

22 How can markets contribute to the conservation of agricultural biodiversity on farms? From theory to practice

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[a]Introduction

Although the role of cultivated and wild biodiversity in agricultural systems and rural livelihoods is widely recognized and understood, little focus has been put on how agricultural biodiversity contributes to economic well-being and how it can be conserved and promoted through market strategies (Lockie and Carpenter, 2010). The relationship between agricultural biodiversity and markets is not one-sided. In the past, markets have had a negative impact on agricultural biodiversity, and market pressures have most probably been one of the major causes for the decline in crop and varietal diversity found on farms and in fields (Pimbert, 1999; Lenzen *et al.*, 2012; Rao *et al.*, 2005; Van Dusen and Taylor, 2005). This is because agricultural markets have long favoured monocultural systems specialized in few crops with high-yielding varieties that are more uniform in terms of quality and form (Prescott-Allen and Prescott-Allen, 1990; Gruere *et al.*, 2006). These systems, however, lead to a narrowing of the genetic base. In more recent years, interest among high-end and middle-income consumers has been growing in local food culture, origin and exclusivity of food products, and concern has been raised about food quality, authenticity and long-term sustainability (Gruere *et al.*, 2006). These interests are reflected in a growing market for organic or natural products, products branded by area of origin or its nutritional value and the revival of products based on traditional recipes (Willer *et al.*, 2008). This attention represents an opportunity to reverse the usual negative impacts of markets on diversity, leveraging consumer interest to conserve and promote neglected or underutilized species (NUS) and landraces.

It should be recognized that a substantial part of agricultural biodiversity has limited market value and there are often only a few varieties within a species (or species within a genera) which attract strong demand from large consumer groups and generate revenues for many farmers. Furthermore, a value chain approach based on unique species or varieties is not automatically agricultural biodiversity friendly. A market strategy for a single lesser-known species or variety runs the risk of ‘replacement’ or the ‘crowding-out effect’, in which the farmers decide to replace the remaining diversity with the newly promoted ‘superior’ species or variety. In this scenario, the successful promotion of a single underutilized species or variety could lead to the replacement of many other less successful crops or landraces. Examples are the replacement of a wide range of quinoa landraces by smallholder farmers in Bolivia with the now internationally very popular white and red types (Bioversity International, 2013; Drucker *et al.*, 2013) or the replacement of a wide range of old mango varieties by mango farmers in Uttar Pradesh in India with the popular and geographic indication-protected variety Dashehari (see Chapter 3.2). To avoid such a scenario, value chain strategies should be integrated with community-based conservation strategies for those species and landraces that may have little market (or use) value today but could generate market (or use) value tomorrow (see Chapter 1.3).

This chapter explores market strategies that contribute to community biodiversity management, for both improved livelihoods and conservation of agricultural biodiversity. The chapter reflects on existing value chain methods and approaches which have guided the formulation of the twelve tools which have been used in a UNEP/GEF regional project titled ‘Conservation and sustainable use of cultivated and wild tropical fruit diversity: promoting sustainable livelihoods, food security and ecosystem services’ (TFT project) to create markets for neglected fruit species and landraces and generate income for custodians of fruit tree diversity. The chapter describes sixteen case studies from the TFT project which showcase how farming communities can use markets to generate income from local, unique fruit tree species and

varieties as an integral part of a community-based on-farm or *in situ* conservation effort. The final section reflects on lessons learned about different types of market strategies to consider when designing value chain development based on natural capital such as agricultural biodiversity and introduces a tool to assess the level of agricultural biodiversity in a value chain, which can guide market interventions and monitor their impact on agricultural biodiversity.

[a]Value chain approaches, methods and tools for agricultural biodiversity

Several value chain development approaches and methods have been applied for biodiversity-based value chains, such as the Marketing Approach to Conserve Agricultural Biodiversity (MACAB), the Participatory Market Chain Approach (PMCA) and Value Chain Development for NUS (VDC-NUS). When designing and implementing value chain strategies for farming communities within the TFT project we used and refined tools, concepts and methods of those three approaches and ensured market strategies which generate income were complemented with conservation efforts of communities to safeguard the remaining diversity locally available.

[b] Marketing Approach to Conserve Agricultural Biodiversity (MACAB)

Bernet *et al.*, (2004) formulated nine steps of a Marketing Approach to Conserve Agricultural Biodiversity (MACAB), the first value chain approach designed specifically for agricultural biodiversity. This intervention strategy was developed based on experiences with potato and yacon diversity in Peru and involves: i) discovery of promising crop attributes, ii) development of a potential new product, iii) analysis of the economic feasibility of the product, iv) elaboration of a sound marketing concept, v) testing of the marketing concept with consumers, vi) protection of brand name and concept, vii)

defining criteria for selecting private enterprises, viii) transparent transfer of the marketing package to the private enterprise, ix) examination of enterprise behaviour and social impact (Bernet *et al.*, 2004).

[b] Participatory Market Chain Approach (PMCA)

The participatory market chain approach (PMCA) is a three-stage facilitated process that promotes technical and social innovation by strengthening trust and constructive interactions among value-chain actors to facilitate the exploration of market value from agricultural biodiversity (Bernet *et al.*, 2006).

