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Saamaka uwii: Saramaccan medical plant knowledge, practices and beliefs for local health care in Suriname

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Chapter 6

General discussion and final conclusions

Charlotte I.E.A. van 't Klooster

'The future depends on what you do today'
(Mahatma Gandhi, 1869-1948)

GENERAL DISCUSSION

In the general introduction (Chapter 1) of this thesis I described the background of the study to frame the research aim and objectives. The four chapters that followed presented information on various aspects of Saramaccan plants and the associated knowledge, which contributed to the growing body of knowledge of the biocultural heritage of the Maroons in Suriname. In this chapter, I will summarize and discuss the results based on the research questions as formulated in the chapters, address implications for health, education and conservation programs, and methodological limitations. Furthermore, I will provide suggestions for future research and close the chapter with my final conclusions and recommendations.

The importance of medicinal plants

The Saramaccans in the tropical rainforest in Suriname live in one of the most biodiverse ecosystems in the world. Since they fled from the plantations, they depended on the forest for all their primary needs and have built up a tremendous amount of traditional ecological knowledge, including knowledge of medicinal plant species and their uses. In the present study a total of 110 medicinal plant species was recorded (Chapter 2). Most medicines were prepared with leaves and processed in the form of decoctions. Bathing with a decoction of medicinal plants was by far the most dominant type of administration, but plants were also administered as ointments or as a compress applied to the skin. Most herbal medicines were applied externally. Although lianas and shrubs were important sources of medicine, the most prominent life forms were trees, followed by herbs. Based on this study, we may conclude that the Saramaccans in Pikin Slee still strongly adhere to their traditional medical practices, in which medicinal plants play an important role.

The importance of medicinal plants for local health care has also been shown in other studies conducted among the Saramaccan Maroons for the Brokopondo district in Suriname (Van Andel et al., 2007, 2008, 2012; Ruysschaert et al., 2009; Ruysschaert, 2018; Vossen et al., 2014; Ramdas, 2015). Although no analysis has been made on their economic value in this study, it is known that in 2006 about 136,000 kg of medicinal plant species with a value of one million US dollars were collected from the Surinamese interior and traded in Paramaribo, while 54,600 kg were sent to the Netherlands (Amsterdam) with a market value of approximately 500,000 US dollars (Van Andel et al., 2007; Mans, 2009). This export of medicinal plants from Paramaribo to Amsterdam has been addressed earlier by Van 't Klooster (2000) and Van Andel and Van 't Klooster (2007) based on a study performed in a Surinamese cultural (Winti) shop in Amsterdam owned by Saramaccans. Trade in medicinal plants and the herbal medicines based on them significantly contributes

to the national economy as a whole and livelihood of the Maroons in particular.

Herbal bathing, an important local practice

Herbal baths play a significant role in the local health care of the inhabitants of Pikin Slee and are part of Saramaccan cultural practices in daily life. We found 69 different species being used in these herbal baths, which varied from strengthening baths for babies and adults, respiratory ailments, skin disorders, spiritual ailments, and genital steam baths. Some herbal baths are made specifically for one person, others for more, or to cleanse the whole village. Mixtures of leaves are kept in a tub or a big wooden dish filled with water, to be used multiple times by pouring the water with the leaves over the head and/or body by means of a calabash (*Crescentia cujete* L.). The baths can include (magical) objects and are often used while saying spiritual prayers. Some baths are prepared by laymen for family use, while others can be made only by herbalists and spiritual healers, whom are often approached for advice when self-treatment or biomedical medicines fail.

Our study showed a large variation in plant use within the Saramaccan community (Pikin Slee versus Brownsveg), which was location specific, as the bath ingredients differed substantially between the two Saramaccan study sites. Restrictions in plant use that exist for certain matrilineages, families or even for a whole village could explain these differences in plant use, as the plant species themselves occur mostly in both localities. This study showed that both Saramaccan and Ndyuka (Aucan) Maroons use a large amount of plant species in their baths. However, the plant ingredients showed little similarity between the two groups, even when the same bath types were examined. Plant use was strongly influenced by study site (and thus Maroon community) and then by ethnicity (Saramaccan versus Ndyuka), but less by application. This could indicate that each Maroon community has adapted its plant use to the species that were locally available. The Saramaccan and Ndyuka established themselves in the 17th and 18th century along different rivers in the interior and hardly had any contact with each other due to the dense forest between the rivers and their strong mutual distrust (Price, 1996; Van Velzen and Hoogbergen, 2011). Their geographical separation and limited contact have led to distinct plant uses in their ethnobotanical practices. The existing overlap in plant species between the Saramaccan and the Ndyuka could be a result of a more recent knowledge exchange. We found that two third of the plant species used by both Maroon groups are nowadays sold in markets in Paramaribo, where Maroon women sell herbal medicine to city-dwelling Maroons of different ethnicities. It is plausible that knowledge exchange is taking place at these markets. From the city, these Maroons transfer their newly acquired knowledge about medicinal plants to the forest communities when visiting family in the hinterland.

