Trail as Heritage: Safeguarding Location-Specific and Transient Indigenous Knowledge

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ABSTRACT

The importance of Indigenous Knowledge (IK) in understanding the environment and informing scientific studies has gained prominence with the increased attention on environmental sustainability. Researchers have partnered with indigenous communities towards leveraging technology to preserve these important IK. However, there still remains a gap in the understanding of how indigenous community members use technology to engage with, and safeguard their IK. We conducted an interview-based study with museum experts and members of an indigenous community in Kenya to understand how community members seek, preserve, and disseminate location-dependent IK. We augmented our findings through a year-long observation of organic interactions on six Facebook Pages that are specifically geared towards discussing aspects of IK. The findings illustrate the importance of location in providing context, and identifying disappearing IK. We also highlight how community members seek and share the IK especially on Facebook. We conclude by describing research and design opportunities for identifying and preserving IK in accordance with community wishes.

CCS CONCEPTS

• **Human-centered computing** → *Empirical studies in HCI*; *User studies*; • **Social and professional topics** → *Cultural characteristics*;

KEYWORDS

Indigenous Knowledge, Cultural Tensions, Accessible Technology, Intangible Cultural Heritage (ICH)

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1 INTRODUCTION

The importance of Intangible Cultural Heritage (ICH) in conveying a community's living expressions, traditions, and knowledge that have been passed down through generations, has been acknowledged and appreciated across academic disciplines [46]. Indigenous Knowledge (IK)–the skills and knowledge that an indigenous community has collected over a long history of interaction with their environment, is considered a sub-field of ICH. That knowledge is increasingly considered important as sustainability has gained prominence [44]. The United Nations Educational, Scientific and Cultural Organization (UNESCO) offers a central point where scholars and scientists across disciplines in conjunction with indigenous communities and other stakeholders, meet to create universal guidelines for safeguarding cultural practices and IK [42]. This includes how ICH evolves with time and technology advances, and the community changing roles as younger community members gravitate away from the traditional way of life [43].

Scholars within Human Computer Interaction (HCI) domain have considered the impact of technology in the preservation, use, and amplification of ICH and IK, and have elicited domain-specific guidelines for handling IK with technology [14]. Partnerships with indigenous communities have yielded guidelines on how to seek community support by establishing respectful boundaries on handling ICH [21]. Other research-community partnerships through participatory design and consultations, have leveraged technology affordances with local epistemologies and IK to design resilient and trustworthy systems [30, 50].

We endeavor in our research to understand how indigenous communities approach the safeguarding of indigenous IK. In this paper, we scope the research to focus on how the Kalenjin people safeguard disappearing IK–especially that which is tied to physical locations. The Kalenjin are an indigenous community who reside in the Rift Valley region of Kenya (area described in Figure 1). We conducted an interview-based study with 12 participants, 10 of whom

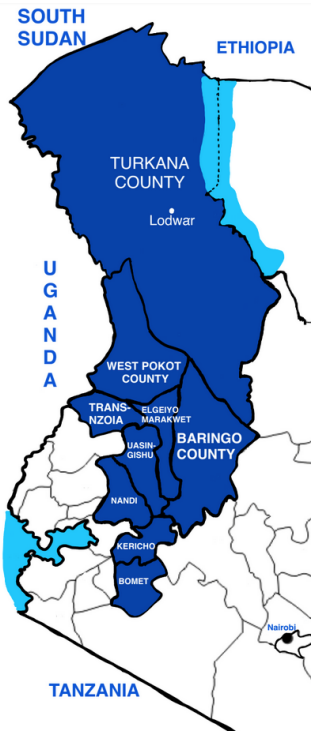

Figure 1: Shaded region represents areas that the Kalenjin reside, which encompasses nine counties located the Rift Valley region.

identified as Kalenjin. Additionally, we observed organic interactions on six Facebook Pages that revolve around the Kalenjin culture. Our choice of Facebook Pages was influenced by our observation of earnest and transparent discussion [33] regarding IK, the conflicts surrounding provenance, acceptability, and the role that technology plays in the preservation.

