



# Argan Oil Trade and Access to Benefit Sharing: A Matter of Economic Survival for Rural Women of the Souss Massa, Morocco

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## Abstract

Poverty eradication, environmental conservation, and the United Nations Sustainable Development Goals cannot be achieved without the input and participation of disadvantaged communities in developing mitigation strategies. Over the last few decades, the markets for natural resources as niche products have grown exponentially. Morocco's production and international sales of argan oil are set to exceed current figures within the decade. We interviewed presidents of cooperatives in several villages in the Souss Massa region of Morocco to assess the current status of the argan oil trade, in particular women's roles in production, their economic status, and whether they have access to benefit sharing (ABS). Our results reveal that control over the argan oil trade has shifted into intermediaries that supply larger corporations, and that the survival of cooperatives and women's access to vital income are increasingly threatened. We argue that the implementation of ABS is essential to preserve women's access to income and their traditional knowledge associated with oil extraction processes and to ensure the conservation of argan ecosystems as prescribed by the Nagoya Protocol.

**Keywords** Argan oil · Access to benefit sharing (ABS) · Cooperatives · Corporations · Markets · Resource capture · Women's economic status · Souss Massa · Morocco

## Introduction

Creating sustainable economic development for socially marginal rural communities is a major concern of the governments of most developing countries (Enders & Remig, 2014; Gryshova et al., 2019) and key to achieving the UNs Sustainable Development Goals (SDGs) agenda (United Nations, 2022; World Bank, 2022a, b). Over the last few decades, the development of natural resources-based products with high-added-value has provided the potential for new socioeconomic opportunities, social equality, active participation of stakeholders in decision-making, women's

empowerment, and a fair return for those involved in their production (Montanari & Bergh, 2019a, b; Raj et al., 2021; Sarlawa & Adiwijaya, 2019). Popular natural resource products that have flooded global markets include shea butter, cacao, coffee, argan oil, and, more recently, cactus oil, all prime examples of high-added-value natural products. Significant funding and multilateral agencies allocate large budgets to implement development initiatives according to national performance measured in positive or negative indicators. These schemes reflect the broader discourse of sustainable livelihoods that link people, natural capital, and resources (Brauman et al., 2020; Diaz et al. 2018; Scoones, 1998), payment for ecosystem services, and poverty reduction (Pascual et al. 2014; Diaz Lopez et al., 2019; Mace et al., 2018), and the latest bio-economy trend (Brauman et al., 2020; Wohlgemuth et al., 2021) emerging from the millennium ecosystem assessment (MA) (2005). Anchored in neoliberal policies, the implementation of these schemes relies on international cooperation for economic development to increase human welfare and resource sustainability, overcome social inequalities, poverty, and social, environmental, and economic challenges, and meet the SDGs (Fortnam et al., 2019; Lokko et al., 2018) towards

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reducing negative impacts on the environment, particularly in developing countries, which tend to rely heavily on agriculture and natural resources (Calicioglu & Bogdanski, 2021; Mace et al., 2018; Stegmann et al., 2020).

A vital task is to redress the “gender” status quo (SDG 5), which, despite having been central to numerous policies through the gender agenda, has largely failed (Cruz-Garcia et al., 2019; Ethan et al., 2018; Fortnam et al., 2019; Sanz-Hernandez et al., 2022). If sustainable development is to be achieved, women need to be fully included in decision-making and policies (Trading Economics, 2023). Cruz-Garcia et al. (2019) argue that in research related to ecosystem services, the overall SDGs cannot be achieved unless a whole gender dimension is included. Women’s contributions cannot be dismissed as they are crucial in maintaining natural resources and securing food, water, and energy for their household and community needs. However, Brown and Fortnam (2018) point out that a gender perspective is seldom included in agricultural policies; even when they do, they do not receive adequate training in newly introduced technologies and policies to meaningfully participate. Kiptot and Franzel (2012) also found that women are not involved in decision-making processes related to controlling resources at the farm level, which men generally dominate. Thus, women are prevented from receiving the benefits of natural by-products, and their contribution to maintaining the resource is little recognized. Benjamin and colleagues (2018) also found that women remain excluded from agroforestry payments for ecosystem services (PES) related to land tenure. Moreover, when women are included in development initiatives for rural socioeconomic development and poverty reduction, they often constitute cheap labor, as shown in studies of the Indonesian oil palm sector (Sinaga, 2021). Berriane (2011), Damamme (2014), and Montanari and Bergh (2019a, b) have also described women as being primarily a labor force within cooperatives.

Morocco launched the Initiative Nationale de Développement Humain (National Initiative of Human Development; INDH) in 2005 to address poverty reduction, natural resource conservation, and the difficult challenge of integrating marginalized rural women. To fulfill these objectives, the creation of cooperatives has been widely promoted, primarily funded under the Green Morocco Plan (2008–2020) (International Labour Organization [ILO], 2018; INDH, 2013, 2023). As a leading country in the North African region, Morocco has significantly upgraded its development indicators for employment and education (World Bank, 2019a, b). However, several social inequities persist concerning rural education, social justice and human rights, chronic poverty, and rural women’s socioeconomic development (World Bank, 2022a, b).

