

Biodiversity in West African parklands promotes pollination of shea

With demand on shea parklands increasing, Aoife Delaney and colleagues explore the pollination services to shea and how we can better support this resource of both ecological and economic importance. Their [new research](#) was recently published in *Journal of Applied Ecology*.

Shea parklands occupy over 1 million km² in the Sudano-Sahelian semi-arid zone of sub-Saharan Africa, from Senegal in the west to Uganda in the east, and are home to up to [112 million people](#). In this ancient form of agroforestry, trees of value to humans are scattered throughout cultivated fields and fallows. The trees are not generally planted, but [specimens are retained](#) when fields are cleared after fallow periods that have traditionally lasted up to 15 years.

The dominance of shea trees in parklands of West Africa reflects their value to society. The fruits ripen at a time [when there are few food sources available](#), and the butter derived from shea nuts is the primary cooking oil for 88% of rural dwellers in Burkina Faso. It has been estimated that about 10kg of shea butter is consumed per person every year in the [shea zone](#). Given that 20kg of fruit [may be expected to yield 1.5kg of butter](#), the collection and processing of shea fruits requires considerable human effort, and this effort is almost exclusively furnished by women. In most households, the women who collect and process shea fruit own any related income, and they are more likely than men [to set aside money for educating children in the family](#).

Today, shea parklands face unprecedented changes: population density in many parts of the shea zone has increased and [the expectation of financial return from farming has grown](#). Fallow periods have become shorter as there is more demand for land in cultivation. With less time for regeneration, fewer saplings remain when fields are cleared. Simultaneously, the international market for shea butter is increasing, prompting attempts to commercialise shea cultivation. Now more than ever, it is vital that we understand the ecological services that support fruiting of shea.

Shea benefits strongly from pollination by insects, primarily bees, [to produce fruit](#). This link between shea trees and bees means that shea is connected with conditions in the wider environment because bees need a range of resources to survive. [We investigated the relationship between pollination services to shea and the diversity of trees and shrub species in cultivated fields as well as the amount of uncultivated habitat near the fields](#). We found honey bees more frequently, and other bees in greater abundance, in sites with a greater diversity of trees and shrubs. We also found that fruit production of shea was limited by lack of pollination, and that this limitation was greater at sites with less tree and shrub diversity. These findings show that more pollination occurs in fields with a greater range of trees and shrubs. This might be because a location that has a wide range of different species is likely to contain a variety of plant-based resources used by bees, like nesting sites, pollen, nectar and resin, throughout the year.

Unexpectedly, given the role of local site-level diversity in driving pollination service, natural fruit set was lower at sites close to larger areas of uncultivated land. However, this may be because shea is a food source for fruit-eating wildlife including birds and mammals that might be more prevalent in larger, uncultivated areas. Thus although local biodiversity promotes pollination, and landscape biodiversity

may promote natural levels of frugivory. Since only 42% of shea fruit is estimated to be harvested by people each year, this leaves a share for nature, but intensification of shea exploitation needs to consider both these biotic interactions.

Shea fruit represents an important ecological, societal and economic resource, and if there were more pollinators in the landscape, more fruit would be produced. Conditions beneficial to both honey bees and other bee species should be fostered to maximise pollination. We recommend that pollination services to shea are supported by maintaining a diverse assemblage of woody species in parklands. Our findings corroborate [existing research](#), showing that the ecosystem services provided by tree and shrub diversity support the well-being of millions of people living in the Sudano-Sahelian zone of West Africa.

Originally posted on [The Applied Ecologist](#)

Metadata

Delaney, A, Dembele, A, Nombéré, I, et al. Local-scale tree and shrub diversity improves pollination services to shea trees in tropical West African parklands. *J Appl Ecol*. 2020; 00: 1– 10. <https://doi.org/10.1111/1365-2664.13640>