The Trade in and Household Use of *Phoenix reclinata* Palm Frond Hand Brushes on the Wild Coast, South Africa¹

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The Trade in and Household Use of *Phoenix reclinata* Palm Frond Hand Brushes on the Wild Coast, South Africa. This paper reports on an investigation of the harvesting, trade, and use of hand brushes made from fronds of the wild palm, Phoenix reclinata. We considered both the abundance of the resource as well as the demand. Within the harvesting areas, there were approximately 141 palm plants per hectare, of which almost two-thirds showed no signs of frond harvesting. During harvesting, most fronds (82%) were left on the plant, 16% were removed to make brushes, and 2% were cut and discarded. Although the number of harvesters had increased during the last decade, most felt that the number of palm plants had remained stable or even increased over the same period. There was strong consensus that cut fronds were replaced within two months, after which a particular stem could be harvested again. Harvesting and trade were practiced largely by middle-aged to elderly women, who had limited formal education, skills, and employment prospects. Most had entered the trade because of cash income poverty. The main markets for selling the palm brushes were in nearby urban areas. The income earned from the trade was modest, but still rated highly by the traders, for most of whom it was the second mostimportant source of cash income. For many users, the palm brushes was found to be the only type of brush suitable for cleaning mud and cow-dung flooring and, most importantly for many, their use forms part of a long household use history and culture.

Key Words: Income, non-timber forest products, sustainability, women, ethnobotany.

Introduction

Production of household items, cultural artifacts, and handicrafts from plant fibers for domestic use and sale is common throughout the world (Macia et al. 2011), and is particularly rich in southern Africa (Cunningham and Terry 2006). These include items such as baskets used for a range of purposes, mats, strainers, brushes, and purely decorative items made for tourist markets. In some regions household use is perceived to be declining as products made from natural fiber are replaced by synthetic substitutes and the interest, knowledge, and time required to make them is diminishing (de Vletter 2001; Mutua et al. 2004). However, items with strong cultural meaning or uses may still be widely sought and appreciated (Cocks and Dold 2004; Cocks et al. 2011).

It is not uncommon for non-governmental organizations or development agencies to promote the sale of what used to be utilitarian items on tourist markets as a means of promoting income generation among traditional or remote communities (e.g. Pereira et al. 2006; Virapongse et al. 2014; Welford and Le Breton 2008). Such initiatives provide income-generating activities for local households, especially those with limited opportunities (due to distance from formal markets or limited formal skills) to participate in the market economy while simultaneously safeguarding local knowledge and skills. This may also result in increased interest in sustainable management of the plant populations from which the raw materials are harvested (Welford and le Breton 2008).

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In contrast, there has been neglect in analysis and promotion of local markets for many natural products (Shackleton et al. 2007; Shackleton et al. 2008; Wallace et al. 2001), which are both widespread and increasing. Shackleton et al. (2007) argue that local markets are increasing due to growing globalization and modernization, which has resulted in an increasing need for cash by even remote rural households, which in turn allows some households to buy items that they would have formerly made for themselves-massproduced substitutes. For those handicrafts with cultural significance, growing urban populations also represent a massive market opportunity due to the large size of the urban markets and the relative affluence of urban dwellers compared to their rural counterparts (Cocks and Dold 2004; Shackleton et al. 2007). Local markets are typically dominated by people who have limited abilities to compete in the formal labor market, because of limited formal education, low skills, age, or remoteness of their village (Shackleton et al. 2008). Thus, even though the economic returns may be low, local markets provide a source of economic engagement for more marginalized groups in many societies. Unfortunately, local level trade in such products remains undervalued by most government and development agencies, and consequently institutional support for these markets and entrepreneurs is frequently lacking (Scherr et al. 2004; Shackleton et al. 2007).

Sustainability of the resource supply is one of the several challenges in promoting local, as well as broader, markets (Shackleton et al. 2007). It is necessary that supply be sustainable; otherwise the small-scale traders who dominate local markets could become impoverished through loss of an important contribution to their livelihoods. While a concern to conservationists, many case studies have shown that the supply of plant fibers for local use and markets is often within sustainable limits, or that sustainability can be achieved with relatively small interventions (e.g. Gyan and Shackleton 2005; Martínez-Ballesté et al. 2008; McKean 2003; Shackleton et al. 2009; Schmidt and Ticktin 2012). Leaf production of some palm species is even stimulated by moderate or high harvesting (e.g. Chazdon 1991; Martínez-Ballesté et al. 2008), although impacts at the population level need to be considered. However, local context and governance are key in

determining sustainability outcomes (McLain and Lawry 2015).

