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To Label or Not? Governing the Costs and Benefits of Geographic Indication of an African Forest Honey Value Chain

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Geographical Indication (GI) has been proposed as a development tool, benefitting producers, consumers and local communities by creating value, improving market access, protecting local knowledge and natural resources and contributing to social cohesion as producers work together to solve common problems. However, scientific evidence on the socio-economic and environmental effects of governing value chains and origin landscapes through this voluntary, market-based arrangement is scarce. Honey appears ideal for GI labeling: having unique, physically identifiable and geographically localizable properties dependent upon the local ecosystem and beekeeping practices. White honey from the Kilum-Ijim forest in the Cameroon Highlands was GI registered in 2013 aiming to guarantee product quality, increase beekeeper selling prices and protect the forest. Long-term panel data from stakeholder interviews, market surveys and participatory action research show the extent to which the GI actually benefited beekeepers, and how the honey value chain and landscape developed since registration. Although honey production and productivity remained steady, profits augmented as prices increased and sales became more nationwide, improving beekeeper's living standards, and appear attributable to the GI. Deforestation continued and imposter brands abounded, signaling potential supply shortages, increased input costs and competition which could affect future profits and the GI reputation and changing the distribution of benefits to suppliers rather than beekeepers. These findings suggest that whilst the Oku white honey GI contributed to short-term positive livelihood effects, longer-term positive impacts which support conservation of the landscape have been ineffective, and the durability of the positive economic impacts is questionable. Although multiple arrangements govern the value chain and landscape, even together with the GI these are insufficient to balance the many demands on this productive landscape, suggesting the limits of weak institutions and non-state governance to protect vulnerable landscapes and ecosystems, and producer's livelihoods. This reality check of the benefits from the Oku white honey GI highlights the importance of coherent, effective governance of the nexus of both landscapes and markets for products from these landscapes.

Keywords: forest product value chains, governance, honey, Africa, certification, geographic indication

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HIGHLIGHTS

- Geographic Indication of Oku white honey has contributed to short-term positive livelihood impacts for many engaged in value chain.
- Honey prices increased from 600 FCFA/kg before the GI in 2012 to 950 FCFA/kg in 2017.
- Longer-term impacts of Geographic Indication to support conservation of the forested landscape have been ineffective and the durability of economic impacts is questionable.
- Multiple but incoherent and weak arrangements govern the value chain and GI landscape, highlighting the importance of coordinated, effective governance of this nexus.
- Non-state, market-based governance to protect vulnerable landscapes and producer's livelihoods has limits.

INTRODUCTION

A Geographical Indication (GI) is a denotation for products with a specific geographical origin and possessing qualities or a reputation that are due to that origin. To function as a GI, the product must be identified as originating in a given place. In addition, the qualities, characteristics or reputation of the product should be due to the place of origin, a factor which distinguishes it from trademarks or quality and sustainability certification (Suh and MacPherson, 2007). As these qualities depend on the geographical place of production, there is a clear link between the product and its original place of production. There are two types of GIs. Protected Designation of Origin (PDO) - also known as appellation of origin, and Protected Geographical Indication (PGI) - where at least one production, processing or preparation activity takes place within the delimited area, in contrast to a PDO where all three stages should take place within the region possessing the specific characteristics. As such, the link between product and place of origin for PDOs is stronger than for PGIs. GIs therefore link people, spaces and places and products (Calboli and Ng-Loy, 2017) and have positive socio-economic, cultural and environmental implications. The World Intellectual Property Organisation (WIPO), the UN Food and Agriculture Organisation (FAO) and the European Union have all embraced GIs for their possibility to contribute to multiple goals, particularly in the context of Sustainable Development Goals 1, 2, 8, 12, 15, and 17.

A GI is a market-based tool and a governance mechanism which aims to benefit not only producers, but also consumers and local, particularly rural communities (Jena and Grote, 2010; Jena et al., 2015; Mengistie and Blakeney, 2016; Chabrol et al., 2017). It aims to create added value and improve market access while protecting local know-how and creating incentives for safeguarding of local natural resources. The impact logic is that that when a product obtains protection as a geographical indication, there is a positive socio-economic impact for the local community (Vandecandelaere et al., 2009). GIs have also aimed to increase production, create local jobs and prevent rural exodus, by helping producers to obtain a premium price for products in exchange for guarantees offered to consumers on production methods and quality (WIPO, 2013). GIs can redistribute the added value in a value chain and bring value to the area of origin, and have other indirect positive effects, such as on tourism. GIs as a market access tool have sought to encourage the variety and diversity of production. They allow producers to market differentiated products with specific characteristics that are clearly identifiable. In the context of globalized markets, consumers are increasingly looking for unique quality products with a specific origin, a demand that GIs feed into (Bramley and Kirsten, 2007; Bramley et al., 2009; Teuber, 2011). As a tool to preserve local know-how, knowledge and cultural and natural resource biodiversity, GI protection may have wider positive benefits on local communities. GIs also seek to celebrate the diversity of food and prevent standardization. As a cultural expression, GIs can contribute to social cohesion by providing a logic for producers to work together and to solve common problems, and enhance local and national identity in their unique, traditional products (Suh and MacPherson, 2007; WIPO, 2013). In conclusion, GIs have been shown to contribute positively to the socio-economic dynamics of local communities around the world. However, scientific evidence that supports or refutes these hopes and claims on the socio-economic effects of GIs on the landscapes where the products originate from and value chains is only starting to emerge (Coombe et al., 2014).

In 2018, of the 200,227 GIs in force worldwide, 63% covered food products including drinks and spirits (WIPO, 2018b). In Europe, the first honey GI was registered in 1996 (European Commission, 2019) and as of 2019, at least 44 GIs concern honey[1], two of which are in Africa (European Commission, 2019). African GIs did not exist until African Intellectual Property Organization (OAPI) pilot projects were initiated from 2004 to 2014, three of which (Oku white honey, Penja pepper and Ziama-Macenta coffee) were registered in Cameroon and Guinea (Chabrol et al., 2017), and one in South Africa for Rooibos tea (WIPO, 2018a). Honey appears ideal for geographic origin labeling: having unique, physically identifiable and geographically localizable properties dependent upon local ecosystems and beekeeping practices. The botanic and geographic origin of honey can be relatively easily verified by its pollen and mineral content, and isotope variation (Anklam, 1998; Kelly et al., 2005; Bogdanov et al., 2007). Honey has been seen as a "near perfect" non-timber forest product that can provide both development - particularly poverty alleviation - and conservation and ecosystem services benefits, especially countering deforestation and degradation, and enabling pollination (Lowore et al., 2018).

[1]Eight honeys were listed in the Lisbon International system of Appellations of Origin database in 2019 (Lorraine, Sapin de vosges and Corsica in France, Homoljski Med Homolje in Serbia, Herzegovinian Honey and Cazin Chestnut Honey from Bosnia and Herzegovina, Sabalan honey from Iran, Kriva Palanka Honey from Macedonia); 32 honeys were listed in EU member states in the EC DOOR database in 2019 (European Commission, 2019); and five honeys were listed in the WIPO website in 2019 (Sumbwa honey from Indonesia, Wenchi volcanic honey from Ethipoia, Machakos Honey from Kenya, Doan honey from UAE, and Oku honey from Cameroon).

The Geographic Indication for Oku White Honey

The PDO GI of white honey from the Northwest region of Cameroon provides an interesting case from which to examine the impacts of GIs as a development and conservation tool as well as a unique form of governing both value chains and a geographically defined landscape. Oku white honey is produced from the Kilum-Ijim forest area in the Bamenda Highlands. It has been marketed as a spatially specific product for at least a century, due to its unique characteristics: a white color, creamy crystallized texture, and sweet, citrusy mild taste with hints of smoke. These characteristics are due to the flora in the Kilum-Ijim forest and surrounding farm lands and beekeeping practices (Ingram, 2009a). The honey provides an essential part of many beekeepers' household income along with other apiculture products, such as wax and propolis, and was important in the local economy and culture (Ingram, 2014). Honey, bees and beekeeping are culturally important with strong traditional values. For example, bees are depicted in traditional carvings, and honey has been used in traditional ceremonies and medicines (Kaberry, 1952; Forboseh, 2002; Ingram, 2014). A development project which aimed to guarantee product quality for consumers and provide a better selling price for beekeepers, while safeguarding the forested area where the bees forage for nectar, led to the Geographical Indication of Oku white honey in 2013. The ''Oku white honey GI project" was conceived and supported from 2010 by the Projet d'Appui a la Mise en Place d'Indications Geographiques (PAMPIG) led by OAPI and the French International Agricultural Research Centre (CIRAD), and financed by the French Development Agency (AFD). The project was process-oriented using a FAO developed, stepwise approach to obtain the GI (Vandecandelaere et al., 2009), detailed in Chabrol et al. (2017). SNV, an international NGO, and Guiding Hope, a Cameroonian certified organic apiculture enterprise, advised CIRAD and OAPI on the process and worked with the Oku Honey Cooperative to set up the Kilum-Ijim White Honey Association (KIWHA) as the umbrella organization for the GI. KIWHA represents white honey beekeepers and their groups, and traders. Initially strongly externally influenced by the partners, by 2012 when KIWHA became stronger, it started to focus attention on maintaining and securing sufficient bee forage and marketing, albeit without project funding (Ingram, 2014). The largest white honey producer and trader in the area was the Oku Honey Cooperative with 216 members. Set up in 1987 as part of the United Kingdom government-financed conservation-focused Bamenda Highlands Forest Project, the Oku Honey Cooperative has since operated as an independent, member-based organization.