We leverage two design guidelines to frame our approach. First, *"People as knowledge, place as knowledge* and *practice as knowledge"* framework proposed by Awori and colleagues [3]. We focus especially on the *place as knowledge* recommendation that considers in-situ knowledge [51] as important to understand indigenous knowledge: place of origin, place of settlement and the communal knowledge therein [3]. Second, we leverage our prior *respectful space* approach [21] in charting the boundaries of location-specific indigenous knowledge that is the scope of this work. We expanded on the idea of location in that work, to include other aspects considered important to the community–beyond in-situ location: sacred sites, cultural locations, etc. [21].

Our work also builds upon previous work on interacting with, and safeguarding IK, including ways of recognizing and leveraging location in imbuing context to IK [7]. It also encompasses work that recognizes and respects the wisdom of the indigenous community through their interaction with their environments [43], together with how best to incorporate this into design of technology and tools [51].

We make three contributions to HCI/ICH study: First, we provide an in-depth understanding on how IK knowledge depends on location, going beyond contextual knowledge that for example informs the placement of houses, wisdom of where to dig wells etc. We also consider geographical features and transient IK–connecting our work with other research that consider the importance of trails (for hiking, pilgrimage etc) and their impact on IK. Second, we provide insights on how community members seek location-specific IK and their importance in giving context to disappearing and forgotten IK. Third, we highlight the implications of considering location in the narration and preservation of IK together with the role of technology in the preservation.

2 RELATED WORK

This work intersects Indigenous Knowledge (IK) and its interaction with scientific findings. We place particular emphasis on the importance of safeguarding IK associated with location, and the role of technology in the preservation.

Changing Influence on Indigenous Knowledge

There is increased awareness on the importance of indigenous knowledge (IK) especially relating to the environment. For example, once banned for the danger of causing catastrophic fires, the Native American practice of light burning called "the good fire" is now acknowledged to be an important practice to combat larger fires [8, 19], as is learning from Vanuatu indigenous architecture towards designing buildings resilient to tropical cyclones [45].

The United Nations Educational, Scientific and Cultural Organization (UNESCO) in addition to highlighting the importance of IK [44], provide guidelines on the ethical handling of IK and the larger domain of intangible cultural heritage (ICH) [43]. This is done through partnership with interdisciplinary researchers and indigenous communities around the world [42]. Further guidelines have been provided by researchers in the HCI domain through observation and partnerships with indigenous community members: for example in promoting sustainable architecture [49], in using local wisdom to inform requirement elicitation frameworks [50], and in the creation of resilient and trusted systems that leverage both indigenous and scientific knowledge [30].

This paper presents a study of the Kalenjin indigenous community in Kenya. We consider the state of IK and how it has evolved especially over the last 100 years–marked by the influence of colonialism and the books about the community that were written by British anthropologists. During the disruption of the colonial period, Local Native Councils (LNC) were established in 1922 with the aim of providing

a space for community members to "air their grievances [and ...] [receive] basic social needs" [29]. By 1950, this had evolved into African District Council (ADC) that granted the local community more autonomy, and would guide how the culture evolved–by setting specific timelines for the rite of passage ceremonies to be conducted [29], for example. As Christianity expanded, indigenous rites were incorporated (naming of altars for example) [25]. While this served to provide some continuity to the IK, it also obscured the original histories and meanings. The Kalenjin still wrestle with the proper way to preserve IK especially as the community has continually shifted from communal notions, to individualism [38]. Understanding how the IK has evolved over time, provide an opportunity to understand how IK is safeguarded in the present time, the generational role of community members in the preservation, and the impact of technology in the evolution.