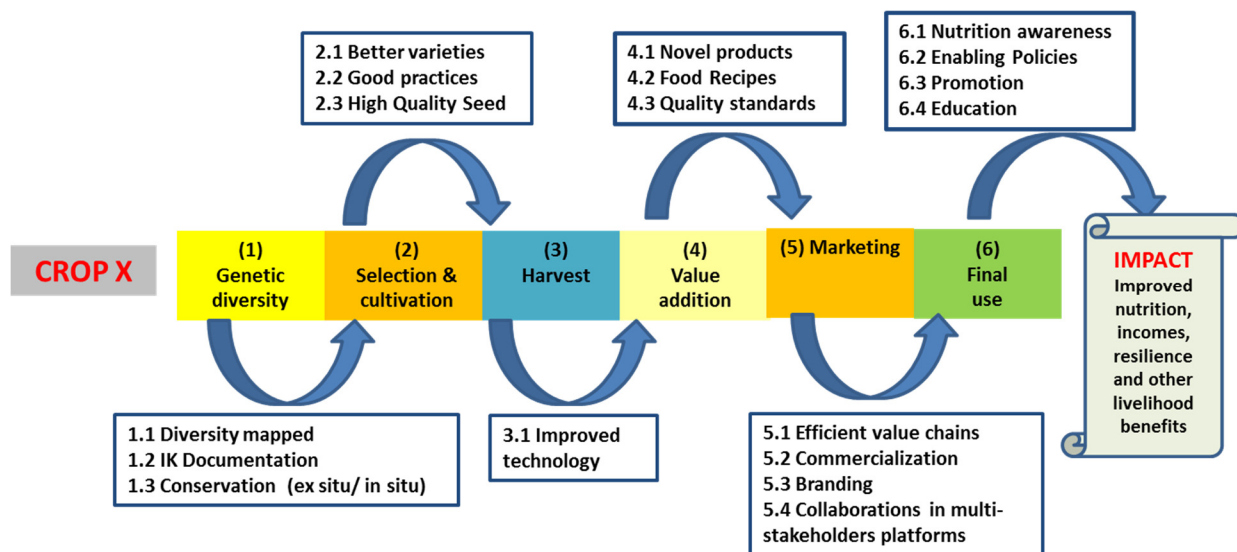
The approach brings together value-chain actors in a multi-stakeholder platform to share the costs of innovation. The approach has been developed and applied for potato diversity in Bolivia, Peru and Ecuador (Thiele *et al.*, 2011; Horton *et al.*, 2011; Cavatassi *et al.*, 2011), chili diversity in Bolivia and Peru (Jaeger *et al.*, 2015) and in Uganda and Indonesia (Devaux, 2014).

[b] Value Chain Development for NUS (VCD-NUS)

Will (2008) provided a guidance document with good practices for Value Chain Development (VCD) for neglected and underutilized species. The book formulates five steps in VCD design and discusses guiding principles and preconditions when NUS-VCD can contribute to agricultural biodiversity conservation and poverty elevation, drawing upon lessons learnt and good practices described in eight case studies and additional literature. Detailed case studies on capers (Guiliani *et al.*, 2005), emmer (Guiliani *et al.*, 2009), coffee and potatoes (Nill and Bohnert, 2006) and several case studies on tropical fruit tree diversity (Kruijssen, 2008; Kruijssen *et al.*, 2009; Kruijssen and Mysore, 2010) highlight the exploration of niche markets, need for collective action (horizontal and vertical) and active community participation for market-based approaches that support on-farm agrobiodiversity management and livelihood improvement. Padulosi *et al.*, (2014) describes VCD-NUS as a holistic approach for the promotion of NUS

based on experiences gained over the last fifteen years in different contexts (Andean grains, minor millets in India) (described in Padulosi *et al.*, 2014). The approach takes into account all aspects along the value chain from genetic diversity and seed supply to final use and consumption (See Figure 22.1) with the goal of contributing to better incomes, improved nutrition, enhanced livelihood resilience and the conservation of NUS. The below figure shows the different stages of a value chain from genetic diversity to final use and all elements that need to be addressed to ensure the envisioned impact on livelihoods including improved nutrition, income and resilience of the farming community.

Figure 22.1: A holistic approach to promoting NUS. Source: Padulosi, 2014



We borrowed insights and methods from the approaches and case studies listed above to open the treasure box of local fruit tree diversity and generate income for the 36 villages in the 22 project sites. We used the sequence of steps as formulated in MACAB and developed a specific tool to identify crop attributes. We also used and refined tools from PMCA such as theatre play, impact filter, and rapid market appraisal. We used the value chain map as described in the guidelines on VCD-NUS and a

participatory focus to build local collective action as highlighted in case studies. Based on the above, the following participatory tools were applied across the 22 sites and 36 communities in different combinations and sequences depending on the local needs and contexts.

[Numbered list]

- 1 Four Cell Analysis (see Chapter 1.3) to identify common, threatened, rare and unique fruit species and varieties
- 2 Participatory identification of crop attributes based on traditional recipes and home uses to evaluate promising market traits and to identify potential products (MACAB)
- 3 Joint assessments by farmers and traders of potential impacts by using an impact filter (PMCA) to evaluate and select best products and markets.
- 4 Theatre play or sketch to facilitate discussion among stakeholders and explain the concept of a value chain, demand orientation and the importance of collaboration (PMCA)
- 5 Participatory value chain mapping to provide insights into the value chain such as constraints, opportunities or knowledge gaps and monitor the increase in market knowledge of participants (VCD-NUS)
- 6 Participatory rapid market appraisal to collect market information and identify market trends, consumer preferences, competitive products, niche markets, product requirements, differentiate consumer groups and estimate market potential (PMCA)
- 7 Identification of collaborating entrepreneurs or potential buyers who are interested in advising or jointly developing and testing novel products (MACAB)
- 8 Stakeholder meetings and workshops to foster collaborations, build trust, and establish a shared vision between traders and farmers (PMCA)

