4.2 Value addition and marketing of local citrus products in Nepal

Bharat Bhandari, Bijaya Raj Devkota and Sajal Sthapit

Value addition: sustaining the community management of local species and varieties

Farmers grow a diversity of crops and varieties with different traits, fulfilling multiple needs in relation to their socio-cultural, economic as well as agro-ecological contexts (Rijal et al., 2000). Even so, they only maintain those crops and varieties that they see as having specific domestic or market use values. Community biodiversity management (CBM), through value addition and product promotion, aims to enhance such values, thereby supporting the continued cultivation and use of threatened or rare varieties and species. The CBM project of Local Initiatives for Biodiversity, Research and Development (LI-BIRD) in Nepal, which is described in more detail by Shrestha et al. in Chapter 1.2, has been working on value addition as one of the strategies to increase the use value of local citrus species. As part of this project, we aimed to create economic incentives for conservation through use of local citrus species, by processing citrus fruits into less perishable products with a high market demand, and by supporting the marketing of these citrus-derived products. This chapter shares our experiences in Ghanteshwor, in Nepal.

Ghanteshwor, its citrus diversity and the CBM project

Doti district lies in the remote hills of western Nepal (Figure 4.2.1) and is known for its potential for cultivating citrus fruit species, including lime (Citrus aurantifolia), lemon (Citrus limon), sweet lime (Citrus limetta) and mandarin (Citrus reticulata). Citrus is an important fruit tree in the home gardens of the mid-hills of the country; its fruit is eaten fresh, processed into juice or eaten as pickle or salad. Many citrus species have traditional, medicinal values, and fruits and leaves are used during festival rituals. In general, the women manage the citrus trees, and together with their children take care of fruit harvesting and selling. Whereas sweet lime and mandarin can easily be sold in the local market, fresh lime and lemon are difficult to sell, fetching low prices in the production season when their fruits are abundant. Huge quantities of lime and lemon are wasted every year. Local processing of citrus fruits into products that can be kept for a longer time, and for which there is a high demand in rural areas as well as in nearby cities, makes good use of such resources that might otherwise be lost. The processing of fruits has the additional benefit of generating local employment.
and raising the income of those community members involved. As such, farmers in Ghanteshwor, in Doti district, where more than 400 families cultivate citrus species in their homesteads, asked LI-BIRD for support in the establishment of a processing plant for lime and lemon processing.

Citrus value addition and marketing

Step 1: Feasibility study

We carried out a feasibility study in Ghanteshwor in 2009, to assess the area coverage of lime and lemon, the number of plants, and the percentage of plants that bear fruits in each of the nine wards (a ‘hamlet’ or ‘sub-village’, the smallest administrative unit in Nepal) that are part of Ghanteshwor. Based on these parameters, we estimated the annual fruit production. In addition, we explored farmers’ interest in future citrus cultivation, and studied the potential of marketing lime and lemon fruits, and their various processed products. Based on the study, we calculated that Ghanteshwor produces 5.2 tons of lime and 20 tons of lemon annually. We estimated that 250 ml of juice can be extracted from 1 kg of lime or lemon, and concluded that the establishment of a community processing plant seemed technically feasible and economically viable. This is further supported by the possibility of collecting additional fruits from the surrounding villages of Doti and Dadeldhura districts.

Step 2: Institutional set-up and division of responsibilities

One of the key principles of CBM is to build and strengthen the capacity of local institutions to make their own decisions in relation to the management of biodiversity (Thijssen et al., Chapter 1.1). As such, we supported the establishment of a CBM-oriented community-based organization (CBO) in Ghanteshwor, the Village-level Biodiversity Conservation and Development Committee (VBCDC), which includes
representatives of farmers’ groups from the wards. We trained the VBCDC members in technical, managerial and financial issues. In addition, we agreed to: support the VBCDC in the establishment of a citrus processing plant; train its members in the management and operation of the plant; link the VBCDC to government agencies; and provide services for promoting and marketing the produce. The VBCDC agreed to promote the proper establishment of fruit orchards, coordinate fruit collection, sustain the processing plant, determine appropriate prices for fruits and processed products, and coordinate the sharing of benefits with participating farmers’ groups organized at ward level. A sub-committee of three members within the VBCDC was appointed to coordinate the processing activities. Farmers’ groups organized at ward level assumed responsibility for the collection and transportation of fruits.

