

# Chapter 9

## Consumption and Marketing Pattern of Non-timber Forest Products in a Rapidly Changing World: Insights from North-Eastern Bangladesh



**Sharif A. Mukul**

**Abstract** Non-timber forest products (NTFPs) and their associated products received huge attention from development workers, practitioner and researchers in the past decades for their potentials for rural development. It is widely recognized that promoting the sustainable harvest and utilization of NTFPs can contribute to forest conservation. Nevertheless, with the development progressed in many regions, substitutes for NTFPs becoming readily available in the markets, challenging the NTFPs. A survey was conducted in an urban fringe of north-eastern Bangladesh to explore the NTFP-based product diversity, marketing pattern, challenges in a rapidly changing environment. A total of 38 NTFPs and NTFP-based secondary products were recorded from twenty-five markets, including- 16 permanent, 7 temporary (semi-permanent), and 2 mobile shops. Bamboo and rattan-based products had the highest demand in the locality and at the same time they also suffer from a scarcity of raw materials. A decreasing trend in the consumption of NTFPs-based goods for urban domestic use was evident. To cope with the competitive markets, sellers mainly emphasized creative marketing strategies and durability of products. New policy guidelines and active government support targeting medium and small entrepreneurs are essential for the sustenance of this industry. Besides, an efficient product's supply chain, technical advancement in the production process, and skill development of the relevant stakeholders can secure the future of these products and dependent livelihoods.

**Keywords** Bamboo and rattan-based products · Consumption pattern · Small-scale traders

---

S. A. Mukul (✉)

Centre for Research on Land-Use Sustainability, Dhaka 1229, Bangladesh

e-mail: [smukul@usc.edu.au](mailto:smukul@usc.edu.au)

Tropical Forests and People Research Centre, University of the Sunshine Coast, Maroochydc  
DC, QLD 4556, Australia

## 9.1 Introduction

Non-timber forest products (NTFPs) are defined as products mainly of biological origin other than commercial timber, which is derived from either natural or managed forests (de Beer and McDermott 1996). Examples include bamboo, cane or rattans, grasses, and their finished products (Mukul et al. 2010). Non-timber forest products play a significant role in the quality and even survival of large numbers of rural poor in most tropical developing countries (Shackleton et al. 2011; Pimentel et al. 1997; Arnold and Ruiz Pérez 1996). In fact, NTFPs' role and importance to households are diverse, and it helps households achieve self-sufficiency, food security, income generation, accumulation of savings, and risk minimization (Mukul et al. 2016; Mukul and Rana 2013; Arnold and Ruiz Pérez 1996). It has also increasingly recognized that the collection and use of NTFPs are ecologically less destructive, and development and promotion of such products could provide a sounder basis for sustainable forest management and community upliftment (Mukul et al. 2010; Mukul 2007; Arnold and Ruiz Pérez 2001). In fact, NTFPs are still more important resources than timber for the livelihood of many people (Mukul et al. 2014). It is also evident that smallholders living in forest margins in diverse parts of the world earn between 10 and 25% of their household income from NTFPs (Wunder 2000). Another study suggests that tropical forests in parts of south-east Asia provide as much as 50 US\$ per month per hectare to local people from exploiting forest resources, without considering the commercial value of timbers (Sedjo 2002; Caldecott 1988). Asia is undoubtedly the world's largest producer and consumer of NTFPs (Vantomme et al. 2002). According to de Beer and McDermott (1996), about 27 million people in Southeast Asia rely on NTFPs. However, as the development progressed rapidly in that region in the last years, alternatives or substitutes of NTFPs and associated products become more available in the market, and presumably in the next day's such natural products will have to compete with available synthetic/substitute products that are seemingly more durable, attractive, and cheap (Mukul 2011).

Bangladesh, being situated in a tropical climate, and Gangetic alluvial plains are endowed with a wide variety of flora, including many non-timber forest products (Mukul et al. 2020, 2018). Banik (1998) reported 33 species of bamboo (represented by nine genera and includes 18 naturally occurring species), seven species of rattans/canes, several palms, grasses, and many other NTFPs from the country. In Bangladesh, the collection, processing, and selling of NTFPs provide significant employment opportunities to the ultra-poor communities of about 300,000 (Basit 1995) and contribute approximately Tk 1.3 billion annually to the country's economy (GOB 1993). According to the Bangladesh Small and Cottage Industries Corporation (BSCIC), there are about 45,000 registered NTFP-based small-scale cottage enterprises distributed over the country, which provides employment and income provisions to thousands of millions of peoples (Banik 1998). Several studies have so far been conducted in Bangladesh that covers various aspects of NTFPs including utilization (e.g. Akhter et al. 2008; Mukul et al. 2016, 2012, 2007; Miah and Chowdhury 2003; Alam 1992), cultivation and management (e.g. Rashid et al. 2014; Ahmed

et al. 2007; Chowdhury et al. 2007; Uddin et al. 2006) and socio-economic potentials of NTFPs to rural livelihoods (e.g., Rana et al. 2010; Mukul 2008a, b; Uddin et al. 2008; Motaleb and Hossain, 2008; Uddin and Mukul 2007; Ahmed et al. 2007; Alamgir et al. 2006; Nath et al. 2000; Khan and Khan 1994). This chapter based on a case study in the northern Bangladesh, tries to provide a preliminary outlook of what have so far happened in the urban NTFPs markets in a rapidly globalized world, how traders/sellers coped with the changing situations, what attitudinal changes took place in the urban consumers/users of NTFPs, and what is required to uphold the NTFPs market in a more competitive world.

