This chapter presents the results of the in-depth analysis of the Prunus africana chain originating from the Northwest, Southwest and Adamawa regions and extending to markets in Cameroon, Europe and the USA. The findings are based on interviews, literature, observation, resource assessments, value chain analysis, market surveys and trade data (see Chapter 3). The values provided have been verified and triangulated with literature and in workshops with stakeholders and are believed to be valid for the specific chain, its geographic locations and population sample for the time period of the data collection. The sections deal respectively with the second research question of how the value chain is arranged in terms of the species it is derived from, the products, location, actors, activities and values; the third question on how the chains are governed; the fourth on their importance to livelihoods and sustainability and the fifth on product and chain sustainability. The conclusion focuses on how governance arrangements influence sustainable livelihoods.

The Prunus africana value chain

This section addresses the second research question of how the Prunus africana chain is configured in terms of the products, their uses, sources, actors, activities and values. These components of the value chain are analysed in the following sections.

Prunus africana species, products and their uses

This section introduces the species and the main products created from its bark and timber: medicines and equipment. Prunus africana (Hook. f.) Kalkman is known in Cameroon as pygeum\(^2\) or kanda stick. In local dialects it is called *kirah*, *elouo* and *mowom*, *eblaa*, *bi'beh 'kemb 'oh'*, *dalehi* and *wotangu* or *wotango*\(^3\). Shown in Photo 9.1, the evergreen hardwood tree has dark-brown, longitudinal fissured bark and thick,

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1 Data derived from peer-reviewed published articles written or contributed to by the author (Ingram and Nsawir 2007; Pfund et al. 2009), a peer-reviewed national policy guidance document (Ingram et al. 2009) and two peer-reviewed, published reports (Foaham et al. 2009; Nkeng et al. 2009).

2 The pidgin name and botanical nomenclature (*Pygeum africanum*) until reclassification in 1965.

3 Respective languages of Lamnso, Kom, Oku, Fulfulde (Northwest) and Bakweri (Southwest).
leathery, oval leaves with pointed ends and reddish stalks. It grows up to 40 m tall and under good conditions can grow to 14 m high and 37 cm diameter at breast height (dbh) in 18 years, with annual growth rates of 1 to 1.9 cm (Hall et al. 2000). Size increments decrease after it reaches 30 cm dbh, such that very large trees of 80 to 200 cm dbh may be hundreds of years old. There is a high variation in the diameter and height of equal aged trees in the same locality (Ingram et al. 2009), corroborating Cunningham et al. (2002). A minimum harvestable age for bark has been proposed as 13 years old (Franzel et al. 2009) or when the tree is 40 cm dbh (Ingram et al. 2009).

The tree is a light-demanding species, although the seeds require shade, with disturbance and fruit dispersal into canopy gaps or forest margins being important determinants of its population biology and accounting for its scattered distribution (Tonye et al. 2000). Its creamy white flowers have a short flowering time which can occur throughout the year, but is often from March to June, with many different pollinators visiting, including bees (Were et al. 2011). Beekeepers indicate it is a melliferous tree producing white honey (see Chapter 8). Fruit production commences at around 15 years old and increases with tree age, with alternating high and low production years (Stewart 2001). The black, fleshy almond-odour fruits are consumed and dispersed by many animals, including endemic and endangered bird, frugivore and primate species (Fossey 1983; Maisels et al. 1999; Stewart 2003). The seeds are semi-recalcitrant and germinate between 50 days and four months old, losing viability quickly if not stored in a moist atmosphere, such that few seeds older than six months old are viable (Mbuya 1994). The tree is generally single stemmed, developing multi-stems when saplings are browsed or cut, with large trees having weak re-sprouting capability. Trees may coppice if surface roots are damaged and occasionally after felling (Cunningham 2002, Ingram 2007). Wubet et al. (2003) noted arbuscular mycorrhizae among the roots, aiding the uptake of minerals and growth, which has implications for cultivation.

The versatile, multi-use tree is used to generate cash and for subsistence uses. Chemical analysis of its fungicidal and termicidal properties (Mburu et al. 2007) supports its reputation as a hard, insect-resistant timber preferred for carving, axe, tool and hoe handles, used as such by 10% of harvesters. The Nso clan uses its timber for ceremonial spear shafts. Poles are used in house construction, fencing and for bridges, confirming Stewart (2003). It is planted to protect and indicate water catchment areas and to demarcate boundaries. It was a favoured fuelwood for heating and cooking (Stewart 2003; Ingram and Nsawir 2007) but is now used by only 13% of harvesters in the Northwest for fuel for subsistence, and not trade. Fuelwood collection is generally from dead trees, due to the traditional ban on collecting live wood for fuel, enshrined in the 1998 Fon-wide rules for forest management. Observations in 2010 and 2011 indicated that increasing numbers of trees in the forest were felled for timber and fuelwood, but no fresh Prunus africana were seen felled. Market observations confirmed that all fuelwood sold in Bamenda and Kumbo was eucalyptus. Traditional carvers in Oku do not use Prunus africana for stools or carving, confirming Knopfli (1998).
The bark was reported as having been used since pre-colonial times as a medicine in the Northwest and Southwest, confirming reports by Mbai (1998). In both regions 35% of harvesters indicated its use for stomach problems, diarrhoea, fevers and madness. Traditional healers reported that it is one of their most important plant species (Ingram and Nsawir 2007). The bark is usually dried, chewed raw, boiled into a tea (often with other herbs), or ground into a paste and mixed with honey and herbs. These findings parallel the human medicinal uses, but not the veterinary uses, recorded for the bark, leaves, berries and roots (Cunningham et al. 1993; Nfi et al. 2001; Cunningham et al. 2002; Stewart 2003; Cunningham 2006b; Nfi et al. 2008).

Medicinal use internationally began in the 1700s (Simons et al. 1998) and was scientifically documented in 1962 (Watt et al. 1962; Altavahealth 2001). The bark, leaves, seeds and roots contain active chemical extracts (Cristoni et al. 2000; Anon. 2002). Studies have confirmed the bark’s efficacy to reduce benign prostatic hyperplasia (BPH) symptoms, chronic prostatitis, sexual and reproductive dysfunctions and obstruction-induced contractile dysfunction (Cunningham et al. 1993; Hall et al. 2000; Anon. 2002). The bark extract has been approved for use in prescription pharmaceuticals since the mid-1960s in Germany, France and Italy. Although there are many other alternative plant-based drugs to treat prostate problems, no synthetic chemical alternative exists. The high social and medicinal value of Prunus africana is emphasised by it being the active ingredient of BPH treatments for over 30 years and continued demand expected with ageing populations from the estimated 85,000 prostate patients in 2000 (Pomatto 2001; CITES 2008). Data on prescription pharmaceuticals based on Prunus africana extract focus on the efficacy of the active ingredients and are aimed at doctors prescribing the drug – not the end consumer. The health product chain targets consumers using images of a natural, botanic remedy, some drawing on traditional use in South Africa (Simons et al. 1998), but none on medicinal or other uses in Cameroon. Certification has been advocated to develop a chain of custody and enhance producer benefits (Peka 2003; Chupezi et al. 2004; Medicinal Plants Specialist Group 2007), but is difficult given that the route to consumers is as a prescription drug.

Ecoregion sources and chain locations

There is substantial indigenous knowledge of the locations and ecology in which Prunus africana is found. This is typically held by medicine practitioners, forest users such as hunters and beekeepers, community forest managers and patrollers, and commercial exploiters. Based on observations, literature and surveys, six major afromontane ecoregion landscapes were identified as the main Prunus africana production areas, shown in Figure 9.1. In Adamaua, where it is not used locally and harvesting takes place by agents exogenous to the region, locations were hardly known. In the Southwest region, on Mt Cameroon the species is found in sub-montane and montane forest in the highest densities between 900 to 2,500 m, on farms and in plantations; in the Bakossi Mountains, Bamboutous Mountains around Lebialem, Mt Kupe, Mt Muanengouba and Takamanda, it was found planted around farms and wild in gallery forests between 1,600 to 2,400 m. In the Northwest region, it was found between 2,400 to 3,000 m in Kilum-Ijim forest in the highest densities, and in forest-savannah transition zones (but not scrub where bush fires are common, indicating its limited fire resistance), secondary forests, forest remnants, and on farms and small plantations across the region. In Adamaua, it was found in the wild in the Mbabo Mountains on the Mayo-Baléo-Nigerian border and Tchabal Gang Daba mountain gallery forests between 1,300 m to 1,800 m. Similar to other African countries (Hall, O’Brien et al. 2002), the distribution of the species is being shown in the process of removal from the region by the authorities.
it is most abundant in high altitude sub-alpine, upper and lower afro-montane mixed forests. This distribution pattern matches ONADEF data (MINEF et al. 2000; Belinga 2001).

Figure 9.1 Map of *Prunus africana* value chain study area in Cameroon

From these production areas, the chain has two main channels, shown in Figure 9.2. One channel concerns local trade and has existed for at least forty years, pre-dating international exports from the 1970s (Cunningham et al. 2002) with four sub-channels. In the local medicinal channel, small, dried bark pieces are sold to the general public through medicinal plant traders in type I local markets and type II urban markets in Bamenda, Kumbo, Bafoussam and Dschang. On average five kg of dried bark was sold every six months by traditional herb and spice vendors in each market, with two to five vendors having permanent stalls in each market. If known, the main sources were named as Oku and Mt Cameroon.
**Figure 9.2** *Prunus africana* chain from Northwest, Southwest and Adamaoua regions

**Key: Relationships**
- Capacity building services
- Partnerships
- Financer
- Regulator
- Support/research
- Member
- Buyer

**Actors**
- Network
- Private sector
- Regulator
- Capacity builder
- NGO
In the second channel, bark is processed into medicines and sold direct to consumers by traditional medicine men from their homes in the Northwest, particularly in Oku, Belo, Fundong and Kumbo, and in the Southwest in centres of traditional medicine (Wonya Mavio, Fontem, Buea, Tombel and Bangem). They source locally, from their own trees, in villages or on the forest edge. This supports reports that for 80% of Southwest herbalists Prunus africana is one of the most important medicinal plants (Nfi et al. 2008). A third channel concerns timber for hoes and tools. A fourth channel is local, small-scale veterinary use (Nfi et al. 2001; Stewart 2003). The second and major chain is international: from the Northwest, Mt Cameroon and Adamaoua, bark is harvested and either dried locally or transported to drying sheds in Douala and Bafoussam. Here it is cut into pieces or powdered, prior to exporting to specialised chemical and pharmaceutical companies in Europe. Pygeum powder and extract is re-exported to other European countries, the USA, India and China.

**Prunus africana chain actors**

This section introduces the main actors in the chain. Table 9.1 shows that an estimated 3,233 people are active in the chain from the study areas. Although the total number of those involved is significant, this is a very small proportion (less than 0.1%) of the total population in the Northwest, Southwest and Adamaoua. The direct actors in the chain are categorised as harvesters, farmers and planters, traders, exporters, importers and consumers. There are also international and national regulatory authorities and support actors including development and conservation NGOs and research organisations.