Rural communities nationwide have been encouraged to enroll in development initiatives (INDH, 2013, 2023). These

schemes encourage the transformation of natural resources that have traditional uses or are regularly consumed and which most people in the community know about or are at least aware of (Montanari, 2019). The creation of income-generating activities (IGAs) has been widely promoted at the heart of local cooperatives to facilitate the enrolment of women who expect a decent income. In theory, all members can fully participate in and benefit from general economic interest and welfare according to common grounded principles and values (Nuredin & Byeon, 2014). In the same year the INDH was launched, 9,400 IGAs were created, 60% in rural areas (Igamane, 2020). Enrolling in these cooperatives gave women in precarious economic situations the prospect of earning a regular income far beyond their expectations. The widespread trade in argan oil, marketed for its benefits to health and skin, is perhaps one of the most pertinent examples of a promising IGA (Montanari & Bergh, 2019a, b; Perry et al., 2020).

## ABS and the Nagoya Protocol

Until the adoption of the Nagoya Protocol by the UN in 2010, the collection of genetic resources (GR) that form the pharmacopeia of indigenous communities was largely ignored. However, the Protocol raised the issue of the unrestricted, uncompensated exploitation of GR and associated traditional knowledge (TK) for commercial purposes (Rabitz, 2015). The non-remuneration of local knowledge holders and the lack of intellectual property rights (IPR) and reward sharing for indigenous communities became highly contested (Duffield, 2003; Liang, 2011).

While a review of the large body of literature related to the mechanisms of attribution for ABS<sup>1</sup> (Coolsaet et al., 2015; Medaglia et al., 2014; Michiels et al., 2022) is beyond the scope of this paper, it is helpful to emphasize that the Nagoya Protocol Articles and ABS encourage opportunities to exploit GR and state that knowledge holders and industrial companies must share benefits equally and fairly. Benefits can take the form of provision such as education or medical services or monetary remuneration for the sovereign resource and the local TK associated with its uses and applications. In theory, local communities are provided ABS in exchange for the development/exploitation of their local resources. Articles 5, 6, 12, 7, 10, 12, 13, 14, and, to a lesser extent, 25 of the Protocol are particularly pertinent

<sup>1</sup> UN Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity. 2011; UNDP-GEF. Strengthening Human Resources, Legal Frameworks, and Institutional Capacities to Implement the Nagoya Protocol (UNDP-GEF Global ABS Project, 2021).

to our study as they address the goals of conventional biodiversity (CBD), that is, fair and equitable sharing of benefits arising from the use of GR, enhancing biological diversity conservation, the sustainable use of GR components, and sustainable development for human wellbeing.

While the UN adopted the Nagoya Protocol directives in 2010 and recognized “bioprospecting” as illegal (UN Environment, 2017), the legislation leaves each country substantial leeway to choose whether its GR should be subject to ABS, alter or introduce legislation to reflect national policies, or even create new terms and requirements that are broader in scope than those initially stipulated by the CBD and the Protocol. In a worst-case scenario, implementing expensive ABS regulations has been counterproductive, discouraging rather than facilitating access to biodiversity (Michiels et al., 2022). Thus, the application of ABS remains complex and time-consuming. Morocco, which signed the CBD in 2011, recently ratified the Nagoya Protocol.<sup>2</sup> However, the government hesitates on definitions related to “local” or “autochthonous,” “communities,” “commons,” and “sustainable use and conservation” and frames other conditions of ABS attribution that are also beyond the scope of this paper.

In addition, the issue of corporate social responsibility (CSR) has recently reemerged. CSR, in theory, requires that business communities, the private sector, and other business-like enterprises increase their social responsibility towards workers. Rooted in the 1800s during the industrial revolution and prominent in the 1950s (Carroll, 2008), CSR is framed in fairtrade and other equity labels and certifications that, in theory, reflect good, sustainable, and ethical practices in a consumer market eager for transparency and the welfare of communities. In principle, applying ABS should also contribute to fulfilling these goals.

## The Endemic Argan Tree

Widely found throughout the Souss Massa region, the endemic argan tree *Argania spinosa* (L.) is famous for its culinary properties and cosmetic benefits, and its oil has gained prominent economic value on international markets (Charrouf & Guillaume, 2014). Besides economic value, the argan tree has many beneficial functions for local communities: wood for burning and construction, foliage, fruit for animal fodder, and shade cover for insects and plants. Moreover, the tree has been traditionally linked to complex customary and agrarian rights that have sustainably managed the ecosystems for centuries (Genin & Simenel, 2011; Ruas et al., 2016).

Women traditionally extract oil from the argan kernels primarily for culinary purposes. Groups of women collect the nuts, which are then cracked between two stones so that the kernels can be ground into a pulp and put into a mill to extract the oil that men typically sell in the market (*souk*). The women use surplus oil for skin care (Perry et al., 2019). The women’s traditional skills associated with the locations of argan trees and the best times for collection (TK) have been passed down through successive generations (Chalfin, 2004; see also Delaney, 2006; Adedokun et al., 2016). These practices play a vital role in the conservation of the argan tree. In addition, the image of a natural product traditionally harvested and managed by women has been used to make argan oil highly marketable (field notes July 2021).

The market value of argan oil dropped in the latter part of the nineteenth century, but interest reemerged when steryl and unsaturated fatty acid (UFAs) were identified as significant components in the early 1870s (Girardet, 1927; Jaccard, 1926). With the further discovery of essential tocopherols, antioxidants, UFAs, and hepato-protector properties with choleric benefits (Charrouf & Guillaume, 2009, 2014) in the twentieth century, the benefits of argan oil were then promulgated on the markets (Lybbert et al., 2011). The first argan oil cooperative in Morocco was established in 1996 with the express goal of improving rural women’s livelihoods (Charrouf & Guillaume, 2009). Following the intervention of the international development agency the Gesellschaft für Technische Zusammenarbeit (GTZ), companies showed a keen interest in working actively across Morocco to promote rural and socioeconomic development and conservation. Producing argan oil presented a unique opportunity to enroll women in cooperatives and development programs (le Polain de Waroux, 2012; le Polain de Waroux & Lambin, 2013; Turner, 2014).