## 9.2 Materials and Methods

### 9.2.1 The Study Area

The study was conducted in Sylhet Sadar—the most populated *upazilla* (sub-district; administrative entity) of Sylhet division located in north-eastern part of the country. Geographically this *upazilla* located between 24° 43' and 25° 05' north latitudes and between 91° 40' and 92° 01' east longitudes. On the north, the *upazilla* is bounded by Companiganj and Gowainghat *upazillas*, on the east by Golapganj and Kanaighat *upazillas*, on the south Balaganj and Fenchuganj *upazillas*, and on the west by Bishwanath *upazilla* and Chhatak of Sunamganj district (Fig. 9.1). The *upazilla* occupies an area of 517.43 km<sup>2</sup>, including 19.22 km<sup>2</sup> of government forest area (BBS 1996). The forests surrounding the area are mainly hill forests and swamp forests (Khan et al. 2007). The average annual temperature is 23.6 °C, with an annual rainfall nearing about 5048 mm (Karim et al. 2020). The *upazilla* is famous for some specific NTFPs in the *cupazilla* country, such as rattans or cane (mainly *Calamus* spp.), murta (*Schumannianthus dichotoma*), agar (*Aquilaria agallocha*), reeds, and several species of bamboo (Chowdhury et al. 2003, 2004, 2007; Uddin et al. 2008).

### 9.2.2 Data Collection

Fieldwork for this study was conducted between late 2007 and 2008. Both quantitative and qualitative data were collected from field visits and interviewing the respondents (i.e. traders/sellers and consumers/buyers of NTFPs). A total of 25 NTFP shops were surveyed. A semi-structured questionnaire was used to collect data where the NTFPs and finished products available in the shops, local or trade name, origin, major uses, trends of trade, and respondents view on the major challenges of NTFPs trading were recorded. For collecting information from the consumers (n = 12), an open-ended but short discussion was held in the NTFPs shop/stall upon their consent.

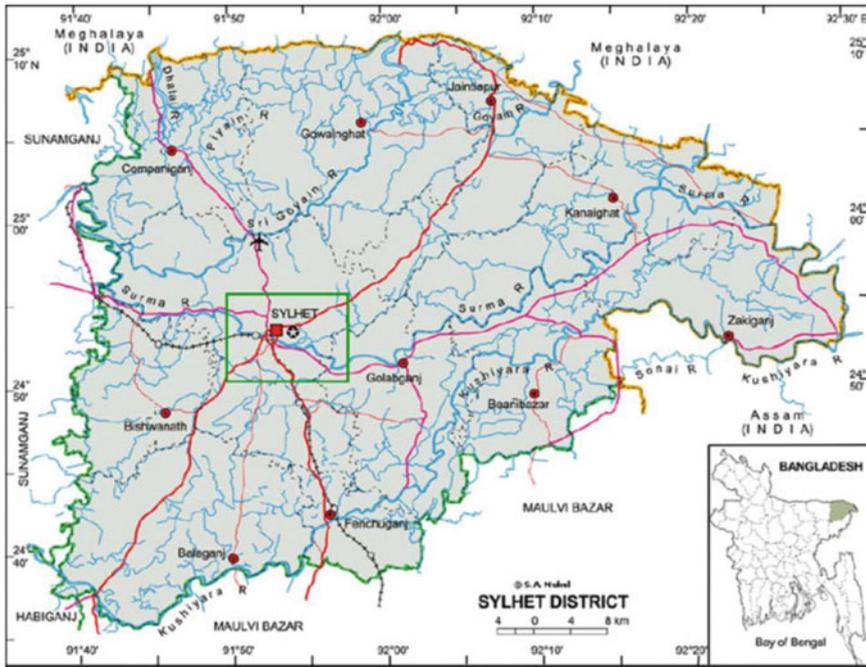


Fig. 9.1 Location map of the study area in northern Bangladesh. Source Banglapedia (2009)

### 9.2.3 Data Analysis and Interpretation

Both quantitative and qualitative data were collected through direct field visits and interviewing the respondents (i.e. traders/sellers and consumers/buyers of NTFPs). Descriptive statistics were used for data analysis. For data input and analysis, MS Excel was used. Income of the NTFPs traders during 1997–98 and 2007–08 from selling NTFPs were collected. Estimated annual revenues of the shops were adjusted by deducting from total sales the production costs, wages for labor (including a provision for self-labor), rent of the shops (where appropriate), and miscellaneous costs (e.g. electricity, supplies, and taxes on sales in the case of permanent shops). To avoid complexity for the respondents (i.e. traders) and to assure the quality of the data, only operating costs were taken without keeping any provisions for permanent or fixed costs (e.g. furniture, machinery), and the amounts represent the cumulative value from selling both plant-based and synthetic NTFPs.