**Table 9.1 Population statistics of Prunus africana study area**

<table>
<thead>
<tr>
<th>Region Division</th>
<th>Capital</th>
<th>Surface area km²</th>
<th>Popln¹</th>
<th>Popln. density km²</th>
<th>N⁵ value chain actors</th>
<th>% total popln.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northwest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Harvester Farmers</td>
<td></td>
</tr>
<tr>
<td>Bamenda</td>
<td>17,812</td>
<td>1,728,953</td>
<td>100</td>
<td>245</td>
<td>800</td>
<td>6</td>
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<tr>
<td>D.M. Ndu</td>
<td>4,279</td>
<td>269,931</td>
<td>33</td>
<td>20</td>
<td>5</td>
<td>1</td>
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<tr>
<td>Bui Fundong</td>
<td>2,297</td>
<td>321,969</td>
<td>32</td>
<td>150</td>
<td>455</td>
<td>3</td>
</tr>
<tr>
<td>Boyo Kumbo</td>
<td>1,592</td>
<td>124,887</td>
<td>31</td>
<td>75</td>
<td>120</td>
<td>25</td>
</tr>
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<td>Mezam Fundong</td>
<td>1,745</td>
<td>524,127</td>
<td>35</td>
<td>220</td>
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<tr>
<td>Adamaua Ngoundéré</td>
<td>63,691</td>
<td>884,289</td>
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<tr>
<td>Djerem Tibati</td>
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<td>124,948</td>
<td>9</td>
<td></td>
<td></td>
<td>0.00</td>
</tr>
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<tr>
<td>Buea</td>
<td>24,571</td>
<td>1,316,079</td>
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<td>205</td>
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<td>222</td>
<td>200</td>
<td>23</td>
<td>1</td>
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<tr>
<td>K.M. Bangem</td>
<td>3,404</td>
<td>105,579</td>
<td>31</td>
<td>10</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td><strong>West</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bafoussam</td>
<td>13,892</td>
<td>1,760,276</td>
<td>38</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Littoral Douala</td>
<td>20,239</td>
<td>2,510,263</td>
<td>124</td>
<td>15</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>Centre Yaoundé</td>
<td>68,953</td>
<td>3,098,044</td>
<td>45</td>
<td>25</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>450</td>
</tr>
</tbody>
</table>

Sources: Research results and ¹ 2005 population (National Institute of Statistics 2010). ² Includes plantation owners. Key: DM= Donga Mantung KM= Kupe Muanengouba

In the Southwest, all the harvesters were male, 73% were less than 31 years old, with an average household size of seven people with a high proportion (92%) having primary education. The largest group of 200 harvesters inhabit 14 Bakweri villages in Fako division circling Mt Cameroon with a total population of around 10,000 (Stanley 2009). The harvesters worked on rotation under the supervision of the Mount Cameroon Prunus Management Common Initiative Group (MOCAP-CIG). MOCAP-CIG was created in August 2000 to control the harvest and sale of Prunus africana in nine villages. It grew from the Mapanja and Bokwango Harvesters’ Unions established in
1994 to supply Plantecam Ltd. The German development agency GTZ supported MOCAP-CIG through the Sustainable Management of Natural Resources in the Southwest Province project (see Chapter 6), paying set-up costs of over 1 million FCFA (2,041 US$), helping overcome administrative hurdles and for them to eventually obtain a harvest permit in 2007. In the same year, a United Nations Development Programme (UNDP) grant supported the purchase of a small processing machine. But the trade suspension in 2007 (discussed in the section on national regulations) discouraged the group (Joseph Ekati, MOCAP-CIG, pers. comm. 2010). Around 10 harvesters from Nyasososo, a village of around 1,500 people, have harvested occasionally on Mt Kupe and an estimated 15 harvesters inhabit villages around Bangem, near Mt Muanengouba.

In the Northwest, all harvesters were married men, 50% from the Kom, Nso and Oku ethnic groups, associated with 21 community forests, 18 of which are located in the Kilum-Ijim Forest (see Chapter 4 and 6). They mainly inhabit 11 forest-adjacent villages in Bui division with a population of 29,000, 13 villages in Boyo division with around 30,000 people, and Njila village of 2,500 inhabitants in Donga Mantung. A few harvesters (8%) were members of a Prunus harvesting association and 47% were members of forest management committees governing the community forests. The other 50% of harvesters were also from the Northwest, being individuals or employed ad-hoc by intermediaries. Northwest harvesters were on average 47 years old, educated to primary school level, heading a household of 9.8 people on average.

Large-scale harvesting has usually taken place in groups of 10 to 400 people from the community and community forests, with harvesters working individually or in pairs. The majority (72%) of the Northwest community forests were less than a decade old in 2009 and had commenced harvesting in the last four years or less. Individual harvesters had on average 16 years’ experience, with a maximum of 40. Many (80%) collect other NTFPs, with on average 11 years’ experience harvesting honey, bamboo, firewood and medicinal plants, and were knowledgeable about the forest. Some 2% of harvesters were also traditional medicine practitioners. Harvesting was rated by 50% as one of their five main income sources and nurseries by 25%. In the Northwest, other major income sources included subsistence farming and cash crops (coffee, market gardening, cola, potatoes, palm-wine, maize and beekeeping), livestock, petty trading and labouring. Less than 2% had salaried incomes. All had diversified incomes with up to seven different activities and an average of three.

In the Southwest, 75% of harvesters had at least two other supplementary activities, mainly subsistence agriculture and cash crops, the value of which was less than Prunus africana in 2008. The vast majority of bark harvested was sold, 5% was given as gifts and 5% degraded, usually from mould. A small proportion, on average 1.1 kg of bark was kept by 15% of harvesters for family medicinal use. Timber was occasionally harvested. At least 22 plant nurseries in the Northwest region, eight in the Southwest and two in the West sell Prunus africana seeds and seedlings, among a range of multi-purpose plants, melliferous and native trees. Many started with support and/or training from conservation projects such as the Mt Kupe Forest, Kilum-Ijim Forest, Bamenda Highlands Forest, Mount Cameroon and government-supported projects such as the support programme for rural forestry and agroforestry (PAFRA) and the capacity building for community-managed forest and fauna resources initiatives (RIGC) (see Chapter 6). They employ on average three to four staff each, mainly male. Seeds tend to

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4 Population data reported in community forest simple management plans.
be collected from nearby forests and cultivated. Many of the nurseries are side-enterprises of NGOs, farming groups and community forests and around a quarter are solely occupied by the nursery business. Three councils have started nurseries, the largest of which is Kumbo Urban Council, supplying municipal re-planting and erosion control schemes in watersheds and as a commercial enterprise.

At least 4,821 individuals and 78 Common Initiative Groups (CIGs), farmers and 20 community forests have planted and ‘own’ *Prunus africana* trees. There are at least 18 large-scale plantations in the Northwest, 13 in the Southwest and three in the West. They are owned by individuals, schools, an agricultural enterprise, a water company, NGOs and the state Cameroon Development Corporation (CDC).

Seven medicinal plant vendors in markets in Oku, Bamenda, Bafoussam and Dschang sold small pieces of *Prunus africana* bark at 200 to 500 FCFA (0.40 to 1.02 US$) a piece. Their stock ranged from one to ten kilos with a low turnover. They were supplied by specialist harvesters or harvested themselves with permission from traditional rulers or from tree owners. Their clients either asked specifically for the bark for home medicinal use or were advised by the vendors once specific complaints were indicated. *Prunus africana* was not found in markets in Yaoundé or Douala. Two itinerant *Prunus africana* hoe handle vendors harvested in Kilum-Ijim Forest and had a stock of around 40 handles. They travel to Country Sunday markets in large villages such as Oku, Belo, and in Mezam and Bui divisions.

Around 28 agents, intermediaries and buyers have been active in the international bark trade. The majority employ men (80%), aged 38 years on average with a household of five people, working on average 5.8 years in the sector, with the longest 15 years. Their staff size ranges from three to hundreds, with the largest being Afrimed, a consortium that includes one of the largest Cameroonian financial institutions. They obtain special forest product (SFP) permits or buy weigh bills from permit holders. Some of the larger enterprises have informal teams of occasional harvesters and/or hire villagers on an ad-hoc basis paying per kilo of fresh bark. Most have warehousing capacity and re-sell to the exporting companies. Eight companies have regularly exported *Prunus africana* from Cameroon since 2003. Most also trade in other forest products: eucalyptus poles for the domestic market, yohimbe bark (*Pausinystalia johimbe*) and gum arabic (*Acacia* spp.) for export.

Since 1972 at least 11 exporting enterprises have conducted primary and secondary processing. Fresh bark is cut into 10-20 cm chips, sun or air-dried to a moisture content of less than 30% and packed for shipping. The only companies processing from 2007 to 2009 were the Compagnie Commerciale pour l'Exportation des Produits Forestiers (CEXPRO), Africaphtyo and Agrodenree in Douala and Afrimed based in Bafoussam, Yaoundé and Douala. As some importers require verification of the species – due to substitutions made in the past – quality control along the chain now usually takes place in the easiest way by purchasing bark instead of powder. MOCAP-CIG has a small-scale shredding machine, but has never used this commercially. Only two companies process into a powder of less than 10% moisture content: CEXPRO and Afrimed. Although Africaphtyo has the capacity, since 2007 it has only exported bark. Plantecam 5 operated a *Prunus africana* bark-processing factory in Mutengene near Buea from 1972 to 2000 when its license expired and factory operating costs became

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5 Plantecam Ltd. was a subsidiary of Laboratoires Debat, owned by the Fournier Pharma group, and now by the French company Solvay Chemicals.
uneconomic. Since 2000 no extract-processing facilities have operated in Cameroon. Since 2000, 50 companies had obtained licenses, with three dominating the market. Afrimed annually exported on average 1,382 tons, having on average 57% of market share annually, CEXPRO 208 tons, SGP 190 tons and others 40 tons. On average, from 2005 to 2009, five companies annually have been granted permits. In 2006 a Spanish importer was interested to set up operations but was dissuaded by the permitting system and insecurity of supply. Four exporters are members of associations. The Syndicat des Exploitants Transformateurs Industriels Exportateurs des Produits Spéciaux (STIEPFS) is a vocal lobby group for special forest product and forest-product traders and the National Organization of Non-Timber Forest Product Operators of Cameroon (ONPECAM) conducts capacity building and lobbying. Although exporters did not respond to the entire questionnaire, sufficient trust was built up such that many shared information piecemeal. This reflects their frustration with the sector, initial mistrust and research fatigue.

At least ten pharmaceutical companies have imported Cameroonian bark and extract the active chemical from the bark. Solvay Chemicals is an international chemical company which has produced the *Prunus* extract-based drug Tadenan for the last 30 years and has the longest history of importing from Cameroon. Their product is on average used by 1,300 persons daily. The drug has been a long-term ‘cash cow’ for the company: exceeding the anticipated 15 year lifetime, with an additional two to ten years predicted, depending on the availability of *Prunus africana*. Due to 2007 CITES trade suspension, Solvay indicated its plan to be more active in sustainable extraction to its value chain suppliers by providing financial and moral commitment for vertical integration using plantations or forestation to secure supply, as difficulties obtaining the raw material could make the product no longer commercially viable. Synkem is a Solvay subsidiary producing extracts (of which *Prunus* is the only botanic extract) and was active in Cameroon as Plantecam Ltd. It now operates from France and imported barks from Cameroon, DRC, Equatorial Guinea, Uganda and Tanzania. The EU trade suspensions in 2007 reduced its supplies by 80% (see section on Governance), posing a major supply threat as it keeps around six months’ worth of stock. Starlight and Herbs International are French companies processing and selling in Europe and the USA. The Spanish pharmaceutical company Euromed produces both the extract and pharmaceuticals. The Italian company Indena produces the extract using a different process, which it exports to the USA health and diet supplements market. Madagascar-based Innovax makes an extract sold mainly to France. The European companies also supply American and Chinese manufacturers of health and diet supplements. Many of these also manufacture products from other barks and natural resources.

The chain structure and actors have changed significantly during the forty-year history of international trade, but little since 2000 (Pomatto 2001), indicating a stable market since then. The actors changed when Cameroon became a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2005, with the Ministry of Forestry and Wildlife (MINFO) designated as the CITES management authority and the National Forestry Development Agency (ONAFOR) as the national CITES scientific authority. Since the CITES trade suspension in 2007, the two authorities have been most active. Development organisations such as GTZ, SNV, Birdlife International, WWF and particularly the

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6 ONAFOR became ANAFOR in 2006, see Chapter 6.
Mount Cameroon Project, Sustainable Management of Natural Resources in the Southwest Project and Kilum-Ijim Forest projects have been prominent actors over the last 15 years. Local development and conservation NGOs such as the Western Highlands Nature Conservation Network (WHINCONET) have been increasingly active since the mid-2000s, often with donor aid (see Chapter 4). They have supported conservation-focused inventories, monitoring and yield studies. Together with international and national research organisations, they have studied the sector and disseminated information in Cameroon, influencing CITES and the European Commission. Since 2000 their focus has increasingly been on institutional, organisational and technical capacity building of harvesters in the Southwest and Northwest and collective action. Actors from all regions and along the chain met together for the first time in 2006. A Prunus Platform was facilitated as part of the FAO-CIFOR-SNV NTFP Project to provide guidance on a national management plan and allow exchanges on techniques, problems and markets.

Prunus africana chain activities
Activities are generally conducted irrespective of seasons and climate, although slightly more harvesting was reported during the low agricultural season (June to August). The two channels use different harvest and processing methods.

For international trade, only the bark is harvested. Men dominate harvesting: walking 3 to 12 km to find trees, climbing them, using a machete and knife to incise and then peel the bark into approximately 30 by 50 cm to 100 cm strips, taking on average two hours for 10 kg, tie it and head-load the 30 to 75 kg (average 50 kg) bundles to their homes or village drop-off points. The vast majority of bark is sold in fresh strips. Bark from mature trees is generally twice the weight of dried bark i.e. 1,000 kg of wet bark produces 500 kg of dry bark at 50% humidity.