- 9 Action plan to develop sample products, design the brand and label, develop prototype packaging and test improved processing equipment by research partners or community groups (PMCA, VCD-NUS)
- 10 Product evaluation by laboratory analysis of biochemical components such as micro-nutrients or vitamins or during tasting events at trade fairs, workshops or diversity fairs (PMCA)
- 11 Participatory assessment of the level of agricultural biodiversity in a certain value chain using the market pyramid to assess and monitor how far species or varieties have entered the value chain
- 12 Community-based conservation strategies such as diversity blocks where a selection of all local varieties and species will be maintained, the marking of superior source trees which need to be protected, distribution of saplings or seeds from promising heirloom varieties or the promotion of sustainable harvesting practices in forests (VCD-NUS).

[a] Results of market interventions to create income from fruit tree diversity

A high level of fruit tree diversity was found in the project communities (see Table 3.12.1) of the TFT project. In total 43 distinct species of the genera *Citrus* (13 spp.), *Garcinia* (12 spp.), *Mangifera* (13 spp.) and *Nephelium* (5 spp.) were identified in the 36 project communities across four countries of which orange, mangosteen, mango and rambutan are the most commonly known species for each respective genera. Besides, within the mango species (*Mangifera indica*) a total of 211 distinct named varieties were identified across the four countries. After initial assessments conducted by partners, a total 67 potential products derived from 21 species were initially identified and selected for value chain development activities. After further assessments regarding their market potential, 35 products from 14 species were selected and developed into novel or improved prototypes which were tested and promoted by project partners with processing groups or cooperatives in all four countries. Finally, 18 products from 10 species were taken up by cooperatives, processing groups or entrepreneurs and

generated income or resulted in increased turnover. The other case studies are still being developed or encountered value chain constraints that hampered successful adaptation by communities. These market constraints include lack of an entrepreneurial manager or leader, lack of collective action, difficulties in finding appropriate buyers with interest in diversity-based products, lack of trust between farmers, traders and support organizations, lack of skills in obtaining appropriate market intelligence and lack of physical or financial assets to invest in enterprise activities.

Different types of market strategies can be deployed by entrepreneurs to generate income from local agricultural biodiversity. The Ansoff matrix (see Figure 22.2) is an assessment tool which identifies four types of growth strategies for an enterprise based on new or existing products and for new or existing markets (customers): (a) market penetration, (b) market development, (c) product development and (d) diversification. The level of market risk is lowest with a penetration strategy and increases when entering new markets or engaging in new products and is highest when trying both at the same time.

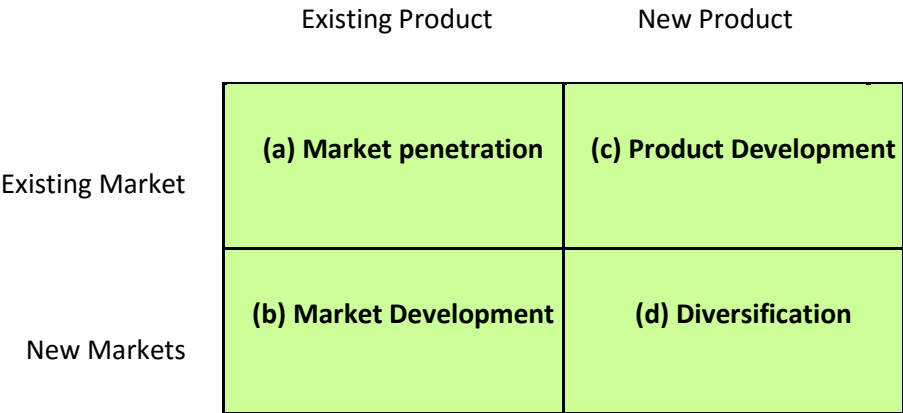
We used the Ansoff market growth strategies to describe 16 most representative market case studies of the TFT project that create both income and contribute to the conservation of fruit tree diversity. Each case, study is described by explaining the product, entrepreneur and target market, which species are involved, type of growth strategy, economic success (or relevant constraints) and contribution to conservation (Table 22.2).

Table 22.1 *Overview of market activities in TFT project*

	India	Indonesia	Malaysia	Thailand	Total
Number of project communities	18	6	6	6	36
Number of targeted households	5,681	3,405	1,328	3,931	14,345
Combined richness of four genera	13	16	13	17	43*

(<i>Citrus, Garcinia, Mangifera and Nephelium</i>) encountered in project communities					
Number of initial potential products identified	23	18	10	16	67
Number of prototype products developed, tested and evaluated	12	8	5	10	35
Number of products promoted and adopted that generate revenues	7	3	3	5	18
Number of most representative products that contributed to both income generation and conservation	6	3	3	4	16

Figure 22.2 Four distinct growth strategies for an enterprise (Ansoff, 1957)