### 9.3 Results and Discussion

#### 9.3.1 General Information

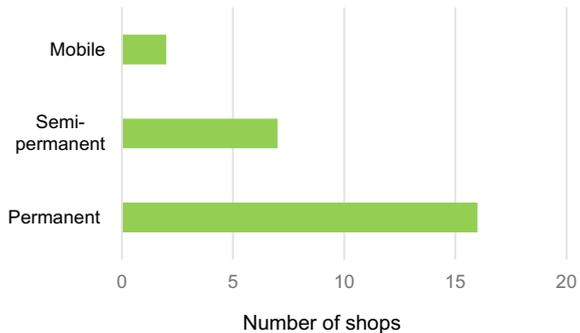
Altogether, 25 urban NTFPs traders and 12 consumers were surveyed. All the respondents were male (100%). Most of the traders were illiterate (64%); where all the consumers were educated (100%). The average age of the traders and consumers were 41 and 34 years, respectively. Around 72% of the traders were found in that profession for at least ten years, whereas the remaining were relatively new in this profession (< 3 years). The selling of NTFPs was the main occupation for about 64% of the traders, and the share of NTFP based income to respondents (i.e. traders) gross annual income was found to vary from 28 to 100%.

#### 9.3.2 The Marketing of NTFPs and Associated Products

Among the surveyed NTFPs shops, around 64% were permanent, 28% were temporary (or semi-permanent), and 8% were mobile (Fig. 9.2). The permanent shops were usually located in multi-storeyed buildings and found to sell mainly luxurious (decorative) goods for household and corporate use. These products were mostly manufactured from rattan or canes (*Calamus* spp. and *Daemonorops jenkinsianus*). The average labor force employed in these shops was about 2.4 people. On the other side, the temporary or semi-permanent shops were on the roadside, and they usually reside in a semi-permanent or temporary structure or even sometimes found in open spaces. The mobile shops were arranged in a specialized vehicle, and they used to sell mainly domestic utensils, cleaning materials such as house broom at a reasonable price.

A total of 38 NTFPs and associated goods from 25 surveyed NTFPs shops were recorded (Table 9.1). Among the products, 18 were based on bamboo, 15 were made using rattan or cane, and nine were based on other NTFPs/raw materials. Table 9.1

**Fig. 9.2** Types and number of NTFPs shops surveyed



**Table 9.1** The diversity of NTFP's and associated products in local market in the study area in northern Bangladesh

| S. No. | Article(s)   |                  | Raw material(s)   | Price range (Tk) <sup>a</sup> | Availability <sup>b</sup> | Major use(s)                    | Remarks <sup>c</sup> |
|--------|--------------|------------------|---|-------------------------------|---------------------------|---------------------------------|----------------------|
|        | Common name  | Local/trade name |   |                               |                           |                                 |                      |
| 01     | Bamboo culms | Bansh            | <i>Bambusa</i> spp.   | 20–150 Tk/culm                | 12 (48)                   | Construction, domestic utensil  | ↑                    |
| 02     | Basket       | Jhuri            | <i>Melocanna baccifera</i>                                    | 25–50 Tk                      | 16 (64)                   | Domestic utensil                | –, √                 |
| 03     | Basket       | Tukri            | <i>Bambusa</i> spp.   | 75–200 Tk                     | 06 (24)                   | Construction work (for laborer) | ↑                    |
| 04     | Birdcage     | Pakhir khacha    | <i>Calamus</i> spp.   | 75–200 Tk                     | 09 (36)                   | Domestic (luxurious good!)      | ↓, √                 |
| 05     | Bookshelf    | Bookshelf        | <i>Bambusa</i> spp.<br><i>Melocanna baccifera</i>             | 100–250 Tk                    | 11 (44)                   | Domestic                        | ↓, √                 |
| 06     | Bookshelf    | Bookshelf        | <i>Calamus</i> spp.   | 500–1000 Tk                   | 11 (44)                   | Domestic (luxurious good!)      | ↑                    |
| 07     | Broom        | Phul jharu       | <i>Daemonorops jenkinsianus</i><br><i>Thysanolaena maxima</i> | 20–50 Tk                      | 23 (92)                   | Domestic                        | ↓, √                 |
| 08     | Broom        | Jharu            | <i>Cocos nucifera</i>   | 30–50 Tk                      | 13 (52)                   | Domestic                        | –                    |
| 09     | Brush        | –                | <i>Melocanna baccifera</i>                                    | 25–50 Tk                      | 08 (32)                   | Domestic                        | ↓, √                 |

(continued)