Within this context we were interested in the extent and sustainability of the local markets for hand brushes made from fronds of the wild date palm (Phoenix reclinata Jacq.-Arecaceae) in the Willowvale area of the Wild Coast, South Africa Previous work in the Eastern Cape province of South Africa has revealed high demand for plant fiber products among rural and urban populations, especially reed mats made from several sedge species (Kepe 2003; Makhado and Kepe 2006; Pereira et al. 2006) and brushes made from palm fronds (Gyan and Shackleton 2005), grasses (Cymbopogon validus [Stapf] Stapf ex Burtt Davy) (Cocks and Dold 2004), or cape reeds (Ischyrolepis eleocharis [Mast.] H.P. Linder) (Shackleton et al. 2009; Ruwanza and Shackleton 2015). The wild date palm is widely distributed throughout southern Africa (and much of tropical Africa [Stauffer et al. 2014]), typically on the fringes of lowland coastal forests and along streams and rivers (Barrow 1998; Cunningham and Terry 2006). It is usually multistemmed, with adult stems reaching 3-6 m tall, and a few exceeding 8 m. The species has various uses in different countries including for fruits, palm wine, and medicines (Cunningham and Wehmeyer 1988; Gruca et al. 2014; Kotze and Traynor 2011), but in the Eastern Cape province it is primarily for fiber.

The aim of this research was to assess the role and incomes from domestic use and commercial trade of palm brushes in the Willowvale area, South Africa. Key questions included: (1) What is the extent of household use and of commercial trade, (2) What is the current supply and impacts of harvesting, and (3) Is current use likely to be sustainable?

Study Area

Willowvale is situated on the coast in the former "bantustan" of Transkei in the Eastern Cape province of South Africa (32°15'46.33'' S; 28°28'50.15'' E) (Shackleton et al. 2013). It was selected for this study as part of a larger research project in the area on local livelihoods and change and the consequent familiarity of the researchers with the site. Having worked at several places in the broader Transkei region over many years, we do not know of anything that differentiates Willowvale from the broader coastal

zone of the southern Transkei. Phoenix reclinata is distributed along the entire 250 km coastal zone of the Transkei. The mean annual rainfall ranges from 800-1,000 mm, mainly concentrated in October to April (Shackleton et al. 2013). Temperatures range from a mean maximum of 27°C in summer to a minimum of 3°C in winter (Shackleton et al. 2013). The area is dominated by rolling hills and valleys, with an altitude ranging from sea level to around 450 m (Mucina and Rutherford 2006). The soils are predominately sandy and clay loams (Mucina and Rutherford 2006). The vegetation is a mosaic of forest, thorn savanna, dune thicket, and grassland patches (Mucina and Rutherford 2006). It falls within the Maputaland-Pondoland-Albany biodiversity hotspot, and therefore has high levels of endemism and threatened species (CEPF 2010). Forests in the area are naturally fragmented and are found in lower lying areas and valleys and are the most species-rich non-tropical forests in the world (CEPF 2010). The high livestock stocking rates and use of natural resources are regarded by some as putting pressure on the local environment (CEPF 2010). Land in Willowvale is common property, with each household allocated residential land and an agricultural plot by traditional authorities. The remaining land is open access for the grazing of livestock and collection of natural resources. Nominally, both chiefs and local municipalities are responsible for the management of land and resource use. However, both these authorities lack relevant expertise or financial resources for natural resource management activities.

Willowvale is characterized by dispersed rural homesteads (Shackleton et al. 2013). The area is largely rural and is one of the poorest and most underdeveloped districts in South Africa (Stats SA 2011). The majority (64%) of those 20 years and older have functional literacy, yet 27% of the adult population has no school education (Stats SA 2011). The unemployment rate is at 42% (Stats SA 2011). Only 3.5% have piped water to their houses and electricity has only recently been installed in the area. According to Stats SA (2011), 58% of households are femaleheaded. Many households depend heavily on direct use and, for some, the sale of natural resource products to improve or meet several important livelihood outcomes (Palmer et al. 2002). There is also large dependence on social welfare grants, migrant labor, and remittances (Timmermans 2004).