Honey Value Chains and Institutions in Cameroon

The Cameroon government has been sporadically active promoting and governing beekeeping, with at least three different ministries at times promoting beekeeping: as an agricultural or livestock practice, for forest conservation, and as a development activity, largely on a project-by-project basis or related to the personal skills and interests of staff (Paterson, 1989; Ingram, 2014). Since 2006 responsibility for the sector has been claimed by the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA), which, largely under pressure from apiculture trading enterprises and development organizations such as the Netherlands Development Organisation (SNV) and the UN Food and Agriculture Organisation (FAO), has gradually been developing policies and regulations.

The Northwest region was the second major production area of honey in Cameroon in 2009, with 4,500 beekeepers producing an estimated 92,000 liters of honey (Ingram, 2009b). White honey has been sought after in the country's urban areas, fetching a higher price than other honeys (Erasmus et al., 2006). Given this context, starting in the mid-1980s a series of high profile, conservation based projects (the Kilum, Ijim, and Bamenda Highlands Forest Projects, c.f. Ingram, 2014 for details) focused on forest conservation, inventories and monitoring. These projects also introduced and supported 'modern' beekeeping techniques primarily to support preservation by promoting alternative income generating opportunities, based on cooperative models of honey trading (Thomas et al., 2000; Abbot et al., 2001; Forboseh, 2002; Wright, 2009; Camgew, 2014). These new collective, market-based governance arrangements built upon customary beekeeping and forest conservation practices and enlarged the honey production area wider than the traditional hubs around Fundong, Kumbo and Oku (Kaberry, 1952; Paterson, 1989). At its peak from the late 1990s to around 2002, the Northwest Bee farmers Association (NOWEBA) had 6,000 members organized in 250 groups on a cooperative union system, operating a credit, collection and joint marketing system selling about 40 to 50 tons of filtered honey per annum and 0.5 tons of beeswax through its shops and market stalls in the main towns of the Northwest and to shops in the capital Yaoundé. In 2002, NOWEBA split into an NGO (ANCO), to focus on conservation, and a cooperative (HONCO) as a production and sales organization. A Federation of Beekeepers' Associations of Cameroon was set up in 1995, led by NOWEBA, joining four beekeepers' associations from three provinces. Within a year, the Federation ceased to exist due to internal conflicts and unrealized expectations of funding. Since 2007, apiculture groups, backed by organizations such as SNV and FAO, have been revitalizing a new Federation led by groups from the Southwest and Northwest. Parallel to this, intermediaries organized beekeepers in the Adamaoua savannah, the largest honey production region in Cameroon (Ingram, 2010) and supported by MINPEIA to create an 'interprofession' which joins stakeholders from the apiculture chain and gives them a voice in developing Cameroon's apiculture policies, advocating honey quality standards, regulations for exports and raising consumer awareness. A Union of Apiculture Exporters was formed in late 2007 and the first large scale export of Cameroonian honey to the EU was made in 2009 (see Ingram, 2014 for details). Despite discussions on market regulation since 2006, national honey quality standards have not yet been implemented. Although Cameroon was categorized in 2018 as a medium-level development country, with a multidimensional poverty index of 0.244 (United Nations Development Programme, 2018), the

unconductive economic climate, combined with high levels of corruption, have created a consistently difficult business climate, illustrated by Cameroon's low ranking on the ease of doing business index of 166 out of 190 (World Bank, 2019).

Given this context, this paper examines the extent to which voluntary GI certification has benefited beekeepers and other stakeholders in the Kilum-Ijim white honey value chain – through the lens of how markets, incomes and prices changed – and how the honey value chain governance and the GI landscape environment have changed since GI registration.

CONCEPTUAL FRAMEWORK

From an economic perspective, GIs provide a collective, monopolistic right by allowing the users of the indication to differentiate their product in the market, whilst simultaneously functioning as a barrier to entry to this specific market segment (Rangnekar, 2004). Competition theory predicts that GIs create economic value, because a differentiated product can capture a premium price by meeting consumers' specific needs (Reviron et al., 2009). Given the power that these rights infer and that GIs represent a voluntary form of non-state, market-based governance (Cashore, 2002), taking a governance perspective is relevant. The growth of market-based governance arrangements such as GIs, voluntary sustainability certification, corporate sustainable sourcing policies and market based rules - often set by global networks of standard-setters - has increasingly been recognized (Cashore, 2002; Lambin et al., 2014). GIs however can be differentiated from other forms of market-based governance as they explicitly address the customary regulation of stakeholders in the value chain of the GI product with customary traditions governing the landscape the product originates from. They also require strong international and national support to be effective (Bowen, 2010). GI can thus be characterized as a truly plural, hybrid form of governance arrangement affecting the nexus of value chains and landscapes (Ingram, 2014). This plurality means that such formalized, hybrid governance arrangements are complex, overlapping and reflect multiplicity of meanings and interests (Cleaver and De Koning, 2015).

Within governance theory, value chain governance focuses on power relationships among stakeholders in chains, notably how terms of participation is shaped and how stakeholders are included or excluded (Helmsing and Vellema, 2011), and on the impacts from these terms, particularly socio-economic. Bowen (2010) and Sonnino and Marsden (2006) emphasize that alternative food value chains (such as those involving GIs) are embedded in social relations and that power dynamics and the institutional context underpin the localization of such chains. As GIs also concern the place of origin, the governance of the spatial landscape where the natural products originate – often termed a territory in GI parlance – impacts both the ecosystem services as well as people inhabiting and using these landscapes. Value chains can drive landscape changes with environmental and social outcomes (Ingram et al., 2010; Meyfroidt et al., 2013; Lambin et al., 2014) and significant development impacts (Altenburg, 2006). Landscapes are often governed by regulations and customary practices, sometimes by international agreements and projects (Colfer, 2011; Ingram, 2014). In parallel, landscapes and value chains are governed by customary arrangements, projects, corruption and international agreements. The landscape-value chain nexus thus often has plural, multiple-scale governance arrangements (Awafong, 2003; Mwangi and Wardell, 2012; Poteete, 2012), which may not be complementary in governing forest products (Ingram, 2014).

The impacts of governance arrangements - both planned and unplanned - are often unpredictable (Klijn et al., 2010; de Koning, 2014) in tropical forested landscapes (Colfer, 2011) as well as in value chains (Humphrey and Schmitz, 2000; Ingram et al., 2015, 2018). Lambin et al. (2014) note that GIs have mixed impacts, with some promoting more sustainable land use practices (Quetier et al., 2005; Giovannucci et al., 2009), but also no or negative effects when poorly managed and the value of the territory is lost (Bowen and Zapata, 2009). Giovannucci et al. (2009) emphasize that despite the originality of a potential GI product, benefits will not accrue to stakeholders without the support of the legal and institutional frameworks. Other factors that support GI registration of products include collective action, prices and market for the product, specificity and reputation of the product, support from actors along the value chain, production methods and a link between product characteristics to history or tradition of the geographical area (Bramley et al., 2013; Egelyng et al., 2017), also for honey (Besah-Adanu et al., 2019). The effects of hybrid institutions also depend on product types and value chain characteristics (Lambin et al., 2014). In particular, institutions governing wild products and their value chains often underestimate the sustainability of wild sourced products – such as honey - as resource availability and ecological system responses to large scale exploitation are largely unknown and insufficiently taken into account in value chain governance (Laird et al., 2010; Ingram et al., 2017). Despite an emphasis on 'getting institutions right', development initiatives have frequently failed to deliver impacts as planned (Cleaver, 2002). Given that "governance matters" (Gereffi and Lee, 2016) in creating sustainable, resilient, efficient, equitable landscape production systems and value chains that contribute to resolve wicked problems such as poverty and deforestation (Gibbon et al., 2008), this societal challenge remains highly pertinent. Therefore the impacts of a GI can be seen as a factor of not just the landscape it originates from, but also how this landscape was governed, and the institutions that enable access to the resources needed to produce the product [in the case of honey: sufficient water and year round floral nectar and pollen, and resources to construct hives, traditional beekeeping and processing methods, such as hive transhumance and smoking during harvest (Ingram, 2014)], and access to markets (Wiersum et al., 2014).