Trail as Heritage: Location Importance

The importance of 'place' has been demonstrated to be critical to IK across different indigenous groups [48]. The boundaries surrounding these places are imbued with meanings that in turn influence the culture by informing identity [3]. It is important that technology in this domain leverage this in-situ knowledge [6] to inform boundaries [53], and embed the context [7] to other spatial representations [15]. Within the described boundaries, we consider the role of time. We define permanent locations as stand-alone sites of importance to IK, and encompass cultural sites. Transient locations are those that are impacted by time, and add depth to narratives and stories told to give context and meaning to IK. Our definition of transient knowledge builds on previous research on transient locations that has considered long distance hikers: as they cover long distances in a given time–to understand their motivations for doing so, for example for religious purposes in pilgrimages [9], the impact it has to themselves [10], and to others: both online and offline [23].

Transient knowledge within indigenous communities can be considered the preserve of "travelling griots" [12] who travel from place to place to tell stories and preserve IK. Transient knowledge also encompasses the community's understanding of their local terrains and important landmarks that may no longer be visible and are typically not revealed in modern maps [34]. While important in collective memory – "for coding and legitimization of kinship, ownership and belonging" [18], location is also difficult to represent given the different ways that indigenous communities interpret them [7]. For example: narrating how IK on ancient paths to safe watering points e.g. where to avoid crocodiles [49], and the origins of ancient ornamentation [32]. The timelessness of the nature of collective memory make it challenging to be used and preserved as fact using current technologies.

In this work, we consider the importance and promise of location to IK narration and preservation. To further guide our approach, we adopt the location-specific IK boundaries we described in previous work [21, 24], alongside "place as knowledge" sub-framework defined by Awori and colleagues [3].

Technology Use for Preserving Indigenous Knowledge

The reliance on oral narration to preserve and entrust traditional knowledge is perceived to be fragile, and easily interrupted [8, 46, 48]. The opportunity to use technology in the preservation to counter this fragility is still a matter of debate: balancing the advantages of permanent preservation, against community wishes to have agency over how they are represented [12, 17] in the stories, and how they retain ownership of their narratives [8]. Together with this importance, comes the awareness regarding the possible IK commodification that erodes community trust in adopting technology to archive their IK [48].

While technology has provided means to re-connect generations and to preserve IK passage [4, 36, 37], often there are limitations and participation required in order to adapt to how community members preserve their IK [6, 7]. This typically occurs where there is a mismatch of IK representation and technology used in the preservation: for example preserving oral-based IK in written form [47]. The trust signals used by community members do not transfer to the written form, which limits community participation [11, 47]. Technology is also not very well equipped to handle "cultural wicked problems" [35]–where conflicting understanding of cultural knowledge within the community itself exist. Typically, the understanding is continually (re)negotiated by community members, but these re-negotiations are not part of current design approaches, nor are they supported by current technologies [21]. Technology that have found measures of success have involved contextual applications with community buy-in [26, 36].

Critical theories customized to computing have provided guidance on how such research partnerships should be conducted [1, 14]. This is borne out of awareness of the narratives describing IK, including suspect methodologies that leveraged racial theories and used the testimony of very few informants during the colonial period [32], resulting in texts that was then (and still are) considered authoritative sources of knowledge about the indigenous community. We adopt our "respectful space" approach [21] to guide the handling of IK, as this approach also provide guidelines for accommodating cultural wicked problems and limiting researcher bias. Using the critical lenses above, we consider how the Kalenjin indigenous community members use location to imbue context to IK both online and offline, how technology space

Alias	Gender	Age	Occupation	Notes
P1	W	94	Farmer	Kabarnet
P2	W	88	Farmer	Kitale
P3	M	87	Maize Farmer	Kitale
P4	M	63	Retired Teacher	Eldoret
P5	M	59	Retired Office Clerk	Eldoret
P6	M	44	Docent	Kitale Museum
P7	W	35	Docent	Kabarnet Museum
P8	W	33	Docent and Curator	Tambach Museum
P9	M	23	Diver	Cheploch Gorge
P10	M	20	Diver	Cheploch Gorge
P11	M	20	Student	Everywhere
P12	M	19	Student	Everywhere

Table 1: Interview Participants. All the male participants had completed their rites of passage and were considered adults by their community – entrusted with the wisdom to adapt to contexts when discussing IK that had been passed on to them

has impacted the safeguarding of IK, and how the cultural know-how has evolved.