In some Northwest community forests, preliminary cleaning and drying was conducted, using ASSOFOMI and ASSOKOFOMI offices as stores. Only 9% of individual harvesters dry barks using their own houses or sheds and 2% clean barks. The bark is sold to processors in Cameroon or to international pharmaceutical companies, who pulverise it into a powder of up to 10% moisture content. This is then dissolved in a solvent base to produce an extract. A second processing produces a fine white crystalline extract of 5% to 0.05% weight of the initial dry powder, which is the active ingredient for pharmaceutical preparations. In 2001 in France, Switzerland, Austria, Spain and Italy at least 19 products and in the USA, eight contained Prunus africana extract (Pomatto 2001). By 2009 over 25 medications and 20 products contained Prunus africana extract, marketed by American, French and Chinese companies and in 2010, at least 40 brand-name products were sold on different internet sites.
Initially Plantecam Ltd. felled trees, changing to the two quarters technique where bark is peeled and stripped from opposing quarters of the tree trunk (see Box 9.1) in 1989 in response to the 1986 law. The company trained its workers on this technique between 1972 and 1987, and then harvesters in the Northwest in 1985 and harvesters from 12 villages around Mt Cameroon in 1994. The Mount Cameroon Project (Hall et al. 2000) further popularised this technique. In the Southwest, all MOCAP-CIG harvesters reported being trained and using the technique. In the Northwest 45% use the technique, 13% strip the whole tree of bark and 40% harvest a small patch or poles for own use or local sale. MOCAP-CIG limits harvesters to one 33 kg bundle a day, for health reasons and to control harvesting, rotating harvesters so that all can earn. Plantecam Ltd. restricted workers to five and half days harvesting per month. In the Northwest, harvesting was reported as an occasional, temporary activity, commonly undertaken in response to a trader’s order. On average, individual harvesters reported having harvested three times and community forests twice. Bark is also stripped from felled trees, particularly in the Southwest (Cunningham and Mbenkum 1993; Meuer 2007), but less in the Northwest (Stewart 2007).

**Box 9.1 Two quarters bark harvesting technique**

- Bark removed from the trunk in strips from 1.30 m above ground level to the first branch.
- Only trees with diameter at breast height (dbh) >30 cm can be debarked.
- Trees with dbh <50 cm should be debarked with two strips in opposite sides, each no wider than 1/4 of the tree circumference.
- Trees with a dbh >50 cm should be debarked in four strips, regularly distributed around the circumference, each no wider than one eighth of the circumference.
- Lateral roots with a minimum diameter of 20 cm on trees >dbh 50 cm can be debarked.
- Debarking is prior to clearing the root rhizosphere and should not exceed one quarter of the root's circumference.
- After debarking, the root should be covered with soil to avoid desiccation and enable rapid reconstitution.
- Trees with debarked roots and trunks should be marked.
- Each debarked tree should completely recover before subsequent debarking.

*Sources:* (Ministry of Agriculture 1986; Ndibi *et al.* 1997; Ondigui 2001).

When harvested for own use and local trade, different activities and tree parts are used. Traditional bark harvesting by medicine men in Kilum-Ijim Forest involves cutting a small piece of bark, around 10 wide by 10 or 20 cm long, with a machete or knife from the lower bole of a mature, healthy tree of 30 to 100 cm dbh. Harvesting occurs approximately once every six months to two years. Pieces of dry bark, sold in widely varying sizes weighing between 50g to 400g, remains useable for years. The practitioners indicated that it was common to repeatedly harvest the same tree, with no visible health impacts to tree health or mortality. The efficacy of barks from different trees is not checked and patients do not usually provide feedback. As *Prunus africana* is used alongside other components, practitioners could not indicate if there were differences in efficacy between trees. Harvesting was conducted mostly from trees located on the harvester’s compound or farm and occasionally from neighbour’s trees or the nearest community forest. Branches used for poles, hoe and tool handles are harvested from selected branches, not usually by felling the tree and are sold per unit rather than by weight.

*Prunus africana values*

Over the past 40 years the chain has grown from a subsistence and low-volume, low commercial value medicinal bark, timber and fuelwood trade, to a high-value bark trade
driven by the international pharmaceutical and botanical health-product sector. Available data indicates that annual production (including illegal\(^7\) harvests), from the major production zones has varied significantly, shown in Table 9.2 and Table 9.3.

### Table 9.2 Prunus africana harvests in the Northwest and Adamaoua 2001 to 2007

<table>
<thead>
<tr>
<th>Region</th>
<th>Division</th>
<th>Year</th>
<th>Average quantity (kg)</th>
<th>Average selling price in village (FCFA)</th>
<th>Total income (FCFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest</td>
<td>Bui</td>
<td>2007</td>
<td>2,575</td>
<td>64</td>
<td>164,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2006</td>
<td>385</td>
<td>45</td>
<td>17,325</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2007</td>
<td>1,360</td>
<td>66.5</td>
<td>90,440</td>
</tr>
<tr>
<td></td>
<td>Donga Mantung</td>
<td>2006</td>
<td>530</td>
<td>54</td>
<td>28,620</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2005</td>
<td>250</td>
<td>75</td>
<td>18,750</td>
</tr>
<tr>
<td></td>
<td>Boyo</td>
<td>2005</td>
<td>3,860</td>
<td>32.5</td>
<td>125,450</td>
</tr>
<tr>
<td>Adamaoua</td>
<td>Mayo-Banyo</td>
<td>2001 to 2007</td>
<td>494,600</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Faro et Déo</td>
<td>2001 to 2007</td>
<td>8,800</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Sources:** Research results interviews traders, MINFOF Northwest, MINFOF Adamaoua.

### Table 9.3 Prunus africana harvests in Northwest community forests 2003 to 2007

<table>
<thead>
<tr>
<th>Community forest</th>
<th>Year</th>
<th>Average quantity (kg)</th>
<th>Average selling price (FCFA per kg)</th>
<th>Total income (FCFA)</th>
<th>Illegally harvested quantity (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afua &amp; Juambum</td>
<td>2006</td>
<td>12,000</td>
<td>65</td>
<td>780,000</td>
<td></td>
</tr>
<tr>
<td>Adjicofomi</td>
<td>2007</td>
<td>20,000</td>
<td>90</td>
<td>1,800,000</td>
<td></td>
</tr>
<tr>
<td>Abuh</td>
<td>2003</td>
<td>2,700</td>
<td>74</td>
<td>199,800</td>
<td></td>
</tr>
<tr>
<td>Anyajua</td>
<td>2007</td>
<td>20</td>
<td>90</td>
<td>1,800</td>
<td>6,000</td>
</tr>
<tr>
<td>Ajyng</td>
<td>2000</td>
<td>8,000</td>
<td>50</td>
<td>400,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Baba II</td>
<td>2004</td>
<td>5,000</td>
<td>50</td>
<td>250,000</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>122,000</td>
<td>90</td>
<td>10,980,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>95,000</td>
<td>30</td>
<td>2,850,000</td>
<td></td>
</tr>
<tr>
<td>Anyafua</td>
<td>2005</td>
<td>1,000</td>
<td>60</td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>Bihkov</td>
<td>2003</td>
<td>150,000</td>
<td>80</td>
<td>12,000,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>85,000</td>
<td>40</td>
<td>3,400,000</td>
<td></td>
</tr>
<tr>
<td>Kilum</td>
<td>2006</td>
<td>900,000</td>
<td>85</td>
<td>76,500,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>250,000</td>
<td>90</td>
<td>22,500,000</td>
<td></td>
</tr>
<tr>
<td>Ijim</td>
<td>2003</td>
<td>42000</td>
<td>80</td>
<td>3,360,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>80,000</td>
<td>90</td>
<td>7,200,000</td>
<td></td>
</tr>
<tr>
<td>Kedjem Mawes</td>
<td>2006</td>
<td>106,000</td>
<td>100</td>
<td>10600,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>6,000</td>
<td>75</td>
<td>450,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>20,000</td>
<td>75</td>
<td>15,000,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Laikom</td>
<td>2005</td>
<td>40,000</td>
<td>135</td>
<td>54,000,000</td>
<td>6,630</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>410</td>
<td>94</td>
<td>38,540</td>
<td></td>
</tr>
<tr>
<td>Muteff</td>
<td>2004</td>
<td>29000</td>
<td>75</td>
<td>21,750,000</td>
<td></td>
</tr>
<tr>
<td>Vehkovi</td>
<td>2004</td>
<td>20,000</td>
<td>80</td>
<td>16,000,000</td>
<td></td>
</tr>
<tr>
<td>Yatimofco</td>
<td>2003</td>
<td>3,500</td>
<td>50</td>
<td>175,000</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>86,853</td>
<td>76</td>
<td>6,842,506</td>
<td>23,526</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,985,630</td>
<td></td>
<td>163,440,140</td>
<td>117,630</td>
</tr>
</tbody>
</table>

**Sources:** Research results with harvesters and community forests, ASSOFOMI and ASSOKOFOMI.

To overcome illegal harvesting and prevent bushfires, community forests such as Ndu, Ijim and Kedjem Mawes set up patrols. Success depended upon their ability to pay patrollers (on average 500 to 1000 FCFA – 1.02 to 2.04 US$ – a person daily). This in

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\(^7\) Harvesting is illegal if unauthorised by a community forest, if contrary to the forest management plan, if the plan was unapproved or if sold to a person not possessing a special forestry product permit.
turn rested upon the income gained from community forest harvesting, the scale of illegal harvests and implication of FMIs, local authorities and community members in enforcement and punitive actions. Increased demand led to a “free for all situation” (Peter Bah, Ijim CF, pers. comm. 2009). Many community forests gave up patrolling and harvested illegally, with high volumes harvested in 2006 and 2007. Mt Cameroon has also suffered from illegal harvesting (Meuer 2007). Figure 9.3 shows regional production, highlighting that the origin of half (57%) of the bark from 2003 to 2011 was unknown: the source being only occasionally indicated on weigh bills. There is no distinction made in official figures between legal and illegal bark. These figures emphasise the importance of Mt Cameroon and the Northwest as major production zones and with no distinction made between wild and cultivated bark.

**Figure 9.3** Annual *Prunus africana* production (tons and percentage) 2003 to 2011

![Graph showing regional production of Prunus africana 2003 to 2011]

Sources: MINFOF SFP permits, Research results from ASSOFOMI, ASSOKOFOMI and MOCAP-CIG.

Shown in Table 9.4, harvester selling prices varied substantially from 1980 to 2011, with a national average over this period of 180 FCFA (0.31 US$) per kg. Prices also varied widely by location: 30 to 50 FCFA (0.05 to 0.09 US$) outside of community forests; 76 FCFA (0.16 US$) from community forests and 160 FCFA (0.28 US$) to 260 FCFA (0.45 US$) from MOCAP-CIG. Although many harvesters indicated their unhappiness with prices, *Prunus* income was seen as more valuable than small-scale farming or plantation crops, confirming earlier studies (Yaron 2001). Higher selling prices in the Southwest are attributed to MOCAP-CIG eliminating intermediaries, negotiating directly with exporters and regularly selling larger quantities. The export market value is shown in Table 9.4, averaging 1,332,601 US$ annually. The retail market in consumer countries in 1999 was estimated at 200 million US$ (CARPE 2001). In 2009, the average internet selling price of branded pygeum capsules (76 capsules weighing 91 g, containing 50 to 100 mg of bark extract) was 16 US$. This is equivalent to 991 US$ per kg of active ingredient (GAIA/GRAIN 2000). The values of bark sold along the international channel are summarised in the chain map in Figure 9.5.

**Table 9.4** Harvester and export value of *Prunus africana* 1995 to 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Exports tons</th>
<th>Average harvester price kg</th>
<th>Market value Cameroon (FCFA)</th>
<th>Average exporter price kg</th>
<th>Export value FCFA</th>
<th>Export value US$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sources: MINFOF SFP permits, Research results from ASSOFOMI, ASSOKOFOMI and MOCAP-CIG.*
Cameroon has consistently been the world’s largest *Prunus africana* exporter, averaging 38% of global market share from 1995 to 2004. Since 2000 Cameroonian *Prunus africana* has been imported predominantly by France (53% of imports), Spain (31%) and Madagascar (11%), with India, USA, Belgium and China all importing...
around 1% each. Cameroon’s share increased to 48% of global production after 2004 as other exporting countries, such as Madagascar and Kenya, decreased production. Worldwide trade trebled from 2003 to 2005, the majority from Cameroon. CITES export restrictions led to world production decreasing to 641 tons in 2008, sourced from the DRC, Cameroon, Kenya. Only 54 tons was exported worldwide in 2009, all from Uganda. Annual exports from Cameroon are shown in Figure 9.4. Despite data inconsistencies\(^8\) a growing volume is apparent until the trade suspension in 2007 and subsequent gradual resumption. COMCAM recorded exports in 2008 are difficult to explain, given that in 2009 only suspended stock harvested in 2007 was permitted by CITES.

Benefits from *Prunus africana* revenues have extended to local communities in the Southwest, stimulated by the Mt Cameroon project and access and benefit-sharing principles of the CBD. The benefit-sharing system of Mapanja *Prunus* Harvesters Union contributed 1,580,000 FCFA (2,260 US$) to the village development fund in 1998, supporting water and electrification projects (Ndam *et al.* 2004). Revenues to local communities over a nine month period in 2004 amounted to 35,700 US$, of which 2,260 US$ (7%) went to a village development fund and 1,530 (4%) to pay for group functioning costs. The multiplier effects of average incomes reported in the livelihood section included increased house construction, a surge in formal marriages and a greater proportion of children attending school (Ndam *et al.* 2004). MOCAP-CIG continued a benefit-sharing scheme, allocating 5% of the per kilo selling price to nine Village Development Funds, 65% to individual harvesters, 8% to MOCAP-CIG management and monitoring activities and 4% for government taxes. Out of the 15% allocated to the community, 90% is shared equally among member villages, 7.5% among the natural resource custodians (chiefs) and the remaining 2.5% is paid to the host village (Tieghuhong *et al.* 2008). In 2005, 3,700,000 FCFA (7,104 US$) was paid into village development funds, for water and electrification, building markets and community halls (Tieghuhong *et al.* 2008a).