Table 9.1 (continued)

| S. No. | Article(s)      |                  | Raw material(s)  | Price range (Tk) <sup>a</sup> | Availability <sup>b</sup> | Major use(s)               | Remarks <sup>c</sup> |
|--------|-----------------|------------------|--|-------------------------------|---------------------------|----------------------------|----------------------|
|        | Common name     | Local/trade name |  |                               |                           |                            |                      |
| 10     | Cage (chicken)  | Khacha           | <i>Phoenix sylvestris</i><br><i>Bambusa</i> spp.       | 75–150 Tk                     | 07 (28)                   | Domestic                   | ↓                    |
| 11     | Ceiling cleaner | –                | <i>Melocanna baccifera</i>                             | 20–65 Tk                      | 04 (16)                   | Domestic                   | ↑                    |
| 12     | Chair           | Chair            | <i>Phoenix sylvestris</i><br><i>Calamus</i> spp.       | 200–1250 Tk                   | 07 (28)                   | Domestic (luxurious good!) | ↑                    |
| 13     | Corner          | Corner           | <i>Daemonorops jenkinsianus</i><br><i>Calamus</i> spp. | 350–1000 Tk                   | 06 (24)                   | Domestic (luxurious good!) | ↑                    |
| 14     | Cradle          | Dolna            | <i>Daemonorops jenkinsianus</i><br><i>Calamus</i> spp. | 1000–2500 Tk                  | 06 (24)                   | Domestic                   | ↓, √                 |
| 15     | Doormat         | Paposh           | <i>Daemonorops jenkinsianus</i>                        | 50–100 Tk                     | 12 (48)                   | Domestic utensil           | ↓, √                 |
| 16     | Easy chair      | Easy chair       | <i>Cocos nucifera</i><br><i>Calamus</i> spp.           | 850–2000 Tk                   | 08 (32)                   | Domestic (luxurious good!) | ↑                    |
|        |                 |                  | <i>Daemonorops jenkinsianus</i>                        |                               |                           |                            |                      |

(continued)

Table 9.1 (continued)

| S. No. | Article(s)    |                  | Raw material(s)  | Price range (Tk) <sup>a</sup> | Availability <sup>b</sup> | Major use(s)               | Remarks <sup>c</sup> |
|--------|---------------|------------------|--|-------------------------------|---------------------------|----------------------------|----------------------|
|        | Common name   | Local/trade name |  |                               |                           |                            |                      |
| 17     | False wall    | False wall       | <i>Calamus</i> spp.                                    | 750–1500 Tk                   | 05 (20)                   | Domestic (luxurious good!) | ↑                    |
| 18     | Fence         | Bera             | <i>Daemonorops jenkinsianus</i><br><i>Bambusa</i> spp. | 50–100 Tk                     | 07 (28)                   | Construction, domestic use | ↑                    |
| 19     | Fishing cage  | Anta             | <i>Melocanna baccifera</i><br><i>Bambusa</i> spp.      | 75–100 Tk                     | 03 (12)                   | Domestic                   | ↓                    |
| 20     | Flower vessel | –                | <i>Calamus</i> spp.                                    | 300–750 Tk                    | 06 (24)                   | Domestic (luxurious good!) | ↑                    |
|        | holder        |                  | <i>Daemonorops jenkinsianus</i>                        |                               |                           |                            |                      |
| 21     | Hand fan      | Hat phakha       | <i>Bambusa</i> spp.                                    | 20–40 Tk                      | 09 (36)                   | Domestic                   | ↓, √                 |
| 22     | Hand fan      | Hat phakha       | <i>Borassis flabellifer</i>                            | 20–35 Tk                      | 06 (24)                   | Domestic                   | ↓, √                 |
| 23     | Mat           | Sital pati       | <i>Schumannianthus dichotoma</i>                       | 250–1000 Tk                   | 11 (44)                   | Domestic                   | ↑                    |
| 24     | Mat           | Madur            | –  | 100–200 Tk                    | 10 (40)                   | Domestic                   | ↓, √                 |
| 25     | Mat           | Dari             | <i>Typha elephantina</i>                               | 50–85 Tk                      | 13 (52)                   | Construction, domestic     | ↑                    |
| 26     | Mat           | Chatai           | <i>Bambusa</i> spp.                                    | 35–100 Tk                     | 10 (40)                   | Construction               | ↑                    |

(continued)

Table 9.1 (continued)

| S. No. | Article(s)                        |                  | Raw material(s)                 | Price range (Tk) <sup>a</sup> | Availability <sup>b</sup> | Major use(s)               | Remarks <sup>c</sup> |
|--------|-----------------------------------|------------------|---------------------------------|-------------------------------|---------------------------|----------------------------|----------------------|
|        | Common name                       | Local/trade name |                                 |                               |                           |                            |                      |
| 27     | Mirror holder                     | Mirror holder    | <i>Calamus</i> spp.             | 150–450 Tk                    | 05 (20)                   | Domestic (luxurious good!) | ↑                    |
| 28     | Rickshaw hood                     | Rickshaw hood    | <i>Bambusa</i> spp.             | 450–1000 Tk                   | 04 (16)                   | Industrial (!)             | ↑                    |
| 29     | Show pieces/handicrafts (various) | Show pieces      | <i>Bambusa</i> spp.             | 50–2000 Tk                    | 11 (44)                   | Domestic (luxurious good!) | ↑                    |
|        |                                   |                  | <i>Calamus</i> spp.             |                               |                           |                            |                      |
|        |                                   |                  | <i>Daemonorops jenkenstanus</i> |                               |                           |                            |                      |
| 30     | Sieve                             | Chaluni          | <i>Bambusa</i> spp.             | 50–150 Tk                     | 12 (48)                   | Domestic utensil           | –, √                 |
| 31     | Sofa set                          | Sofa set         | <i>Calamus</i> spp.             | 2000–7500 Tk                  | 08 (32)                   | Domestic (luxurious good!) | ↑                    |
|        |                                   |                  | <i>Daemonorops jenkenstanus</i> |                               |                           | corporate use              |                      |
| 32     | Tea/side table                    | Tea table        | <i>Calamus</i> spp.             | 1000–1750 Tk                  | 09 (36)                   | Domestic (luxurious good!) | ↑                    |
|        |                                   |                  | <i>Daemonorops jenkenstanus</i> |                               |                           |                            |                      |
| 33     | Table lamp                        | Table lamp       | <i>Calamus</i> spp.             | 500–1500 Tk                   | 09 (36)                   | Domestic                   | ↑                    |
|        |                                   |                  | <i>Daemonorops jenkenstanus</i> |                               |                           |                            |                      |