3 METHOD

Study Site and Participants

To understand the role that location plays in IK in different contexts, we conducted an interview-based study with 12 participants, 10 of whom spanned different sub-groups that make up the Kalenjin indigenous community. The participants ages ranged between 19 and 94 years at the time of the study (Table 1). The participants also spanned elders who had experience with old trails, three museum docents who had knowledge of how indigenous knowledge is narrated in the museums, and other–younger community members who could provide contextual information regarding their understanding of locations in the context of IK. We used convenience sampling to ask for recommendations for elders to interview in this study: by asking friends on social media to recommend who to interview and to introduce us to the elders in order to establish a line of trust, the verification of our identity and the research subject. The first author is a member of the Kalenjin community, fluent in the language: this fact served to provide a measure of trust and comfort–widening the topics that the elders were willing to share, trusting that we would respectfully handle those stories.

The three elders in this study (P1, P2, P3) were already adults in the late colonial period–the time right before Kenya won its independence from the British in 1963. At that time, transport infrastructure was scarce. When interviewing the elders, we were particularly interested in their experience of travelling without the aid of vehicles and their understanding of landmarks–including how they obtained the knowledge of these landmarks.

Two participants were born around the time Kenya won its independence (P4, P5) and received formal education. We wanted to examine the kind of IK they had regarding places and landmarks, how they used these places and their contextualization, and the current iteration of these IK places.

P9 and P10 were part of a 14-man diving team that jump off the Chebloch gorge that borders the Kerio river[1] for sport. People would pay to observe this death-defying attempt. Kerio river is an important landmark that is used as a natural border between Elgeiyo Marakwet county and Baringo county (Figure 2). The river (and the gorge) plays a major role in old IK held by Kalenjin subgroups that have for centuries been separated by it. In our interview, we sought to understand the IK the participants held about this important geographical location.

Finally, to understand the type of location-specific IK that is preserved by the museum and/or narrated by the docents to augment other community artifacts, we interviewed docents representing the three main (cultural) museums that represent the Kalenjin community: Kitale, Tambach and Kabarnet museum respectively (Figure 3). The three museums are funded and managed under the National Museums of Kenya umbrella[2] [22].

Once it was widely known by the community of our intention to interview the elders regarding IK, we had audiences of interested community members awaiting us either outside the museum gates or at the elders' homes. Apart from listening alongside the interview, the audience members would often interject to give context to the IK narrated, or to ask questions. We welcomed these interactions as they enriched our interview experience–and made the elders feel at ease as

[1] https://en.wikipedia.org/wiki/Kerio_River
[2] https://www.museums.or.ke/

Figure 2: The Kerio river formed the Chebloch gorge (first and second panel). The third panel is a view from atop the escarpment overlooking the Kerio Valley. The river provided a natural boundary between two subgroups with different relationship to the river and the valley and is associated with a lot of indigenous knowledge and oral history.

they essentially held court and told their stories in the language and cadence that fit the narrative (Figure 4 illustrates this).

The interviews were conducted in three languages: Kalenjin, Kiswahili and English, depending on participant comfort. The younger participants tended to speak in a mix of languages, while the elders exclusively spoke in the Kalenjin language. The museum docents used a mix of English and Kiswahili in their interviews.

Alongside the interviews, we observed community interaction on social media to have a deeper understanding of the role that location plays in the seeking and narration of IK online. Facebook Pages are managed by administrators whose posts appear on the main feed. Page followers can interact with the administrator(s) posts, while their own posts appear in a separate–mostly out-of-view page.