[a] Analysis of market case studies

In most cases entrepreneurs, producer groups (including women, men and mixed groups) or cooperatives engaged for the first time in processing activities or marketing activities targeting buyers beyond the traditional channel of farm-gate sales of fresh or preliminary dried fruits to collecting traders. The majority of the case studies (8 out of 16) are characterized as a market development strategy while seven describe a market diversification strategy and one a product development strategy. None represent a market penetration strategy, which focuses on improving the marketing of an existing product within an existing market. This supports the idea that pursuing a value chain development strategy for agricultural biodiversity often entails a diversification strategy simultaneously exploring new products and engaging with new type of customers or market channels. This results in higher potential profits but also increases risks and thus the chance of failure of the enterprise. Pursuing such a diversification or market development strategy requires substantial market intelligence and a minimum level of market skills and experience of the respective entrepreneur to succeed. While dedicated value chain tools such as street theatre, value chain map and rapid market appraisal increases the knowledge about markets of individual farmers, women's groups or cooperative/association members, the lack of an experienced entrepreneurial, skilled leader or manager has proven to be a major barrier to developing a viable and profit making enterprise (as experienced in case 2, 4, 8, 11 and 12 in Table 3.12.2.), while the entrepreneurial skills of leaders as demonstrated in case 1, 3, 13, 14, 15 and 16 in Table 22.2 has contributed substantially to its success.

Table 22.2 Overview of 16 most representative market case studies from TFT project

	Description of product, entrepreneur and target market	Species or varieties involved	Market growth strategy (Ansoff)	Indicators of economic success	Contribution to conservation
	India				
1	Sales of heirloom varieties of mango in single and combination cartons branded 'Chittoor origin' at roadside stall during mango season by 2 farmers in Chittoor, India. Targeting city dwellers travelling by bus and car from Bangalore to Tirupati.	<i>Mangifera indica</i> - range of lesser-known heirloom varieties such as Kudadat, Kalepadu, Green Baneshan, Dil Pasand, Rumani, Pulira, Lal Baba, Athimaduram	Market development by direct sales to consumers through improved and branded cartons for heirloom varieties	Prices obtained are generally higher than when sold in local <i>mandi</i> (government controlled wholesale market) or to pre-harvest contractors who prefer commercial varieties only. The two farmers bought additional landraces of other farmers when sold out in 2014 and plan bigger stall for next year.	Loss of diversity reduced as interest in lesser-known landraces has increased among farmers and consumers in this commercially oriented mango production belt, which generally focuses on common varieties such as Totapuri, Banganapalli and Alphonso only. Diversity block established in private orchards of two farmers.
2	Sales of organic fresh mangoes of	<i>Mangifera</i>	Market	Initial sample of 300kg	Eosta is willing to support

	indigenous varieties by a farmer group in Chittoor, India, to Eosta, the Netherlands (www.eosta.com) packed in mango diversity boxes targeting customers of organic retail shops in Germany.	<i>indica</i> – common varieties such as Banganapalli, Totapuri and Alphonso combined with lesser-known varieties such as Lal Baba, Athimaduram, Rumani, Pulira	development targeting consumers in the EU using a novel idea of combining several mango varieties in one carton	delivered to Eosta received positive feedback from organic retailers; however a ban in 2014 and 2015 on mango exports from India to the EU disrupted trade. Only few famers changed over to organic due to persistent pest problems and lack of assured market demand and trust among farmers, traders and support organizations.	conservation activities of supplying farmers when trade is re-established, such as agronomic training, the maintenance of diversity blocks, support for community nurseries and the multiplication and distribution of lesser-known varieties.
3	Sales of branded and Geographic Indication protected ‘Satpura Hills Mandarins’ packed in cartons to major cities like Nagpur, Mumbai and New Delhi by farmer cooperative MOGA in Amravati district, India	<i>Citrus reticulata</i> – local adapted type and rootstock species such as Rough lemon and Rangpur lime.	Market development by targeting urban consumers by improving the packaging and promoting the GI status of Satpura Hills which are	GI status obtained from Indian Government allowed use of the GI logo. Price and profit obtained per kg increased substantially compared with sales to local <i>mandi</i> (government controlled wholesale market) and pre-harvest	Two nurseries established to conserve rootstock types in mother blocks and to provide high quality rootstock material to local farmers.

			known for the quality of fruits	contractors.	
4	Display and sales of indigenous mango varieties at mango <i>melas</i> (fairs) in New Delhi and Lucknow in single variety and combination boxes by the Society For Conservation of Mango Diversity (SCMD) in Malihabad targeting urban consumers.	<i>Mangifera indica</i> – popular varieties such as Dushaheri, Langra, Chausa and various lesser-known traditional varieties such as Malihabad Safeda, Gola, Husnara, Fazli, Ramkela, Gilas, Khasul Khas, Nawab Pasand	Market development targeting consumers in bigger cities through mango fairs	Price and profit obtained per kg increased substantially compared with sales to local <i>mandi</i> (government controlled wholesale market) and pre-harvest contractors. However, sales volume is limited.	Local diversity of over 200 mango varieties maintained in diversity blocks and hedge rows of a few dedicated farmer members. Local nurseries established by SCMD to promote multiplication and distribution of traditional varieties.
5	Mango pickle made from specific wild aromatic mango types collected from forests by one women group in Sirsi, India sold in plastic jars	<i>Mangifera indica</i> ‘appe midi’ types Milanji,	Diversification by developing a new product based on unique	Sales turnover increased from 30 to 450 kg in 3 years with a total value of US\$ 2,000 in 2014. Now at least	Several community nurseries were established and the number of saplings sold of appe midi types increased