In the Northwest, the Kilum-Ijim Forest Project also encouraged community forests to develop and implement benefit-sharing mechanisms. Generally 50% of community forest revenues were allocated to village development projects, 35% to forest regeneration and 15% for the community forest management institution (WHINCONET 2005). Harvesters received on average 67% of the total forest edge price. Of the total price received for the bark, individual harvesters are paid on average 30 FCFA (0.61 US$) per kg brought to collection point and 40 FCFA (0.81 US$) per kg was kept by the community forest. The money is usually kept in a credit union account, subject to distribution according to agreed rules, with 35% set aside for the running of the community forest management bodies, 50% for community development and 15% for regeneration and training on forest conservation (Samuel Mbu, Emfveh-Mii CF FMI, pers. comm. 2004). For example, ten villages benefitted from the 3.3 million FCFA (6,736 US$) *Prunus africana* revenues by Emfveh-Mii community forest in 2003, with between 40,000 and 225,000 FCFA (81 to 459 US$) per village allocated for development purposes such as a water supply, primary school roofing, a bridge and repairs to Oku Rural Radio, and 250,000 FCFA (510 US$) to traditional authorities. Although the community forest associations (Bihkov, ASSOFOMI and

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\(^8\) Cameroon CITES authorities provide data for the CITES database. Differences may be due to how dried bark, powder and extract were recorded and time lags between authorisations, exports and published data.
ASSOKOFOMI) have benefit-sharing mechanisms, none of the community forests harvesting *Prunus africana* in the period 2004 to 2008 paid dues to the Associations. Only Bihkov produced a report and accounts with details of benefit sharing. Three community forests had major internal conflicts in the period 2004 to 2008 due to mismanagement of funds, and five failed to produce annual reports in this period. A small proportion of harvesters (10%) indicated conflicts due to boundary disputes and Plantecam Ltd. agents not paying. Community members indicated concerns that benefit-sharing mechanisms had not fully been implemented and communities had not sufficiently benefited. Due to the lack of permits and harvesting outside of their management plans, income was illegal for many of the community forests (WHINCONET 2005; Nsom et al. 2007; Stewart 2007b).

Values and volumes of *Prunus*-based medicinal products sold by traditional medicinal practitioners were not investigated. The average values of hoe handles and bark pieces sold for medicinal use in local and national markets are shown in Figure 9.5.

*Figure 9.5*  *Prunus africana* value chains and prices

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Source: Research results
Governance of the *Prunus africana* value chain

To answer the third research question, this section presents and analyses the governance arrangements and trends in the *Prunus africana* chain. The trade in this tree’s bark is one of most highly regulated among forest products in Cameroon and Africa, both formally by national laws and international conventions, customarily and by project-based arrangements.

A plethora of national regulations

Regulation of commercial harvesting of *Prunus africana* started in 1974⁹, when permits were granted for a private company (formerly SODEXMEDIE) to harvest. Plantecam Ltd. received a permit in 1976, following three failed requests, subsequently obtaining permits annually for at least 500 tons a year from 1976 to 1983, and five-year permits for 1,300 tons annually from 1986 to 1996. Two or three permits were issued to other Cameroonian companies in this period. After over-extraction in 1985, rules for harvesting medicinal plants, including *Prunus africana*, were prescribed in 1986 and 1992 (Ministry of Agriculture 1986; Ndibi et al. 1997; Ondigui 2001). In 1986 a requirement to plant three hectares of *Prunus africana* annually from 1986 and five hectares annually from 1992 was enacted. In 1981 the Minister of Agriculture enacted a law¹⁰ following concerns about harvests in the Southwest. The 1994 Forest Law refined this procedure, requiring regional forestry chiefs to specify harvesting methods and quantities exploited. Interviews indicated this requirement has never been provided as part of the permit of special forest product process since 2004 (Joseph Ntsengue Levodo, MINFOF, pers. comm. 2010). A quarter of harvesters interviewed did not know about any rules. The two quarters technique was promoted by projects and apparently in the 1981 law, although long practiced, is of unproven efficacy. Monitoring and inventories highlight that if and when the two quarters technique was applied, high levels of subsequent debarking of the remaining quarters or total debarking occurred. The bark regeneration study (see Nkeng et al. 2009 in Appendix 1) and participatory meetings in 2009 to develop the national management plan provided new insights upon which to base a harvesting standard. Actors in the chain were convinced that a combination of a new governance regime including sole exploitation rights, certified harvesters, a well-publicised harvest standard and a conservative quota would ensure that a revised harvest technique based would work. A harvest standard with a minimum 40 cm and maximum 80 cm exploitable dbh, eight year rotation period taking into account tree health, tracing and tagging system, harvester training and certification and specification of harvesting seasons was incorporated into the guidance for a national management plan (Ingram et al. 2009). Supported by GTZ, the Ministry of Forestry and Wildlife then finalised a national harvest norm in 2010 (Ministry of Forestry and Wildlife 2010). This awaits implementation in the 2013 forestry law revisions.

*Prunus africana* has been regulated as a special forestry product since 1994, through the system of annual, tonnage-based quotas and permits for bark harvested nationwide and/or from specific regions. Felling without special permission is illegal. Permits are granted by an Inter-Ministerial Committee, based on technical reports from regional forestry chiefs that should provide a ‘reasoned recommendation’ of quantities,

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⁹ Decree No. 74/357 of 17 April 1974.
¹⁰ Law No. 81/13 of 27 November 1981.
exploitation areas and harvesting modalities. In practice species and quantities have been indicated on the annual special forest product list and exploitation areas have only occasionally been specified. The lack of coordination at regional Ministry of Forestry and Wildlife level has made it difficult to trace bark to its source and there are no controls of harvesters or harvesting techniques. Although a 2007 Circular introduced a new Cahier de Charge (technical specification), this was not implemented due to the 2007 trade suspension.

The Special Forest Product permit costs approximately 1,000,000 CFA (2,041 US$) plus a payment of 2% of the quota value, and a 10 FCFA (0.02 US$) per kg regeneration tax payable by permit holders in three or two instalments, one of which is in advance. None of the government regeneration projects appear to have been funded from this tax, having other funding sources, and no specific government regeneration projects have been set up for Prunus africana. The regeneration tax is paid on all NTFPs, generating 556,000 US$ for the Treasury in 2003 (Chupezi et al. 2004). Prunus africana government revenues are estimated at 12,101 US$ annually and 29,970 US$ in the peak year of 2005. Permit holders should notify the regional Ministry of Forestry and Wildlife delegation and leave a copy of the permit when seeking to exploit. This often does not often happen or only in retrospect. Harvesting in community forests requires a permit, although again in practice this did not occur. Prunus africana seized after illegal harvesting is auctioned at a public sale, with the buying price usually below the current market price. The buyer does not need a permit but pays an additional 12% of the buying price to the Ministry of Forestry and Wildlife delegation making the seizure. This practice was criticised by traders and community forests as a white-washing: selling illegally harvested Prunus africana cheaply and collusively to the benefit of the local Ministry of Forestry and Wildlife delegation. A Certificate of Origin should be issued by the ministry prior to exportation; however those seen in the Port of Douala office only state Cameroon as the origin and its planted or wild origin.

Granting permits to many organisations for the same area creates unsustainable exploitation by creating a ‘prisoner’s dilemma’ situation, which encourages over-harvesting. The Ministry of Forestry and Wildlife has had difficulty monitoring multiple exploiters, attributing destructive harvests and exceeded permit quotas. The short-term time scale of permits and unspecified locality means there is no ownership of specific sites, thus no incentive to use the two quarters technique or long-term resource management. The procedure is not transparent, with exploiters in the field often not corresponding with weigh bill holders. The expensive, complex bureaucratic permit procedure is difficult for small-scale organisations and community forests to access, taking over two years for some, with the quota received less than requested, making business planning very difficult. International pharmaceutical companies also reported that the short-term permits discourage long-term investment in processing in Cameroon. There have been no sanctions for exceeding permits or destructive harvesting.

Bans have been regularly enacted due to perceived unsustainable extraction. A national prohibition on harvesting was enacted from 1991 to 1992; a 1983 Prefectural Order was applied to Kilum Forest and in 1997 in Ijim Forest, prohibiting farming and grazing in the forest, but permitting NTFP collection. Enforcement was minimal and deforestation rates remained (Abbot et al. 2001). In 1998 harvesting was suspended on Mt Cameroon. In November 1999 an Arrête specified the control systems and the

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governor of the Southwest region imposed a harvest ban. In May 2005 the Divisional Delegate of Bui suspended harvesting from Oku Forest\textsuperscript{12} and in December 2005, the divisional delegate of Fundong, collaborating with the ASSOKOFOMI delegate, seized 5 tons of illegally collected Prunus africana and banned further harvesting. In May 2006 the Sub-Divisional Delegate suspended harvesting in Oku Sub-Division\textsuperscript{13}. In October 2007, harvesting and exports were suspended in relation to the CITES convention.

A national management plan for Prunus africana (Ingram et al. 2009; Akoa et al. 2010) is currently being implemented. Lessons learnt from the trade suspension appear to have generated a more cautious resource management and consultation and consensus-making approach, with the Ministry being more aware of its image nationally and internationally and of contentious governance issues. There is now an “impression that things are going better now in terms of good governance” (H. Ackagou, MINFOF, pers., comm. Nov. 2011). The new arrangements have created Prunus allocation units in the six major production zones. A Prunus Allocation Unit is a wide geographical area in which Prunus africana can be exploited with a long-term permit based on an inventory and management plan agreed by the government and granted on competitive tender basis. Local organisations were to have priority, but in practice, have had to team up with companies. Pharmafric and Afrimed have been granted the Northwest Prunus Allocation Unit (Phillipe Evoe, MINFOF, pers. comm. 2011) as well as Afrimed Mt Cameroon (Mambo Okenye, GTZ and Pierre Kebou MINFOF, pers. comm. 2011). Local community members, via MOCAP-CIG may harvest Prunus africana according the National Park management plan. Harvesting in a National Park is a legal anomaly, as normally no commercial exploitation is possible in protected areas. This was supported by GTZ as part of the Sustainable Management of Natural Resources in the Southwest Province project (see Chapter 6) and approved by the Ministry of Forestry and Wildlife and the Cameroon CITES authority. MOCAP-CIG will continue to represent and coordinate community harvesting, having made a memorandum of understanding with Afrimed, which addresses benefit-sharing mechanisms for revenues (Mambo Okenye, GTZ, pers. comm. 2011; Jean Pierre Kebou, MINFOF Southwest, pers. comm. 2012). These new institutions allowed exports from Cameroon to recommence in 2011.

Until 2010 the regulatory framework was not founded upon a national-scale assessment of resource or threats to ecosystems and tree populations. However many inventories and surveys had been conducted in the Adamaua plateau, the Bamenda Highlands community forests and Mt Cameroon (see Ingram et al. 2009 in Appendix 1). These varied in methodology, with only one (Foaham et al. 2009) using the same methodology for multiple locations. The 2006 CITES Significant Trade Review (STR) required a national management plan based upon an inventory, reflecting the view that inventories are key to sustainable wild harvesting (ETFRN 2000; Wong 2003a; FairWild Foundation 2010). The adaptive cluster sampling method has been proposed as appropriate for unevenly distributed wild tree species such as Prunus africana (Roesch 1993; Thompson et al. 1996; Acharya et al. 2000). There was however no consensus nationally, in academic circles or from CITES on an appropriate inventory method. Inventories on Mt Cameroon (Acworth et al. 1998; Underwood et al. 2000)

\textsuperscript{12} E26/PS/126 Prefectural Order N° 17/2005.
\textsuperscript{13} E26.03/GSB/19/S.1/288 Sub-Prefectural Decision N° 3.
and Bioko Island, Equatorial Guinea (Sunderland et al. 1999a; Navarro-Cerrillo et al. 2008b), used adaptive cluster sampling and led to recommendations for an inventory standard (Hall et al. 2000; Belinga 2001; Betti 2008; Ndam et al. 2008). Inventories in 2007 and 2009 (Nsom et al. 2007; Foaham et al. 2009) further confirmed the transect-based adaptive cluster sampling approach and need to incorporate tree health and prior harvesting in the method. A review of all methodologies by the Prunus Platform in 2008 further emphasised balancing scientific rigour with costs, time and local capacity to conduct inventories. Based on this review, an inventory norm was drafted (Ministere des Forets et de la Faune 2009) and legalised in 2011 after testing in the community forests in the Northwest (Akoa et al. 2010) and on Mt Cameroon. It has been accepted by CITES and the EU as the basis for the national management plan.