Herbal bathing is also a common practice in French Guiana (Tareau et al., 2017). Most of the bath types presented here correspond with the therapeutic functions of baths reported by Tareau et al. (2017) among the French Guianese youth. However, baths for adult strength were not reported: these baths seem to be less important for youngsters in French Guiana, reflecting their life styles in more urban settings. Although a number of studies have been conducted among Maroons in neighboring countries like French Guiana (Fleury, 1991, 1996) and Brazil (e.g. Albuquerque, 2001; Voeks and Leony, 2004; De Santana et al., 2016), publications on medicinal plant knowledge held by Maroon communities living in primary forests are still scarce. There is a need for more comparative research among Maroons living in remote forested areas in the Guianas and Brazil to further investigate differences and similarities in their plant use, by using similar methods and sample efforts at all study sites. This will give further insights into a shared cultural knowledge than which is currently possible with the minimal information available for Suriname. The data could then be used to compare with Maroon studies conducted in deforested or urban communities in these countries.

Medicinal plants for health promotion, disease prevention and cure

A total of 302 health uses were recorded for 110 medicinal plant species, which gives an impression of the extensive medicinal plant knowledge in Pikin Slee. Most uses related to ‘general health promotion’, followed by diseases of the digestive system, musculoskeletal system, general symptoms and signs (e.g. fever of unknown origin), respiratory system diseases, skin and subcutaneous tissue diseases, injury, poisoning and other consequences of external causes, and cultural illnesses. More than half of the medicinal plants were used for more than one health purpose. For example, the multi-functional species *Lantana camara* was used to treat fever, leishmaniasis, body pain but also to heal the vagina after a delivery, and was added to baby baths and used to give the new mother strength. *L. camara* is an aromatic shrub and therefore often used in herbal medicines. Research in other Saramaccan areas noted the variety in medicinal plant uses, and the existence of multi-purpose plant species (Ruysschaert et al., 2009; Van Andel and Ruysschaert, 2011; Ramdas, 2015).

We found that that majority of plant uses were related to cure (58%), followed by health promotion and disease prevention. The results of this research are in contrast with the study conducted earlier by Ruysschaert et al. (2009) in another Saramaccan village, where health promotion and disease prevention scored higher than potentially life-threatening conditions like diarrhea or respiratory infections. This might be explained by the fact that our study area was far more remote than Ruysschaert’s study site Brownsweg (Brokopondo district). Formal health care in

Pikin Slee was only available at the village health center, making the villagers more dependent on medicinal plants than in Brownsveg, where biomedical care and basic pharmaceuticals like paracetamol were cheap and easily available (Ruysschaert et al., 2009). Another explanation might be that Ruysschaert et al. (2009) focused especially on baby care, in which health promotion plays a significant role, while this study focused on all traditional herbal medicines used within the community. Still a large amount of the plant use reports related to health promotion, especially to strength. This shows the cultural importance of the maintenance and improvement of strength for the Saramaccans. Most adults conducted heavy physical labour, following gender-divided patterns of labour. Men were responsible for building boats and clearing forests to make new agricultural fields for their wives and women planted and harvested the crops. Walking back to the village with crops, firewood and drinking water from the forest creeks is physically challenging. Therefore, herbal baths for strength were used regularly, as people believed that this would keep their body strong.

This finding shows that, apart from curing disease, the Saramaccan ethno-medical system has a deep focus on enhancing health and well-being of the body and mind. Both needed to be strong to survive in the rainforest, which encompasses living in harmony with the various types of spirits that inhabit their village and their direct surroundings. It is believed that a disruption of the balance between humans and nature or the spiritual world can lead to a discomfort in health of various degrees. The intense relationship between the human, natural and spiritual world has also been described by Haverkort et al. (2003) for sub-Saharan African cultures, in which the natural world provides the habitat for spirits that can send messages to the human world, providing guidance, punishment and blessings. In many other African belief systems, good health is holistically addressed as well and extends to the person's social environment (Cocks and Møller, 2002; Geissler et al., 2002). This holistic concept is also found in the pan Caribbean Creole medical system (Longuefosse and Nossin, 1996). A disturbance in health caused by external agents, such as evil spirits, needs to be treated by performing cultural practices. This finding correlates with other studies that have found a strong preference by people to treat cultural illnesses with traditional medicine (Quinlan, 2010; Mathez-Stiefel et al., 2012; Vandebroek, 2013; Towns et al., 2014).

Traditional medicine vs biomedical health care: choice or necessity?

One of the main conclusions of this thesis is that the people in Pikin Slee made a deliberated choice for using traditional medicines, even though most health concerns could also be treated by the nurses and doctor in the health center. We therefore reject our hypothesis that health concerns that could be successfully

treated by the health center would be less salient in their herbal medicine practices. Our results also showed that a large proportion of the health concerns in the village could be considered as 'cultural'. As the health center focused on disease prevention and cure, 'general health promotion' and 'cultural illnesses' could only be addressed with traditional medicines. This finding is consistent with earlier arguments that herbal medicine is not only a necessity, but also a deeply rooted cultural preference (Bussmann et al., 2007; Pieroni and Vandeboek, 2007; Van Anel and Carvalheiro, 2013). As long as the cultural importance of a clean body and soul persists and a strong belief that any disturbance in health is caused by external agents, cultural practices such as herbal bathing will continue to exist, even if access to modern health care facilities is improved.

