24.4% | 4.9% | 1.2% | 82 |
| Medicinal plant | 3.0% | 3.0% | 21.2% | 21.2% | 12.1% | 21.2% | 15.2% | 3.0% | 33 |
| Bamboo shoot | 3.7% | 8.5% | 2.4% | 30.5% | 18.3% | 25.6% | 11.0% | | 82 |
| Broom grass | 3.5% | 18.8% | 2.4% | 17.6% | 22.4% | 22.4% | 9.4% | 3.5% | 85 |
| Menda bark | | 27.5% | | 13.7% | 27.5% | 17.6% | 13.7% | | 51 |

$X^2 = 84.169$; Degrees of freedom= 35; p-value= .000

*Suggested initiatives' codes: 1= roads and infrastructure development, 2= more transport facilities, 3= phone access, 4 = more financial support as grant/ loan, 5= enhanced access to market information (through extension officer, radio etc), 6 = make people aware of the NTFP market, 7 = govt./ private initiative for market place/ display center facility, 8= other.

Appendix F

Proposed NTFP-based Livelihood Development and Forest Conservation Model



VITA

Shiba P. Kar

I was born and brought up in Bangladesh. I did my B.Sc (with Honors) in Forestry from Institute of Forestry and Environmental Sciences, University of Chittagong, Bangladesh in 1998. Then I worked for an environmental consulting firm as a field researcher in Bangladesh and conducted field work that included using various tools including surveys to assess socioeconomic and environmental impact of shrimp farming. After one and a half year of the service, I joined Bangladesh Forest Department as an Assistant Conservator of Forests in 2001 and served the department for managing and implementing community forestry programs. In 2002, I was awarded Australian Development Scholarship and went to Australia for doing Masters in Environmental Management and Development under Australian National University (ANU). After graduation from ANU in 2003, I returned home and started working for an environmental NGO named NACOM as a Senior Program Officer where I worked for implementing and monitoring natural resource management projects. Later in 2005, I came to USA as a permanent resident and started my PhD study with graduate assistantship in August 2006.

My research interest and expertise include non-timber forest products sustainability and livelihood development, climate change, forest biodiversity and sustainability, community-based forest resource management, and socioeconomic and policy issues in forestry. Along with my PhD dissertation research, I also worked (as a research partner) for PEN global study of Centre for International Forestry Research (CIFOR) that was focused on forest-poverty linkages in the tropics. I am a member of Society of American Forester, Xi Sigma Pi, Bangladesh Environment Network and North American Lake Management Society.