Using the Facebook built-in search filter, we used various keywords relating to the Kalenjin culture–including the "Kalenjin" keyword. We manually examined the results and included public Pages and Groups that are predominantly involved in the discussion about the Kalenjin culture. To begin the analysis and Facebook conversations from Pages, we sought permissions from the Page administrators and include the six that assented. In our Facebook observations, we particularly focused on examining what IK was shared, how it was shared, what was sought–and especially focusing on the discussion on location.

Analysis

We transcribed and translated most of the participant interviews alongside posts from Facebook. Out of respect, we did not transcribe any of the participant discussion regarding sacred knowledge and sacred spaces. We also took photographs and kept notes of our observations. We then performed an iterative thematic analysis [39]: first the authors and four other researchers coded the transcripts. The first author then led a second session using axial coding to elicit themes from the codes with consensus meanings.

Themes from the second session consisted: landmarks, context-specific IK, sacred spaces and trail knowledge. We considered (1) How the IK specifics are still preserved, if at all, (2) the effort of the community both online and offline to interact with it, and (3) the implications on research and technology in preserving and narrating these specific type of indigenous knowledge.

4 FINDINGS

Location-Specific Indigenous Knowledge

The Kalenjin community pass their history through oral narratives. Indigenous Knowledge (IK) that are dependent on locations mostly revolve around prominent features: for example hills, rivers, and waterfalls are still preserved and understood by community members to this day. Less understood, are the IK associated with old routes that were converted into formal roads–especially cross-roads that are considered sacred.

When the Kalenjin community were restricted to "reserves" during the colonial period, the knowledge of important but non-prominent locations also started disappearing. The lost locations are a source of conflicting narratives depending on the sub-group and how the IK was passed down through generations. An example of contested location-based IK surrounds the reason why two subgroups of the Kalenjin, namely the Nandi and the Tugen, only have seven of the eight cyclical age-sets.

We first asked the divers about their knowledge of the IK associated with the Kerio river (Figure 2). The IK associated with it showcases the contested nature of the IK.

> *"From what I was told, there was a war, and the Keiyo drove all the men in the Maina age-set of the Tugen to the Kerio river so that most of them drowned. So the elders cursed that age-set and was struck off. – P10*

But when we asked the rest of the participants, they had different IK regarding the missing age-sets.

Figure 3: Three museums that we visited: the National Museum of Western Kenya (also known as the Kitale Museum) located in Kitale town (left), Tambach Museum (middle) located in Tambach town, and Kabarnet Museum (right) located in Kabarnet Kenya. We interviewed the docent for Kitale and Kabarnet Museum, and the curator/docent at Tambach Museum.

> *"No, it is the Nandi who lost the Korongoro age-set due to war [with the Maasai] – out of grief, the elders struck that age-set from the cycle. The Tugen's Maina [age-set] was struck off because they were notorious, so the elders punished them by [redacted], and then placed the curse on that age-set itself." – P4*

After having the two versions during their interview, P2 agreed with P4's version regarding the missing *Maina* age-set. They contextualized their answer by narrating their observations:

> *"I heard my grandmother cursing the [age-set] 'may I never see one from that age-set'–I believed because they were so bad and wouldn't listen, they had to be banished" – P2*

When observing community interaction on Facebook, we found that the members generally sought to identify the IK that was lost, so as to discuss whether and how to preserve this IK. This includes archaeological sites whose associated IK have mostly faded with time [40].