## Study Area: The Souss Massa Region

Souss Massa (in Tachelhit: ⵜⴰⵎⴰⵙⴳⴷⵉⵜ<sup>3</sup>, “the plain,” Sus al-Aqsa in Arabic) in southwest Morocco is bounded by the Atlantic Ocean in the west, the High Atlas Mountains in the north, the Anti Atlas Mountains in the southeast, and the Sahara in the south. It is characterized by a semi-arid to sub-desert climate, mainly due to the presence of the Azores Anticyclone despite the Atlantic coast and the High Atlas Mountains (Abahous et al., 2018). The rainy season occurs between November and March, and the dry season lasts approximately six months, from May to October. As a historical, cultural, and geographical region of Morocco, Souss Massa forms part

<sup>2</sup> This should have come into effect in July 2022 (C.N.110. 2022. TREATIES-XXVII.8.b).

<sup>3</sup> Tifinah (alphabet character) of the official Tamazight Language in Morocco.

**Table 1** Cooperatives, Argan oil trade and certification

Denomination	Status	Presidents	Argan nuts bought from middlemen	Argan oil	Certification
A1	Operational	1	✓	✓	Norma Cert; USDA; Ecocert, MA-BIO 154
A2	Operational	3	✓	✓	Afoulki; Fair for Life
A3	Operational	1	✓	✓	Afoulki
A4	Operational	1	✓	✓	Ethical women
A5	Waiting for ONSSA sanitary certification	1	✓	✓	No
A6	Waiting for ONSSA sanitary certification	1	✓	✓	No
A7	Waiting for ONSSA certification	1	-	✓	No
A8	Operational	1	✓	✓	Norma Cert; IGP 01088 082019
A9	Operational	1	✓	✓	Ecocert; Fair for Life

of the administrative region of Souss-Massa and Guelmim-Oued Noun, created in February 2015, following Decree No. 2.15.40, which determined the number of regions in the Kingdom of Morocco, their names, their chief towns, and the prefectures and provinces of which they are composed. The region's economy is based on agriculture, fishing, and tourism.

The Souss Massa region has a total population of 2,674,697 inhabitants over an area of approximately 31,577 km<sup>2</sup> (Haut-Commissariat au Plan (HCP), 2014). Divided into six provinces, it includes 19 municipalities and 16 circles, known as territorial “collectivities” that are gathered into several communes endowed with legal administrative and financial autonomy. Following a new departmental division, the region acquired two prefectures (*Agadir Ida Ou Tanane* and *Inzegane Ait Melloul*) and four provinces (*Chtouka Ait Baha*, *Taroudant*, *Tata*, and *Tiznit*), which include a total of 175 municipalities: 21 urban and 154 rural (Mansir et al., 2021).

The Office de Development et de la Cooperation (ODCO), (2021) reports 655 registered argan cooperatives, representing 86% of argan oil production in the country, while the total number of cooperatives throughout Morocco reached 47 609. Financial support from foreign and Moroccan state funding programs is available through partnerships with various donor organizations, development agencies, and non-governmental organizations (NGOs) (Bouroua, 2016). In addition, the government has privileged a private–public partnership (PPP) scheme for managing and privatizing public and collective lands and a Groupement d'intérêt économique<sup>4</sup> (GIE) to facilitate the commercialization of argan oil.

Thus, the international corporation L'Oréal has signed agreements for a PPP with its suppliers, namely, Laboratoires

Sérobiologiques (LS) and the NGO Yamana, whose role is to secure the argan oil supply, and established a framework for sustainable argan oil production with the potential for expansion to the whole argan economy of Morocco and other raw vegetable materials (L'Oréal Canada, n.d.). The LS (a division of Cognis – now part of BASF) developed CSR in collaboration with L'Oréal, the NGO Yamana, and Targanine cooperatives, their Moroccan partners (Robinson, 2021). In theory, the increased production will benefit the local populations and improve the relationship between the local villagers and the officers of the Department of Water and Forestry (El Wahidi et al., 2015).