**Step 3: Establishment of the processing plant and identification of products**

In November 2009, the VBCDC, together with LI-BIRD and partners, established a small citrus processing plant to produce two products: *chuk*, a dark and viscous, traditional vinegar made from lime that has culinary and antiseptic uses, and lemon squash, a concentrate that is mixed with ice and water to make cold lemonade. The idea was to use lime and lemon by-products, after the extraction of juice, to make pickles. The plant was equipped with two juice-extraction machines for lime and lemon, utensils for boiling and a bottle-sealing machine. In addition, 2000 half-litre bottles and printed labels were provided.

**Step 4: Strengthening of farmers’ skills in citrus processing**

During that same period, we developed a relationship with the Regional Food Quality Control Office, a government authority responsible for controlling these types of businesses. They supported us in carrying out training in citrus fruit processing and in the use of by-products. Ten people identified by the VBCDC were trained in the theory and practice of fruit juice extraction, juice preservation, vinegar and squash making, product quality issues, and labelling, storage and packaging techniques. Farmers were also trained in the techniques of producing pickles from lime and lemon after juice extraction.

**Step 5: Enhancement of the capacities of farmers to establish citrus orchards**

Citrus plants have the potential to produce fruits for 30–40 years. However, the trees in Ghanteshwor generally die within 8–15 years. This short lifespan is mainly because the seedlings are often planted in soil that is not appropriate for the cultivation of citrus (e.g. white soil, which contains high quantities of calcium, or soil with sedimentary rock below the soil surface, which is very common in Ghanteshwor). We encouraged farmers to use a more sustainable citrus production system by providing training and practical guidance on subjects including orchard layout, good soil management practices, appropriate locations for planting trees, and transplanting and mulching
techniques. The VBCDC realized that if the community had its own seedling nursery it would be able to meet local demands for lime and lemon saplings. Community members selected fruits from the best trees and collected seed locally in preparation for the establishment of the nursery. In 2010, the saplings were ready to distribute in the village. In this way, they were able to distribute 3600 citrus seedlings in the area.

**Step 6: Initial production and marketing of citrus products**

During the first year of operation, 2009, the citrus processing plant produced and sold 200 bottles of chuk and 300 bottles of lemon squash. In addition, the local women’s groups produced 265 kg of spicy and sour pickles (Table 4.2.1). The chuk and lemon squash were sold in half-litre bottles, for an average price of US$1.25 and US$ 0.90, respectively. The price set was based on the production costs plus an additional margin of 20%. Marketing the processed products, particularly the pickle, was not as easy as we expected. With our help, 50% was sold in Pokhara; the rest was sold in local shops and through shops in nearby towns. Because of the poor quality of the pickles it was difficult to market them.

**Step 7: Adaptation of products and improvement of marketing**

In 2010, the VBCDC specifically focused on strengthening the marketing of their products. We assisted in exploring new markets and establishing new market links. VBCDC members visited some of the markets of western Nepal, such as Dhangadi, Attaria and Dadeldhura; they interacted with interested salesmen and shopkeepers at strategic locations (e.g. along highways) and followed up by sending out samples

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<th>Table 4.2.1 Production and marketing data for chuk, lemon squash and pickles: Nepal, 2009 and 2010</th>
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Source: Bhandari (2012).

a Amount of chuk and squash is indicated in half-litre bottles; amount of pickles is indicated in kg.
b Because of quality problems with the pickles, 75% remained unsold in 2009; no pickles were produced in 2010.
for promotion. The market assessment showed that the products have a high market potential, but that more effort needed to be made to improve quality, including packaging quality and product information. In 2010, we assisted the VBCDC with improving their product packaging.