Most inventories have been financed by conservation, development and research projects. Responsibilities for financing inventories are currently unclear, with costs running into tens of thousands of euros, dependent upon the area surveyed. Community forests and small exporters and agents complained of the high financial and political capital needed to conduct an inventory and Prunus Allocation Unit permit. Although more expertise now exists in Cameroon to conduct inventories, it is mostly among civil servants, creating potential for corruption. The Bihkov community forest inventory (Tah 2009) highlights how a participatory inventory can use local knowledge, increase awareness and ownership by local people, with the pros and cons thereof (Gregersen et al. 2010; Lawrence 2010). Inventoring cultivated Prunus africana requires a different method than for trees in natural forests. The guidance management plan proposed registration of cultivated stocks by owners, including details on tree age and harvest status. Cultivated Prunus africana started to be registered by the Ministry of Forestry and Wildlife in 2010; however difficulties have been experienced confirming ownership and the low level of awareness by tree owners, farmers and plantation owners. Some traders, such as Kumbo-based Cameroon Medical Plants (CAMEP) enterprise, have inventoried planted stocks to secure resources and raise owner awareness. There remains a widespread lack of knowledge about registration, creating a false impression of stocks. An elaborate regulatory framework concerning Prunus africana has been developed in the last thirty years. However it has been only partially implemented and not been able to control and monitor illegal practices. Despite its strengths in offering a statement of intent and an open competitive nature, it has major weaknesses.

Dash

Corruption feeds off and thwarts the statutory permitting procedures controlling access to the resource, monitoring and sanctioning. The high level of regulation of this high value trade and the small number of harvest areas, channels and actors through which the trade flows – provides a lucrative opportunity for corrupt officials. This then further exacerbates regulatory and customary failures. Corruption aggravates the challenges actors have to operate legally, promoting rather informality and illegality as a (slightly) easier and apparently profitable way of doing business. Corruption thus became an insidious, predictable but incalculable governance arrangement and may continue to do so under the revised Management Plan, as unprecedented power is channelled via government officials controlling inventories rather than participative inventories.

Customary regulations

Of the harvesters interviewed in the Northwest, 66% indicated access restrictions to certain forest areas: protected areas and traditional sacred areas (66%) and private or
family areas of forests and plantations (33%). Access to the open forest was free. Less than 1% indicated changes, due to a part of Kilum-Ijim Forest becoming the Oku Plantlife Sanctuary protected area in 2005. In the Northwest 82% of harvesting was conducted in community forests and the remainder from family farms and other forested areas.

The Kilum-Ijim Forest Project formalised a number of customary rules into the ‘Fon-wide agreed rules’ in 1998. This process was legitimised by the presence of the Ministry of Forestry and Wildlife. The Fon-wide rules created a hybrid institution incorporating new rules, such as tree planting, patrols and fire-tracing. Prunus africana was specifically mentioned as a collective activity, from which the whole community should benefit and was one of four ‘protected’ species from which only mature trees could be harvested for bark and only branches or dry (dead) trees for hoe handles. Traditional rulers in Kom, Bihkov, Nso and Oku subsequently upheld some of these rules. For example, when Prunus africana was harvested in the Laikom sacred forest in 2006, the Fon of Kom commanded the culprit to be found and exploited barks confiscated as punishment. In 2010 these were still held in the palace as a warning to others. In Bakingili, Chief Ephraim Inoni (Prime Minister from 2004 to 2009) also strove to enforce customary rules.

However, in mid-2005 harvesting took place in the Oku Plantlife Sanctuary and the Oku sacred forest, with the implication of Fon Ngum III of Oku (WHINCONET 2005). This was a major about-turn as initially the Fon had been one of the major proponents supporting the Fon-wide rules and community forests during the Bamenda Highlands Forest Project. He was known as a conservationist, winning a prize and grants for his work. Interviews indicated that the Fon’s action was economically motivated, with proceeds spent on a new car. The sudden death of Fon Ngum III in October 2007 was seen by some as witchcraft and retribution for breaking the rules: the car was never used and reportedly has never since worked. The act signalled the end of both customary and hybrid regulations and encouraged others to flout customary and statutory rules, such that by 2007 the largest scale and most destructive harvesting had taken place, encouraged by the government and exporters, signalling the commodification of previously common property resources. This is exemplified by the Fon of Nso who “claimed that people stopped thinking of the forest as a community asset and started to think about it as a resource to be exploited for personal gain” (Cunningham et al. 2000:321) illustrating the gradual degradation and ignorance of customary rights described in Chapter 6 and by Enchaw (2010) and Chi (2004). Many of the community forests reported that they were strongly rebuked for their actions by the traditional councils. The traditional authorities were unable to mitigate conflicts between communities and permit holders in the community forests, or mediate with the Ministry of Forestry and Wildlife. The current Fon of Oku, Fon Sentieh II, aims to reverse this situation, having taken measures to control access revenues (such as the tourist fee to enter the forest, in collaboration with the local council), working with the community forests and with the small remaining Bamenda Highlands Forest Project and project interventions such as those by SNV and the African Intellectual Property Organisation (OAPI). Thus in the Northwest, community-managed and customary controls over Prunus africana have generally not been more sustainable than open access areas where the private sector has had a free reign. Traditional authorities have either not been able to stop destructive harvesting practices or have actively participated in illegal and unsustainable harvesting.
In the Southwest around Mt Cameroon, harvester interviews indicated there were no restrictions on access to the forest or to Prunus africana. Although farms are normally seen as private property, planted Prunus africana was reported as vulnerable to theft, perceived as either wild or simply as valuable and easy to steal. However, most harvesting is conducted in open-access forest, seen as common property of the village, with chiefs and village councils as guardians and the clan as the legitimate landowners of Mt Cameroon. There was thus common affront when Plantecam Ltd. contracted non-Bakweri to harvest Prunus africana bark. This added the perception of a gradual erosion of forest resource rights, starting with colonial appropriation (Schröder, 2000) and the 1981 and 1994 forest laws. Together with further tensions concerning land and forest management and a disregard by some Bakweris for traditional leadership this led to over-harvesting (Ndam et al. 2004).

In Adamaoua near the main harvesting region population density is very low and with few communities within approximately 25 km of the resource, only some semi-nomadic Fulbe/Fulani pastoralists. They did not claim rights to access or control the montane forest and did not know the species or its uses. Reports from traders and their agents reiterated similar experiences and indicated that due to the lack of local knowledge and use, they preferred to use their own teams of non-resident harvesters who could identify the tree and had no fears of working in the remote, steep forests for periods of days to weeks.

Customary regulation has played a major role in both creating and resolving conflicts. Traditional institutions were instrumental in the adoption of harvesting techniques, but when confronted with the large economic gains to be made and weakened by new institutions such as community forests, were unable to enforce sustainable harvesting techniques, control volumes harvested or restrict access. Customary access rules have yet to adapt to the transition from a wild to a privately owned, cultivated species, but a number of rules have been incorporated into new collective governance arrangements (see next section).

Assisted voluntary, collective action
The collective action assisted by projects (community forests in the Northwest and harvesting unions and MOCAP-CIG in the Southwest) has had a clear impact on governance arrangements, although their monitoring, sanctioning and conflict resolution power, location of decision making authority and legitimacy has been highly variable.

The 1980s and 2000s scramble for Prunus africana led to frequent conflicts within and between villages and the forestry service in the Southwest. By November 1996 the conflicts caused the Mount Cameroon Project and Plantecam Ltd. to mediate and set up partnerships between local communities, traditional authorities, government and business to sustainably harvest bark and increase the benefits to local communities (Ewusi 1998). Many illegal harvesters formed harvesters unions, collaborating with village elders and traditional councils to represent villages in negotiations with outside stakeholders. The Mount Cameroon Project brokered an agreement between the Mapanja and Bokwango Harvester’s Unions and Plantecam Ltd., allowing villagers to harvest legally under Plantecam’s license (Acworth and Ewusi 1999). The chiefs realised that the scramble for bark and frequent conflicts within and between villages, the forestry service, the Mount Cameroon Project, Plantecam Ltd. and its harvesters and villagers, posed a problem requiring intervention. The harvesters elected an executive and created union rules and regulations. Representatives from the harvesters’ unions and
community elders, including women, helped reduce conflicts and introduced local governance rules (Tieguhong et al. 2008a). By 2004 the union was seen as a force of social cohesion and of employment (Belawang 2005). Thus traditional institutions were incorporated into new collective governance arrangements and new institutions formed.

The Mount Cameroon Project continued to encourage planting and agroforestry, monitoring and evaluating benefit-sharing mechanisms and conflict resolution. When Plantecam Ltd. closed, the change created new governance possibilities. In response to this opportunity, MOCAP-CIG was formed, grouping the 13 villages involved in Prunus africana harvests to integrate activities in the value chain by becoming harvester, buyer and trader and maintaining a strong community basis. Although MOCAP-CIG has claimed Mt Cameroon as its domain, permits with national coverage and specifically for the Southwest have allowed up to nine other enterprises to operate in the last five years. MOCAP-CIG has not been able to counter unsustainable or illegal harvest for other non-permit holders on the mountain. Despite the inventories and management plan established for Mt Cameroon, by 2006, three of the five blocks were almost totally depleted of exploitable Prunus. Meuer (2007) points out that in MOCAP-CIG-controlled zones there were also infringements. Most areas affected now fall within Mt Cameroon National Park. Even though traditional rulers have had some clout in restricting access to Prunus africana, unsustainable harvesting practices have not been countered by collective action. Local communities and traditional leaders disagreed with some of the Sustainable Management of Natural Resources in the Southwest Province project activities, particularly the upgrading of Mt Cameroon to national park status, partly due to belief in their customary right to harvest and trade Prunus africana. These conflicts prolonged the creation of the park for over four years (see the section on the Southwest project governance arrangements in Chapter 6), and further complicating governance arrangements by adding a layer of formal rules.

In response to the possibility created by the 1994 Forest Law which permits devolved management authority in the form of community forests, twenty one community forests and their associations (ASSOKOFOMI, ASSOFOMI and Bihkov) were set up in the Northwest under the umbrella of the Bamenda Highlands Forest Project, which continued long-term support for them (see Chapter 6 for details). This form of state legitimated collective action developed new rules governing Prunus africana harvest. These all focus on Prunus africana as their main source of cash revenue (ASSOFOMI and ASSOKOFOMI delegates, pers. comm. 2007). Harvest zones and periods were defined in simple management plans (SMPs) and protection patrols and regeneration plans included planting Prunus africana. None included inventories or annual quotas. Although the attribution process was long and difficult, most of the local population and community forest committee members considered the community forests as ‘theirs’. All the community forests had started protection and conservation and also developed new income-generation activities (such as ‘modern’ beekeeping and bamboo paper making), however many were not fully established and for some the attribution process was not finished as demand for the bark grew. In response, harvesting occurred in half of the community forests. Four community forests exploited Prunus illegally (see Table 9.3) (i.e. not according to their SMP). This was purportedly following a signal from the regional Ministry of Forestry and Wildlife delegation that Prunus was ‘needed’ in collaboration with buyers. Six community forests failed to renew their simple management plans upon expiration in 2006 and 2007 but also continued harvesting. Despite these infringements of their own rules and the SMPs agreed with the governments, these community forests were not subjected to sanctions for harvesting
bark, but for some the finalisation of their attribution files was delayed and in two cases, lost and had to be resubmitted. Whether this is connected is not known, as an awkward and difficult attribution process is common in Cameroon (Beauchamp et al. 2011). The community forests paid dues to Fons to secure their commitment to these new institutions, which in effect decreased the powers of traditional authorities over the forests (Enchaw 2010). The community forest associations ASSOKOFOMI and ASSOFOMI aimed to provide a common voice for the community forests and created an additional hybrid institution, channelling information and power. The community forests and their associations created new local institutions with forest access and management rights, relocating rights away from traditional control, but without granting corresponding monitoring or sanctioning powers and responsibilities, or economic capital to enable this. Thus when the traditional authorities failed to receive the promised economic and political capital under the community forest benefit-sharing mechanism, their motivation to collaborate was low. The scale and destructive harvest technique used raised alarm among local conservation organisations and in the community forests, many of which had not yet harvested by the end of 2005 (WHINCONET 2005).

Community forests are currently being established in the Southwest around Mt Cameroon National Park with support of the Sustainable Management of Natural Resources in the Southwest Province project.

**International conventions**

Cameroon became a party to CITES in 2005, acquiring its history of regulating the species. *Prunus africana* was listed as a CITES Appendix II species in 1995, meaning it is not threatened by extinction, but may be so if trade is not regulated. Producer parties, such as Cameroon, have to declare exports, to set a ‘scientific non-detriment findings’ for the growing annual quotas (see trends in Figure 9.6) and report these to CITES.