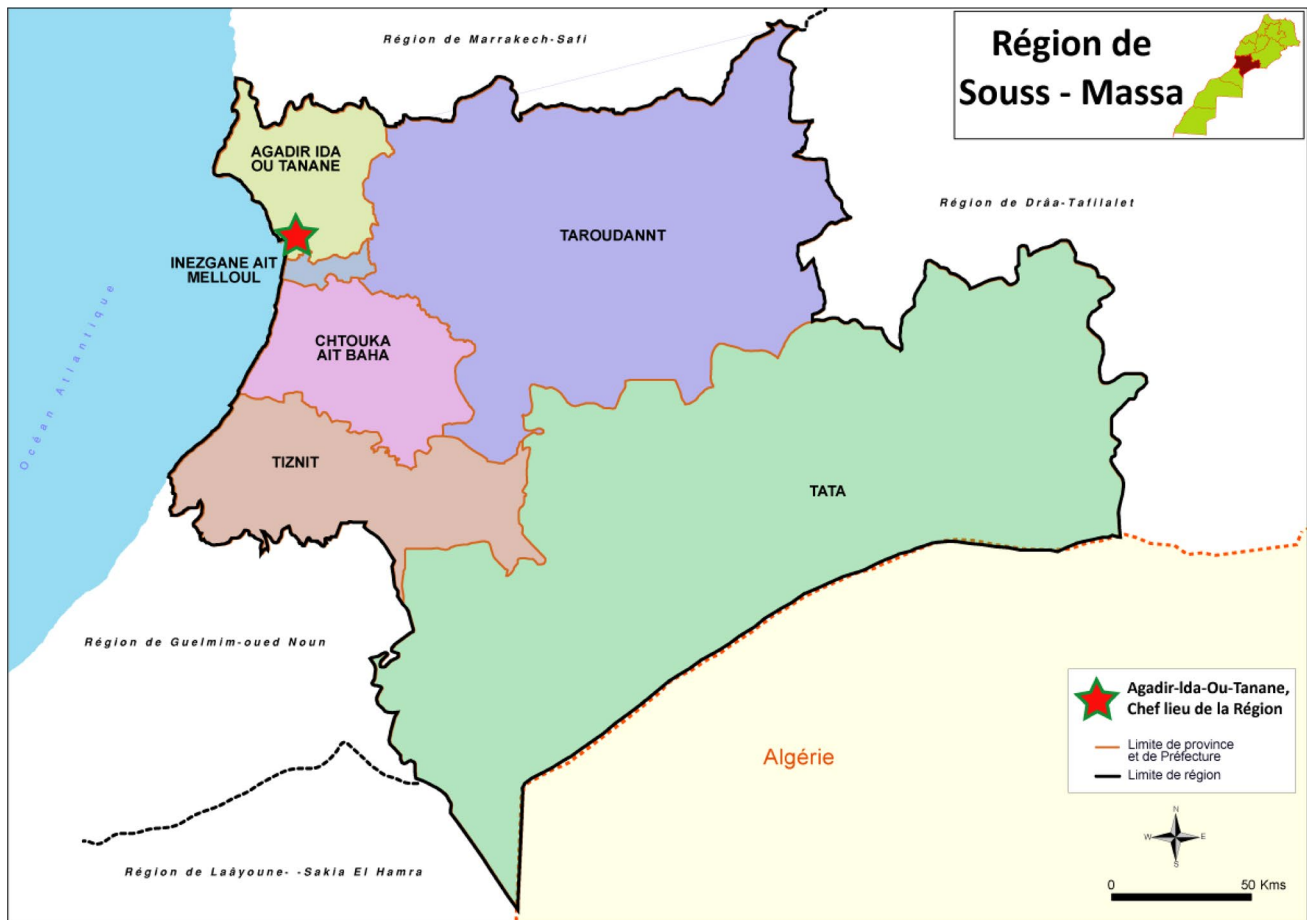
Shipping transiting through the GIE represents 1% of argan oil activities in Morocco (L'Oréal Canada, n.d.). In addition to PPP, various institutions are involved in the argan oil industry. In theory, they aim to encourage conservation, development, and logistical support, endow local communities with a multi-stakeholder approach, overcome traditionally confined conservation zones, establish appropriate schemes that combine core protected areas within zones, support sustainable development for local inhabitants, and involve enterprises with highly innovative and participative governance systems (UNESCO, 2017).

## Methodology

The Covid-19 pandemic imposed many restrictions throughout the world during 2020 and 2021. Despite some overall restrictions on travel to Morocco, we were able to visit the region of Agadir Ida-Ou-Tanane in the Souss Massa for approximately two and a half weeks in July 2021 for data collection and conducted interviews with the presidents of ten cooperatives and an intermediary from the region (Table 1).

All study villages are in Agadir Ida-Ou-Tanane (Figs. 1 and 2) except for cooperative A8, which is approximately

<sup>4</sup> The economic interest group, also known as EIG, is a group of different legal persons who agree to merge their activities or to set up a common system allowing them to better develop their economic activities and thus increase their results (*Le Groupement d'intérêt économique en droit marocain* ([expert-maroc.com](http://expert-maroc.com))).