	branded 'appe midi' or the specific variety names targeting consumers in Uttara Kannada and neighbouring districts (Chapter 3.18).	Haldota and Nandagara among others which are collected from forests.	crop attributes 'distinct taste, texture and flavour' of preferred varieties	five other women's groups have initiated production of similar products.	sharply in the last few years. Women group's members have planted saplings of appe midi types in their home gardens. Superior source trees have been demarcated in the forest by grafting experts and seven diversity blocks with at least 30-40 varieties each have been established in farmers' fields and village forests as well as at the premises of the College of Forestry, University of Dharwad. Interest in following sustainable harvesting practices increased among collecting households after awareness training and workshops.
6	Higher quality fruit rinds of <i>G. gummi-gatta</i> sold by collecting households in Uttara Kannada	<i>Garcinia gummi-gatta</i> collected from	Market development by direct sales to	First trade to be established but several meetings have taken place. Price expected	Himalaya Drug Company agreed to support supplying farm households with obtaining

	district, India through improved dryers for direct sales to Himalaya Drug Company (www.himalayawellness.com) as ingredient for Ayurslim, a weight loss product sold in capsules to consumers in India, Asia and USA (Chapter 3.1).	forests.	major processor.	to be higher compared with sales to collecting traders. In process of developing producer company and obtaining organic certification.	organic certification, technical training in the cultivation of medicinal plants. They will support local nurseries to distribute saplings of <i>G. gummi-gatta</i> and other native types and support sustainable harvesting campaigns financed through their Corporate Social Responsibility (CSR) programme.
	Indonesia				
7	Dried mango from varieties Podang Urang, Madu, Podang Lumut and Santok, branded 'Java bite' by farmer groups in Tiron, Kediri, Indonesia for domestic market (Jakarta) and export to USA in collaboration with NGO Resource Exchange International (REI) and subsidiary company Sun Rei	<i>Mangifera indica</i> – local heirloom varieties, e.g. Podang Urang, which is most preferred by consumers and originates from this area	Market development by targeting domestic and overseas consumers in USA and Jakarta with a branded product.	Established own brand name 'Java bite' and managed to increase turnover. Exploring diversification of product range with dried pineapple and papaya.	Diversity block including 24 varieties established in Tiron village on the mountain side.

8	Sales of indigenous fresh fruits (Hampalam, Kasturi, Kweni and Banana, Orange, Mandarin, Kafir lime or Guava) by women's group in Sungai Tabuk to Swiss Bell Hotel (www.swiss-belhotel.com) in Banjarmasin in South Kalimantan, Indonesia.	<i>Mangifera casturi</i> , <i>M. odorata</i> , <i>M. indica</i> , <i>Citrus reticulata</i> , <i>C. sinensis</i> , <i>C. hystrix</i>	Market development by targeting hotels for native species	First delivery took place during International Environment Day in 2014, volume of repeat orders are still small.	Swiss Bell Hotel planted several indigenous trees at hotel premises as conservation strategy during Environment Day 2014.
9	Dodol (a sweet, sticky toffee-like confection popular in Southeast Asia) made by women's group from Telaga Langsat sub-district from indigenous species Kasturi for sales in tourist or gift shops in Kandagan, Banjarmasin, Banjarbaru and Martapura in South Kalimantan, Indonesia	<i>Mangifera casturi</i>	Diversification based on new product with unique taste of Kasturi, a native species emblematic of South Kalimantan.	Prototype product has been made, but large scale production hampered by lack of appropriate equipment.	Diversity block established including 22 species and varieties of <i>Mangifera</i> on the edge of the village.
Malaysia					
10	Production of higher quality dried rinds of aroi-aroi (<i>G. forbesii</i>) by two entrepreneurial farmers in Papar,	<i>Garcinia forbesii</i>	Product development by improving	Sun dryers installed and used by two entrepreneurial farmers which increased	Interest by local farmers in planting aroi-aroi trees increased and substantial

	Sabah, Malaysia through improved sun dryers, to be sold as ingredient for spice condiment in curries and soups (laksa, fish), as traditional medicine (for stomach ailments, cough, skin problems or eczema and for recovery of women after birth) and cleaning agent for bronze antiques (Chapter 3.11)		quality of dried rinds for various uses	quality of the dried rinds. Proper packaging developed for the sales of this raw product, which attracts increasing demand for its use as food ingredient, traditional medicine and as cleaning agent. Powdering and capsulation of the product is being explored with a business man from Penampang near Kota Kinabalu and funding from Ministry of Science Technology and Innovation (MOSTI).	number of saplings have been planted across households to increase crop area.
11	Sweet and sour mango pickle from Mampalam (<i>M. Pentandra</i>) made by women's group in Bungai for sale to local market and shops in Sibuti and Miri, Sarawak, Malaysia	<i>Mangifera pentandra</i>	Diversification based on new product using unique local species which looks like mango	Processing location established and prototype product developed with positive feedback from several shopkeepers.	Interest in maintaining Mampalam trees increased and a diversity block for local fruit tree species established at Bungai village (see chapter 3.13).