STUDY AREA: THE KILUM-IJIM FOREST

This paper provides a case study of Oku white honey produced from the 200 km^2 Kilum-Ijim forest around Mount Oku in

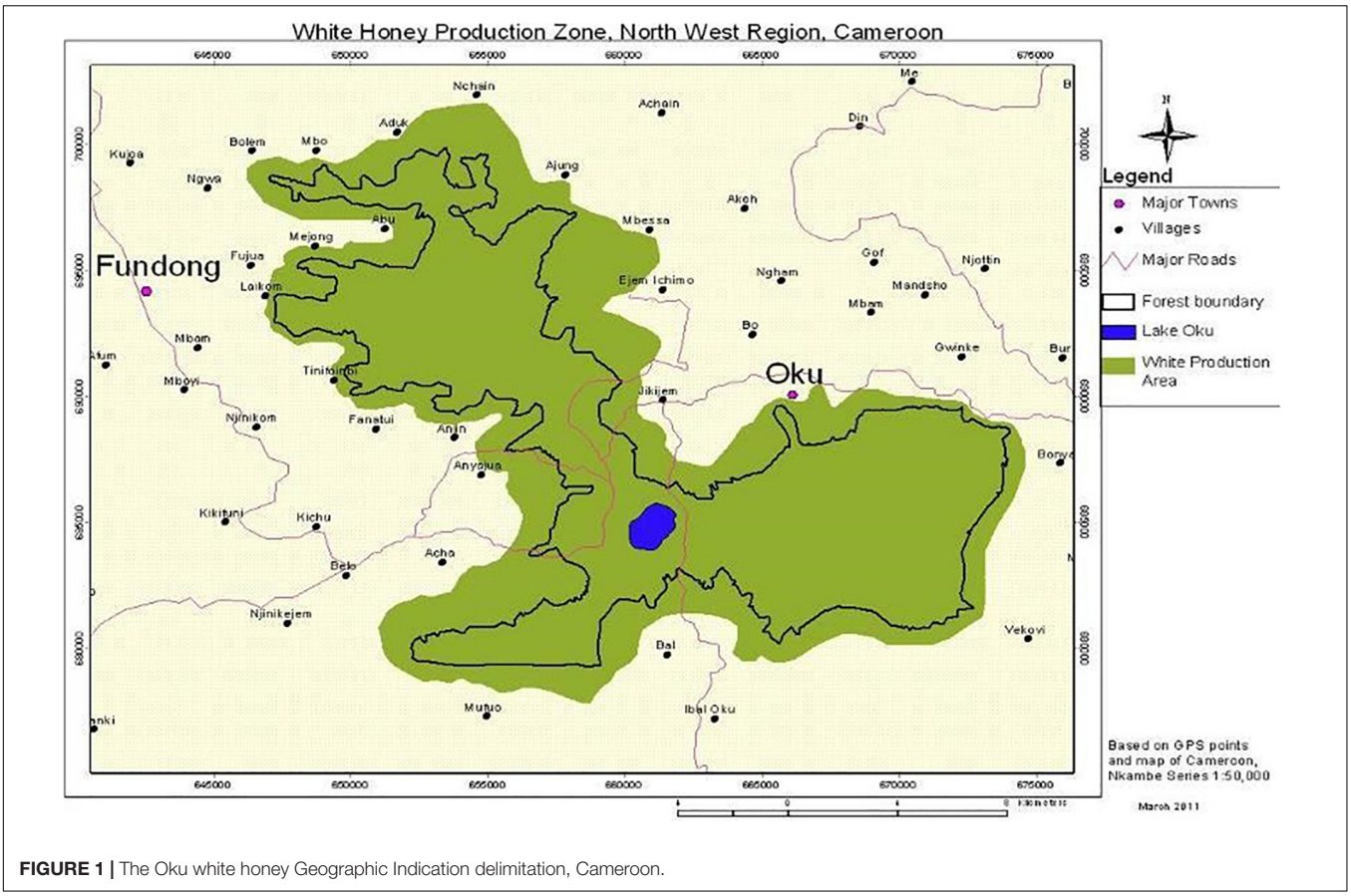

FIGURE 1 | The Oku white honey Geographic Indication delimitation, Cameroon.

the Bamenda Highlands of Northwest Cameroon, shown in **Figure 1**. Around 44 communities were located in and around the Kilum-Ijim forest with about 300,000 people living within a day's walk of the forest in the study period, making the area one of the most densely populated areas outside of the major Cameroonian cities. The montane cloud forest, situated at between 1,700 m and 3,011 m, was the largest largely continuous remnant of tropical Afro-montane forest stretching along the mountain range from Mount Cameroon in the Southwest, into the Northwest province and Nigeria, covering 26,000 km^2 (Bergl et al., 2007). This forest type was a biodiversity hotspot with a high rate of endemism (Maisels and Forboseh, 1999; Cheek et al., 2000). Pollen analysis and beekeeper's observations suggest that the mix of indigenous flora - notably *Schefflera abyssinica*, *barteri* and *manii*, *Zanthoxylum rubesces*, *Croton macrostachyus*, *Gnidia glauca,* and *Syzgium staudii* - and crops such as coffee (*Coffea arabica*), eucalyptus (*Eucalyptus* spp.), bitterleaf (*Vernonia colorata*), oil palm (*Elaeis guineensis*), maize (*Zea mays*) and an exotic weed (*Bidens pilosa*), contribute to the ecologically and geographically (due to the specific altitude and ecological niche in which many of these plants grow) demarcated uniqueness of Oku white honey (Ingram, 2009a, 2014). At lower altitudes under 1700m, the Bamenda Highlands landscape was dominated by small scale mixed agriculture with occasional patches of forest, which produce a brown honey (Ingram, 2009a).

MATERIALS AND METHODS

The study is a comparative case, with data collected during multiple field visits, individual and focus group interviews with stakeholders in the Kilum-Ijim forest area and the white honey value chain before, during and after the GI registration, summarized in **Table 1**.

Data Collection

Data was collected before the GI process had started - during the period 2006 to 2010 - to map honey and other apiculture product value chains in Northwest Cameroon, including Oku white honey. Information was gathered using a total of 509 structured questionnaires and focus group meetings concerning the socioeconomic status of stakeholders, household and beekeeping income and expenses, beekeeping practices including workloads, use of tools and training; production and market data (numbers and locations of beekeepers and groups, types of apiculture products, volumes sold, prices and costs, extent of collective organization and activities), and perceptions of bee forage, the environment and climate changes. Focus groups comprised of groups of stakeholders in the value chain were also used to collect and to validate data. Verbal and written informed consent was obtained for the interviews and use of data. Observations were made of beekeeping and product processing

TABLE 1 | Type and number of respondents in periods before, during and after GI registration of the Oku white honey.

Respondents in interviews, surveys and group discussions	BEFORE				DURING	AFTER			
	2006	2007	2008	2009	2010–13	2013	2017	2018	Total
Beekeepers	28	95	72	92	42	77	41		447
Beekeeper & producer associations*	2	2	6	26	3	13	2	5	59
Honey traders		4	5		3			2	14
Retailers	4	45	49		2			1	101
Consumers				67					67
Government authorities			3		3		3	1	10
Traditional authorities			1	2	2			1	6
NGOs			2	2	2		1	1	8
Research organisations	1			1	1				3
Total	35	146	138	190	58	90	47	11	715

**Three producer associations also retail and wholesale honey, wax and other apiculture products.*

practices and markets with stakeholders along the value chain from beekeepers to consumers.

During the GI process from 2010 to 2013, one of the authors (VI) participated in the GI process with Guiding Hope and SNV, advising on demarcating the GI zone and its stakeholders, drawing up the code of practice and monitoring plan with the participation of stakeholders, and setting up the Kilum-Ijim White Honey Association (KIWHA) and a local sensory and standards panel. Data was also gathered as part of MSc thesis studies of which the authors were supervisors or advisors (Tangkeu, 2011; Sanglier, 2013; Dieleman, 2016) using a total of 148 structured questionnaires and observations of beekeeping and bee product processing practices and markets, on socioeconomic status, beekeeping income and expenses, beekeeping practices, production and market data (products, volumes sold, prices and costs, collective organization and association management), and perceptions of the environment relevant to beekeeping and honey production. A visual record of the sector, the "The Honey King" was made (ApiTrade Africa, 2010).

After the GI was established, in the period 2017 to 2018, a structured questionnaire (see Hansen, 2018) was used to gather data from 41 Oku white honey beekeepers, of which small and large beekeepers, old and new cooperative members, experienced and newcomer beekeepers, and men and women were purposively sampled. Information was collected again on socio-economic status, perceptions of the GI registration processes, beekeeping practices before and after GI registration, prices of inputs and outputs for beekeeping and honey production. Semi-structured interviews were held with representatives from stakeholders in the GI registration process including OAPI, national authorities represented by the National Committee for Geographical Indication (CNIG), which was comprised of members of different ministries and interest groups, and OAPI; the Oku Honey Cooperative and the GI umbrella association KIWHA; Guiding Hope, persons responsible for the GI project in CIRAD; NGOs Belo Rural Development Association (BERUDA/BERUDEP), Cameroon Gender & Environment Watch (CAMGEW) and the Western Highlands Nature Conservation Network (WHINCONET); the Ministry of Agricultural and Rural Development and Ministry of Forestry and Wildlife at Oku Subdivision level. Production (honey and wax volumes, numbers of beekeepers and associations) and market (prices and quantity sold) data and perceptions of market changes was gathered from beekeeping associations and the Ministry of Livestock.