*Figure 9.6*  *Prunus africana* quotas and exports from Cameroon 1995 to 2011

Concerns about the sustainability of international trade and wild harvest were voiced in the mid-1990s (Cunningham et al. 1993), culminating in a CITES Significant Trade Review in 2006 (CITES 2006; Cunningham 2006a). The Significant Trade Review process identifies problems and solutions in implementing the Convention and acts as a safety net to prevent species decline due to international trade. An alternative is to transfer the species to Appendix I where no trade is permitted. The Significant Trade
Review recommendations included maintaining Appendix II status and supporting and monitoring cultivation with wild harvest as a short-term measure in the transition to cultivation. A Working Group established to guide the implementation of recommendations offered a survey and management plan of Bioko as a model (Clemente Muñoz et al. 2006), classifying Cameroonian *Prunus africana* as of ‘urgent concern’. Cameroon was also required to review the current export quota and establish a conservative, reduced quota for export within three months; carry out an inventory of standing stock, establish estimates of sustainable harvest; develop a scientifically based system to monitor harvested and un-harvested populations by July 2007; collaborate with Nigeria on trade monitoring; and establish a long-term management plan for sustainable use within two years. Using the EU’s legally binding CITES Regulation on its member states, in July 2004 the EU Scientific Review Group requested information from Cameroon and other countries on their management of the species. Failure to provide this would lead to trade suspension with the EU. In March 2005 import from Cameroon were provisionally allowed, but in June 2005 further data was requested on how the annual export quota was calculated.

Despite support from the Working Group, the government found the ‘reasoned recommendation’ and ‘scientific non-detriment finding’ difficult to establish and was unable to meet the requirements. News of the destructive and large harvests in 2005 and 2006 reached conservation organisations, CITES and the EU, stoking fears, at the time unsubstantiated by evidence, of unsustainable trade. In October 2007 the EU Scientific Review Group subsequently suspended *Prunus africana* imports to EU member states, the main importing countries. The Ministry of Forestry and Wildlife responded with two Ministerial Circulars in November 2007 outlining management measures, procedures for gathering statistics and administrative requirements. A CITES Working Group workshop in Naivasha in September 2008 aimed to support CITES Management and Scientific Authorities of seven priority countries, including Cameroon. In January 2009 trade was also suspended from Tanzania, Equatorial Guinea and the DRC, dramatically decreasing the global availability of *Prunus africana*. As the Lima 2006 recommendations were not met, Cameroonian exports to the EU remained suspended for most of 2008. Eventually the origins of bark 646.5 tons held in stock from the 2007 harvest were traced, leading to CITES granting a quota for 1,000 tons of powdered bark in April 2008, exported in 2009 to France and Spain. This was critical as stocks held by European importing companies were reportedly almost depleted. It also maintained the faith of Cameroonian actors in the chain. Cameroon declared a zero quota for 2009, buying time to respond to the recommendations.

Actors joining the Prunus Platform indicated a wish to continue exporting bark, and so, with support from the Ministry of Forestry and Wildlife the National Forestry Development Agency, the FAO-CIFOR-SNV NTFP project and GTZ, an action plan

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was developed in September 2008 to meet CITES recommendations, followed by a guidance document in 2009 (Ingram et al. 2009). The Cameroon CITES authorities used this to develop a National Management Plan – defining Prunus Allocation Units, an inventory norm and a harvest standard. At the end of 2010 this plan (Akoa et al. 2010) was submitted to CITES, belatedly supporting the Northwest inventory and a 150 ton quota request granted in December 2010 and March 2011 (Andre Nna, MINFOF, pers. comm. 2011). Further inventories in the Southwest led to a resumption of trade in 2012 with a quota of 658 tons. This reinstated Cameroon as the world’s leading exporter, with small amounts permitted from the DRC (72 tons) and Uganda (176 tons) in 2012.

The impact of CITES has been wide-reaching. Actions to meet the Lima 2006 commitments were insufficient, despite the threat of penalties. Only with the trade suspension were the repercussions clear. Until then the government saw Prunus africana (along with NTFPs in general) as of minor importance, providing a meagre contribution to state revenues (Joseph Ntengue Levodo, MINFOF, pers. comm. 2008). The suspension, subsequent meetings, lobbying and support from CITES Scientific Review Group and stakeholders flagged up the environmental, social and economic importance of the bark exports and placed it on the forest, development and conservation agendas.

Prunus africana is a favoured subject of the access and benefit sharing (ABS) component of the Convention on Biological Diversity (CBD) (United Nations Environment Programme 1998; Chupezi et al. 2004; Ekpere 2007; Laird et al. 2008; Secretariat of the Convention on Biological Diversity and Central African Forests Commission 2009; Samndong 2010; Union for Ethical Biotrade 2010). A common theme of these studies has been its high value, declining stocks, high contribution to harvester’s livelihoods – and presence of the scheme on Mt Cameroon to share benefits. However benefits to others in the chain and in other areas are not discussed. Samndong (2010a) highlights a gap between definitions of genetic and biological resources in the CBD and implications for negotiations on national and international levels. Also that Prunus africana exports are not a direct use of genetic resources as defined in the CBD, but an indirect use, since only components of the bark extract are prospected, not the gene directly. Unduly emphasising and restricting its trade may affect communities dependent upon the tree for their livelihoods. The studies all reiterate problems of ineffective institutional structures and need for capacity building to address access and benefit sharing.

Exporters and importers revealed a lack of awareness of access and benefit sharing discourses and their low level of impact on livelihoods except in Mt Cameroon. Access and benefit sharing schemes neither prevented large-scale uncontrolled harvesting leading to the trade suspension or subsequent negative effects on livelihoods, nor increased harvester’s rights nationwide. A lobbying report (GAIA/GRAIN 2000) argued for the negative impacts of commodification on local livelihoods and the intrinsic value of biodiversity. This however does not reflect feelings in the Northwest and Southwest expressed from 2007 to 2009 whilst developing the national management plan. The main priority of harvesters, traders and exporters were their livelihoods (financial capital). Local trade, ecological and cultural value were stressed only by support actors:

local and international NGOs, development organisations, researchers and occasionally the government. Equitable benefits were a concern for harvesters and their associations, due to their realisation of the large profits gained by the pharmaceutical industry and that they were unable to add more value to the product in Cameroon. The unique situation of Cameroon being the main exporter globally was seen to give harvesters a better bargaining position. In contrast to the GAIA lobby not to privatise, many actors indicated a wish for community organisations and individuals to obtain ownership and tenure rights, privatising the resource and ensuring better management.

Other international agreements have also affected the chain. In 1998 *Prunus africana* was classified as a vulnerable species (IUCN 2006). Renowned botanists have argued that the species was not remotely in danger of extinction, being very common in its range, as long as montane forest survives, proposing a rating of ‘least concern’ or ‘near threatened’ in Kilum-Ijim Forest (Cheek *et al.* 2000) and ‘lower risk, near threatened’ on Mt Cameroon (1998d). The classification has been contested as inappropriate as the species is locally common, although threatened by low densities, in shrinking and increasingly degraded montane ecosystems and high levels of harvesting. This led to a comment that “further consultation with all parties concerned is required” (IUCN 2009). The classification remains unchanged to date. Developments since 1998 across all the range countries indicate that the Red Data listing drastically requires updating, as it is an important influence on decisions made by CITES, conservation and development programmes. The majority (94%) of harvesters interviewed had no knowledge that *Prunus africana* is a protected species, classed as vulnerable, or that it is endemic.

**Project governance**

The Mount Cameroon, Kilum-Ijim Forest and Bamenda Highlands Forest projects (see Chapter 6 for details) all used community participation in the management and protection of forests, based on a philosophy that this allows dual objectives of income generation and biodiversity conservation to be met. To date however, community management has not been evidenced by an improved track record concerning *Prunus africana* compared to non-project or protected areas. In the Southwest and Northwest examples abound of unsustainable impacts (Nurse *et al.* 1995; Ewane 2001, Tieguhong, 2008; Ewusi *et al.* 2001; Gabriel 2003; Gardner *et al.* 2001; Sumelong undated). The GTZ monitoring study (Meuer 2007) indicated that MOCAP-CIG was unable to control unsustainable harvest by others (or its own members).

Community forestry was one of the main approaches used by projects (see Chapter 6 and above section on Assisted, voluntary collective action). The Mount Cameroon, Sustainable Management of Natural Resources in the Southwest Province and FAO-CIFOR-SNV NTFP projects were highly instrumental in creating an inventory and harvesting standard, conducting training and building awareness of the two quarters harvest standard (Hall *et al.* 2000) around Mt Cameroon in the late 1990s and the Northwest in 2007. Actors with little incentive to harvest sustainably (buyers and non-indigenes on Mt Cameroon (MOCAP-CIG 2007) and in other areas) were not targeted by projects, creating gaps in skills and understanding nationally. The Mount Cameroon and Bamenda Highlands Forest projects were also enforcers, financiers and initiated and implemented management, monitoring and evaluation (Acworth and Ewusi, 1999; Ewusi, 1998). For example, if harvesters exceeded their allotted bark quota, penalty compensatory payments to a Village Development Fund were required. Continued over-extraction led to fines or a cessation of harvesting for some days. The Mount Cameroon project held capacity-building workshops with harvester unions to increase
participation, motivation and trust among members (Ewusi 1998). GTZ has continued assisting MOCAP-CIG to date, including securing the right to harvest in Mt Cameroon National Park. Projects by the IUCN and WWF Wildlife Trade Monitoring Programme (TRAFFIC), GTZ, FAO and CIFOR were also influential in clarifying and developing a harvesting norm and pushing this to become a legal instrument. CITES and ITTO projects (ITTO-CITES 2010) built staff and institutional capacity of the Cameroonian management and scientific authorities, aiding them to build the national standards and to meet CITES requirements.

Strong, plural bricolage

The differences between Cameroon and other Prunus africana-producing countries (CITES 2008; Navarro-Cerrillo et al. 2008a) indicate that the governance arrangements are a major factor impacting livelihoods and sustainability. The Prunus africana chain is characterised by strong, multiple arrangements and institutional bricolage. The arrangements governing the international bark chain have been gradually crafted over the last forty years to make this one of most regulated forest product chains and products in the country and in Central Africa. Formal regulation has grown since the 1980s, influenced strongly by international conventions and standards. Enforcement however has been arbitrary and ineffective, regularly resulting in illegal harvesting and dubious transactions. Customary regulations (non-existent in Adamaoua, but present in the Southwest and Northwest) have been added, and sometimes overrun by projects. Community-based companies and community forests created hybrids with difficult existences: sometimes adding on to, collaborating with or dependent upon, occasionally subjugated to and often challenging traditional and regulatory authority. This has led to further alienation and disabling of the power of customary institutions to control increased commodification. The local chain for bark and wood is entirely governed by strong customary and weak market-based systems. Scored using the system introduced in the methodology in Chapter 3 and detailed in Appendix 18, the arrangements are illustrated in Figure 9.7.

**Figure 9.7** Governance arrangements in the Prunus africana chain in Cameroon
Governance and livelihoods in *Prunus africana* chain

This section addresses the fourth research question of how governance arrangements affect the livelihoods of actors along the chain, using the sustainable livelihoods approach.

The governance arrangements of the international chain for medicinal use of the tree’s bark have gradually increased and multiplied with international fears of over-exploitation and increases in the level of threat to the species and its increasing value since 2000. In contrast, although *Prunus* bark and timber are valued for subsistence use, with a fifth of harvesters interviewed engaging in local trade and exchange, traditional use of the bark and wood is largely unregulated. Despite the low level of processing and value adding of the bark destined for international trade in Cameroon since 2000, the simplicity of activities taking place in the chain in Cameroon, year round harvesting, long shelf life with low losses and high demand mean that a significant number of people have profited from the international chain. Approximately 1,464 people benefitted directly from exported *Prunus africana* incomes in the study period.

Given the average household size, approximately 13,375 people benefit in total in the Northwest and Southwest regions. There are also indirect, non-cash benefits from revenue benefit-sharing schemes for an estimated 71,500 people in communities around the Mt Cameroon and Kilum-Ijim Forests. Thus around 86,339 people benefit from the international chain in Cameroon, including 21 community forests and a community-based enterprise, over 829 smallholder tree owners, around 455 harvesters, up to 11 traders, five exporting enterprises and an estimated eleven importing and processing companies internationally.