In 2010, the VBCDC did not have any difficulty in selling the produce, both at its own selling point and in local shops in Ghanteshwor. Prices were higher, as is illustrated in Table 4.2.1; however, due to a bad fruit season, fruit yields were much lower, which was reflected in the amount of chuk and squash produced. The VBCDC decided not to produce pickles because of the lack of capacity to produce a quality product.

Future steps to expand and sustain markets

To perform well in a growing market and sustain an acquired position, the VBCDC depends on an adequate quantity and quality of fruits, and on a reliable and continuous supply. In the CBM project, we are putting a lot of effort into ensuring the appropriate fruit volumes can be obtained, by reaching out to neighbouring villages, in order to be able to sustain a continuous supply of processed products in the market. Up to now, the small volumes of fruit have limited citrus processing to a seasonal activity.

By maintaining regular contacts with the Regional Food Quality Control Office, the VBCDC is making a continuous effort to improve the quality of its products. A team of VBCDC members have been trained in post-harvest handling, and are now capable of maintaining strict quality control procedures for processing, preserving and packaging. Consumers do appreciate the quality of the chuk and lemon squash. However, the quality of the pickles is still below expectation and needs much improvement. There is also room for improvement in the packaging and labelling of chuck and squash. Consumers, retailers and wholesalers have indicated that besides the half-litre bottles, 250-ml and one-litre bottles should also be available. All bottles should be filled with exactly the same volume, and should provide full information on content. The VBCDC is currently working on these issues.

Through the marketing of chuk and lemon squash in nearby cities, consumers are able to access unique products that are associated with the traditional food culture of Nepal. In addition to this, the marketing of these products in Ghanteshwor enhances the knowledge and skills related to the production of traditional food items. Since they are the only producers of these products in the far western part of Nepal, the VBCDC has a strong market position. To expand and sustain the market for the products, sufficient efforts must be made to raise consumer awareness and promote the products. Product promotion is now being addressed through participation in fairs and festivals as well as through radio advertisements.

Value addition in a context of CBM

Creating economic incentives is generally an effective means to promote the use of specific crops and varieties. Jarvis et al. (2011) demonstrate that in many parts of the world market-based actions and incentives are vital for motivating farming com-
communities to continue to use traditional or local crops and varieties, as can be seen in the various practices of our CBM project (Gauchan et al., 1999). Value addition, through the processing of local crops and varieties, and establishing market linkages for the derived products, can provide such market-based incentives. Access to markets for their produce provides rural farmers with opportunities to generate household income and to benefit economically from local agrobiodiversity.

In the specific case of citrus processing and the marketing of its products, the farmers in Ghanteshwor were able to earn some extra cash income. They also benefitted from increased prices for lime and lemon (see Table 4.2.1). Two hundred households, of which 30% are poor and marginalized farmers, directly benefit from access to the local citrus processing plant. The community worked closely together in establishing fruit nurseries and organizing the group collection and marketing of fruits to the VBCDC, which has strengthened social cohesion. The processing and marketing of citrus-derived products has motivated farmers to better manage their orchards and increase the plantation of lime and lemon. The value-addition initiative allows farmer producers to gain an income from, and promote, species that were previously neglected or underutilized. As such, our project has been able to link conservation with livelihoods through increased market access.

To sustain the success of this initiative, the full commitment and ownership of the VBCDC, good collaboration among participating farmer groups and continued support from external organizations will be needed for the coming years. Building the capacity of community-based organizations and their networks in marketing management is vital for ensuring the sustainability of the value-addition efforts. Strong linkages and transparency between producers, consumers and intermediaries in the value chain may increase efficiency and benefits for both producers and consumers.