(continued)

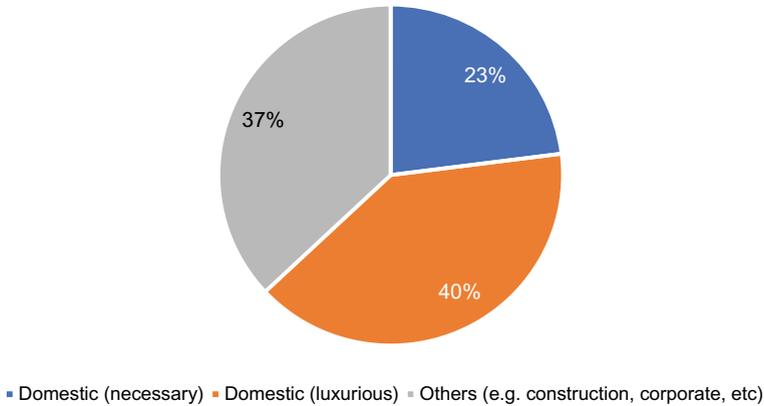
Table 9.1 (continued)

| S. No. | Article(s)    |                  | Raw material(s)                 | Price range (Tk) <sup>a</sup> | Availability <sup>b</sup> | Major use(s)     | Remarks <sup>c</sup> |
|--------|---------------|------------------|---------------------------------|-------------------------------|---------------------------|------------------|----------------------|
|        | Common name   | Local/trade name |                                 |                               |                           |                  |                      |
| 34     | Walking stick | Hat lathi        | <i>Daemonorops jenkinsianus</i> | 100–250 Tk                    | 08 (32)                   | Domestic         | –                    |
| 35     | –             | Mora             | <i>Calamus</i> spp.             | 250–700 Tk                    | 10 (40)                   | Domestic         | –                    |
| 36     | –             | Mora             | <i>Bambusa</i> spp.             | 100–250 Tk                    | 07 (28)                   | Domestic         | ↓, √                 |
| 37     | –             | Kula             | <i>Bambusa</i> spp.             | 75–125 Tk                     | 07 (28)                   | Domestic utensil | ↓                    |
| 38     | –             | Bhar             | <i>Bambusa</i> spp.             | 75–150 Tk                     | 02 (08)                   | –                | –                    |

<sup>a</sup>Source Market survey 2007–08

<sup>b</sup>The availability of the product in no. of shops in relation to total no. of shops surveyed; number in the parentheses indicates the percentage

<sup>c</sup>Trend of utilization (based on market demand/sell; ↑—increased; ↓—decreased; – unchanged) and presence of substitute (√—substitute present)

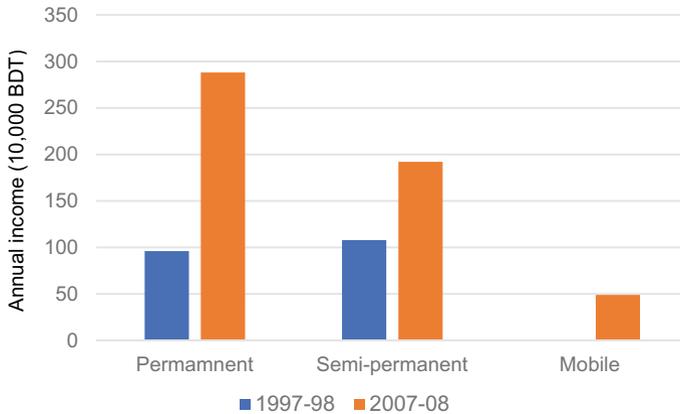


**Fig. 9.3** Share of income from various NTFPs in the area

presents a brief about the products, their origin, uses, prices, availability, and demand trends. NTFPs in the area were into three broad categories: viz, domestic utensils (necessary), domestic decorative articles (luxurious), and others (e.g. construction, corporate, etc.). According to this classification, 23 articles were domestic (necessary), 11 were (luxurious) goods, and the rest were used for construction or other corporate purposes. The house broom (manufactured from *Thysanolaena maxima*) was the most common article (92% shops) across the surveyed shops. The prices of the NTFPs and associated products were found to be ranges between Tk 20 and Tk 7,500. The share of three diverse kinds of NTFPs to traders total NTFPs based income is given in Fig. 9.3, being highest (40%) in the case of decorative or luxurious goods.