Methods

PALM ABUNDANCE

The abundance of *P. reclinata* plants was assessed by means of 31 belt transects distributed among five harvesting sites identified by the harvesters, usually within 1-3 km of their homes. At approximately 300 m intervals along both sides of the selected stream or river, a 100 m x 10 m belt transect was sampled parallel to the stream. In each transect, every *P. reclinata* plant was counted, as were the number of stems per plant, plant height, and a visual estimate of the extent of harvesting (none, light, medium, high). The number of leaves of the first adult palm in the transect was recorded.

USERS

Questionnaires were administrated in the local language (isiXhosa) to 34 randomly selected households in the vicinity of traders' homesteads to glean information on the household use of palm brushes. The questionnaires captured information on social profile, the number of years that the respondents had been using palm brushes, level of household use of palm brushes over the last 10 years, and reasons for using.

PALM BRUSH TRADE

A snowball sampling approach was used to identify sellers, who were approached at their homesteads or place of trading. Thirty-one palm brush traders from Willowvale were interviewed regarding their socioeconomic profile, benefits from trade relative to other income sources, raw material harvesting and processing, perceptions on brush demand, palm abundance, and number of people operating in the trade over the last 10 years, as well as the challenges they face as traders. The sample was close to 100% of the palm traders in Willowvale.

Gross monthly income was calculated based on traders' recall of sales in "good months" and "bad months" as well as number of "good months" and "bad months" per year and the selling price per unit. At the time of field work, the exchange rate was approximately USD 1 = ZAR 11.30 (South African Rand). The number of raw material collecting trips per month was recorded. Information on total cash income for the household was established through semistructured questionnaires that captured the range of income sources per respondent. Respondents were asked whether they receive state old-age pensions, child grants or other state grants, as well as information on how many adults in the household had parttime or full-time employment and the contribution.

One to two harvesting trips were conducted with four of the traders. At each site we weighed a sample of palm leaf bundles (headloads) and counted the number of leaves per bundle. Additionally, for each palm stem from which leaves were harvested, we recorded the total number of leaves and the number cut and either discarded or taken away. Detailed conversations were conducted with each harvester about the harvesting process (selection of sites, trees, and leaves), any local beliefs or observations, as well as issues of sustainability such as trends in the abundance of palm trees and how much time is required before they can return to harvest from a previously harvested stem. Approximate quantities of raw material harvested annually were calculated from the number of collecting trips per month and number of headloads collected each time.

Means and standard deviations were used to summarize continuous data. Graphical summaries (e.g., histograms) were used to show the distribution of data (e.g., gross monthly income from the sale of brushes, reasons for using palm brushes). A linear regression was used to determine the relationship between plant height and number of leaves.

Results

PALM ABUNDANCE

There was a mean of 14.1 ± 7.37 *P. reclinata* plants per 100 m transect, equating to approximately 141 ha⁻¹. The height of the adult stems varied from 5 m to 8 m, and overall, the population had a unimodal distribution with the bulk of the plants being in the

 Table 1. Perceived trends over the last ten years

 IN ABUNDANCE, NUMBER OF PEOPLE IN THE TRADE AND

 DEMAND FOR PALM BRUSHES.

Percentage of producers (n = 18)					
Variable	Increased	Decreased	Same		
Abundance of <i>Phoenix</i> reclinata	17	44	39		
Number of people in the trade	89	11	0		
Demand for palm brushes	33	44	22		

medium height class (3–6 m), followed by large (>6 m) and small (<3 m). The number of fronds per plant was highly variable, ranging from 16 to 172, with a mean of 83 \pm 40. The number of fronds was weakly but significantly related to stem height, expressed as *no. of leaves* = 9.84*height +35 (r² = 0.15; p <0.05).

Of the harvesters who had been involved in the trade for ten years or longer, 44% felt that the abundance of *P. reclinata* plants had decreased, 39% felt it had remained the same, and 17% felt it had increased (Table 1). Of those stating that it had decreased, the primary reasons offered were (i) too many harvesters, (ii) wild fires, and (iii) a lack of rainfall. The remaining 56% argued that there had been no change or perhaps even an increase because (i) only a few fronds are harvested per stem and (ii) palms rapidly make new leaves after they have been cut and are able to produce harvestable fronds within two months.