Focus group discussions held after the GI were usually held after a day or so of interviews in the village, upon explaining the study and seeking permission of traditional and/or local authorities. They allowed further populations to be targeted and met, and stakeholders not previously interviewed to be questioned. They were used to facilitate group discussion, enable data triangulation and clarify points raised in interviews. Meetings were timed to include as many stakeholders as possible.

A review of project reports, government data, good quality academic theses and gray literature also served to contextualize data from interviews and meetings. Remote sensing studies of forest loss were used to triangulate stakeholders' perceptions of environmental and climatic changes.

Data Analysis

All data (from the before, during and after the GI periods) was entered into Excel or directly into SPSS version 16. Data were checked for consistency of names, and measures used in the field and markets (basins, buckets and tins) were calibrated and calculated as metric volumes and values, based on the average conversion rate of 1 liter of honey weighing 1.5 kg. A bucket of honey weighs on average 30 kg. Data were extrapolated from individual and group level to village and GI level, based on the estimated total population of beekeepers. Seasonal data were combined to estimate annual volumes and values and the often highly seasonal fluctuations in hive product production. Statistical and quantitative analyses were analyzed in Excel for descriptive statistics of quantifiable measures, such as inputs and outputs to calculate annual quantities, annual production costs, profits, income and aggregated values. Profits were calculated using only stated costs, as interviewees generally could not provide an economic value or opportunity cost for their own time spent on apiculture activities. If labor was hired and paid for, these costs were included. Qualitative statements were analyzed

for common patterns and differences amongst the different respondents and stakeholder types. The results of the different qualitative and quantitative data sources were compared to ascertain any patterns and triangulate findings.

RESULTS

The results are presented for each period (before, during and after the GI registration) for the honey market – including quantities, prices and incomes; the value chain - including stakeholders and governance; and the status of the environment that comprises the GI landscape.

Changes in Honey Markets

Increased Interest in Producing Oku White Honey

Before the GI, in 2012 beekeepers had an average of 65 hives, although most had less than 50 hives and a few owned over 200. The hives were all of the traditional cylindrical design, made from bamboo, raffia and grasses. Beekeepers states that they prefer traditional hives rather than "modern hives", influenced by customs, the low weight, the availability of resources in the forest at no financial cost and easy construction method. The majority (87%) of beekeepers used traditional grass smokers during harvest.

After the GI beekeepers had on average 80 hives, most of which were of traditional design, while two of the interviewed beekeepers had both traditional hives and Kenya Top bar hives. On average, 47% of hives were colonized and producing in 2017.

Increased Price and Quantity of Oku White Honey

Prices and the volume of honey sold increased since the GI, as shown in **Table 2**. The price of 1 liter of white honey sold by the Oku Honey Cooperative increased by 2,500 FCFA, corresponding to 125%, in the period from 2008 to 2017, whereas brown honey prices increased by 1,300 FCFA (108%) in the same period. In the capital Yaoundé, Oku White Honey was sold at 4,900 FCFA for 500 g (equivalent to 9,800 per kg) in a supermarket and 3,800 FCFA for 325 g (equivalent to 11,692 per kg) in a French bakery. In Oku, Oku Cooperative honey cost 4,500 FCFA for 1.5 kg (1 L), equivalent to 3,000 per kg. The substantial difference in honey prices across Cameroon was due to transportation and packaging costs (glass jars in Yaoundé, plastic buckets in Oku), along with an increased willingness and ability to pay in the larger cities. The price of brown honey was seen by interviewees to have increased because demand for honey in general has increased. Many Cameroonian buyers indicated that white honey has become "too expensive", especially for those in Oku area who instead purchase brown honey, showing how price increases have increased the demand and price of substitute products. Increasing demand for white honey was noted by nearly all beekeepers except two. They and the Oku Honey Cooperative however questioned if they could continue to meet the increasing demand since 2013.

Not only the beekeepers and the cooperative were aware of the increased price premium the GI created. All respondents directly and indirectly involved in the value chain reported that value had increased since the GI. Increased production costs for beekeepers were also noted: all beekeepers (except one) said they experienced increased production costs. Changes in production costs were attributed to the increased price of materials used for hive construction, harvesting tools, transportation and hired labor. Price changes in hive material and constructed hives are shown in **Table 3**. Although beekeepers indicated that production costs had increased, it was not possible to obtain precise changes in prices for transport and labor.

Comparing the price increases presented in **Table 3** with increased honey income, an imbalance is apparent. Prices after the GI increased 58.3% for beekeepers selling crude honey, whereas prices in materials increased by up to 225% and on average 185% since 2013. This indicates that others in the value chain were benefiting relatively more than beekeepers. One explanation given was the supply shortage of hive construction materials. All beekeepers, except the only female beekeeper interviewed in 2017, constructed beehives themselves, with 85% buying materials to construct hives, the remaining harvesting the material themselves. Those collecting materials complained about scarcity of both bamboo and grass, noting that an increasing number of beekeepers were harvesting hive materials. Fields where they used to harvest were barren and travel in search of materials took longer. Whether this tendency would have occurred without the GI is not clear. Scarcity may also be linked to bushfires and land use changes due to increasing population density. The amount of beekeepers was reported to have increased because of the GI project activities, with over 100 beekeepers joining the Oku Honey Cooperative just after the GI registration in 2013. While this increase may be a coincidence, it appears unlikely that such a growth occurred due to other factors which were not mentioned, and was attributed to the GI project attracting new beekeepers. The increased number of beekeepers and hives may also explain beehive material scarcity. Beekeepers also complained about a scarcity of bees and good places to install hives, which can affect honey yield. Official data (INS, 2013, 2015, 2017) suggest that since 2011 an increasing number

TABLE 2 | Quantities and price of 1 L of Oku white and brown honey sold by Oku Honey Co-operative.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Quantity (kg) sold	n/a	1095	2134	n/a	n/a	n/a	n/a	n/a	4488	6000
Price FCFA per kg OHC white honey	2000	2000	2000	2500	2500	3000	3500	3500	4000	4500
Price FCFA per kg OHC Brown honey	1200	n/a	n/a	n/a	1500	n/a	n/a	n/a	n/a	2500
Price FCFA per kg (in a 30 kg bucket)	n/a	n/a	n/a	600	600	675	900	900	900	950

TABLE 3 | Purchase prices of items for beehive construction before and after 2013, the year of GI registration of Oku White honey.

Item	Price (CFA) before 2013	Price (CFA) after 2013	Price Increase %
Bee hive	1,000	3,000	200
Colonized bee hive	2,000	5,000 – 8,000	150 – 300
1 bundle of grass	500	1,500	200
1 bundle of Raffia bamboo	500	1,000	100
1 bundle of Indian bamboo	500	1,500	200

of beekeepers and honey production occurred in the Northwest province, mirroring beekeeper's reports.

Besides hive construction, the major costs for beekeepers were harvesting, processing and transport to markets, with 88% of beekeepers paying for transportation to deliver beehives directly to the cooperative, 78% hiring labor to carry hives down the mountain, 54% paying in honey, and 9% using unpaid labor from friends and family.

Increasing Yields of Oku White Honey

In 2012, the average yield per hive was 4.3 kg, ranging from 0.3 to 15 kg of honey per hive, with a high standard deviation of 3.8 kg per hive. One of the main factors reported as affecting yield was the rate of colonization, with around 50% of hives "active." Positive statistical correlations for colonization were found for beekeepers with higher education or a business, and those with longer experience, but not for those with more hives.

After the implementation of the GI, the number of active hives in 2017 increased but not all beekeepers improved productivity with the average yield per hive in 2017 being 3.35 L (5 kg) per hive. **Figures 2A,B** show that even though all members had received training in recent years, 45% reported higher yields than before the GI – attributed to training and new tools and 39% indicated no change in productivity and 16% reported lower yields than before 2013.

Figures 2A,B show how total yield increased when the number of hives increased. **Figure 2B** shows how the marginal yield from adding another hive decreased, explaining why increasing production volume did not give a marginally higher outcome. Beekeepers who experienced a decrease in their yield explained that it was due to increased 'competition' by bees and the difficulties of finding good places to install hives. They explained that the increased number of beekeepers made it more difficult to produce optimally. However, one member rejected this argument and indicated that there was room for additional hives and beekeepers.