Our findings that treatments offered by traditional medicine are both overlapping with and complementary to biomedical health care, was also reported for Bolivia (Vandeboek et al., 2008). In Pikin Slee, some people go directly to the health care center as treatment with biomedicines is easy and quick, while others first use traditional medicines as it fits better with their belief systems. A deeper examination of people's health seeking behavior in the village could further clarify the current co-occurrence of modern and traditional treatments for the same diseases. Care provided by the village health center could be enriched if traditional knowledge, illness concepts, and medicinal plant uses could fit into a larger framework that studies healthcare from a community perspective. A deeper understanding of Saramaccan traditional practices and cultural illnesses could help biomedical health care providers as they may address underlying neglected diseases, as was described by Towns et al. (2014) for West Africa. Since the reliance on traditional medicines in Suriname is high, formal health care providers should be aware of their patients using both types of health care and be conscious of possible contraindications and signs of toxicity based on potential drug-herb interactions (Van Anel and Carvalheiro, 2013). Traditional medicines can, just like modern medicines, cause complications and side effects, as was recently highlighted in a study on *Psidium guajava* L. used in traditional medicines in Suriname (Bultman and De Vries, 2018). Except for phytochemical and pharmacological studies and scientific reviews of Mans et al. (2017, 2020) on the use of traditional medicines, research on Surinamese plant species to find scientific evidence of clinical efficacy to support the use of herbal traditional medicines is still scarce in Suriname.

Improved traditional medicines, the way forward?

For the last two decades, the WHO has been promoting the use and integration of traditional, complementary and alternative medicines into national biomedical health care systems and offered governments support to regulate their herbal

medicines. Although the first attempts to address a possible integration started as early as 2002, when the CARAPA symposium was organized in Suriname with the same vision (CARAPA, 2002), the lack of rules and standardization regarding the quality and safety of traditional and herbal medicines is still a concern. As a large proportion of the Surinamese citizens use traditional medicines, it is critical for the Surinamese government to create a national policy on this matter and further implement, together with NGOs and relevant stakeholders, all steps described in the WHO global report on traditional and complementary medicines (WHO, 2019), to achieve a possible integration. Collaborations with other countries in or outside the Caribbean region could be helpful.

In 2011, a ‘Multi-disciplinary University Traditional Health Initiative’ (MUTHI) was started with the overall objective to create sustainable research capacity and research networks in Africa, especially between the participating countries Mali, South Africa and Uganda, as well as some collaborating neighbouring institutions and European project partners to achieve improved health in Africa. This four-year project addressed health research focusing on the future potential of traditional medicine in Africa (CORDIS, 2015). Traditional medicines are still an important form of primary health care for many Africans, but they have hardly undergone any form of quality control. To develop the research capacity of African researchers on improved traditional medicines (ITMs), the MUTHI project focused on developing the capacity of the participants to 1) conduct high quality medical anthropology, ethnobotanical and ethnopharmacological research, 2) use quality analyses and bioassays to find and evaluate bioactivities of phytomedicines/nutraceuticals derived from plants, 3) conduct, assess, and analyze the outputs of observational and clinical trials using improved traditional medicines and plant derived compounds, and 4) apply research ethics, legislative requirements, IPR protection and access and benefit-sharing around ITM and plant-derived drugs. In Mali, where many people only have access to traditional medicines for their primary health care needs, a number of ITMs are now available in the local markets (Willcox et al., 2012). A high level of government support for research and development of traditional medicines, and well-organized associations of traditional healers for researchers to collaborate with, made research on the safety of popular traditional medicines successful in Mali. The ‘improvement’ of these traditionally used medicines lies in the available pharmacologic evidence of safety and efficacy, the standardized dose and quality control (Willcox et al., 2012). As the ITMs are still based on the traditional knowledge, practices and beliefs of the local community, and other forms of modern health care provisions are often scarce in Mali, they contributed substantially to people’s primary health care needs and are still affordable to the population. Such capacity building projects on traditional medicines for better

public health could also be beneficial to Suriname, to support local researchers in the development of ITMs.

Patterns in traditional knowledge transfer

Knowledge transfer can take place in a number of ways. It can be 'vertical' (related to kinship, like from parent to child), 'horizontal' (between individuals of the same generation, irrespective of their relationship, such as peers), and via 'oblique transmission', (between individuals of different generations, not related through kinship), as described by Cavalli-Sforza et al. (1982) and Reyes-García et al. (2016). Vertical transmission is often complemented with horizontal transmission of knowledge (Setalaphruk and Price, 2007; Eyssartier et al., 2008; Van den Boog et al., 2017). This was the case in Pikin Slee as well, where medicinal plant knowledge was gained from family members (parents, sisters, cousins) and friends. However, plant related knowledge was also gained via spirits and dreams, further contributing to the variation in knowledge, something that was also reported in Bolivia by Vandebroek et al. (2004), in Ethiopia by Kidane et al. (2014) and in India by Terangpi et al. (2015). The gained medicinal plant use knowledge was shared again with family members and some close friends. Our assumption that medicinal plant knowledge would be kept secret within families, which was said to be a Saramaccan tradition, proved to be incorrect, at least when looking at the use of specific species only. One reason for this lack of exclusive family-based species knowledge could be that the respondents only shared common species knowledge with the researcher, keeping their secret plant species, if any existed, for themselves. Possibly, the secret family knowledge refers more to specific preparations (recipes) or applications (e.g., bone setting), including associated incantations and prayers. This detailed knowledge is still kept within families and not shared with friends, but it was out of the scope of this explorative study to investigate this further.