Context-Specific Indigenous Knowledge

When considering non-prominent locations, we found a greater engagement on Facebook towards identifying them and articulating their prominence to the community. Given a location, community members sought to ask living elders regarding the knowledge they possessed regarding those places, and/or other means of reverse-engineering to find the associated IK. The suggestions of important locations spanned geographical sites *"the logical place is Tulwap Ngetik at londiani"*: Tulwap Ngetik is known in IK as the place where the first Kipsigis sub-group performed their rite of passage. Suggestions also included places that have been replaced by formal roadways *"I think we should preserve Sach-Oran because this was a sacred place that was involved in cursing away conditions such as the epidemic"*. The location of Sach-Oran is at a crossroads: while still considered sacred, the knowledge of the roads that intersected at this space is knowledge that is disappearing with the elders.

Other suggestions showcased the decentralized nature of the Kalenjin: *"In all our counties, we Kapkoros (translated: worship) the altar of Kalenjins"* – "Kapkoros" also a term referring to a shrine. Contested discussions surrounded those that were against the selection and celebration of cultural sites as long as harm caused during the colonial period are not addressed *"As long as the [Seer who was captured by the British and died in exile] remains are still interred in the midst of strangers, there should be no celebration. He should be brought home [first]."*

A theme of IK that emerged given how people related to the location–in contextualizing their identity, fell under context-specific IK. This included how community members identified themselves.

> *"There are multiple clans with our name. But our clan originates from Morop" – P3*

Identity still remains layered. Community members identify themselves by their family names, clans, and then villages–although the latter is losing significance owing to technology and population growth.

> *"In those times, everybody knew each other by their villages: Kapterit [Borders Elgeiyo-Marakwet and Trans-Nzoia counties], Kapseniak and Kapkebei [currently found at the border of Uasin-Gishu and Elgeiyo-Marakwet counties]. But these days with the increased populations, they are no longer as efficient a way of life. So this way of life is slowly disappearing." – P8*

Ornaments would also be designed to fit the context-specific nature of practicing IK. For example, P7 when narrating leg bells described it thus:

> *"... these would be worn on feet so as to make as much noise as possible. It used to announce that there is a celebration planned. The ceremony-goers would sometime travel a great distance and these bells would announce them way ahead." – P7*

The interview participants had encounters with sacred spaces–mostly as children participants, or as observers.

Figure 4: Attendee asking a followup question to the elder participant.

> *"There was a sacred tree that the community will congregate underneath. They would bring offerings [...] But I am going to ask my mother about the details: that when there is a drought, the elders would go up to the [hill] taking with them a sheep with no blemishes that they would slaughter on the hill. When they descend back down, the rain would come." – P5*

There are locations that are still preserved, and still relevant in the cultural practices of the Kalenjin. These typically involves sacred rites.

> *"I have also witnessed a rain ceremony [...] there was a drought that year and so the grandmothers met and went (to the ceremony). No one else was allowed. They wore traditional clothes and the road was blocked so no one would follow them. They would create a sacred circle at a special place at the river bank where the water has dried up. Then they would do their thing."–P9*

Some location-specific but contextual IK remain a mystery. P1 remembers inheriting ornaments made of copper and cowrie shells from her own grandmother. Cowrie shells originated from the coast of Kenya (about 800 kms/500 mi away), and her community did not have the expertise to mine and refine copper. If the community bartered with others from the coast, then they would precede the formal trade routes that were observed in the mid-to-late 1800s and are preserved in books.

Transient Indigenous Knowledge

Transient IK involves the knowledge that relates to trail and old paths. It also encompasses travelling storytellers/bards/griots. Beyond trade routes, the Kalenjin passed on knowledge of safe passages across communities, and locations of important resources such as salt licks. Narration by community members about transient IK was the most fascinating, as they had stories of witnessing the elders in various years preferring to walk to their desired destination even when public transportation would be more convenient:

> *"My grand father-in-law would regularly walk from Plateau to our home (distance of roughly 30km/18miles), an easy day's walk for him. We always sent him transport, but he said it was a waste of good money. He kept regularly visiting us this way until he was over 100 years. He knew the way here through paths that we no longer know." – P5*

P1 had the most experience of walking long distances between spread out communities.