While observing the harvesting process, the mean number of fronds per stem that were harvested was 3.9 ± 1.89, cut and discarded was 0.5 ± 1.21 , and left on the plant was 20.3 ± 12.2. Thus, 82% of fronds were left on the plant, 16% removed to make brushes, and 2% cut and discarded on site. Fronds were cut with either a sickle or a machete. All harvesters interviewed mentioned that they never cut immature fronds or those from a stem with very few fronds and that the dry and old leaves from mature stems are never harvested because they are too hard for a needle to go through the rachis. All respondents stated that they can reharvest the same plant after two months. The harvesters mentioned that P. reclinata is widely distributed in Willowvale and



Fig. 1. Visual estimates of harvesting intensity per plant.

that they never experience difficulties in gaining access to palm leaves, except for minor restrictions associated with the taboo of harvesting palm trees found along streams that are considered to be inhabited by ancestral spirits. The visual estimates of harvesting intensity in the sample transects indicated that most palms (64%) had no signs of harvesting at all, and of those that did, the extent was light for most (Fig. 1).

RAW MATERIAL HARVESTING

Most the interviewees harvested their own raw material within their local area (1-3 km)from their homes) and carried the bundles of fronds back to their homes; a round trip typically took 3–4 hours. A few travelled further and hired small pickup vans (bakkies) to do so. Harvesting was generally in groups of 2–5 women, for mutual support and to save costs (if hiring transport). On average, producers collected 66.2 ± 51.8 headloads of palm fronds per harvester per year (for most it was one per trip, but a few individuals collected 6–8 headloads per trip when they had access to vehicles for transport). This could make an average of 179 brushes per year.

Once the raw material was back at the harvester's dwelling the fronds were laid out in the sun or a dry place for 2–3 days to dry,

after which after they were cut to uniform length (40–50 cm) and the leaflets shredded with a sharp point. Several fronds were then bound tightly together with a needle and twine pushed through the top of the rachis and around the top as the handle for the brush (see Fig. 5). The shredding and binding generally took 30–40 minutes per brush (35 \pm 18 minutes), but could be up to two hours for decorated ones or if the manufacturer had stiff hands.

PROFILE OF BRUSH USERS AND REASONS FOR USING PALM BRUSHES

All the randomly selected households used palm brushes to a greater or lesser extent. The users' mean age was 55 ± 2 years and were all female (Table 2). Seventy percent had no or only primary school education. The majority of users (74%) stated that the level of household use of palm brushes had remained the same over the last 10 years.

Almost half of them (44%) had been using palm brushes for more than 20 years (Table 2). The most stated reason for using palm brushes, given by 26% of the respondents, was that they sweep floors made from cow dung better than other brushes available on the market, and that plastic brushes tend to fracture the cow dung floor (Table 2). Many houses in Willowvale are clay/ mud houses, with cow dung floors, or have some

		Producers and	
Characteristic	Category (% per category)	Traders	Users
Mean age (yr + SD)		58 ± 10	55 ± 7
Education level	No schooling	19	35
	Primary school	55	35
	High school	26	24
	School-leaving certificate	0	3
	Tertiary	0	3
Sources of household cash income other than from trade	No permanent employment	94	-
	At least one pension	65	-
	At least one child grant	32	-
	At least one job	3	-
Number of years in the trade/using palm brushes	*	14 ± 2	21 ± 3
Reasons for entering the trade	Needed cash income	52	-
	Poverty/hunger	32	-
	Loss of husband's income	13	-
	Interested in the activity	3	-
Most important source of household cash income	State pension	42	-
	Brush trade	26	-
	Vending business	10	-
	State child grant	10	-
	State disability grant	6	-
	Other self-employment	6	-
Reasons for using palm brushes	Sweeps dung floor better	-	26
	Part of household use & culture	-	21
	Affordable	-	18
	Lasts longer	-	15
	Excellent in cleaning dust	-	12
	Preference	-	6
	Easy to make	-	3

Table 2. SOCIOECONOMIC CHARACTERISTICS OF TRADERS AND USERS.

structures made of such, a common feature in many rural areas of the Eastern Cape. The second-most common reason (21%) was that palm brushes form part of their household use and culture; they said that they grew up with palm brushes being used by their parents at home.