Acquiring knowledge of plant species and their uses is essential for children in any society, but particularly for those growing up in remote areas like Pikin Slee, where people directly depend on the natural surroundings for their survival. Childhood is an important period in which the basis for traditional and cultural knowledge and skills is set (Reyes-García et al., 2016). Several adults were concerned that their children did not have enough time anymore to go with them into the forest. According to these adults, schooling had a negative influence on the transfer of their plant knowledge to children (Van 't Klooster, 2009). They stressed the need to actively stimulate this transfer of knowledge and its documentation for conservation purposes. Our result corresponds to other studies that reported that transfer of ethnobotanical knowledge to younger generations is hindered due to formal education and children's lack of time to spend in the forest with elders

(Barreau et al., 2016; Cruz-García, 2006; Reyes-García et al., 2010; Saynes-Vasquez et al., 2013; Srithi et al., 2009). As highlighted recently by Ramet et al. (2018), there is a strong demand to create programs to support the intergenerational dialogue that fosters traditional knowledge transmission. It was in this context that a lesson on medicinal plants was given at the primary school in Pikin Slee, which included a homework assignment on medicinal plants to stimulate the plant knowledge transfer from adults to children. A total of 112 medicinal plant names were recorded, which related to 36 different species that the children brought to school. Almost half of them were cultivated species, half were wild, while a few could not be identified. Most children reported on herbs, some others on cultivated trees. As herbs grow in and near the village, they could easily be collected by the children, just like the branches of cultivated trees, well-known among children for their edible fruits. Since the assignment was to bring a single plant to school and the primary forest was too far to reach after a normal school day, the children brought their species mainly from the village and the surrounding secondary forest and shrubby vegetation.

The results of the homework assignment revealed that most health uses related to baby care, headache, high blood pressure, stomach ache, hand or foot fungus and eye infections. These are all health issues that regularly occur in the village, and are often self-treated by family members. We conclude that keeping your baby healthy and strong with herbal medicines is very important for the Saramaccans, and for Maroons in general, as showed by Ruyschaert et al. (2009) and Vossen et al. (2014). Since Maroon mothers are responsible for taking care of babies and young children (Ruyschaert et al., 2009), the pupils got most information from their mothers. Mothers shared information on female-related health issues and baby care (such as baby bathing and cleaning umbilical cords) only with the girls, which suggests that this knowledge was gender-specific. This pattern corresponds with the strict gender-based labour divisions in the village, which leaves the women in charge of food production and childcare as their main responsibilities. Our findings coincide with results from a recent study conducted by Díaz-Reviriego et al. (2016) in the Bolivian Amazon, which showed that Tsimane' medicinal plant knowledge was strongly gendered, so women had a better knowledge of plant uses associated with reproductive and childhood ailments. Other studies also suggested gender-based differences in medicinal plant knowledge (Silva et al., 2011; Teklehaymanot and Giday, 2007; Voeks, 2007; Voeks and Leony, 2004).

None of the pupils' parents shared herbal medicines to cure supernatural illnesses, although it is evident that Maroons use large numbers of ritual plants (Van Andel et al., 2013). Although some major ritual plant species, such as *Scoparia dulcis* L., were

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collected by the pupils, their reported uses were limited to physical diseases. This indicates that this type of knowledge is considered not suitable to share with young children between the age of 9 and 11. So far, no research has been conducted on how, when and at which age Saramaccan children acquire their ethnobotanical knowledge and learn about ritual plant uses. Other sensitive information on medicinal plant uses, such as those related to sexual disorders or pleasure, often mentioned when interviewing adults in the village (Chapter 2), were not commonly shared with the children either. Only one girl wrote ‘*you will wash your eye to make your thing below good*’. This is a literal translation for the Saramaccan term ‘*wasiwoyo*’, in which ‘*wasi*’ means washing and ‘*woyo*’ means eye. It is a common euphemism used by women for plants they use to wash their genitals. The comment was made for the species *Campomanesia aromatica* (Aubl.) Griseb., a plant commonly used in vaginal steam bathing (Van Andel et al., 2008), and not for disinfecting eye inflammation. This example underscores that a good understanding of the Saramaccan language and cultural practices is important to interpret the obtained results. None of the family members shared knowledge on typical male aphrodisiac plants either, such as *Quassia amara* L., *Strychnos melinoniana* Baill. or *Aristolochia consimilis* Mast., although it is known that these are frequently used in bitter tonics (Van Andel and Ruyschaert, 2011). We conclude that the type of knowledge generated with this assignment concentrated on physical ailments and health issues easily understandable for children, which could be treated by laymen. The fact that the parents knew their knowledge was going to be used for a school assignment, and that the school was based on Christian principles, may have influenced the type of knowledge shared. Based on the classroom assignment, we can conclude that Saramaccan traditional knowledge and practices can easily be learned and discussed in a classroom environment, and supports the intergenerational transfer and revival of plant knowledge. However, as learning about medicinal plants in school is taken out of the Saramaccan context, based on a different worldview and way of learning, not all aspects of learning can be addressed in school. It is therefore essential for the children also spend sufficient time with their elders.

Saramaccan plant names, erosion, co-existence... or revival?

As showed in Chapter 5 of this thesis and an earlier study conducted by Van Andel et al. (2014), Afro-Surinamese plant names often contain elements referring to animals, their properties, appearance or uses, and are therefore an important aspect of culture. Our results presented in Chapter 4 showed that many pupils, during their homework assignment on medicinal plants, reported Saramaccan plant names. However, the wide variety of spelling can have a negative effect on the transmission of the cultural knowledge that is stored in the plant names. It is therefore essential for Maroon children to learn how to read and write in

their own language. We further conclude that Saramaccan medicinal plant names reported by the pupils were increasingly influenced by other languages, as almost one third of the plant names were written in Sranantongo. Typically, Surinamese Dutch names were used only for cultivated species occurring in the village, while wild species were mostly known by their Saramaccan or Sranantongo names. As many Saramaccans nowadays travel to the city Paramaribo for various reasons, they become more familiarized with Sranantongo plant names, so they start using them at home, although Saramaccan plant names still exist for these species.