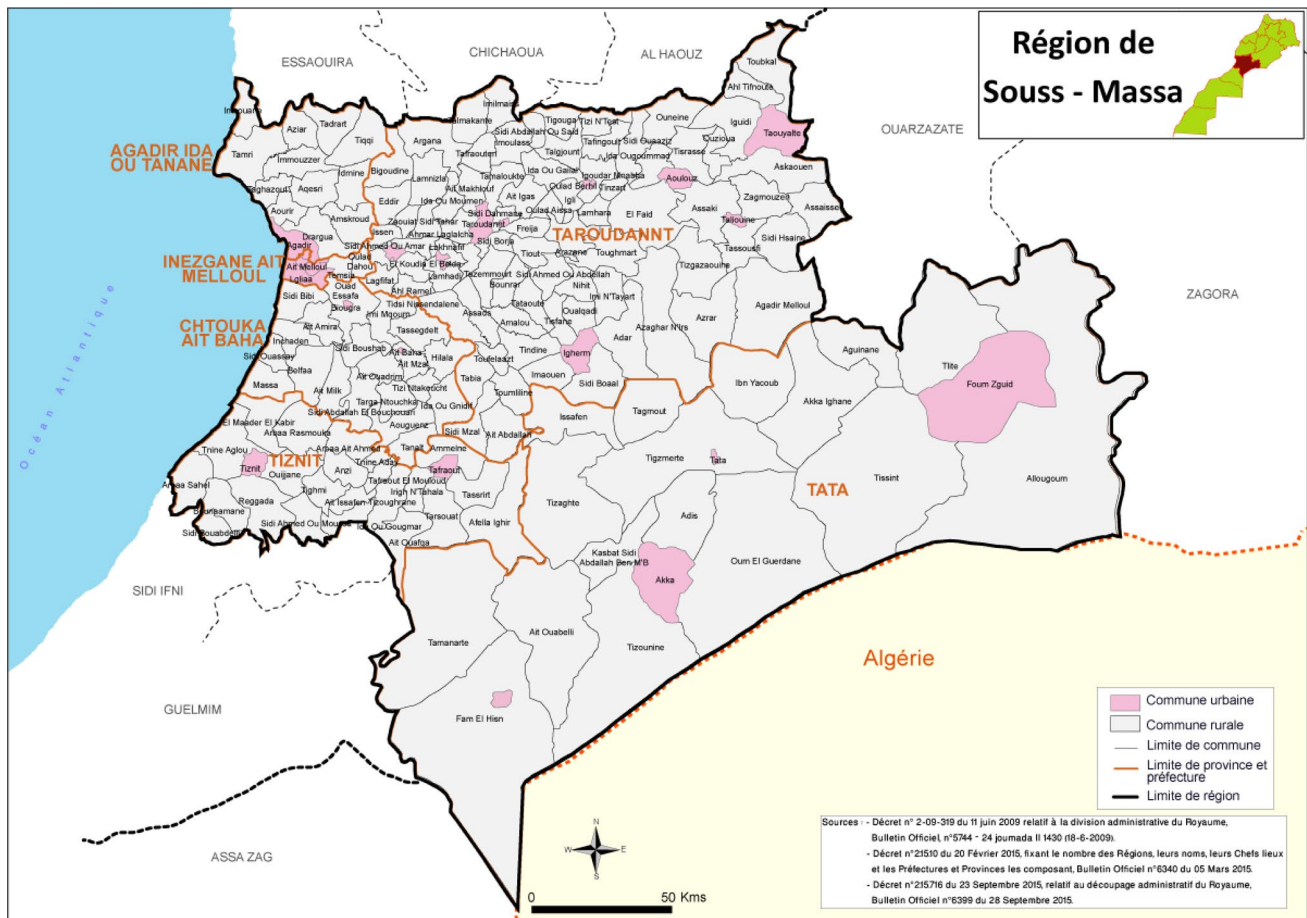
**Source :** La région du Souss Massa. Monographie générale-, ministère de l’Intérieur, 2015.

**Fig. 1** Provinces of the Souss Massa region

20 km north of Agadir. In recent years, some cooperatives have become reluctant to let foreign researchers conduct research in their cooperatives, mainly because the results were not shared in return (personal communication). However, with the support of the Directeur du Centre des Etudes Amazighes Historiques et Environnementales, who is also president of the Confédération des Associations Amazighes du Sud Marocain and a native of the region, and of the president of Fédération Nationale des Femmes de la Filière d’Argane (National Federation of Women in the Argan Sector) (FNFARGNANE), who facilitated contact with the cooperatives, we were able to pre-arrange appointments to meet the women presidents by telephone to ensure their availability. Before the trip, official invitation documents were provided to justify the need to travel to Moroccan authorities during Covid-19 traveling restrictions. Interviews were conducted on the cooperative premises, except with the president of cooperative A9 and the intermediary who were interviewed in Agadir.

Our interviews elicited data on the presidents’ familiarity with the Nagoya Protocol, pending ABS attribution, and other factors affecting the argan oil trade. The presidents granted their prior consent and indicated their willingness to participate before being interviewed, according to the Society of Ethnobiology research ethics. Semi-structured interviews were conducted in French whenever the interviewees spoke French and/or in Tashlehit to facilitate communication and translated back to French. However, the presidents were eager to discuss the increasing difficulty of accessing argan nuts. They expressed their mounting frustration with problems encountered in the cooperatives and expressed their doubts about resolving them. As Perry et al. (2020) noted: “In the realm of political and development discourse in Morocco, the voices of the local people are seldom considered.” The interviews were informally conducted with tea and biscuits, *Tanourt* (Berber traditional bread), *Amlou* (a rich blend of crushed walnuts, argan oil, and honey), and local argan oil and honey in accordance with local traditions





**Source:** La région du Souss-Massa. Monographie générale- Ministère de l'Intérieur, 2015.

**Fig. 2** Detailed map of the villages within the Souss Massa region

of hospitality. For the protection of the informants, their names are omitted.

We conducted a literature review on ABS in Morocco travel to the study cooperatives. In addition to the relevant articles of the Nagaya Protocol cited above, we consulted other relevant articles in the Protocol annex, studies, and documents such as magazine articles<sup>5</sup> (Perry et al., 2019; Perry et al. 2020; Turner, 2014, 2016, 2021; Lybbert, 2007; Lybbert et al., 2002, 2010, 2011; le Polain de Waroux 2012; le Polain de Waroux & Lambin 2013; UNIDO, 2017), and literature related to newer schemes of sustainable development, ecosystem services, payment for ecosystem services, gender inclusion, and bio-economy.