12	Agro-tourism package including jungle trekking with a visit to a fruit diversity garden and traditional Bidayuh lunch with fresh fruits offered to domestic and foreign tourists by villagers of Kakeng, Malaysia. Other tourism activities are a welcome dance, sales of handicrafts, demonstration how to make a parang (jungle knife), paddy planting or harvesting activities, pepper and fruit harvesting in the forest (Chapter 3.13)	Range of <i>Garcinia</i> , <i>Mangifera</i> and <i>Nephelium</i> species (12 in total)	Diversification into a range of new tourism products based on unique environmental biodiversity and cultural practices	No tourist attracted yet, but a few tourist agents from Kuching have visited the village and shown interest.	Wide range of species found in the area conserved in the fruit diversity garden. Awareness about the uniqueness of the village increased among villagers.
Thailand					
13	Home stay for visiting guests (48 single rooms with families and 10 mini resorts for group accommodation) in Kiriwong, Thailand, combined with tourism activities such as jungle trekking, demonstration of soap making (see 14 below) or tie-dyeing technique	Various fruit and non-fruiting tree species	Diversification into a range of new tourism products based on unique environmental biodiversity and cultural practices	Substantial increase in number of domestic tourists over recent years. Being selected as exemplary eco-tourism site by tourism department of the Thai government.	Strong sense of responsibility

	(see 15 below), cycling, fishing and rafting (Chapter 3.14).				for the conservation of the traditional biodiverse orchards, forests and farming system established over last decades due to a combination of group efforts into eco-tourism, reforestation and rehabilitation of traditional multi-species orchards.
14	Herbal and natural soap and shampoo branded as 'Mr Mankud' made by herbal processing group in Kiriwong, Thailand which is sold to hotels, shops and consumers in Kiriwong, Nakorn Sri Thammarat state, Bangkok and overseas (Chapter 3.14).	<i>Garcinia mangostana</i> , <i>G. atroviridis</i>	Diversification based on new product with anti-bacterial and anti-inflammatory attributes	Increased turnover, successful exports achieved and awarded by Thai government OTOP prize for best high quality product.	
15	Several colours for tie-dye technique for apparel (shirts, dress, bags, shawls) using fruit parts: rambutan peel or <i>Parkia speciosa</i> (grey), mangosteen leaf (orange and pink), jackfruit bark (yellow), tropical almond (yellowish green) by processing group in Kiriwong, Thailand for sales in local village shops and sales to shops in Bangkok (Chapter 3.14).	<i>Nephelium lappaceum</i> and <i>Garcinia mangostana</i> among other fruit or tree species.	Diversification based on unique dyeing technique and natural colours made from local fruit tree species.	Increased turnover of items sold, especially higher quality items such as bags, shirts and shawls.	
16	Spicy pork curry 'moo chamuang'	<i>Garcinia cowa</i>	Diversification	Sales turnover increased	Population of <i>Garcinia cowa</i>

	<p>using <i>Garcinia cowa</i> leaves sold in cans and plastic packs produced by one women's group in Chantaburi, Thailand, targeting consumers in Chantaburi district and Bangkok (Chapter 3.15)</p>		<p>based on unique crop attributes sour taste of chamuang leaves</p>	<p>from 600 packs to 1400 cans and 600 packs per month representing a value of US\$1330 per month in 2014.</p>	<p>trees increased over last 5 years as interest in the species among farmers increased.</p>
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The most promising and successful market case studies can be grouped into six broad categories of market strategies:

1. Products based on unique crop attributes
2. Products that display a unique diversity of types or forms
3. Tourism based on local agricultural or natural biodiversity
4. Geographic indication or certification to obtain premiums from consumers to compensate for conservation efforts and related costs
5. Farmers' group or enterprise saves revenues to finance conservation efforts
6. Supply to larger processors or buyers which are willing to support conservation efforts through Corporate Social Responsibility (CSR) programmes.

Some case studies are a combination of two or more strategies.

[b] Products based on unique crop attributes of minor crops and landraces

This strategy entails the exploration and identification of unique or distinctive attributes of a product based on traits, characteristics and uses of the minor crop or landrace which can be linked to the interests of specific consumer groups. European consumers for example prefer red mangoes with a slightly sour aftertaste while Asian consumers often prefer sweet mangoes with less emphasis on the colour. Another example is the fast-growing market emerging over the last ten years in the Western Ghats of India for home-made mango 'appe' pickle made from a unique aromatic sub-type of mangoes (appe midi) collected from forests, which is locally preferred above the conventional mango pickle. These socio-cultural associations provide opportunities for the marketing of products derived from specific native species and varieties. However they can also entail barriers. In a different project in India,

marketing of minor millets in India was initially negatively influenced by social factors ascribing a ‘poor’ connotation to them, as they were traditionally produced and consumed by poor households, even though they have exceptionally high nutritional values compared with the more prestigious wheat (Padulosi, Thompson and Rudebjer, 2013). Additional barriers are more intensive processing requirements (drudgery) or a shorter shelf life such as the case of juice made from Kuini (*Mangifera odorata*) compared with mango (*Mangifera indica*).

[b] Products displaying a diversity of types or forms

A market strategy or product development strategy can focus on products or services that ‘celebrate’ or promote the range of types, distinct forms, varieties or species that are available. For example Eosta introduced recently heirloom tomatoes in German and Dutch supermarkets, a mixture of different coloured and shaped traditional tomato varieties combined in one package (personal communication Volkert Engelsman, 2014). Similar products exist for potato heirloom varieties in supermarkets in the EU or include gift packages with a range of spices targeting tourists in India. Often such types of products are bought by consumers for special occasions and celebrations or entail the targeting of tourists (one time buyers).

[b] Agro-tourism or eco-tourism

This type of market strategy entails ecotourism or agro-tourism activities in which the visitor or tourist enjoys the natural and agricultural ecosystem and all its intrinsic diversity. Agro-tourism is of growing interest especially in areas of rapid urbanization where urban dwellers seek re-connection with nature, countryside and socio-cultural traditions. A prerequisite is however that the environment should be of a unique quality and enable the generation of a range of interesting tourism activities to attract tourists.