Evolving Honey Markets

Changes in the honey market in Cameroon occurred after the GI, but cannot be attributed only to the GI. Increasingly collective action was used as a way of entering and governing markets after the GI, in the form of beekeepers associations who buy, filter, package, wholesale and retail honey. The number and type of channels used to sell honey generally (and specifically white

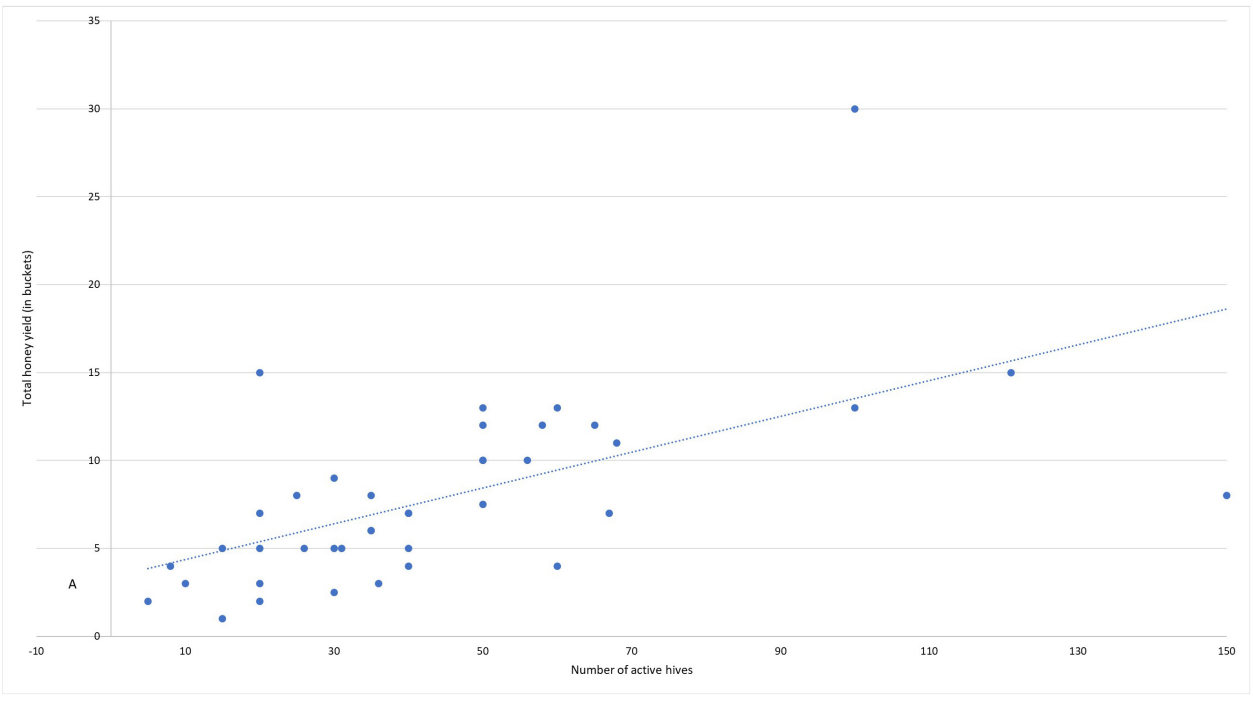

FIGURE 2 | (A) Total yield in buckets per active hive, 2017. **(B)** Total yield in buckets per hive, 2017.

honey) increased. From approximately ten small scale, mostly informal outlets (roadside sellers and beekeepers homes) and the Oku Honey Cooperative shop before the GI, by 2018 there were at least twelve supermarkets, five pharmacies, and around fifteen specialized honey and bee product shops and market stalls, run mainly by beekeeper's and tourism- crafts associations and NGOs selling white honey in small towns (Kumbo, Fundong and Belo) in the Northwest province, in major towns such as Bamenda and Bafoussam, and in cities of Douala and Yaoundé.

The way Oku white honey was marketed evolved after the GI, with an increase in labeling and the use of dedicated plastic pots (in contrast to the use of recycled plastic and glass jars pre-GI) by the majority of retailers. One group - Guiding Hope - developed an innovative market strategy with high-quality labeling and glass jars, supported by high-profile marketing campaigns in provincial, national and international trade and agriculture exhibitions and fairs, traditional and social media concerning the origin and quality of honey. KIWHA developed a marketing strategy as part of the GI application, requiring the consistent naming of the product from the GI as "Oku white honey", accompanied by a logo and labeling requirements to maintain the quality and set recognizable standards for GI white honey for consumers. Market survey and interviews post-GI, however, indicated that the logo has not been used by any traders; that KIWHA has not been able to enforce its use due to a lack of funds; and that different terms (shown in **Figure 3**) such as Oku honey, Cameroon Highlands white honey, and Bamenda white honey are as common after the GI as they were pre-GI.

Prior to the GI, Oku white honey was not officially exported, but occasionally taken and sold aboard on small-scale via diaspora and expatriates. Although the GI aimed to promote, market and organize beekeepers to increase the volumes available to make export economically interesting, the demand from the national market and increasing price did not make this economically feasible. This was indicated by two organizations who actively explored exporting Oku white honey to Europe, the United States and South Africa, prior to the GI and during the GI project. Even accessing the higher value organic and fair trade certified honey and beeswax markets for Oku white honey, which Guiding Hope had already done for the dark brown savannah honey and wax, was not feasible given the smaller scale of trade and increasing price of brown honey and wax following the GI. Since 2009, Cameroon has exported an estimated 15 and 60 tons of honey annually to the United States, France, Belgium and other European countries. In the four years leading up to 2013, the average export price was 0.44 USD/kg and in the 4 years after 2013, the average export price was 0.80 USD/kg. This may be a general price increase. However, average import prices of honey to Cameroon, mainly from France, decreased by one third in the same period. Increased export prices may be due to an overall higher demand for Cameroon honey, which is attributed to the marketing efforts of two of the exporters for Cameroonian honey, and the exposure of Oku White honey through the GI project as having a generally positive effect on honey export prices.

Besides direct economic benefits to beekeepers and an expanded market, respondents indicated that the entire Oku area benefited from the GI registration. With Oku white honey more

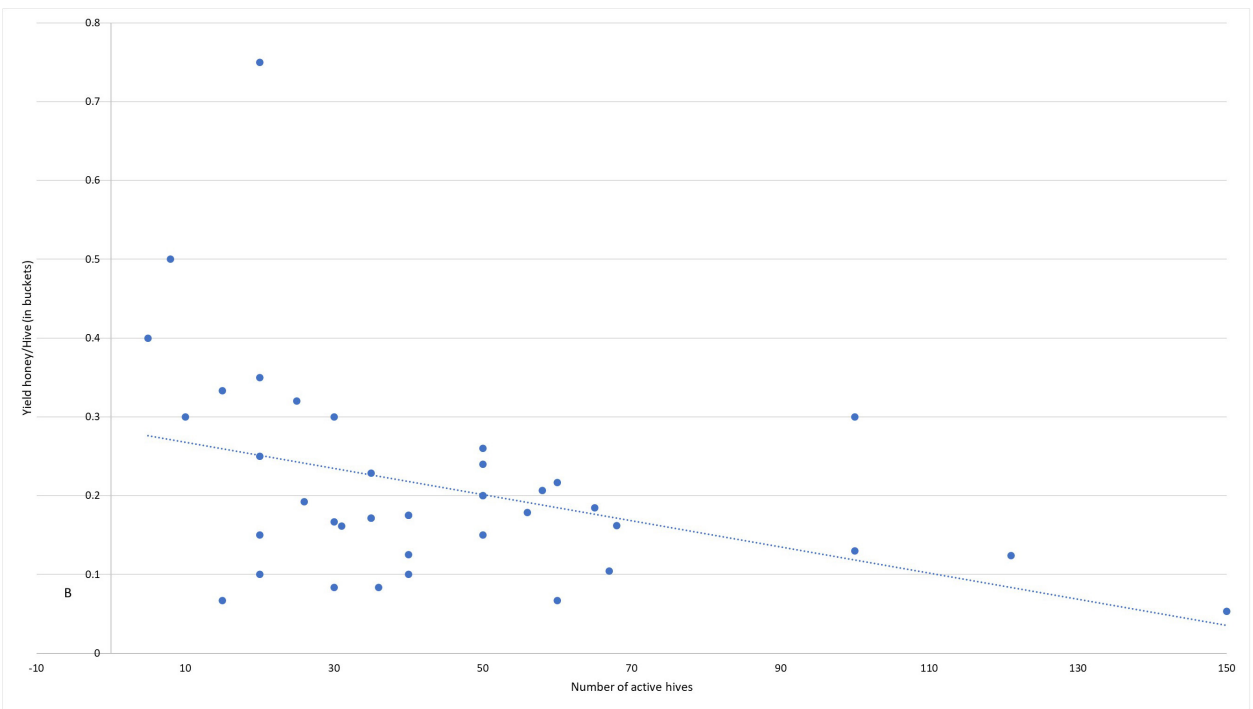

FIGURE 3 | Examples of labeling and packaging of Oku white honey in 2017.

well-known across Cameroon, the growing recognition helped to create an increased focus on the region. More tourists were reported as visiting the area, which has wider local economic impacts. Increased production costs may have disadvantaged beekeepers, but those selling material for hive construction, transport and selling their labor for harvesting, also reported benefiting from the more valuable honey sector.

Changes in Apiculture Value Chain Governance

Increased Collective Action and Beekeeping Rules

In 2012, the majority of interviewed beekeepers (75%) were members of a beekeeper group, twice the average for beekeepers in the Northwest (41%). Reasons given for membership included sharing experiences, being more effective, entering new markets, earning higher income and to obtain government support. Problems of collective action included lack of materials, the inability of some groups to pay for honey in cash, and what respondents call a "lack of market" (i.e., difficulties and capacity of producers to access to markets outside of Oku). The latter includes lack of marketing, low levels of professionalized management of cooperatives and enterprises, low quality production techniques (Maisels and Forboseh, 1999), and a lack of knowledge of buyers.