### 9.3.3 *Changing Consumption and Trade Pattern in a Competitive World*

A comparison of income from selling NTFPs and associated products in the surveyed shops is shown in Fig. 9.4. A dramatical increase in sales from 96,000 Tk/year during 1997–98–288,000 Tk/year during 2007–08 was evident in the permanent shops. Those shops were found to sell mainly luxurious or decorative goods. In the case of semi-permanent (or temporary) shops, the income in 2007–08 is nearly doubled compared to their income reported for 197–98 (108,000 Tk/year during 1997–98–192,000 Tk/year during 2007–08). It was impossible to obtain the previous income of mobile shops since it was a relatively new adaptation to cope with the changing market of NTFPs. The changes in these values could be attributed to differences in consumption (based on quantity sold or demanded), value change of the products, and changes in local currency price.



**Fig. 9.4** Comparison of income from sales of NTFPs during 1997–98 and 2007–08 in the area

In the market, alternatives or substitutes for about 12 products (i.e. 32% of total recorded products) were found. Most of the substitute products were made from either plastic or steel, making them more durable and attractive. Interestingly, it was found that most of the traders keep both NTFPs and their substitutes in their shops. Other major adaptations and strategy included, arranging mobile shops in public places or door to door service at more reasonable price; addition of products aesthetic and use value with more attention and finishing while manufacturing, more publicity of shops and greater user compatibility of products.

## 9.4 Major Problems, Challenges, and Future Potentials

Table 9.2 lists the major constraints in the development and trading of NTFPs and associated products according to the traders in the locality. Most of the traders (84%) identified competition with substitute goods as a significant challenge to the NTFPs market nowadays. Other challenges include scarcity of raw materials (72%), high production and processing cost of products (72%), and changes in consumer's preference (64%). Again, it was found that (in Table 9.3) consumers' expectations on various NTFPs and associated goods were mainly concentrated on their visual value (83%) followed by user compatibility (75%) and durability (67%) of products (Fig. 9.5).

**Table 9.2** Major problems and challenges (as per traders) in NTFPs trading in the study are in northern Bangladesh

| Challenges/issues  | No. of sellers opined (sellers) |
|--|---------------------------------|
| Competition among the sellers  | 09 (36)                         |
| Competition with other substitute goods (mainly made of plastic)           | 21 (84)                         |
| Consumers attitudinal change (in preference)                               | 16 (64)                         |
| Increased cost in production and processing                                | 18 (72)                         |
| Increased shop rent, and other cost  | 08 (32)                         |
| Lack of institution to encourage or trained local crafters/ <i>karigar</i> | 07 (28)                         |
| Market insecurity (seasonal demand fluctuation)                            | 11 (44)                         |
| Poor government and NGO support  | 09 (36)                         |
| Scarcity of raw materials  | 18 (72)                         |
| Unwillingness of future generations to come in this profession             | 06 (24)                         |

*Note* Number in the parentheses indicates the percentage

**Table 9.3** Consumers' expectations on NTFPs in the study are in northern Bangladesh

| Expectations/issues                             | No. of respondent opined (consumers) |
|---|--------------------------------------|
| Should be chiefly available                     | 06 (50)                              |
| Products should be attractive (aesthetic value) | 10 (83)                              |
| Should be cheap                                 | 07 (58)                              |
| Should be durable                               | 08 (67)                              |
| Should have multipurpose use                    | 05 (42)                              |
| User friendly/compatibility with user           | 09 (75)                              |

*Note* Number in the parentheses indicates the percentage

## 9.5 Conclusion

Although a changing and challenging situation in the NTFPs market was evident in northern Bangladesh from this study, it was also apparent that NTFPs traders developed some innovative approaches that helped them minimize the adversity of changing the NTFPs market situation. For a successful business, all elements of the value chain, however, need to be work together (Belcher and Schreckenber [2007](#)). Government and non-government development organizations (NGOs) need to play a crucial role to strengthen the existing market that will ultimately improve the quality of livings of peoples who are directly or indirectly dependent on this sector/profession. Government and NGOs should also support research on NTFPs development, domestication, and promotion; provide small loans to the small-scale entrepreneurs; helps in the technical advancement of the processing units and storage. They could also play an essential role in maintaining effective coordination among



**Fig. 9.5** Diversification of NTFPs-based (here using reeds) products in a rapidly changing world.  
*Photo credit S. A. Mukul*

producers and consumers and could offer some skill development programs to the workers involved in manufacturing NTFPs and associated products in the area.