In the peak years of harvest *Prunus africana* contributed up to 80% of household incomes for harvesters in the Southwest and was one of the main income sources for half of harvesters in the Northwest. It has been a source of income for on average 16 years and for 68% of harvesters for more than 20 years. For retailers, traders and exporters, it has been one of their main income sources alongside other medicinal plants for on average a decade. Regular *Prunus africana* revenues have been used to meet basic household needs in the Southwest and in the Northwest, the occasional harvests have contributed to major investments such as housing and marriages. For harvesters, *Prunus africana* is generally very profitable, equivalent to 3,100 FCFA (7.03 US$) per day, well over a 2 US$ a day poverty line. In the Northwest, the average income generated per harvest and harvester was 160,197 CFA (SD 90,257) (363 US$ SD 204), with 46% earning over 150,000 FCFA (339 US$) from harvests over the last decade. Higher incomes in the Southwest are due to *Prunus africana* harvesting being a regular activity since the 1970s, whereas in the Northwest it is largely undertaken only occasionally. Revenues paid for food (30%), school fees (17%), household needs (16%), healthcare (15%), clothing (8%) and weddings (2%). Profits vary depending upon transport costs from forest to pick up points and upon bargaining power, with members of unions and community forests obtaining higher prices. Its increasing value in the long term has meant that nurseries selling *Prunus africana* seeds and seedlings have provided regular incomes in the last decade. For importers and pharmaceutical companies, the bark extract has been the source of a lucrative trade for over forty years. For many consumers, it is an effective and relatively low cost treatment for common medical conditions.

Average net daily income from *Prunus* harvesting in the Southwest is shown in Table 9.5. Most harvesters think in terms of gross revenues, rather than net profit. In
In 2004, the 60 Mapanja Prunus Harvesters Union members earned around 532 US$ each (Ndam and Tonye, 2004). Union members had 74% higher revenues than non-members in the area (Ndam and Tonye, 2004): affiliated harvesters earn on average 50 FCFA (0.9US$) per kg more than non-organised harvesters. Hence collective action makes a difference.

**Table 9.5**  Average daily *Prunus africana* harvest revenues, Southwest

<table>
<thead>
<tr>
<th>Activities</th>
<th>Duration (hours)</th>
<th>Costs (FCFA)</th>
<th>Income (FCFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (260 FCFA per kg * 30 kg)</td>
<td>8</td>
<td></td>
<td>7,800</td>
</tr>
<tr>
<td>Travel on foot to forest</td>
<td>1.5</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Finding suitable trees</td>
<td>0.5</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Measuring tree girth and cleaning</td>
<td>0.5</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Meals</td>
<td>0.5</td>
<td>675</td>
<td></td>
</tr>
<tr>
<td>Climbing tree</td>
<td>0.5</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Debarking and bundling</td>
<td>2.5</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>Transport bark to village</td>
<td>2</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
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<td></td>
</tr>
<tr>
<td>Gross total</td>
<td>8</td>
<td>2,300</td>
<td>7,800</td>
</tr>
<tr>
<td>Contribution MOCAP benefit sharing scheme (80 FCFA*30 kg)</td>
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<td>2,400</td>
<td></td>
</tr>
<tr>
<td>Net total</td>
<td></td>
<td>4,600</td>
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</tr>
<tr>
<td>Profit</td>
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<td></td>
<td>3,200</td>
</tr>
</tbody>
</table>

Source: Research results

The formal regulation of the trade from 1985 to 1994 allowed many permit holders to operate, creating completion for *Prunus africana*, enabling owners, farmers and harvesters to negotiate higher prices. The open access to the resource created a classical tragedy of the commons scenario, where it was in the interests of each permit holder to fell or harvest trees because if they didn’t, someone else would. The monopoly of Plantecam Ltd. till 2000 provided regular and stable incomes, and institutional arrangements with harvesters, particularly in the Southwest, led to regular, high incomes. The combination of granting permits to more companies from 1994, laxly and unenforced formal controls with increasing global demand and reduced supply from other African countries, presented increasingly lucrative opportunities for uncontrolled harvesting across the country, allowing more actors to easily and profitably join the chain. Projects supporting community forestry quickly added both rules and new actors interested to benefit from the ‘green gold’ (Page 2003). A tragedy for livelihoods occurred in 2007 with the EU CITES trade suspension abruptly ending exports and leading to a two-year period of uncertainty with little to no income for any actors in the chain. This forced actors to work together to bricolage new governance arrangements, dictated by international conventions and based on revised formal regulations, customary best practices and projects. The resulting arrangements appear a framework for more sustainable livelihoods in the long term.

**Governance and sustainability in the *Prunus africana* chain**

This section answers the fifth research question of how the governance arrangements impact on product sustainability. The sustainability of harvesting *Prunus africana* depends on interrelated variables: the quantity and health of wild and cultivated trees, sustainable bark yields i.e. the quantity of bark which can be harvested and the rate at
which a tree can be repeatedly harvested and remain healthy and productive, and maintain tree populations.

Quantifying the resource and its health: inventories
Despite the studies summarised in Ingram et al. 2009, a national overview of the quantity of Prunus africana in the major production zones did not exist when this research commenced. Thus two surveys\(^{19}\) were conducted within the framework of this study, experimenting with and testing methodologies.

Stewart (2009) and the surveys quantified and confirmed the legacy of repeated harvesting in the Northwest: between a third to 60% of trees of harvestable size had been exploited, mostly unsustainably (from 62% in Ijim community forest to 98% in Emfveh Mii community forest). Tree health varied from nearly all (98%) being in good condition in Ijim to less than half (47%) in Emfveh Mii and 13% mortality. Very little regeneration and fruiting were found in either community forest. The 2008 Kilum-Ijim inventory (Foaham et al. 2009) indicated a much lower availability (11 tons annually over the next ten years if sustainably harvested) than previously harvested. In the Southwest, surveys (Tasse 2006; Meuer 2007) also indicated the detrimental impact of harvesting on tree health. The 2007-2008 inventory (Foaham et al. 2009) indicated a higher density than previous studies, attributed to the larger sample and location of transects, with an estimated 272 tons of bark from wild sources annually over 10 years if sustainably harvested and 5 tons annually from plantations. Mts Kupe and Muanengouba had lower density and healthier stocks, with 22 tons annually estimated as available over the next decade.

The negative impact of unsustainable harvest techniques upon tree health and mortality health was confirmed, with significant reductions in crown size after harvest (see Nkeng et al. 2009 and Foaham et al. 2009 for details in Appendix 1). Despite training and the best practice standards and decree, the majority (61%) of trees in all the main harvest zones surveyed were debarked unsustainably. This was predominantly in forests, especially those with easy access. Only 9% were harvested according to the Two Quarters technique, mainly in privately-owned plantations and some areas of Mt. Cameroon controlled by MOCAP-CIG. Less than a third (29%) of trees were under-exploited, mostly in difficult access areas in Adamaoua and the Northwest. In the community forests in the Northwest, higher levels of unsustainable debarking were found: 98% of trees in Emfveh Mii community forest, 62% in Ijim community forest. In Bihkov community forest, 30% of trees over 60 cm dbh died when poorly or over-exploited compared with 17% when the sustainable technique was used. An increase in unsustainable harvesting is also apparent over time: in Adamaoua in 1999 11% of trees had been unsustainably exploited (MINF et al. 2000) and on Mt Cameroon in 1999 36% of trees were unsustainably debarked (Underwood et al. 2000), increasing to 43% in 2007 (Meuer 2007).

This data suggests that younger, smaller trees can withstand over-extraction and larger trees are most vulnerable, resulting in poor health or death. Mortality occurred between two and seven years after harvest, confirming Navarro Cerrilo (2008b) and Stewart (2001). The mortality rates found in this and other surveys are all higher than in natural populations (Stewart 2001), indicating a positive correlation with unsustainable

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\(^{19}\) Supported by the FAO-CIFOR-SNV NTFP Project and reported in Chapter 3 on the methodology and in Nsom et al. 2007 and Foaham et al. 2009 in Appendix 1.
harvesting, shown in Figure 9.8. As Stewart (2009) notes, the death of large trees has implications for population regeneration, as they produce most seeds. However, older trees do exist. This finding sheds new light on the data presented in the 2006 Significant Trade Review. The majority of normally exploited trees were in perfect condition and had not died. This supports Cunningham and Mbenkum’s (1993) observations and the Mount Cameroon Project that *Prunus africana* can withstand repeated limited bark removal after a period of years.

**Figure 9.8** Relation between tree mortality and harvest technique

![Graph showing tree mortality and harvest technique](source: Research results)

The surveys and comparisons with previous studies demonstrate the wide variations in density, tree size, stocking levels, phrenology, post-harvest regeneration and mortality rates for the main production areas. Density and distribution appear to be correlated with previous extraction. The inventories confirm the typical clumped and patchy distribution of *Prunus africana*, which may be exacerbated by harvesting. They also confirm the wide variations in density found across Africa (Hall et al. 2000). However, the lack of a national baseline and different study locations do not provide accurate, longitudinal evidence of a declining resource nationally. The surveys do however strongly suggest locally declining natural populations on Mt Cameroon and Kilum-Ijim, with abnormally low tree density, poor health and high mortality rates and evidence that this is due to repeated harvesting. The differences between populations and harvesting activities per production area make it impossible to nationally assess the national status of *Prunus africana* populations or to extrapolate from one site to another. However, this is exactly what happened: alarms raised concerning Mt Cameroon were inferred to the total population of *Prunus africana* in Cameroon. The surveys also highlight how anthropogenic activities upon the ecoregion impact on the quantity of *Prunus africana*. Bushfires, livestock grazing and forest degradation by agriculture inhibit natural regeneration by decreasing numbers of seeds and of seed dispersers, such as primates – many of which have recently become extinct (Ingram et al. 2008), birds (Fotso et al. 1991), frugivores (Gautier-Hion et al. 1985; Maisels et al. 2001; Wang et al. 2007; Farwig et al. 2006) and possibly bees – important *Prunus africana* pollinators (Tangkeu 2011).

In natural forests the inability of customary authorities to control access in the Northwest and their open access nature on Mt Cameroon and Adamaoua, combined with a regulatory system that allowed multiple permit holders open access to an quantified resource, stimulated competition. With no responsibility to maintain resources, no or low levels of enforcement and with opportunistic corrupt officials, this
created an operating environment emphasising short-term economic wins through unsustainable extraction. The new regulatory framework aims to counter these problems.

Quantifying the resource: cultivation

Tree domestication is the process where species are adapted for cultivation from their natural state. As shown in Appendix 1, inventories up to 2009 had focused on wild *Prunus africana*. The 2006 CITES Significant Trade Review reported that in Cameroon “all bark entering the international market is from wild harvest” (CITES 2006: 5). This was despite many commentators noting domestication and cultivation activities in the last four decades (Cunningham *et al.* 1993; Cheek *et al.* 2000; Hall *et al.* 2000). Interviews indicated that *Prunus africana* has been cultivated in the main zones since the early 1970s. Nearly one-third (29%) of harvesters in the Northwest indicated they had planted trees. Of those who had not, 61% said that this was because they did not know how; 15% because it is time consuming and difficult; 20% because it is still available in the forest “so there is no need” and 4% due to a lack of land. On average farmers in Bui and Donga Mantung Divisions had 250 trees each, ranging from one to 600 with 75% owning up to 25 trees. In the Southwest, the majority of harvesters (95%) had not planted, quoting the same reasons. The 2009 survey indicated that 34 plantations contained trees on average 14 years old, 41% (115,490 trees) of which were over this median age. Approximately 70% had never been harvested. Some 25% were located in pure strands, the rest were mixed with other agroforestry species. Given an average survival rate of 32%, it is estimated that around 515,200 trees currently exist in plantations, equivalent to approximately 86 tons annually on a 10 year rotation. Interviews also indicated that a further 4,821 individuals, 78 CIGs and 20 community forests had planted at least 1,698,481 *Prunus africana* trees (Ministry of Forestry and Wildlife 2008, Foaham *et al.* 2009). Most have been planted by individuals on farms and family compounds supported by government projects (Forestry Funds, the former Office National de Développement des Forêts (ONADEF), the Capacity building for community-managed forest and fauna resources initiatives (KIFP) and the Support Programme for Rural Forestry and Agroforestry (PAFRA). At least 15 projects (such as the Mount Cameroon, Kilum-Ijim and Bamenda Highlands Forest projects, and shorter term projects by ICRAF, HELVETAS and local NGOs which facilitated planting by individuals, in community forests and communal spaces such as schools and watersheds. Initially required by law, government projects enabled planting in natural forests and on government-owned plantations.