## Results and Discussion

Typically, most cooperatives work independently with a president and an administrative bureau coordinating and running the operations; moreover, many cooperatives have

gathered under several umbrellas. These include L'Union des Coopératives des Femmes pour la production et la commercialisation de l'huile d'Argane (UFCA); the Fédération Interprofessionnelle de la Filière de l'Argane (FIFARGANE)/ Agence Nationale pour le Développement des

<sup>5</sup> "Project for "Strategic support to community heritage areas and territories (APA)"; Capacity-building workshop on access to GR and ABS, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2007, Retrieved 10 Dec 2022); "Implementation of the Nagoya Protocol to the Convention on Biological Diversity (ABS-Capacity Development Initiative) (giz.de); documents related to the "Avant Projet de loi n° 56–17 sur l'accès aux ressources génétiques et le partage juste et équitable des avantages découlant de leur utilisation" (2017), a document preceding a project to pass a "Bill on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their use (available from the Nagoya Protocol website/Morocco's country profile) Filière de l'argane—Fellah Trade (fellah-trade.com); the document "Réseau des Associations de la Réserve de Biosphère Arganeraie (RARBA)" which the coordinator of the RARBA Association Tiznit shared; and other online reviews of cooperative federations/organisations.

Zones Oasiennes et de l'Arganier created in April 2011, which gathers several smaller associative bodies; and the Fédération Nationale des Femmes de la Filière d'Argane (FNFARGNANE), created in March 2021 and the most pertinent for the issues addressed in this case study. It covers the eight provinces of the "Argan Biosphere Reserve" (Agadir Ida Outanane, Inezgane, Ait Melloul, Chtouka Ait Baha, Taroundant, Tiznit, Sidi Ifni, Goulmine, and Essaouira) and aims to include all cooperatives in the Reserve de Biosphere de l'Arganeraie" (RBA). Larger than the other organizations, it has 150 registered cooperatives and 8000 members, all women. Among its range of objectives, the fight against all illicit practices that jeopardize women's control over the resource is its primary concern. In addition, some cooperatives have gathered under other small umbrellas/certifications that offer some form of "credibility," such as Afoulki, Fair for Life, and Ethical Women.

## The Argan Oil Trade

In the last few decades, the argan oil trade has evolved from an essential home commodity to a high-valued product on the international global market, destined for a niche market (Turner, 2016; le Polain de Waroux & Lambin 2013). Argan oil is currently the most expensive oil in the world (Laariby et al., 2017; Turner, 2016). Lybbert et al. (2011) claimed that a liter was sold at 20 Dh (approximately 2 Euros) in 2010. During the tourism boom before the Covid-19 pandemic, it was sold to tourists at between 80 and 120 Dh (8 to 12 Euros) on average and sometimes for as much as 180 Dh (Kassam et al., 2018). However, the price of argan oil destined for the cosmetics industry has soared from 100 Dh (approximately 10 Euros) on the local market to 300 Dh (30 Euros) for the international export market (Aziz et al., 2013; Lybbert et al., 2011) and up to 350 Dh (approx. 35 Euros), according to Cooperative 3. In addition, experts forecast that women will produce thousands of tons of oil, estimated to reach a value of \$507.2 million (approximately 454 704 800 Euros) (Lybbert et al., 2002; Lybbert, 2007; Lybbert et al., 2011). The Market Research Future (MRFR) (2023) predicts that the compound annual growth rate (CAGR) will increase by 7.1% for argan oil for the period 2019–2024, with a total value of USD 676.51 million (approximately 606 626 517 Euros) on the market. While these figures reflect the lucrative markets of oil, the struggle of women working in cooperatives depicts a different picture.

Typically, cooperatives are run by and for women, although some are also run by men (Montanari & Bergh, 2019a, b; Renforcement économique des femmes de la Filière Arganier au Maroc (REFAM), 2019). Members have voting rights at annual general assemblies and, in theory, receive a basic wage and a share in the cooperative's profits;

however, in some cooperatives, women represent merely a labor force that sometimes works without remuneration (Dammame, 2014; Montanari & Bergh, 2019a, b). It has also been stated that women have access to some basic literacy classes and childcare besides receiving an income (Perry et al., 2019). We did not witness this, nor did the presidents of cooperatives mention it. Moving between the cooperative's shift work and home duties, women have little time for literacy classes or anything similar. As for childcare, children often look after their younger siblings while their parents carry out other duties, such as tending gardens and looking after animals (Montanari & Bergh, 2014, 2019a, b). In addition, the interviews with cooperatives A4 and A7 and the intermediary revealed that most people were not interested in money or ABS but would rather have improved infrastructure, such as roads and bridges.

## Women's Loss of Resource Control and Attempts to Preserve Their Income

The presidents of cooperatives A1 and A2 noted that, in the past, women collected the nuts freely in the forests. Women in cooperative A9 still collect argan nuts and "*de-pulp*" them at home (A9). Although traditionally, it was the women who collected the argan nuts, sometimes, men and children also collect on private lands either they or their families own or due to specific rules related to Agdal<sup>6</sup> at specific times of the year. The women keep the harvest of nuts collected on their husbands' land. However, if the women collect the nuts on someone else's land, they keep only half according to mutual agreement (personal communication president cooperative A9). In most cases, women proceed with the collection and divide it daily and equally between the participants. In other cases, women may also hire someone to collect on their behalf, after which the harvest is shared among members (interview cooperative A3).

However, following the exponential growth of the international market for argan oil, women have increasingly struggled with new actors who collect the resource and coordinate with national or international companies. Primarily since the Covid-19 pandemic, the argan forests of the region have been occupied by illegal harvesters: "Women are increasingly assaulted when going to the forest" (cooperatives A1, A2, A3, A9). Confronted with this new network of intermediaries, women have lost the battle to control the argan resource at source (Cooperatives A1, A2, A3, A4, A5, A6, A7).