TRADE AND TRADERS

There are four market routes for palm brush trading in Willowvale (Fig. 2). Traders could either sell directly to customers or through street vendors. The price of the brushes ranged from ZAR 10–12 each. Most of the respondents stated that they sell their brushes for ZAR 10 around the village and for ZAR 12 in towns. The most important market route was the selling of palm brushes in the nearby town of iDutywa (65%). Respondents stated that iDutywa (30 km from Willowvale) was bigger than

Willowvale and that there is a larger market for palm brushes than in Willowvale. Respondents choosing to sell brushes in iDutywa used local transport and would take a large load (30-60 brushes) and meet with other traders in iDutywa. They would stay there for a few days and sell their brushes for ZAR 12 each. The traders would go to iDutywa during the end of the month when potential customers had been paid their monthly salary or received their state grants. Occasionally the traders would sell to individual street vendors at a special negotiated price of approximately ZAR 60 for 10 brushes. Selling in Willowvale town was identified as the second-most important market route (19%). Some preferred to remain in their villages and sell brushes in village pension-day markets instead (10%), but with small numbers of brushes compared to those who sell in iDutywa, while some (6%) chose to go as far as Butterworth



Fig. 2. Key markets and market routes for palm traders in Willowvale (bold arrows represent the most important market route identified by the traders).

(approximately 45–60 km away, depending on route used) (Fig. 2).

The trade was dominated by middle-aged to elderly women (most in their late 50s and early 60s; mean age was 58 ± 2 years) (Table 2). Over three-quarters of respondents (74%) had no or only primary school education; none had completed high school. Ninety-four percent of them had no permanent employment; only one trader had temporary employment (worked at a



Fig. 3. Gross monthly cash income from palm brush trade in Willlowvale (n = 31).



Fig. 4. Substitute livelihood activities that would be undertaken if palms were unavailable (% of responses).

local road construction site). The majority (65%) lived in households that received at least one state old-age pension as a source of cash income other than that from trading palm brushes, and 32% of the participants received at least one state child grant (Table 2). Old age pensions were rated as the most important source of cash income by 42% of the traders, followed by the income from trade in palm brushes as the second-most important source (26%).

Over two-thirds of the respondents (68%) had been trading palm brushes for more than ten years, with one-quarter (26%) practicing it for more than 20 years. Nonetheless, there were several new entrants with 13% having been trading for less than one year and 32% for less than five years. The main reason for entering the trade, given by 52% of harvesters, was the need for cash income (Table 2). The second-most common reason, at 32%, was described as due to poverty or hunger. The average gross monthly income was modest at ZAR 134.7 ± 110.8 (Fig. 3), with a minimum of ZAR 6 to a maximum of ZAR 475. Most of the traders (29%) earned incomes between ZAR 101 and 150 per month. Only 16% of the traders earned more than ZAR 200 per month on average (Fig. 3).

CONSTRAINTS TO PALM BRUSH TRADE

The most common problem mentioned by the respondents in the trading of palm brushes was that customers, particularly those in the home village, quibble for lower prices and threaten not to buy if a discount is not offered. Therefore, many chose to sell their brushes in the nearby towns of

Butterworth and iDutywa and occasionally sell at lower prices in their villages. The second-most commonly cited problem was that harvesting sites were far away. Out of the thirty-one traders interviewed, five traders from Ndlambe village stated that every month they hired a bakkie for ZAR 200 to transport them to Ncentane, a harvesting area approximately 15 km away. The sellers said that they traveled to this area because the abundance of *P. reclinata* was low around their home village compared to the site at Ncentane. This group stated that they individually harvested up to 6-8 headloads per trip, a lot more than the 1-2 bundles per trip most harvested from their local areas. The increased number of people selling palm brushes over the last 5-10 years was another factor, which they felt increased competition and hence limited their income from the trade. Most of the traders interviewed preferred to sell a majority of their brushes at the end of each month when social grants and salaries are paid.

It is evident that trade in palm brushes plays a significant role in contributing to the livelihoods of the traders in Willowvale. Many traders (33%) mentioned that if the supply of palms diminished they would turn to selling alternative natural products such as thatch (mainly used for roofing houses) (33%) or reed mats (28%) (Fig. 4).