## References

- Ahmed R, Islam ANMF, Rahman M, Halim MA (2007) Management and economic value of *Schumannianthus dichotoma* in rural homesteads in the Sylhet region of Bangladesh. *Int J Biodiv Sci Manag* 3:252–258
- Akhter S, Halim MA, Sohel MSI, Sarker SK, Chowdhury MSH, Sonet SS (2008) A review on the use of non-timber forest products in beauty-care in Bangladesh. *J For Res* 19:72–78
- Alam MK (1992) Medical ethnobotany of the Marma tribe of Bangladesh. *Econ Bot* 46:330–335
- Alamgir M, Bhuiyan MAR, Jashimuddin M, Alam MS (2006) Economic profitability of cane based furniture enterprises of Chittagong city corporation area, Bangladesh. *J Res* 17:153–156
- Arnold JEM, Ruiz Pérez M (1996) Framing the issues relating to non-timber forest products research. In: Ruiz Pérez M, Arnold JEM (eds) *Current issues in non-timber forest products research*. CIFOR-ODA, Bogor, Indonesia, pp 1–18
- Arnold JEM, Ruiz Pérez M (2001) Can non-timber forest products match tropical forest conservation and development objectives? *Ecol Econ* 39:437–447
- Bangladesh Bureau of Statistics (BBS) (1996) Bangladesh population census 1991, community series, zilla: Sylhet. Bangladesh Bureau of Statistics, Dhaka, Bangladesh
- Banglapedia (2009) National encyclopedia of Bangladesh. Asiatic Society of Bangladesh, Dhaka
- Banik RL (1998) Bamboo resources, management and utilization in Bangladesh. In: Rao AN, Rao VR (eds) *Bamboo conservation, diversity, ecogeography, germplasm, resource utilization and*

- taxonomy. Proceedings of the training course cum workshop held in 10–17 May in Kunming and Xishuangbanna, Yunnan, China, pp 137–150
- Basit MA (1995) Non-wood forest products from the mangrove forests of Bangladesh. In: Durst PB, Bishop A (eds) Beyond timber: social, economic and cultural dimensions of non-wood forest products in Asia and the Pacific. Proceedings of a regional expert consultation held in Bangkok, 28 November to 2 December 1994. FAO Regional Office for Asia and the Pacific (FAO-RAP), Bangkok, pp 193–200
- Belcher B, Schreckenber K (2007) Commercialisation of non-timber forest products: a reality check. *Dev Pol Rev* 25:355–377
- Caldecott JO (1988) Hunting and wildlife management in Sarawak. IUCN, Gland, Switzerland
- Chowdhury MSH, Uddin MS, Haque F, Muhammed N, Koike M (2007) Indigenous management of patipata (*Schumannianthus dichotoma*) plantation in the rural homesteads of Bangladesh. *J Subtrop Agric Res Dev* 5:202–207
- Chowdhury Q, Rashid AZMM, Afrad M (2004) Socio-economic significance of reed forest in a rural community: a case study from the greater Sylhet region of Bangladesh. *Small-Scale Forest Econ Manage Policy* 3:121–130
- Chowdhury MQ, Rashid AZMM, Afrad MM (2003) Status of Agar (*Aquilaria agallocha*) based small-scale cottage industries in Sylhet region of Bangladesh. *Bangladesh J Res Dev* 2:21–30
- de Beer JH, McDermott MJ (1996) The economic value of non-timber forest products in Southeast Asia, 2nd rev edn. Netherlands Committee for IUCN, Amsterdam, Netherlands
- GOB (Government of Bangladesh) (1993) Forestry master plan: participatory forestry. Asian Development Bank (TA No. 1355-BAN) UNDP/FAO/BGD 88/025. Dhaka, Bangladesh
- Karim R, Sultana F, Saimun MSR, Mukul SA, Khan MASA (2020) Plant diversity and local rainfall regime mediate soil ecosystem functions in tropical forests of north-east Bangladesh. *Environ Adv* 2:100022
- Khan MASA, Uddin MB, Uddin MS, Chowdhury MSH, Mukul SA (2007) Distribution and status of forests in the tropic: Bangladesh perspective. *Proc Pakistan Acad Sci* 44:145–153
- Khan SA, Khan NA (1994) Non-wood forest products of Bangladesh: an overview. *Bangladesh J Sci* 23:45–50
- Miah MD, Chowdhury MSH (2003) Indigenous healthcare practice through medicinal plants from forests by the MRO tribe in Bandarban region, Bangladesh. *INDILINGA Afr J Indig Knowledge Syst* 2:61–73
- Motaleb MA, Hossain MK (2008) Dependency of rural livelihood on non-wood forest products (NWFPs) in Hathazari upazila, Chittagong, Bangladesh. *Int J For Usuf Mngt* 99:1–7
- Mukul SA (2007) Bridging livelihoods and forest conservation in protected areas: exploring the role and scope of non-timber forest products. Field experience from Satchari National Park, Habiganj, Bangladesh. BSc. Thesis, Shahjalal University of Science and Technology, Bangladesh
- Mukul SA (2008a) Hogla (*Typha elephantina* Roxb.): a potential NTFP for socio-economic upliftment in rural Bangladesh. *Non-Wood News* 16:43–44
- Mukul SA (2011) Changing consumption and marketing pattern of non-timber forest products in a competitive world: case study from an urban area of north-eastern Bangladesh. *Small-Scale For* 10:273–286
- Mukul SA, Rashid AZMM, Uddin MB (2012) The role of spiritual beliefs in conserving wildlife species in religious shrines of Bangladesh. *Biodivers* 13:108–114
- Mukul SA, Tito MR, Munim SA (2014) Can homegardens help save forests in Bangladesh? Domestic biomass fuel consumption patterns and implications for forest conservation in south-central Bangladesh. *Int J Res Land-Use Sust* 1:18–25
- Mukul SA, Rashid AZMM, Uddin MB, Khan NA (2016) Role of non-timber forest products in sustaining forest-based livelihoods and rural households' resilience capacity in and around protected area: a Bangladesh study. *J Environ Plann Manage* 59:628–642
- Mukul SA, Biswas SR, Rashid AZMM (2018) Biodiversity in Bangladesh. In: Pullaiah T (ed) *Global biodiversity* (vol 1: selected countries in Asia). Apple Academic Press/CRC Press, Canada, pp 93–107