[b] Certification and Geographic Indication

Certification strategies entail a certification or product branding strategy in which consumers pay a premium for the product to finance agricultural biodiversity conservation activities. This can be achieved through third-party certification in which existing or new labels include conservation targets in the label requirements, such as set by International Federation of Organic Agriculture Movements (IFOAM) for organic labels or the Forest Stewardship Council (FSC) programme for forests (Mutersbaugh and Klooster, 2010). Geographic Indication (GI) registration guarantees that a good originates from the locality or region where a given quality, reputation or other characteristic is attributable to its geographic origin (WTO, 2012). For example in India partners managed to register 'Satpuri Hills mandarin' as a geographic indication, as this hilly region is known to provide an ideal climate for mandarins. Similarly, a geographic indication strategy was followed and approved in 2009 for 'Malihabadi Dushaheri' from Malihabad district, and 'appe midi' types of mangoes from the Western Ghats. However in both cases farmers have had difficulty translating the GI registration into a quality brand and thus a premium price for their mangoes or derived products. The social, economic and environmental impacts of GI registration are debated (Thevenod-Mottet, 2010; Bowen and Zapata, 2009) and achieving benefits from GI requires substantial investment and time. A GI strategy is less suitable for a novel product, but protects a product with a certain history and reputation against counterfeit or competitive products produced outside the geographic indicated region who claim the same qualities or characteristics (Ngo Bagal and Vittori, 2011; Jaeger and Padulosi, 2012).

[b] Voluntary conservation fund by producer groups and enterprises

This entails a market strategy in which the farmers' group or enterprise decides to save funds voluntarily to finance conservation efforts. This can be facilitated through a Community Biodiversity Management Fund (Subedi *et al.*, 2006) in which a percentage of the revenues earned from commercial activities are saved to finance conservation activities (See Chapter 1.2 and Chapter 3.19). This is sometimes referred to as a self-declaration strategy or participatory guarantee systems (PGS) in which producers agree to maintain the traditional agro-ecosystem or safeguard local biodiversity through a certificate or seal on the product label, company website, or in advertisements (May, 2008). This strategy differs from a certification strategy as no external agency is involved to monitor and verify the claims made and the monitoring is based on trust, peer-review, social learning and direct linkages between consumers and producers. Often such a strategy is combined with obtaining funds from government or other agencies to enlarge the conservation fund.

[b]Linking CSR programmes to conservation efforts of supplying farming communities

This market strategy entails a larger processor or retailer which supports conservation efforts of its suppliers through its CSR programme and budget. Examples of such a strategy are the supply of mangoes by Chittoor farmers to Eosta, the largest organic importer of exotic fruits in the EU, who is willing to support local conservation activities such as supporting the nursery and the distribution of rare species and varieties, contributing to the maintenance costs of the diversity block and the training of farmers in agronomic practises. Similarly Himalaya Drug Company is committed to assisting collecting households in Uttara Kannada district in the Western Ghats to obtain organic certification, and is willing to finance the supply of saplings and awareness-raising activities for sustainable harvesting practices. Barriers of such a strategy are often the more sophisticated product requirements and quality standards

of such large scale processors or traders and that CSR-based financial support is only provided when a trade relation is established.

[a] Tool to assess agricultural biodiversity in value chains

When designing and implementing value chain development activities as part of an agricultural biodiversity conservation programme, it is useful to have insights into how far locally available diversity has entered markets; i.e. which species or varieties already have market value and which do not. Besides, a way to measure impact is needed, i.e. whether more diversity reached the market after the interventions. As no clear tools existed for these two purposes at the beginning of project design, the TFT project designed the 'market pyramid' which helps to assess and monitor the level of agricultural biodiversity at species or varietal level in a certain value chain. The pyramid in Figure 3.12.2 depicts the varietal diversity (intraspecific) of mango (*Mangifera indica*) available in markets in India. The x-axis represents the number of varieties and the y-axis shows the distance or distinct levels of the value chain including home consumption, local village markets, distant wholesale markets and exports. For example in India, about 1,500 distinct named varieties of mango are grown and found on farms across the country including 1,000 commercial varieties (Mukherjee, 1953; National Horticultural Board of India, 2015), which form the base of the pyramid. Based on consultation with traders and researchers it was estimated that only between five and eight varieties are exported, about 25 to 30 varieties are traded across states and found in wholesale and retail markets in major cities such as Delhi, Mumbai and Chennai, and an estimated 800 to 1,200 varieties are sold in local village markets across the country.