A recent study conducted in two Indigenous communities along the Corantijne River also showed that schoolchildren used Sranantongo and Surinamese-Dutch words instead of their Indigenous languages to name plant species (Van den Boog et al., 2017). This pattern of using the country's lingua franca instead of their native languages was also reported in a recent study conducted by Gallois et al. (2017) for Baka children in Cameroon. As plant names are used by people to store their traditional ecological and cultural knowledge, plant names (or parts thereof) adopted from other languages will interrupt this conservation process, and the meaning of the plant names will get lost. The writing of proper Saramaccan plant names and the translation of health issues from Saramaccan into Dutch was a huge challenge for the pupils, indicating a gap between the official school curriculum (in Dutch), Maroon traditional knowledge and literacy in Saramaccan. It is plausible that the Dutch language used for the assignment might have influenced the results: the children needed to translate their interview results from Saramaccan (which they speak at home) into Dutch (for school), and detailed information may have got lost in translation. To prove that education in the Dutch language and globalization is indeed affecting Maroon traditional knowledge, more research is needed on cultural change and loss of ethnoecological knowledge among Maroons in different groups of age, schooling and competency in the local language, such as the study conducted by Saynes-Vasquez et al. (2013) in Mexico.

Safeguarding traditional knowledge via school

Transmission of Saramaccan ethnobotanical knowledge and skills is still mainly experience-based and passed on orally within the family environment, and therefore not easily fully transmitted in a classroom-based learning setting. However, extracurricular activities could stimulate the transmission and revitalization of Saramaccan traditional knowledge, as showed in Chapter 4. Despite the caveats, our study proved that a school assignment can yield substantial ethnobotanical knowledge in two days. As showed by Ruiz-Mallén et al. (2009) for preparatory school adolescents from Zapotecan origin in Mexico, participation in extra-curricular education programs on the acquisition of school and local environmental

knowledge improved the overall school learning. Reyes-García et al. (2010) argued that contextualized schooling not only enhances local environmental knowledge and school performance, but also counteracts the loss of traditional knowledge. In contrast to these and other education programs run in the Andean highlands and Upper Amazon, in which local knowledge is incorporated in the existing school curriculum (Zent, 2009), most schools in Suriname do not, as yet include local knowledge in their school curricula. Extensive extra-curricular education programs on local traditional knowledge do not exist either. This implies that schooling hours disrupt vertical, horizontal, and oblique traditional knowledge transmission, which was also suggested by Van den Boog et al. (2017) for Western Suriname. Contextualized learning by incorporating traditional knowledge into the school curriculum, and providing bilingual learning would contribute to safeguarding people's biocultural heritage. More research is essential to get a better understanding of the relationship between schooling and local environmental knowledge in the interiors of Suriname to determine whether and how a new curriculum should be developed to complement, rather than substitute, traditional knowledge.

Hidden knowledge stored in Saramaccan plant names

Diving into an archive of Saramaccan plant names means diving into history, and gaining a deeper understanding of their meaning and etymology. Chapter 5 shows that plant names hold a large body of knowledge, information on where people historically came from and with whom they exchanged knowledge with. In Chapter 5, we analyzed geographical origin and meaning of 978 Saramaccan plant names collected during earlier fieldwork, literature and herbarium databases. One of the main findings of this study is that Saramaccan plant names are influenced by European, Indigenous and African languages, especially those from Central Africa. Two third of the Saramaccan plant names showed European elements in their names, which corresponds with Van Andel et al. (2014), who also found a high proportion of European lexical elements dominating Afro-Surinamese plant names. This shows that plant naming by enslaved Africans and their descendants in Suriname was strongly affected by the languages spoken by the English, Dutch and Portuguese plantation rulers. During and after the Saramaccan escaped from the plantations, they have been in contact with various Indigenous communities, from whom they also learned plant names and uses, cultural practices and words (Price, 2010; Borges, 2015). These influences can still be found in Saramaccan plant names: about one fifth of the Saramaccan plant names were of Indigenous origin, often Carib and Arawak. Some Saramaccan plant names stem from Indigenous languages spoken outside of Suriname, such as 'kadyu' (cashew, *Anacardium occidentale* L.), which comes from the Tupi word 'cajú' used in Brazil for the same species (Alcantara Rodríguez et al., 2019) and came via the Sephardic Jews from

northeast Brazil to Suriname. We furthermore found that a substantial amount of the Saramaccan plant names was of African origin (39%), which is comparable with the results of Van Andel et al. (2014) for all Afro-Surinamese plant names in Suriname, but much higher than the plant names in Curaçao (Alcantara Rodríguez, 2016). Due to their isolation in the forest, many African-based plant names have been conserved. Fortes-Lima et al. (2017) found that, compared to any African-American population found so far, the Maroons in Suriname and French Guiana have the highest proportion of African genetic ancestry (98%), which clearly had an effect on their plant naming process. However, their sample size (71 Maroons, including 19 Saramaccans) cannot be representative for all Maroons in Suriname and French Guiana.