- Mukul SA, Rana MP (2013) The trade of Bamboo (*Graminae*) and its secondary products in a regional market of southern Bangladesh: status and socio-economic significance. *Int J Biodiv Sci Ecosyst Serv Manage* 9:146–154
- Mukul SA, Uddin MB, Rashid AZMM, Fox J (2010) Integrating livelihoods and conservation in protected areas: understanding role and stakeholders' views on the prospects of non-timber forest products, A Bangladesh case study. *Int J Sust Develop World Ecol* 17:180–188
- Mukul SA (2008b) Integrating biodiversity conservation and livelihood provisions in protected area management: understanding stakeholders view on the role and prospects of non-timber forest products, A Bangladesh case study. Poster presented at the international conference; 'towards sustainable land-use in tropical Asia' organized by 'the association for tropical biology and conservation' during April 23rd to 26th, 2008b
- Mukul SA, Uddin MB, Tito MR (2007) Medicinal plant diversity and local healthcare among the people living in and around a conservation area of northern Bangladesh. *Int J For Usuf Mngt* 8:50–63
- Mukul SA, Khan MASA, Uddin MB (2020) Identifying threats from invasive alien species in Bangladesh. *Glob Ecol Conserv* 23:e01196
- Nath TK, Uddin MB, Ahmed R (2000) Role of bamboo based cottage industry in economic upliftment of rural poor: a case study from rural Bangladesh. *Malaysian Forester* 63:98–105
- Pimentel D, Mcnair M, Buck L, Pimentel M, Kamil J (1997) The value of forests to world food security. *Hum Ecol* 25:91–120
- Rana MP, Mukul SA, Sohel MSI, Chowdhury MSH, Akhter S, Chowdhury MQ, Koike M (2010) Economics and employment generation of bamboo-based enterprises: a case study from Eastern Bangladesh. *Small-Scale For* 9:41–51
- Rashid AZMM, Tunon H, Khan NA, Mukul SA (2014) Commercial cultivation by farmers of medicinal plants in northern Bangladesh. *European J Environ Sci* 4:60–68
- Sedjo RA (2002) Tropical Forests and Poverty Alleviation - how can benefits be captured? In: Verweij P (ed) Understanding and capturing the multiple values of tropical forests. Proceedings of the international seminar on valuation and innovative financing mechanisms in support of conservation and sustainable management of tropical forests. Tropenbos International, Wageningen, Netherlands, pp 63–66
- Shackleton S, Delang C, Angelsen A (2011) From subsistence to safety nets and cash income: Exploring the diverse values of non-timber forest products for livelihoods and poverty alleviation. In: Shackleton S, Shackleton C, Shanley P (eds) Non-timber forest products in the global context (tropical forestry series, vol 7). Springer-Verlag, Berlin and Center for International Forestry Research, Bogor, pp 55–81
- Uddin MS, Mukul SA, Khan MASA, Alamgir M, Harun MY, Alam MS (2008) Small-scale Agar (*Aquilaria agallocha* Roxb.) based cottage enterprises in Maulvibazar district of Bangladesh: production, marketing and potential contribution to rural development. *Small-Scale For* 7:139–149
- Uddin MB, Mukul SA (2007) Improving forest dependent livelihoods through NTFPs and home gardens: a case study from Satchari National Park. In: Fox J, Bushley B, Dutt S, Quazi SA (eds) Making conservation work: linking rural livelihoods and protected areas in Bangladesh. East-West Center, Hawaii and Nishorgo Support Project of Bangladesh Forest Department, Dhaka, pp 13–35
- Uddin MB, Mukul SA, Khan MASA, Chowdhury MSH, Uddin MS, Fujikawa S (2006) Indigenous management practices of Hogla (*Typha elephantina* Roxb.) in local plantations of floodplain areas of Bangladesh. *J Subtrop Agri Res Develop* 4:114–119
- Vantomme P, Markkula A, Leslie RN (eds) (2002) Non-wood forest products in 15 countries of Tropical Asia: an overview. FAO-RAP, Bangkok, Thailand
- Wunder S (2000) Poverty alleviation and tropical forests—what scope for synergies? *World Develop* 29:1817–1833