Discussion

This study has shown that there is widespread use of palm brushes among the rural households of the Willowvale area (Fig. 5). Moreover, the extensive use is driven to some extent by preference for palm brushes over modern synthetic substitutes because



Fig. 5. Photos of the region and *Phoenix reclinata* palm brushes (a) typical homestead, (b) counting harvested fronds, (c) manufacturing a palm brush and (d) finished brushes on sale in an urban market along with other fiber products. (Photo credits: (a) Ross Shackleton; (b-d) Nwabisa Mjoli).

they are better suited for the cow dung or clay floors found in many of the homesteads. This mirrors the extensive use of plant fiber brushes by both urban and rural populations elsewhere in the Eastern Cape province (Cocks and Dold 2004; Gyan and Shackleton 2005; Makhado and Kepe 2006; Shackleton et al. 2009). Cocks and Dold (2004) argue that such brushes have a high cultural significance and are common gifts during weddings and ceremonies, and that use is high even among urbanized communities. Consequently, they felt that there will be continued high demand for hand brushes well into the future even though the socioeconomic context is rapidly changing, as may be the specific uses for such brushes (for example, very few urban households have floors made of dung).

The widespread household use supports several small local markets for the palm brushes. The traders preferred selling in urban markets, despite the cost of transport to get there, because of increased opportunities for sales and the fact that customers were less likely to quibble over the price. Just over half of the traders felt that the demand had persisted or increased over the last 10 years, a time marked by significant changes in household incomes, urban development, and access to amenities in the region. Nearly all (89%) of the traders felt that there had been an increase in the number of participants in the trade over the same period, suggesting both a growing market, but also perhaps increasing competition within the markets. Other researchers in southern Africa have also commented on the growing participation in NTFP markets, driven by both economic hardship and well as participants' observation of an opportunity (Campbell et al. 2002; Shackleton et al. 2008).

The majority of the traders were middle-aged to elderly women (>50 years old), most of whom had begun trading in response to hardship and the need for cash income. Most of them had low formal education and had limited options regarding means to earn cash incomes. This echoes the findings of Shackleton et al. (2008) who examined the profiles of traders of four different NTFP products in northeastern South Africa, as well as other studies in the Eastern Cape province (Makhado and Kepe 2006; Pereira et al. 2006; Gyan and Shackleton 2005; Shackleton et al. 2009) and other African countries (Adam and Pretzsch 2010; Ndoye et al. 1998; Schreckenberg 2004). Natural resource products were a free resource, and many of them had learned the skills of harvesting and manufacture during their teenage years. Thus, it was not surprising that most felt they would turn to alternative NTFPs, such as thatch grass, reeds, or firewood, if the supply of or trade in palms was constrained or impossible. The cash income earned from the trade was modest for all but one of the traders, as is often the case for local markets for NTFPs (Shackleton et al. 2008). However, despite these low incomes, the income from palm brush trading was regarded as the second-most important source of cash after government social security grants, a clear indication of its importance.

The resource survey revealed that there were relatively few indications that current use is unsustainable. First, there was an abundance of adult palms in the area. Second, there were clear signs of recruitment, although the sizeclass profile indicated some constraints in that the density of small stems was lower than either medium or large ones. Third, twothirds of the adult palms displayed no signs of harvesting, and 25% were harvested only lightly. Fourth, more than half the traders felt that the abundance of adult palms had remained static or increased over the last ten years. Fifth, when the harvesting process was observed, only 18% of fronds per stem were cut. And last, there was unanimity that cutting several leaves did not harm the palms and that

the cut leaves were replaced within two months. The constrained recruitment evident from the size class profile requires further investigation, including a comparison between harvested and unharvested populations. It may be a consequence of lower fruit abundance on harvested adult stems, but it could also be a consequence of fires and heavy browsing of young plants by livestock. The potential suppression by invasive plants, as observed for Phoenix loureiroi in southwest India (Mandle et al. 2013), would also need consideration as they are of increasing concern in the region (Shackleton et al. 2013). While these indicators suggest that the current harvest levels are sustainable, the establishment of a local participatory monitoring program of palm density and recruitment, as well as potential drivers of change, would be useful to alert harvesters to any population changes before they are too advanced.

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