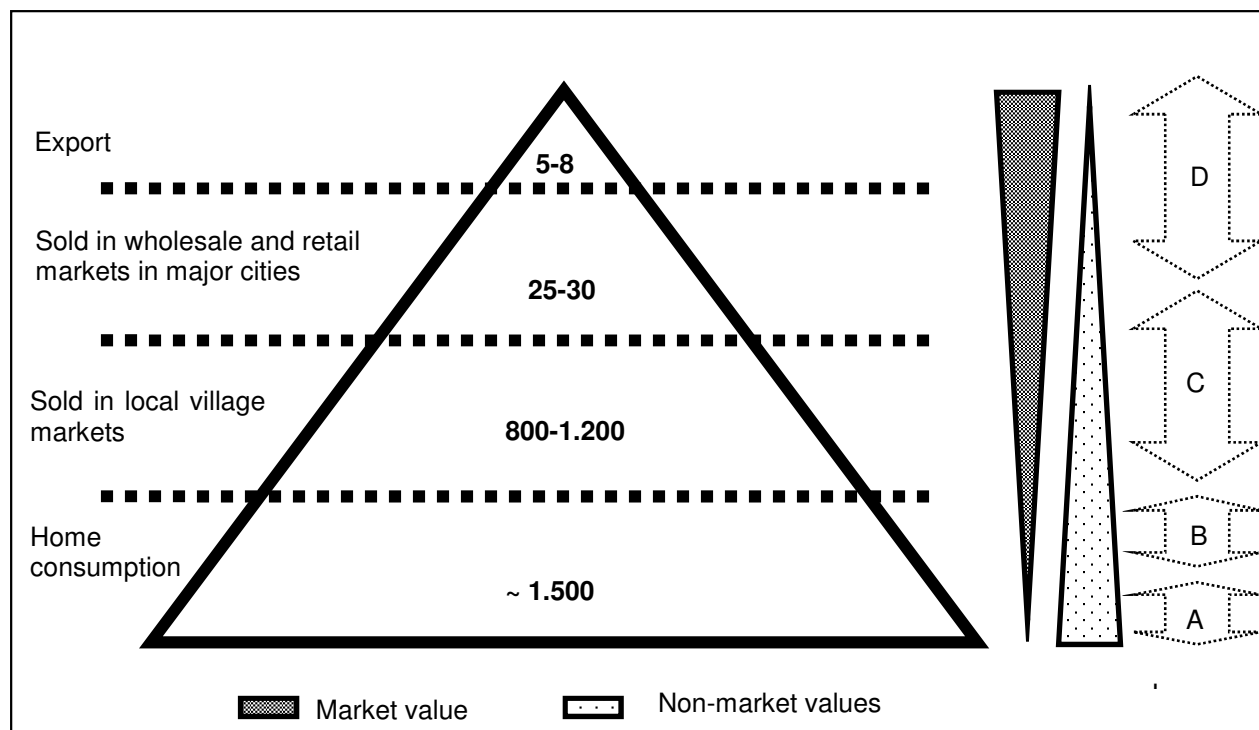


Figure 22.3 Market pyramid to assess the level of diversity within the mango value chain in India. The species and varieties at the top of the pyramid can be characterized as those with high market value and limited non-market values, while those at the bottom of the pyramid comprise limited market value but high non-market values. Based on this we categorized locally found diversity into species or varieties with: i) high market value targeting distant urban consumers (category D); ii) medium market value targeting local rural consumers (category C); iii) low market value but high direct use value at home (category B); iv) low market and use value but high indirect, option or non-use values requiring a safeguarding strategy (category A).

The market pyramid can be developed for any species, genus or functional groups for a given geographical area. For example, one could depict the level of diversity found for the functional group of fruit trees in a particular village and list how many of the locally found species are used at home within the village, are sold in the local village market, in the nearby district markets and reach up to more

distant wholesale markets. A market strategy for agricultural biodiversity in this context means bringing more species or varieties to a higher level in the value chain pyramid; i.e. introducing varieties and products used for home consumption to local village markets or bringing products based on species sold only in local village markets to more distant wholesale and retail markets or exports.

Applying this pyramid and categories to the range of species or varieties as encountered in the field helps the identification of market traits based on unique crop attributes (e.g. colour, taste, storability, etc.) and the design of market interventions and safeguarding strategies. The exercise, when done with farming communities at the start of a value chain development project, provides a first insight into the level of market penetration of the wide range of locally available species and varieties. When repeating the exercise after the value chain interventions took place, it gives an estimate of the impact of activities on the level of agricultural biodiversity in the market. The categorization of species or varieties is not static, but can change when novel uses or market traits are being explored and discovered.

[a] Conclusion

This chapter explored market strategies that contribute to community biodiversity management that simultaneously improve livelihoods and promote conservation of agricultural biodiversity, building on existing value chain methods and approaches, and drawing on lessons learned from sixteen case studies from the TFT project. The case studies have shown that successful market strategies that contribute to the conservation of agricultural biodiversity in these case studies often focus on the exploration of niche markets and entail a market or product diversification strategy with higher prospected profits but also higher risks. However, farming communities in biodiversity rich regions often have limited exposure to markets and thus limited entrepreneurial capacities and market skills. Other value chain barriers that were encountered across the case studies include lack of collective action, difficulties in finding

appropriate buyers with interest in diversity-based products, lack of trust between farmers, traders and support organizations, lack of skills in obtaining appropriate market intelligence and lack of physical or financial assets to invest in enterprise activities. A tailored set of tools, presented in this chapter, and support activities can enable these communities to engage in value chains and create added value for local agricultural biodiversity.

Farmers do not maintain a wide range of diverse varieties or species at farm level for a single reason, but for a combination of several distinct benefits such as income, nutrition, managing harvest or market risks, socio-cultural values or beneficial ecosystem services. A value chain approach based on agricultural biodiversity should take these multiple aspects into account. When marketing biodiversity, the focus should not be on a single value chain for a single purpose (economic gains) but to create income based on the range of unique species and landraces that have market potential while ensuring maintenance of the other benefits of diversity for farming households through on-farm conservation strategies.

To be able to manage above risks associated with exploring new markets or products while dealing with the barriers and interests of small holder farmers, it is required to have a tailored set of tools and support activities that enable these communities to engage in value chains based on local agricultural biodiversity. The TFT project helped to identify, test and refine twelve value chain tools that can guide market interventions for biodiversity-based value chains and identified six different marketing strategies which could help others when pursuing a value chain development strategy which generates income and conserves agricultural biodiversity.

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