Compared to before the GI in 2013, changes occurred in the informal rules which guided cooperative members and were promulgated by beekeeping trainings by the community forest projects, with 56% of beekeepers changing from their previous methods to more sustainable beekeeping and honey production practices. For example, night harvesting was allowed before 2013, and preferred by some as bees are less active at night making harvesting easier. Of the 56% who said they changed their way of producing, 37% of these used to harvest at night with 21% changed due to the training and tools received from NGOs such as CAMGEW, and Oku Honey Cooperative, and 53% indicating that the tools they use after the GI allowed harvest quantity to increase. 76% indicated that control mechanisms by cooperatives were stricter, and they were more aware of quality - to avoid post-harvest rejection. The intensified control-mechanisms – while perceived to lead to potentially higher profits - also led to an increased workload for almost all beekeepers (95%), with 34% of beekeepers explaining this was due to the extra monitoring of hives to prevent harvest failure and increase yield. The time taken to collect hive materials to build additional hives and transport these up the mountain also increased the workload, although 20% of beekeepers indicated the extra workload was not a problem, and they were highly motivated to obtain high yields and therefore profit. As all beekeepers interviewed had received training from CAMGEW and from other projects in the past, their heightened motivation was also influential in increasing yield and quality. Given that 95% of beekeepers now have more hives than they did before 2013, increased workload was to be expected.

In the period during and after the GI formation, formal governance of the apiculture sector continued to develop. Prior to the GI, there were no state regulations for the honey sector. The rules in place were mainly local based on customary beekeeping traditions and the rules which cooperatives and groups had developed, which focused mainly on beekeeping practices, rather than accessing markets. In 2007 a Union of Apiculture Exporters was formed representing exporters, members of which set up a Council for National Apiculture Security in 2008 to secure Cameroon's application to the European Union for a Honey Monitoring Residue Scheme, which enabled honey exports to the EU. In 2009 MINEPIA developed the 'Projet d'Appui au Développement de la Filière Apicole' (PADFA), followed by the 'Cadre de Gestion Environnementale et Sociale Développement (MINEPIA, 2016). These projects aimed to professionalize the sector by providing training and equipment, setting up beekeeping groups, gradually gathering trade data, and registering processing organizations and cooperatives under hygiene regulations. Also prior to the GI, market information systems were piloted by NGOs in the Northwest and other areas of Cameroon to fill information needs, resulting in higher local market sales and prices (detailed in Ingram, 2014). The activities of the GI played a role in formalization of the sector. The GI documented and formalized many rules governing how apiculture was practiced in Kilum-Ijim which stemmed from customary practices and the long-running forest conservation projects. Guiding Hope, as a certified organic and community trade company - was a member of the Exporters Union, Honey Security Council, adviser in the MINEPIA projects and a member of KIWHA. They contributed their expertise in national and international apiculture product trading and in certification.

Interviews indicated that after the GI many honey producing groups had low levels of awareness of the emerging legal framework for national production and exports. This was attributed to various factors, such as extremely infrequent control, monitoring and sanctions by the government; difficulties in disseminating information from national to local level; and problems keeping local members in contact with collective action organizations such as the interprofessional and national union. After the set-up of the GI documentation, the KIWHA Association has hardly been operational, as the financing mechanisms foreseen during the GI process proved difficult to implement. Membership fees have not been paid, no board meetings had been held and monitoring of the GI code of practice, such as labeling, had not occurred in the period 2014 to 2017.

An Increasing Role for Associations and NGOs in Market-Based Governance

Prior to the GI, the majority of beekeepers had formed into groups largely stimulated by the forest conservation projects. Members of cooperative associations such as Oku Honey Cooperative, Oku Bee farmers Association, NOWEBA and HONCO, and NGOs ANCO and BERUDEP all produced, processed and sold white honey from the Kilum-Ijim forest. Two "buy'am-sell'ams" (the pidgin term for a bulk buyer or middleman) in Kumbo and Oku purchase, wholesaled and retailed white honey. Around the time of formation of the GI, two enterprises (Guiding Hope and Les Miellieries) also began trading white honey on a large scale. After the GI, NGOs such

as CAMGEW also entered the market and developed projects. In 2018, interviewees indicated that the value chain continues to be dominated by associations, NGOs and a handful of enterprises, with no growth in middlemen. These organizations, whilst not coherently following the code of practice developed as part of the Oku white honey GI, have added value to the product by increased marketing which promotes the qualities of white honey from Kilum-Ijim forests.

Changes in the Kilum-Ijim Forest Environment

Increasing Awareness of the Role of Forests in Apiculture

With the increasing demand for apiculture products, beekeepers and processing organizations became more aware of the fragility of the forest resource base. Before the GI, in a period spanning 17 years, training, reforestation activities, forest monitoring, patrolling and information dissemination in the entire GI area were carried out by the Kilum Mountain Forest, Ijim Mountain Forest and follow-up Bamenda Highlands Forest Projects and the Mobilization and Capacity Building of Small and Medium Sized Enterprises in NTFP Product Chains in Central Africa project (see Ingram, 2014 for details). These forest projects resulted in 21 community forests covering the GI area. They stressed the positive impact of forests in providing ecosystem services to the local community, notably bees pollinating a wide variety of subsistence and cash crops, as well as supporting the development of apiculture (Forboseh, 2002). During the development of the GI, discourses emphasized that the continued supply of forest forage depends on the continued presence of the forest and that the forest was a unique selling point for Oku white honey, evidenced by the forest and tree images used on packaging and this aspect being stressed in funding applications by processing organizations and NGOs. Despite a belief that white honey is organic, the practice of hive transhumance means that bees also forage on crops such as coffee, where traces of chemical inputs have been found, as pesticide use was widespread and not well controlled (Ingram, 2014). Since the GI, activities have been more limited with training, forest regeneration and awareness-raising carried out only via CAMGEW from 2012 to 2017.

Increasing Climatic Changes and Variability

Before the GI in 2010, beekeepers indicated that they have long recognized that the variability of honey production and the white color was affected by two, eight and nine year flowering cycles of some melliferous plant species, resulting in significant variations in pollen and nectar flows (Cheek et al., 2000; Ingram, 2014). Beekeepers stated that they were used to dealing with varying production, but did not like the resulting uncertainty in fluctuating income. Apart from normal seasonal variations, 97% of beekeepers indicated that the local climate had changed, affecting honey production. Nearly half of the beekeepers (49%) interviewed noted unusual and increasing climatic variations in the last few years with an increase in extreme events: strong winds and heavy rainfalls, a longer dry season and more seasonal variability. They attributed increased bush fires, changes in melliferous plant flowering seasons, new and increased levels of pests which raid and damage hives, increased hive absconding and decreased honey production to these climate changes. Nearly half (47%) of the beekeepers felt these changes negatively affected honey and wax production, and 41% also thought they impact agriculture and (13%) water availability.

After the GI was registered in 2018, the interviewees indicated similar trends in climatic variability and slightly stronger impacts on beekeeping. These perceptions mirror other studies of increased climate variability in the Bamenda Highlands (Sonwa et al., 2012; Innocent et al., 2016). Whilst it was hoped that forest regeneration activities and diversification of farmers into beekeeping, especially women, would reduce or mitigate some impacts of climate change on forests and the variability and sustainability of beekeeping related incomes, these have been generally insufficient to alter the trend of increased vulnerability to climate change for most beekeepers.

Increasing Deforestation Rates

Before the GI, forest cover had been continuously decreasing, with a 62% decrease in the Kilum-Ijim forest between 1978 and 2001, corresponding to a deforestation rate of 579 ha. an^{-1} on average. In 2001, forests accounted for only 9% (8122 ha) of the land cover. Between 1978 and 2001, the area of crops nearly doubled (+98% of surface), savannah cover decreased by 18.4% and bare soil areas more than tripled, covering 4.7% of area in 2001. Deforestation occurred first in the lowest altitudes (<2100 m), then gradually extended up Mount Oku (2100–3000 m). Below 1700 m altitude, almost all forests that had existed in 1978 had disappeared by 1988. Above 2300 m, about half the forest cover had been converted to crop or savannah between 1978 and 2001 (Momo Solefack, 2009). After 2001, forest cover stabilized with numerous small fragments of secondary forest, reflecting the success of the above mentioned forest protection projects. Despite afforestation in the period 2001 to 2007, the proportion of forest continuously declined until 2007, indicating that deforestation was ongoing. By 2007, a mosaic forest cover composed of 66% of recent secondary forests (after 1978) and 34% of ancient forests (present before 1978), and forest fragmentation increased and the average forest area decreased (Momo Solefack et al., 2012). Interviews and observations before and after the GI indicate that the main drivers of deforestation and degradation, in order of importance took place at the forest edge and lower forest area, due to conversion to agriculture, goats, medicinal plant harvesting, particularly *Prunus africana,* and wood harvested for fuel and carving. In the upper forest and summit, the main drivers were free ranging cattle and goats (Kometa and Ebot, 2012; Ingram, 2014; Momo Solefack et al., 2018). The three institutions that govern the forests: traditional authorities, the Ministry of Forestry and Wildlife and the Community Forest management institutions, had long been aware of these problems, but were in some cases part of the problem, as they had insufficient resources to monitor and control and were unwilling or unable to sanction infringements.