Based on this data and reports (Nkembi *et al.* 2008; Franzel *et al.* 2009), five types of cultivation can be characterised: plantations by small companies and the Cameroon Development Corporation, around 3% of cultivators; pioneer owner-farmers from the early 1970s onwards, with varying motives (firewood, traditional medicinal and/or commercial use); high-income, progressive owner-farmers, including traditional ‘notables’ (6% of cultivators) who purchase seed, often from nurseries or individual collectors in Buea, Fundong, Kumbo or Oku, 19% of whom had over 100 trees, on average 993 up to 8,000; small-scale ‘opportunistic’ owner-farmers – the majority of owners – with 81% having less than 100 trees, on average 15 trees each; and community groups, councils such as Kumbo Council with 52,000 trees, and organisations such as the Banso Baptist Hospital and water catchments such as Kiko Roh Vitangtaa.
An overview of cultivation over time, by location and type of planter is given in Ingram et al. 2009 (see Appendix 14). An estimated total of at least 1,616,815 cultivated trees exist, representing around 63% of total stocks known in Cameroon and an important genetic source. This has enhanced access for farmers and planters to diverse tree germplasm and provides a critical stock for regeneration and long-term maintenance of the population in Cameroon. These facts demonstrate the previously unrecognised large-scale of domestication, reinforced by the number of plant nurseries, especially in the Northwest. Figure 9.9 summarises the trends in planting of *Prunus africana* trees annually and Figure 9.10 the number of new plantations. The peaks correlate with high bark harvests from 1995 to 1996 and 2000 to 2007. The private sector has become more interested as the impact of the 2007 trade suspension has been felt, with international pharmaceutical companies discussing options to support cultivation with their Cameroonian buyers, such as Afrimed. The Ministry of Forestry and Wildlife commenced inventories in 2010 to implement the national management plan; however farmer and owner awareness of the need to register *Prunus africana* remains low, in part due to uncertain land tenure. Cultivation has been stimulated by the species’ economic and cultural value and by governance arrangements. Early laws and a series of conservation, research and development projects promoted institutions supporting cultivation. This long history and wide scale of domestication and cultivation activities is strongly in contrast with CITES’ impression that “cultivation is taking place on a small scale in Cameroon” (CITES 2006: 5).

This finding questions two of the assumptions upon which international trade governance arrangements are based: CITES and the species Red data listing. It suggests that the threats to the national species population are less than supposed, corroborating Cable and Cheek (1998) and Cheek et al. (2000). Domestication and subsequent cultivation have provided an alternative supply source from wild *Prunus africana*, challenging the supposition that the trade is of a ‘wild’ and endangered species as the basis upon which international trade is governed. This finding indicates that trade may have been more sustainable than supposed by the numerous trade bans, and that there is potential for cultivated sources to enable continued, sustainable trade.

*Figure 9.9  Prunus africana* seedlings and trees planted 1988 to 2008

*Source: Research results*
Sustainable bark yields
Regulatory control since the 1980s has concentrated on repeated harvesting of live trees. However evidence to support the sustainability of this practice, based upon the premise of bark regeneration, is lacking (Ndam et al. 2004) and depended upon anecdotal evidence from Plantecam harvesters (Ndam et al. 2008). Bark regeneration depends upon tree health pre and post-harvest, the rate of bark growth post-harvest and the time period between harvests (i.e. the rotation). The regulatory framework has ignored these factors and outlawed felling to harvest bark. Thus the use of multiple tree parts, as occurred in Kenya and Madagascar and promoted as economically attractive particularly for cultivated trees (Franzel et al. 2009), is barred.

The bark regeneration study\(^\text{20}\) evaluated bark recovery and potential yields post-extraction in the three main harvesting regions. The results indicate that over 60% of harvested trees were over-exploited (i.e. more than two quarters had been harvested) and 9% sustainably harvested. Bark recovery rates differed significantly by ecoregion location, with a thickness of 0.12 m (SD.05) in Adamaoua, 0.1 m (SD 0.03) in the Northwest and 0.06 m (SD 0.02) in the Southwest annually. Recovery reached 15% of original bark thickness in the first and second years after harvest and progressively dropped to an inflection point (7%) between the seventh and eighth year. This indicates that at least a seven year rotation period is the most sustainable period for repeat harvesting, adjusted to take into account the aforementioned ecoregion differences.

Harvests from trees of 30 cm dbh appear most sustainable because of higher recovery rates (8% annually) and higher average bark thickness (1.3 cm) up to the first branch.

Tree growth rate was faster (14 SD 0.5 m compared to 9 SD 0.2 m tall) in altitudes less than 800 m, however insect attacks (in 94% of trees surveyed) are severer below 1,000 m, indicating that trees at lower altitudes may require a longer harvest period to reduce mortality risks. Generally there was an abundance of seedlings and small trees in open forest, canopy gaps and forest edges, however few seedlings over 5 cm tall were found near living trees and seldom found in closed forest canopies. This confirms Ewusi et al. (1992), Ndam (1998) and Hall et al.’s (2000) observations of the light-loving nature of seedlings.

\(^{20}\) Supported by the FAO-CIFOR-SNV NTFP Project. See Chapter 3 on the methodology and Nkeng et al. 2009 in Appendix 1 for details.
The national regulatory framework until 2010 was demand based, not upon availability, even when inventory data was available and sustainable yield for a given area could have been calculated. As part of the guidance for a national management plan (Ingram et al. 2009), an annual sustainable yield equation was developed, building upon past work (Acworth 1997; Underwood et al. 2000), the 2009 and 2010 inventories and the bark regeneration study. This was calculated based on the population density of exploitable trees, area of forest containing Prunus africana, average sustainable bark yield per tree and the time taken for bark regeneration. Regular re-measurement of sample trees over time is recommended to determine the long-term impacts of harvesting on tree recovery and bark regeneration.

Long-term rates of mortality, recruitment and growth must be known or estimated to determine the sustainability of the harvesting cycle. Tree growth rates were calculated by size class distribution (the diameter size over a range of tree ages) in a Prunus Allocation Unit and taking into account previous harvesting. If a larger amount of the smallest two size classes and a large number of the oldest classes are present, this can assure regeneration. Given mortality rates averaging 17% in Cameroon (Ingram et al. 2009), a verification of tree health and recovery rates of harvested trees is necessary to determine mortality after first and second harvest (i.e. when the entire circumference of the tree has been stripped). These can be verified using a mortality, recruitment and growth equation (see Appendix 8) that incorporates the number of trees standing at the beginning and end of an harvesting cycle, the number of tree mortalities and tree recruitments during the harvesting cycle and the average yield of bark per tree (kg fresh weight/trees/harvest) by size class. These calculations led to the sustainable yield formula being incorporated into a national inventory norm (Ministere des Forets et de la Faune 2009).

Harvest techniques used for local chains for medicinal bark and wood for hoes appear sustainable, given the preference from cultivated sources, small-scale of harvesting and no reports or observations of poor tree health or of mortality. Whilst governance arrangements such as the 1986 law on harvesting techniques and the subsequent company and project-led two quarter standard specified how to harvest, they did not define the sustainable yield of bark from individual trees. Projects such as the Mount Cameroon project researched yields but this did not emerge as a governance tool and aided the introduction of rules limiting the frequency and quantity harvesters associated with unions could carry in the Southwest. These rules were known only by some harvesters in some regions and largely unenforced, with offenses resulting largely in blanket, short-term bans on harvesting, a few penalties for individuals and none for companies or community-based organisations. Thus none of the governance arrangements have sought to regulate sustainable harvesting either on an individual tree or on a population, ecoregion or landscape level. Hence no regulations exist regarding the quantity of bark that can be harvested and the rate at which a tree can be repeatedly harvested and remain healthy and productive nor the quantity that can be harvested from wild and cultivated populations whilst maintaining that population. However, the EU trade suspension sent shockwaves and forced reflection of and ultimately adherence to the institutions set out in international conventions. This research was a key factor in helping to address how to define sustainable yields on a production zone level and reconfigure the formal and informal mix of actors and institutions to enable this.
Conclusions

The analysis of the *Prunus africana* chain originating from Adamoaoua, the Northwest and Southwest regions of Cameroon indicates that governance arrangements have strongly influenced how the chains are configured in terms of values. Also how the products are sourced, harvested and traded. This section draws conclusions, responding to research questions two to five on the governance arrangements in place; how these impact the livelihoods of actors; and how these impact chain and product sustainability.

*Prunus africana* products are characterised by high values, providing an important economic contribution to actors’ livelihoods. In the last forty years the multi-purpose uses of this tree have changed from local uses by the montane ecoregion communities to create substantial wealth for these and other actors in Cameroon, and companies internationally. It scores highly on socio-economic value, used by thousands of prostate sufferers internationally, consumers with medical problems and for everyday tools. The species has a high environmental value as a key afromontane endemic species.

The multiple governance arrangements covering the international chain make this one of most regulated forest product chains and products in Cameroon and Central Africa. Formal regulation has grown, strongly influenced by international conventions and standards. Enforcement has been arbitrary and ineffective. Working collectively harvesters have had some impact on the distribution of power in the chain, creating opportunities to add limited value and legally control supply in the last decade. The international chain has crept into multiple policy agendas (development, forestry and agriculture). The 2007 European trade suspension precipitated a crisis and participative review of governance arrangements in the form of a national management plan that blends statutory, customary and project-based institutions. Customary regulations are non-existent in Adamaoua but strong in the Anglophone montane areas and preceded the regulatory framework, but have been frequently overrun by projects. Community-based companies and community forests have alternatively used, adapted, collaborated with, occasionally subjugated and often challenged traditional and regulatory authority. This has further alienated and disabled customary institutions as commodification has increased. Governance of the local use chains, in contrast, has remained largely unchanged: with lightly customarily regulated, informal and highly fragmented with no individual actors or enterprises dominating.

The impact of these governance arrangements on livelihoods has been considerable. A handful of processing, exporting and importing companies have benefited enormously for decades, gaining global competitive strategic advantage. Liberalisation to a market-based network had dramatic impacts: increasing prices and competition, retaining low flows of information between buyers and sellers. The state treasury has benefitted from *Prunus africana* exports. Some state officials have gained from corruption. Conservation-minded projects and NGOs promoting alternative and decentralised governance arrangements seeking to improve harvesters and/or the species’ environmental status prompted large-scale resource ‘mining’. However the government’s under-estimation and/or ignorance of the impact of the international conventions and agreements contributed to the EU CITES suspension. This had an immediate and direct negative economic impact. This was a ‘lose’ for the livelihoods of all actors involved. The new rules may have negative implications for equity of access to resources and markets, as the smaller, weaker and, until recently, unorganised actors struggle to make their voice heard against the larger, dominant traders and exporters. Collective action allowed community-based, collective action, often project supported,
to gain or maintain a share of the economic value, increasing selling prices by 50 to 600%. However, attempts at value adding have been hindered by the low level of vertical integration. Now that Anglophone harvesters are in contact and govern access to the Prunus Allocation Units, they expect their power to increase. A sobering note is that collective arrangements also contributed to over-extraction and ultimately the trade suspension.

The impact of the multiple governance arrangements on the sustainability of *Prunus africana*-based products, and ultimately the chain, has been mixed but generally negative. Whilst sustainable harvests are possible, regulatory frameworks that take account of the species’ ecological characteristics still await implementation. The government repeatedly ignored is own rules requiring inventories and harvest standards, and even when conducted, did not use them for permitting. This promoted short-term economic wins above a sustainable, long-term product and chain. Statutory arrangements have been ineffective in countering pressures to harvest unsustainably, culminating in a trade suspension. Natural capital ‘won’ – receiving a respite from harvesting for nearly three years and prompting a profound rethink of governance arrangements. In contrast, project-stimulated collective action has supported planting, leading to a hitherto unrecognised amount of *Prunus africana* being cultivated. However, because they are unquantified, cultivated trees have remained invisible to national and international policymakers, with no distinction made between the product’s wild and farmed origins. Regulations, conventions and project-based arrangements however have been based upon a presumption of wild sourcing and the species’ threatened status. Thus perceptions of sustainability by the CITES and IUCN red data listings have played a dominant, but mistaken, role in its governance and consequent sustainability. The bark’s high value encouraged actors to negate customary rules, illustrated by unsustainable harvests by traditional authorities. Community collective action, promoted by statutory and project-based arrangements, has been directly responsible for illegal and unsustainable harvests and has largely failed to control access or over-extraction. Community-based institutions defied institutional design principles. They were insufficiently powerful to exclude others. Powerlessness was exacerbated by statutory systems allowing multiple resource users in one geographical space, with no sanctions, monitoring or conflict resolution arenas.. However actors’ collaborations with vocal support organisations (research, development and conservation NGOs) have led to policies and institutions that have shifted the focus on product and livelihood sustainability.

The current global market for *Prunus africana* is hovering on the brink between bust and continuation, with Cameroon one of the few suppliers in large volumes. Facing competition from natural and synthetic substitutes makes the chain sensitive to supply disruptions and positive livelihood impacts precarious. Whilst feeble attempts were made by Plantecam Ltd to control supply through plantations, only since the 2007 trade suspension have actors seriously considered vertical integration with traders stimulating cultivation. This tardiness illustrates a classic tragedy of the commons. It is surprising as several importers trade in barks and natural products sourced largely from cultivated sources. In contrast to the international chain, the local chain using customary bark and branch harvesting methods appears largely sustainable. These traditions have been ignored by national and international regulations and actors. Reconciling livelihoods with longer term sustainability has proved difficult. Short-term economic benefits have been gained at the cost of the sustainability of the natural capital they are based on.