The enslaved African ancestors of the Saramaccan Maroons used their ethnobotanical knowledge and native languages to name the flora in their new, Surinamese environment. Chapter 5 shows that the Saramaccan plant names with a possible African origin could be divided in two main categories: names created by retention (based on botanically related species) and names created by innovation (referring otherwise to Africa). We found that 44% of the African-derived Saramaccan plant names were based on retentions, while the rest was based on innovation or were so-called ‘misidentifications’: plant names given to species that resemble other species with a botanical link to Africa. For the Saramaccan plant names for which we found links to botanically related species in Africa (retentions), 62% were of Central African origin, which is a much higher percentage than found by Van Andel et al. (2014) for all Afro-Surinamese plant names. This can be explained by the fact that we had access to a new database with 55,000 records of African plant names collected in the Democratic Republic of Congo (DRC), based on herbarium specimens in the botanical garden of Meise, Brussels. This database was analyzed for the first time to link plant names to the New World, filling the still existing ethnobotanical gap for this region (Van Andel et al., 2014).

We conclude that most Saramaccan retentions belonged to the Bantu language group (Central Africa), followed by Kwa (West Africa). This can be explained by the fact that from 1675 to 1719, most enslaved Africans in Suriname were Eastern Gbe from the Slave Coast and Kikongo-speaking people from the Loango Kingdom. After 1720, when the Gold Coast (Ghana) became the main supplier of African captives, more Akan-speaking people were taken to Suriname (Eltis and Richardson, 2010; Smith, 2015a). The Saramaccan community, however, was formed between 1690 and 1710 (Price, 1983), before the arrival of the Akan-speaking people. As a result, the number of Akan-retentions in Saramaccan plant names is much lower, as is the number of Akan lexical items traced by linguists (Smith, 2015a). The strong

influence of Bantu languages corresponds with the findings of Smith (2015a). The Bantu language that contributed most to Saramaccan plant names was Kikongo, which can be explained by the fact that it was spoken in Central African coastal areas where the Dutch colonizers purchased the enslaved Africans from, such as Malembo and Cabinda (Voyagers database, 2021). A number of other less obvious Bantu languages that are spoken deeper in the interior of the DRC seem to have contributed to the Saramaccan plant names as well, such as Tembo, Luba-Katanga and Luba-Kasai. This confirms the conclusion of Eltis and Richardson (2010) that enslaved Africans were captured up to hundreds of miles inland by traders and took months to reach the coastal areas, where they were sold to the Europeans.

For the Saramaccan plant names with a possible African origin (innovations), we did not find any botanically related species in Africa (yet), but found similar African words in dictionaries, historical and linguistic literature. We therefore conclude that the enslaved Africans used words of their own lexicon to give new names to Surinamese plants they were not familiar with, based on their color, shape, growth form, habitat or uses. The majority of the innovations were influenced by Kwa languages (mainly Fon, spoken today in Benin), followed closely by Bantu languages (mainly Kikongo), while the rest related to other smaller language groups. We furthermore conclude that the Saramaccan plant names (retentions and innovations) contained all sorts of cultural information referring to African places, animals, people and their body parts, habitats, morphological characteristics, illnesses and supernatural beings (see Chapter 5). This practice of storing traditional knowledge in plant names is present among many cultures around the world (e.g., Turpin, 2013; Fundiko et al., 2015). Since the Saramaccan have an oral culture, plant names help them to classify their natural surroundings, safeguard their cultural knowledge, and remember aspects related to plants.

The lack of dictionaries for African languages may have created a bias in the language sources and plant names we found so far. We detected links with Saramaccan plant names and the Congolese language Lingala, an important trade language, but not the original language spoken by the enslaved Africans who came from that region (Meeuwis, 2019). Many vernacular names in African languages have yet to be linked to reliable botanical specimens, and more research on Saramaccan plant names is needed to complete our database. Apart from Irvine (1961) for Ghana and Fundiko et al. (2015) for the DRC, etymological studies on African plant names are very scarce. Most ethnobotanical studies and dictionaries do not provide translations for vernacular plant names. We are therefore unable to provide a definite overview of the African sources for Saramaccan plant names. However, we show that ethnobotanical research can add valuable information to the existing

linguistic and historical studies on the origin of the enslaved Africans in the New World. Therefore, more multi-disciplinary research in Africa and the Americas is needed: collaborations between universities, and the involvement of native speakers as researchers is highly recommended. Finding evidence for the African legacy of Afro-American plant names is still in its beginnings, but so far it has shown the adaptive capacity of humans in a new, challenging environment.