<sup>6</sup> This refers to a period of forest closure (for three or four months per year) when the fruit reaches maturity, which leads to the prohibition of grazing for animals.

The intermediary we interviewed collects argan nuts on 40 square kilometers belonging to the Department of Water and Forestry and distributes them among many cooperatives throughout the Souss Massa region. As he explained, he and some other intermediaries have started their cooperatives. The president of cooperative A9 confirmed that “the kernels, once extracted from the shells, are transported to Casablanca and Fez for oil extraction run by larger companies who hide their activities under the banner ‘cooperative’.” Thus, women are allowed to collect on the land of the Department of Water and Forestry (interview cooperative A2) and are recruited to break the nuts that the men negotiate with the intermediaries. In this case, they can earn up to 12 to 13 Dh per kg of kernels (interview intermediary); their primary role is that of workers selling their labor to the intermediaries, who provide meager remuneration. Thus, the booming argan oil trade is driving fierce competition to secure the resource at the source with the unforeseen and dramatic consequence of the loss of authority and power of traditional tribal systems (El Wahidi et al., 2015).

Over the years, some cooperatives have secured retail outlets to sell the oil directly to European companies. Cooperative A2 sells variable quantities of argan oil to a German company/laboratory. While the president was reluctant to disclose whether this company practiced CSR, we established that a fund had been created for women to benefit from cash for small expenses. Moreover, a decentralized system was implemented to facilitate the women’s domestic labor and nut cracking, as the women did not have the time or financial resources to travel to the cooperative. Thus, 2000 women benefit from the scheme in this location, and the nearby villages sometimes work in rotation in the cooperative building. Previously, argan nuts cost 2.5 to 3 Dh per kg; however, during the Covid-19 pandemic and the imposed isolation restrictions, the price increased to 7 Dh per kg and fluctuated according to market demand and the availability of the resource, which is increasingly affected by the lack of rain (Cooperatives A2, A3, A4, A5, A6, A7, A8, A9). Although some women manage to keep a stock of argan nuts at home for future transactions in periods of scarcity, and cooperative A2 has secured a retail outlet abroad, some cooperatives sell the argan nuts at 6 Dh to the intermediary, which he then resells to other cooperatives at 7 Dh. In many cases, the intermediary extends credit to cooperatives that cannot afford to buy argan stock; the debt may even be wiped out as cooperatives are increasingly precarious. As Aziz et al. (2013) emphasized, the cycle of traditional argan production has been shattered as cooperatives have lost control

over the resource in an expanding market and are primarily dependent on intermediaries who acquire the raw material.

As the presidents attempt to keep the cooperatives afloat, they are diversifying to create income. For instance, Cooperative A3 has started to sell small bags of medicinal plants supplied by women living in the nearby mountains. Others are attempting to produce alternative products (honey, soaps, cosmetic creams); however, these products are insufficient as they cannot be produced and marketed on a large scale. Thus, not all cooperatives can survive; cooperative A7 closed despite an attempt to create a parallel activity of mussel collection on the ocean shore to diversify income sources.

Furthermore, as argan nuts are becoming scarce due to an increasing lack of rain, some cooperatives resort to buying “gauled” argan nuts (gathered by beating the branches to trigger the nuts’ fall to the ground) to increase harvests and maintain oil production (Cooperative A3). During a meeting, the coordinator of the *Réseau des Associations de la Réserve de Biosphère Arganeraie* (RARBA) confirmed that groups carry out “gaulage” in the forest; this not only reduces the number of argan nuts that women can collect and threatens their income but also has a devastating ecological impact on the natural regeneration of argan trees.

In terms of remuneration, the figure of 150 Dh daily was mentioned frequently during our interviews; however, it is doubtful that this much can be earned every day as, on average, two days are needed to break 1½ kg of nuts, depending on skill (interview president cooperative A6). Moreover, industrial standards have set 4 to 5 Euros per kilo as a decent wage, depending on the daily output (Kassam et al., 2018). The *Renforcement Economique des Femmes de la Filière Arganier au Maroc* (REFAM) (2019) recently reported that women’s wages are globally low, ranging between 125 and 700 Dh (approximately 11 to 70 Euros per month); in the most prosperous cooperatives, the remuneration for processing argan oil can vary between 800 and 1,000 Dh (80 to 100 Euros) per month.

As traditional oil production is increasingly replaced by technology, oil quality is being degraded (interviews with Cooperatives A2, A3, A5, A9). However, the most pertinent, challenging, and unforeseen consequence of resource capture and the lack of concrete legislation and attribution of ABS to date is the intergenerational erosion of women’s TK associated with the collection of nuts and the production of argan oil. Furthermore, cooperatives on the outskirts of the expanding city of Agadir are caught up in gentrification, and the younger generations have lost interest in producing argan oil; thus, the loss of TK is imminent.



## Institutions, Development Programs, and Policies do not Fulfill Their Purpose

Although an extensive array of organizations has been established to promulgate the work of cooperatives for the productivity of argan oil,<sup>7</sup> they do not fulfill their purpose, and women are primarily dismissed in decision-making, and their work is undervalued (Cruz-Garcia et al., 2019; Damamme, 2014; Ethan et al., 2018; Fortnam et al., 2019; Kiptot & Franzel, 2012; Montanari & Bergh, 2019a, b; Sanz-Hernandez et al., 2022; Sinaga, 2021). The socioeconomic consequences are dire for the cooperatives and the sustainability of argan trees.