Changes in Bee Forage

In the period just before the GI, from 2010 to 2012, beekeepers identified 123 melliferous species (58 forest plants and 65 crops and exotic plants), and five species used for hives. In 2010 beekeepers did not indicate that access to these hive materials was a problem, with the abundance of five recognized melliferous "bee plants" (*Schefflera mannii, Prunus africana, Nuxia congesta, Hypericum revolutum,* and *Schefflera abyssinica*) seen as having increased up to 2010, except for *Prunus africana*, which declined significantly due the harvest of its bark for international pharmaceutical trade (c.f. Ingram, 2014). This continued abundance of melliferous species was attributed to accumulation of long-running projects, particularly the conservation focus of the Kilum Forest, Ijim Forest and Bamenda Highlands Forest Projects (Thomas et al., 2000; Abbot et al., 2001; Ingram, 2014). For example in 2010, increasing degradation and deforestation was perceived by the larger processing organizations and beekeeper 'ambassadors'[2] with over 50 years of experience, to affect the long-term sustainability of the apiculture value chain. They suggested that most beekeepers, despite seeing the diminishing forest cover, thought that the forest still provided a source of forage and hive materials, that supply increases were still possible and kept pace with demand, due to their generally small-scale production. They indicated that they saw negative changes due to their longer experience in beekeeping, and attributed perceptions by beekeepers with less experience to the confounding natural cycles of specific forage plants which produce bumper honey flows every two, seven or eight years. These experienced ambassador beekeepers indicated that this context leads most beekeepers to perceive access to markets as the main limiting factor in the honey chain, rather than forage sources and the state of the ecological system. In 2012, 57% of beekeepers interviewed indicated having at some time taken preventative action to conserve forests: 12% had participated in restoration activities, 27% had planted bee forage or fire-resistant trees, particularly those located at the forest edge, 0.5% were engaged in educating people about the benefits of forest conservation, and 13 beekeeper groups reported taking protection measures, including tree planting.

After the GI, in 2017, beekeepers indicated a supply shortage in hive construction materials, such as raffia palms, bamboo and grasses. This was attributed to two factors. One was an increase in beekeepers, attributed to both increased demand encouraging more people to take up beekeeping and to CAMGEW projects from 2012 promoting beekeeping by providing hives, training, and organizing 212 people into five new cooperatives in the GI area outside of Oku, and opening a new honey shop in Bamenda. Secondly, although CAMGEW planted 60,500 native trees in eight community forests and provided training on environmental protection, forest cover continued to decrease. In 2013, 2017, and 2018 interviewees all reported continuing degradation due to bushfires, uncontrolled livestock (goat and cattle) grazing in the community forest and protected area, no or weak monitoring, control and sanctions on the exploitation of timber and non-timber forest products in the area that constitute the GI. In 2018, beekeeper's perceptions corroborated the continuing deforestation trends evident in the remote sensing data and from plant biodiversity surveys (Momo Solefack et al., 2016). Beekeepers perceived that the main drivers of forest loss were anthropogenic activity, due to clearing for farmland, livestock grazing, ankara (burning vegetation to stimulate grass growth for cattle), harvesting timber and non-timber products and hunting, and by increasing population density.

DISCUSSION

Here the extent to which voluntary Oku white honey GI certification has benefited beekeepers and other stakeholders in the Kilum-Ijim white honey value chain is discussed – through the lens of how markets, incomes and prices changed, and how the honey value chain governance and the GI landscape environment have changed since certification, and the extent to which the dual aim of development and conservation has been met.

Livelihood Benefits Based on Short-Term Price and Production Expansion

Beekeeping has long been promoted as an income-generating activity among African rural communities that may alleviate poverty as well as create an incentive for local forest conservation efforts (Munthali and Mughogho, 1992; Lowore et al., 2018). Honey, as the main product of beekeeping, has traditionally been produced either for own-consumption or as a bulk commodity, sold on the road side, through middlemen, and in markets and supermarkets in urban areas, with little value addition among the primary producers. An expansion in markets and increase in honey producer prices appears attributable to the GI process of Oku White honey. The price and volume snapshots of before and after the GI provide limited support for this. However, almost all respondent interviews and focus group discussions reported short-term positive livelihood income impacts from higher prices, albeit with higher workloads and input prices. This means there may be little overall effect on income in the longer run.

Even before the GI, beekeeping was noted as having a high potential for income generation in the area surrounding the Kilum-Ijim forest (Londi, 2004; Baimenda, 2010; Ingram, 2014). With the introduction of GI, beekeeping seems to live up to this expectation as the number of producers and beekeeping cooperative memberships increased, producer prices of white and brown honey increased, and white honey sales grew, as have the numbers of market outlets locally and in large urban areas. As such, seemingly the GI formation for Oku white honey mirrored the anticipated benefits theorized by Jena and Grote (2010) and argued for in other theoretical and empirical studies (Benni and Reviron, 2009; Cei et al., 2018), including studies of potential GI honeys (Egelyng et al., 2017; Mwakaje et al., 2018; Besah-Adanu et al., 2019). Positive impacts on local communities (Vandecandelaere et al., 2009), even if not engaged in honey

[2]Notably Paul Mzeka, ANCO director and 2012 United Nations Forest Hero, and George Kangong, Director of Riba Agroforestry Resource Centre and 2010 Equator Prize winner).

production, have also been observed as one of the spillovers of GI, such as an expansion in tourist activities.

The price of Oku white honey started to increase before the GI registration by OAPI in 2013, probably because of related project activities and expanded awareness among consumers. The GI label itself was the final step in the GI process, where value was built upon existing brand value and consolidated through the standardization of the production and quality. This was led by collective producer efforts, and expanding awareness while protecting the origin brand, rather than value addition through a label of quality to consumers on new markets. The fact that increased market coverage and higher prices occurred for white honey, despite no single Oku White GI label being used, shown in **Figure 4**, supports this interpretation. However, some beekeepers in villages in Kilum-Ijim producing white honey in the GI resented the "Oku white honey" brand, feeling the focus on Oku was not inclusive, causing frictions among producers.

The benefits of value addition, market expansion and the increased production documented post-GI were not due to the GI process. Among other factors, the form of institutional support during the development of the GI appears to have been essential for creation of producer benefits. This was also shown by Barjolle et al. (2017) in their study of Kenyan and Colombian coffee, where state support strategies' alignment with producer needs were decisive for higher producer benefits. Neilson et al. (2018) found no producer benefits in the case of two Indonesian GIs for coffee, where state GI interventions focused on reinforcement of state-community relations rather than product placed-based value creation, while Zhao et al. (2014) in their study of Chinese GIs found that strong state GI intervention did not allow independent actors to play a role, and limited value creation. In contrast, the GI process in Oku involved international research institutes and development organizations, emphasized collective action at cooperative level and in KIWHA, and was embedded in a legislative GI framework formed in an international forum by OAPI, while state interventions were limited.

Despite increased awareness of Oku white honey on foreign markets, the market expansion stopsped at the national border. One of the criteria for the selection of Oku white honey as a GI in the PAMPIG project was its potential as a high value export product (Chabrol et al., 2017; Balineau and Faure, 2018). However, post-GI, the barriers to exporting proved as significant as feared (Chabrol, Unpublished). Given the high prices Oku white honey fetched on the national market, although international buyers were interested in the product and its "story," the total costs were too prohibitive. Export entails high transport costs, and complying with complex and costly permits and quality testing, the framework for which was being developed in parallel to the GI process. Following the work by the Council for National Apiculture Security, savannah honey has been exported to the EU since 2010, in quantities of around 60 to 100 tons in the period 2015 to 2019, and no Oku white honey has officially exported. In the period from 2010 to 2017, export prices of honey were between 1.35 and 2.22 €/kg, which was well below the prices paid for Oku white honey, even at the local cooperative level.

Value Chain Governance Without a Unified Label

While KIWHA developed a marketing strategy with consistent naming and labeling of Oku white honey, a common GI label has not been used by the different cooperatives and associations. Instead several marketing strategies, including different logos, packaging and naming abound. This is in contrast to the unified GI labels used in the EU GI framework. Most of the 30 European GI registered honeys (DOOR database, European Commission, 2019) are supplemented with a local GI location specific label that help beekeeping organizations to promote and protect their GI honey products on the EU market and guarantee retailers and consumers the origin and quality of the product. Behind the GI labels are a standardized code of practices developed by the producer organizations (EC regulation no 668/2014), including descriptions of control structures to ensure the origin and quality

FIGURE 4 | Examples of labelling and packaging of Oku white honey in 2017.

processing for the case of honey. The GI code of practice for Oku white honey, and the Cameroonian regulatory framework for honey (e.g., regarding hygiene) was not monitored or enforced. As honey cooperatives, traders and retailers downstream in the value chain have sold white honey at increasingly higher prices, despite lack of guarantee systems, this situation bears witness of the high demand for white honey, lack of sufficient incentives for producers to unite in labeling and control efforts and for retailers to control origin and quality. This context also indicates that exchange and flows of not just economic benefits but also information about the quality of production landscape and control are needed to ensure its durability, all along the chain.