Methodological considerations

To understand the complexity of the human-plant relationship of the Saramaccans, much more time should be spent in the field than was possible for the explorative research that took place in Pikin Slee (Chapter 2). Although only a small number of people were interviewed, I believe that the results still sufficiently represent local Saramaccan herbal practices, but they do not represent the entire Saramaccan population. In Chapter 2, the biomedical oriented International Classification of Diseases (ICD) (WHO, 2015) was used as a framework to analyze the prevalence of diseases and other health related problems mentioned in the village. However, health issues within the Saramaccan medical system are not directly interchangeable with the biomedical system, especially health issues believed to have a spiritual cause. They do not fit in the physical explanatory model, which attributes ailments and illnesses to a disruption of bodily physiological processes. They fit more in a psycho-sociological explanatory model that attributes ailments and illnesses to thoughts or emotions from oneself or from another person directed to you, which is usually a result from social factors (Lynch and Medin, 2006). Therefore, some extra categories were added to address health concerns or uses in the village that could not be captured by the ICD, such as ‘cultural illnesses’ and ‘general health promotion’. In Chapter 3, a comparative analysis was made on the similarities and differences between medicinal plants knowledge of the Saramaccan and Ndyuka Maroons. The lack of ethnobotanical data for the Ndyuka community and the differences in study approach at the Saramaccan field sites may have affected the amount of recorded plant species used per type of bath and the overall results in this comparative study. This suggests that care should be taken in extrapolating data on plant uses collected from one location to a whole ethnic community. In Chapter 4, children were requested to bring a medicinal plant to school for the homework assignment on the following day. This may have influenced the species brought to school, as there was no time to go deep into the forest after school. In Chapter 5, on the origin of Saramaccan plant names finding related botanical species in the African database was time consuming, as local plant names, languages, scientific plant names were not written in a consistent matter. The latter may have led to plant species being overlooked. The above-mentioned aspects should be considered in preparing further research on these topics.

Saramaccan traditional knowledge and the future

The Saramaccans gained rights over their land in 1762, when a peace treaty was signed with the Dutch colonizers. The motivation of the colonial authorities for this treaty was to prevent the Maroon attacks on plantations. The peace treaty ensured their freedom to live as an ethnic community in the area now known as the Saramaccan territory. However, this peace treaty was not recognized by the Surinamese government after independency in 1975. For the last two decades, the people in Pikin Slee have been complaining about the ongoing gold mining and logging activities in their area. Due to these unsustainable extractive practices in their area, large parts of the forest have been cleared and creeks became polluted. To put a halt to these developments, the Saramaccans started a legal battle against the Surinamese government and multinational corporations, which they held responsible for the unwelcome changes in their cultural life. In 2007, the Inter-American Court of Human Rights issued a verdict on the ‘Saramaccan tribe versus Suriname’ case in favor of the Saramaccan people (IACHR, 2007). This was a major breakthrough for the Saramaccans, because all groups claimed to have rights on the natural resources in the area. The two Saramaccan ‘rainforest warriors’, Mr. Wazen Eduards (chairperson of the Association of Saramaka Authorities and Head captain of the village Pikin Slee) and Mr. Hugo Jabini (one of the founding members of the Association of Saramaka Authorities) won in 2009 the prestigious Goldman Environmental prize for their efforts to defend their land rights. They won the legal battle against the Surinamese government amongst others by explaining their dependence on the forest for their survival. The Saramaccans were supported in their battle by the findings of Richard and Sally Price who conducted decades of anthropological research on their history and culture, from the 1960s onwards. How they won the battle over their land is described in full detail by Richard Price (2011). Due to the lack of progress made by the Surinamese government to meet its legal obligations, another hearing was organized in 2010 with the Inter-American Commission, representatives of the Saramaccan communities, and the Surinamese State. Now, more than a decade later, devastating gold mining activities are still taking place in the Saramaccan territories, destroying more forest and seriously threatening Surinamese livelihoods. The future of the Saramaccans living in the interior was also more recently addressed in the campaign ‘SwitiWatra’ of Surinamese and Guyanese NGO’s, a collaboration initiated by WWF-Guianas. This campaign focusses on the conservation of clean rivers and fights the pollution of rivers and creeks in the two countries (WWF-Guianas, 2021).

Many Saramaccans moved to Paramaribo for a better livelihood, but often still live in poverty in city slums and lost the knowledge on how to survive in the forest. They depend on small jobs offered in the city, or end up working in the gold mining industry themselves, as this takes them back to the forest they are familiar with. Now

the forest is disappearing, their associated traditional knowledge will deteriorate as well. This, together with the ongoing acculturation processes, will lead to a rapid loss of their traditional knowledge and practices. Ironically, school children growing up in the forest villages have less time to learn from the elders, but are expected in a later stage in life to sustain themselves and their families. For this, it is essential to know how to catch fish, grow crops, collect plants to prepare medicines, and to know which wood to collect for firewood or to build a house with. The Saramaccans are the victims of the recent developments, not being able to organize themselves after the verdict. Therefore, the future for the Saramaccans living in the forest and the survival of their knowledge for future generations is insecure.

Yet, the Saramaccan community in Pikin Slee started to realize the need to preserve their traditions and raise awareness for the survival of their culture. In 2009, they opened a museum on Saramaccan culture in the village, in collaboration with the Dutch 'Steungroep Totomboti', to preserve various aspects of their traditional and cultural knowledge. In 2012, traditional healer Mr. Edje Doekoe of the Foundation Totomboti was invited as a speaker at the TEDx conference in Maastricht to give his perspective on the future of health for an international group of scientists organized by the Radboud University in Nijmegen. The presentation was broadcasted live in Pikin Slee, for which Mr. Vinije Haabo and I organized new internet facilities in the museum, sponsored by the Radboud University. This initiative gave the Saramaccans of Pikin Slee international exposure and the ability to communicate with other Saramaccans and ethnic groups in and outside Suriname. Currently, in the Netherlands, there is increased attention for the cultural heritage of the Maroons, their African origin, and the role the Dutch played in the Trans-Atlantic Slave Trade, of which the latter is still a sensitive topic. Recent exhibitions in various Dutch museums on Maroons, Suriname and slavery will contribute to the discourse on this topic.