Although the PPP and GIE seem appropriate mechanisms for commercializing argan oil on international markets, resource control has been reorganized to privilege land management and privatization through private companies and multinational corporations (MNCs). Thus, the “capture” at source secures a continuous supply to MNCs and larger markets. Moreover, these rearrangements have increased the prices for tourists, who are reluctant to pay up to 600 Dh (approx. 60 Euros) for a liter of culinary oil. In addition, there is little evidence that companies are engaged in CSR to support the cooperatives financially or that women benefit from the economic trickledown from these lucrative transactions. As Perry et al. (2020) indicated, propelled by neoliberal policies, the enclosure of the forest serves the purpose of gaining control over the argan resource, an economic agenda that benefits MNCs. Despite support by national organizations such as the Argan Project, INDH, ODCO, *Agence Nationale pour le Développement des Zones Oasiennes et de l’Arganier* (Development of Argan orchards in Degraded Environment; ANDZOA), and operating intermediaries and PPP, control of the argan resource has been transferred to the state to facilitate business ventures (Montanari & Bergh, 2019a, b), an agenda not aligned with article 10 of the Nagoya Protocol. That FNFARGNANE was created to address these issues is no coincidence, as it seeks to overcome this global problem in locations where argan is exploited.

Furthermore, “gaulage” has become common among brokers and speculators to secure the argan nuts to supply the

markets (RARBA, 2012, 2018). As women are custodians of the Amazigh cultural heritage and critical actors in the conservation of the argan ecosystems, their role is increasingly jeopardized. In addition, as management practices are lacking throughout the biosphere, no control is exerted over nomadic herders with large flocks of sheep and camel herds which graze forest areas and trespass on the private property of villagers. These illicit practices defy all local laws, customs, and other national and international standards, especially the traditional Agdal, Tiwizi, and Tawala.<sup>8</sup>

While the Nagoya Protocol legislation provides ample flexibility for many countries to modify or change the rules associated with ABS attribution, the legislation remains blurred (Michiels et al., 2022). Nut-cracking and de-pulping activities followed by mechanical extraction emanate from TK practiced and transferred through generations. It is a vital process for producing oil that cannot be substituted (Montanari & Bergh, 2019a, b) if the oil is to retain its quality. These activities fall within Articles 5 and 12 of the Nagoya Protocol. Similarly, the traditional management of the argan ecosystems to preserve the argan trees, passed down through successive generations of women, falls within the scope of Article 7. As the sustainability of the argan ecosystems is increasingly threatened by climatic change (Kassam et al., 2018), women must have access to regain control over the resource, and the authorities must support this endeavor (Article 9). While the implementation of suitable legislation and mechanisms of ABS attribution is still pending, alternative income sources for the cooperatives that struggle to pursue their activities must be provided. Commercialization strategies that have, to date, been oriented toward the European and larger US markets must be redefined to redirect approaches towards a local and solidary economy (Montanari & Igamane, 2023, forthcoming).

## Conclusion

We show that schemes that claim sustainable development and poverty reduction cannot be achieved without the full inclusion of women. Argan oil trade cannot be sustained without women’s TK and work in the cooperatives. Equally, the argan ecosystems cannot be maintained without the integration of women’s traditional ecosystem

<sup>7</sup> Initiative Nationale de Développement Humain (INDH) funding, the Office de Développement et de la Coopération (ODCO) for guidelines for the creation and legislation of cooperatives, and the Office Nationale de Sécurité Sanitaire des Produits Alimentaires (ONSSA) to oversee the hygiene standards for producing argan oil and certification delivery. This institutional framework has been designed to establish a framework for the conservation and sustainability of the argan trees, the well-being, and involvement of local communities, particularly of women, and logistics in which the women should fully participate and deliver high-added-value argan oil products.

<sup>8</sup> Agdal: a protected area for indigenous peoples (Amazigh word meaning ‘closed’ or ‘no access’). Tiwizi: voluntary work of a community that supports the work of a member of the community, e.g., during monsoons or the construction of a track or a bridge (Amazigh word meaning ‘to help and support’). Tawala: the rotational work that each member of a community must do daily; in tribal herds, for example, all members of the community must take turns guarding the herds (Amazigh word meaning taking turns for a role.).

management. As Morocco is about to refine and implement its ABS policies, we recommend that a) delegations of cooperative presidents be actively consulted in the decision-making processes related to the problematic issue of access and control recovery of the resource; b) the government endorses a scheme for women to receive an ABS financial contribution for the TK associated with the early stages of argan oil production and the TK that sustains the argan ecosystem; c) that the argan and associated TK be widely recognized as an emblem of Amazigh sovereignty and cultural identity; and d) that MNC be compelled to engage financially within the framework of CSR aligned with the Nagoya Protocol.

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**Availability of Data and Materials** The data supporting this study’s findings are available upon reasonable request from the corresponding author [BM]. The data are not publicly available due to the study’s sensitive nature, which could compromise research participant privacy/consent.

## Declarations

**Ethical Approval** The study complied with the Research Ethics Committee (COMISSÃO DE ÉTICA) at the University Institute of Lisbon who granted permission to collect data. Informed consent was obtained from all subjects involved in the study according to the Declaration of Helsinki. In addition, it followed the ethics of the Society for Ethnobiology (International Society of Ethnobiology (2006). International Society of Ethnobiology Code of Ethics (with 2008 additions). <http://ethnobiology.net/code-of-ethics>).

**Competing Interests** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this study.

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