Despite inadequate control mechanisms in the production of Oku white honey, producer cooperatives and associations have maintained their dominant role in the white honey trade. The GI for Oku white honey expanded into new markets and increased demand without an influx of middlemen or opportunistic traders stepping in to take advantage of value creation. This is partly explained by the strong beekeeper cooperatives and associations. These were involved in the GI formation and remained the main gateways to urban markets. Other African honeys, with origin-linked quality valued by the market, have seen different developments. In Kenya, where the Mwingi forest honey quality is associated with local Acacia forests, the increase in demand led to value chain dominance by middlemen and eventual near-collapse of the producer cooperative (Musinguzi et al., 2018). In Tanzania, the collapse of the beekeeping cooperative led to compromised quality of Uyui honey, previously named African Queen and valued for its link to the miombo woodlands of Tabora (Mwakaje et al., 2018). Strong producer groups and social ties among producers are known to be important for the coordination of production and marketing of GI products (Reviron and Chappuis, 2011; Egelyng et al., 2017; Besah-Adanu et al., 2019). While producer groups often benefit from legal frameworks provided by the state (Chabrol et al., 2015), producer cooperatives and associations in Oku have traditionally been supported by traditional authorities and strengthened through international projects led by research and development organizations, such as the forest conservation projects and the PAMPIG project that led to the GI registration. In the Kenyan honey experience, the cooperative consisted of units of smaller well-working honey producer groups, while the cooperative was a result of an external project and not supported by local, traditional institutions. The top-down approach to cooperative development is often associated with a lack of trust and social cohesion, which are among the key reasons for cooperative failure (Ruben and Heras, 2012).

GI as a Landscaping Instrument- or Not?

The GI registration and - likely with a larger impact - the former projects on forest conservation and environmental governance, appear to have resulted in improved beekeeping, production practices. However, conservation efforts and afforestation activities by beekeeping cooperatives and associations after the GI and related to the GI registration, have not been sufficient to turn around deforestation rates of the Kilum-Ijim forest. Whilst deforestation and forest degradation result from many different drivers, these drivers did not change significantly from over the periods before, during and after the GI (Kometa and Ebot, 2012; Ingram, 2014; Momo Solefack et al., 2016, 2018). The organized beekeepers in Oku were aware of the importance of managing the forest for a long-term sustained production of honey. They also have engaged in forest regeneration and protection measures. However, the increased price of Oku white honey appears to have attracted additional beekeepers and led to an increase in production, resulting in a situation where the demand for hive materials puts pressure on the very same natural environment on which the GI registration is based. This paradox can be added to the list of unintended consequences of resource policies formulated by Lewison et al. (2019) and of competing claims on landscape resources (Giller et al., 2008). This paradox arises due to the inadequate enforcement and monitoring of the Oku white GI standard, and the lack of a common name and label that could differentiate Oku white honey produced according to the GI standard from other white honeys. contributing, confounding factor in the paradox maybe explained by the cost and time lag between taking conservation investments and impacts - whilst pressure was ongoing or increases - presents challenges. This was especially so for new beekeepers who appeared to have a lesser and different understanding of the complex interactions between these social-ecological systems (Folke, 2006; Folke et al., 2010). These interlinks were, however, realized by the older, ambassador beekeepers. This mimics the situation of the GI for Tequila, where the market valued the origin more than the production methods, leading to environmental degradation (Bowen and Zapata, 2009). Whilst Giller et al. (2008) highlight the need to work with stakeholders, to explore alternatives contributing to more sustainable and equitable use of natural resources, including technical options and governance, the experiences from the Oku white honey case emphasizes that as Lambin et al. (2014) suggest, coherence and effectiveness are important considerations in any governance and policy mix. The National Committee of Geographical Indications was responsible for monitoring GI products in Cameroon and strengthening their legal protection, however, the authority lacks presence in the GI area. Also the existence of varying degrees of whiteness for honey from areas not included in the Oku white honey GI standard, complicates monitoring honey and reduces incentives to engage in collective action among actors to oversee a sustainable use of resources.

The limited voice of beekeepers trying to conserve the forest, in comparison with other actors with extractive economic activities was another and plausibly more important reason for the lack of positive environmental impacts of the GI. Even with increasing numbers of beekeepers, the activities of other actors, predominantly cattle herders and goat owners, continue deforestation and forest degradation. This was exacerbated by both formal and informal institutions. The traditional village chiefs and MINEPIA both promote beekeeping activities, but also condone degrading, extractive activities in the forest, creating an antagonistic interaction between different policies for land use management that undermines the long-term sustainability of white honey production (Lambin et al., 2014).

The GI for Oku white honey shows that for landscape impacts, the market-based mechanism for good environmental stewardship, such as a single product GI, appears insufficient to have a lasting impact on overall forest management and governance or to change environmental trends. Interventions are needed that create complementarity between different institutions and policy instruments, argue Lambin et al. (2014), and that create incentives for all economic agents in a setting, especially when the state is absent or weak in terms of environmental and land use regulation. Even if the GI process for Oku white honey is viewed as an inclusive value chain collaboration 'beyond the chain' (Ros-Tonen et al., 2015), with involvement of local, national and international organizations, the collaboration impacted and involved not all value chain actors in chain governance and insufficiently included all actors in the GI landscape. With few state bodies enforcing existing environmental, forest and livestock laws, weak customary authorities and local beekeepers with no rights - *de jure* or *de facto* – or ability to keep out extractive activities from the forest areas including the Oku forest reserve, the GI project has an insufficient impact on the myriad arrangements governing the natural landscape. For an environmental, landscape level impact, all or at least most main users - both formal and informal - must be involved and perceive that economic benefits can be gained before market-based approaches are successful.

CONCLUSION

This paper examined the extent to which voluntary GI certification benefited beekeepers and other stakeholders in the Oku white honey value chain – through the lens of how markets, incomes and prices changed, and how honey value chain governance and the GI landscape environment evolved since registration.

The short-term results for beekeepers were increased incomes, due to the increased selling price for crude honey. The prospect of higher revenues led beekeepers to install more hives, increasing their incomes even more. Beekeepers also received training and new equipment to improve their harvest and honey quality. However, higher workloads and input prices suggest that prolonged long-term benefits may not accrue.

As part of the GI Code of Conduct, the honey cooperative introduced more controls when buying crude honey from beekeepers. This has been a strong incentive for beekeepers to improve quality to ensure capturing the higher payment. The additional income available in turn improved beekeepers' household living standards and living conditions, for example sending children to school, investing in other types of agriculture (animals and other crops) or using the income to build and improve their houses.

Oku white honey has generally become more popular and widespread throughout Cameroon and to a very limited extent internationally. Not only beekeepers benefited from the increased market, but also other stakeholders along the value chain. Especially local service providers benefited: greater honey production increased the demand for beehives and materials to construct beehives, with the price for beehive material increasing up to 200%. The expanded honey market benefited retailers and transporters selling Oku white honey all over Cameroon. The lucrative national market and high prices, however, meant that an export market was not economically viable.

The dual aim of development and conservation has, however, not been met, being harder to achieve than seemed possible at the start of the GI process. The GI has not been a sufficient force to counter deforestation and forest degradation which ultimately over time, affect both honey quality and quantity – despite the conservation actions of beekeepers, associations and in collaboration with NGO projects and authorities. The longer-term results and benefits are predicted to be different, depending on both the impact on the forest landscape and price trends in materials relative to the price beekeepers receive for honey. The price increases of hive material increased relatively more than the price of crude honey. If this trend continues, it could seriously negatively impact beekeepers' income. Continued control over the brand and market depends on the ability of the current market-based GI and collective organization, such as by the cooperative, to become more effective and coherent with the statutory, customary and project-based governance arrangements and institutions operating in the Kilum-Ijim forest landscape.

This study provides a reality check of the benefits gained from the Oku white honey GI, highlighting the importance of coordinated, effective governance of both the landscape a GI originates from *and* the markets for its products. The impacts of the Oku white honey GI result not just from how the forested and agricultural landscape the honey originates from was governed, but also how markets for the honey were governed. The institutions enabling access to the resources needed to produce the product have weak power, but sufficient to maintain traditional beekeeping and processing methods and to engage in reforestation. These institutions, however, were insufficient to halt or reverse the stronger drivers and actors steadily degrading the forest. The GI and the new bricolage of organizations which sought to govern the Oku white honey brand have resulted in short-term economic gains, but appear insufficiently strong to govern the largely local and national – but also and minor international - value chain upon which the reputation and quality of the GI product was founded.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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