Final conclusions

The overall project aim was to gather scientific information on the traditional knowledge, practices and beliefs of the Saramaccan Maroons, used for local health care purposes, education, as well as nature conservation, and the preservation of the Saramaccan biocultural heritage. Based on this and the framed research objectives as presented in Chapter 1, I reach the following final conclusions:

1. The people in Pikin Slee strongly adhere to their traditional practices, in which many medicinal plants are used.
2. Herbal bathing plays a significant role in providing local health care in Pikin Slee.

3. The geographical separation and limited contact between the Saramaccan and Ndyuka Maroons have led to different plant uses in their herbal bathing practices.
4. The Saramaccan ethno-medical system in Pikin Slee focuses primarily on cure, followed by health promotion, and to a lesser extent disease prevention.
5. People in Pikin Slee make a deliberated choice for traditional medicines, even though most health concerns can be treated by the village health center.
6. The use of herbal medicines is not only a necessity, but a deeply rooted cultural preference.
7. The knowledge generated with the school assignment concentrated on physical ailments and health issues easily understood by children.
8. Writing of proper Saramaccan plant names and the translation of health issues from Saramaccan into Dutch is a challenge for pupils in Pikin Slee, indicating a gap between the official school curriculum (in Dutch), traditional Maroon knowledge and literacy in Saramaccan.
9. The growing influence of Sranantongo on Saramaccan plant naming interrupts the conservation of Saramaccan traditional ecological and cultural knowledge stored in plant names.
10. Contextualized (environmental) learning by incorporating Saramaccan traditional knowledge in the school curriculum, and providing bilingual learning can contribute to safeguarding Saramaccan biocultural heritage.
11. The enslaved African ancestors of the Saramaccan Maroons used their ethnobotanical knowledge and native languages to name the flora in their new environment.
12. Saramaccan plant names are mostly influenced by European languages, followed African and Indigenous languages.
13. Of all African languages that contributed to Saramaccan plant names, Central African Bantu languages contributed most, followed by West African Kwa languages.
14. Kikongo was the most important Bantu language that contributed to Saramaccan plant names.
15. Saramaccan plant names store large amounts of traditional knowledge and therefore play an important role in the conservation of Saramaccan biocultural heritage.

Recommendations for future research

1. There is an urgent need to document Saramaccan traditional knowledge (including medicinal plant knowledge) now that the livelihood of the Saramaccan living in the interior of Suriname and their traditional knowledge and practices are under severe threat, due to acculturation and ongoing deforestation.
2. Meetings between different health care providers in the village would facilitate a deeper understanding of cultural practices and illnesses. This would be of interest to biomedical health care providers, not only because cultural ailments make up a significant portion of local health concerns, but they may also indicate underlying neglected diseases.
3. Biomedical health care providers in the village should ask their patients about any recent use of herbal medicines and be attentive of possible contraindications and signs of toxicity based on potential drug-herb interactions. Traditional medicines can, just like modern medicines, cause complications and side effects, especially when used at the same time.
4. More comprehensive phytochemical and pharmacological research, preclinical evaluations and well-designed clinical studies are needed to provide safe herbal formulas to citizens of Suriname. The lack of regulation and standardization regarding the quality and safety of traditional medicines is still a concern in Suriname.
5. It is critical for the Surinamese government to create a national policy on traditional medicines and further implement, together with NGOs and relevant stakeholders, all steps as described in the WHO global report (2019) on traditional and complementary medicines.
6. The role of medicinal plants as an important non-timber forest product that provides a livelihood for the Saramaccans could be investigated further.
7. There is a need for more research focusing on cultural change and loss of ethnoecological knowledge among Maroons of different age groups and levels of schooling and competency in the local language.
8. To make education more contextualized for Maroons and Indigenous people in the interior of Suriname, a revision of the current curriculum is essential. This could be investigated further based on their needs.
9. Since the traditional ways of transferring knowledge are disrupted due to schooling, there is a strong need for Saramaccan elders to organize themselves and start teaching children their knowledge before it is lost.
10. Bilingual learning should be provided to all primary school children growing up in the interior of Suriname to improve their learning experience and to safeguard their biocultural heritage for the future.
11. There is an urgent need for more dictionaries on African languages, preferably

compiled by native speakers, in which aspects of traditional religion, spiritual and sexual domains are not left out, like is the case at present, as most of this work has been carried out by missionaries. This will contribute to ethnobotanical and linguistic research undertaken to safeguard the biocultural heritage of Indigenous and Maroon communities.

12. There is a need for more ethnobotanical research in Central and West Africa for further comparison with those Surinamese plant names whose origin remain unknown.
13. Ethnobotanists documenting local names should ask their informants for translations of vernacular plant names, and do this in such a way that the meaning of each separate lexeme is given alongside a 'full name' translation.
14. More interdisciplinary research should be conducted to conserve the biocultural heritage of the Maroons. Ethnobotanists, linguists, environmental educationalists, anthropologists and historians should collaborate on this subject.
15. Plant names reveal information about the role the Dutch played in the history of the Trans-Atlantic Slave trade, but more research is necessary to find more evidence.
16. The role of Europeans in the Trans-Atlantic Slave trade should become part of the school curricula in Suriname and in the Netherlands. Plants and plant knowledge that crossed the Atlantic could figure in this narrative, as every African plant (use) in the New World has its own interesting story to tell.