> *"I regularly had to travel between Kabarnet and Eldama Ravine (roughly 75km/46miles). It typically took me two long days. There were known compounds where you could safely spend the night." – P1*

These trusted waypoints were passed on from person to person. The waypoints were typically peoples homes that were willing to welcome visitors with food, water, and a place to spend the night. When this became regular, it was not unusual for regular travellers to bring milk or other gifts as thanks to their hosts. We could trace the IK regarding trusted waypoints–from people the first author knew who went to school then, and had to spend nights on the "road" until the 1950s when this practice became scarce.

When men from the community were conscripted to fight World War II for the British [20], two men from each village were required. But it was left to the community to determine who those two men would be. Beyond the community specification for the men to have first have been married with children (for continuity purposes), the elders would perform sacred rites to determine who to send.

> *"[My village] sent about 30 men. They had to walk from Kimwarer to Tambach (roughly 45km/28miles) where the interview was going to be held. It took them about a day's walk to get there." – P3*

Two men were selected to be trained and sent to war, the rest were allowed to return to their village. (There is also very little IK shared based on the returnees from war, although this is beyond the scope of this work). Asked how they knew of the way to Tambach, P3 elaborated:

> *"A lot of people had raided those communities, and others have travelled across. So they went with a guide who would show the way. After they came back, they would know the way to show others" – P3*

The longest distance traversed by foot was reported by P3 who claimed that he and others trekked from their village in

the Rift Valley region of Kenya to Butembo in the Democratic Republic of Congo (roughly 839km/520 miles) in the early 1950s. This path is an almost straight easterly direction that crosses through Uganda and the forested and dangerous Virunga region of the Congo. P3 Wouldn't divulge any more details on the reasons for their going this distance (and back). Neither would they divulge how long it took to complete the trek and the logistics of undertaking the journey.

5 DISCUSSION

In this section, we discuss the importance of considering location-specific IK. From our findings, we note that the three major reasons why location-specific IK is disappearing involves displacement, relevancy (for example population explosion rendering village boundaries useless), and secrecy – knowledge of sacred spaces and their use.

Some IK were "solemnly charged–not to be divulged on the pain of curse" [38]. Details of sacred rites have been collected and written by British officers–often with missing details and with context stripped [13]. The careless treatment of such ceremonies have led to a general distrust of community narratives that are rendered into written forms especially if this was done during colonial period, and without the sanction of elders and community members [32].

The Role of Social Media in Equalizing Participation

Previous work have identified the popularity [33] and accessibility of Facebook to those with the resources to do so [52]. Alongside these positive attributes, the nature of tools and development reliant on the social media having the tendency to amplify existing inequalities [41]. From our observation of Facebook interactions surrounding the Kalenjin culture, we find that the people who have the IK knowledge to share, tend to be those in the rural areas while the seekers tend to be those raised in urban areas (including the diaspora). There is an equality of sorts with respect accorded to those with the knowledge. The discussion on sacred location typically occurred in the Kalenjin dialect which made it easier for community members to discuss the details. But the use of the dialect also had an effect of discriminating against those who were not raised based on the language. This has been observed in other communities as an opportunity for equality in participation [49] – although as with echo chambers, language as currency have the possibility of fomenting ethnic tensions [27], amongst other ethical implications [16].

As a design recommendation, we propose a closer determination of how to empower community members to make use of the equality inherent in IK exchange, while at the same time equalizing participation with those community members lacking fluency in the language.

Figure 5: The *Sotet* an artifact used to store milk is an example of a "cultural wicked problem": elder community members of the community hold it as a sacred, but the younger members are ambivalent and may use it as ornamentation.

Shifting Indigenous Spaces

We found that changing times prescribes that some locations would lose significance. For example, because the rites of passage that used to be centralized has been decentralized, there is no longer any one significant location that all community members hold sacred: what one age-set in a subgroup considers important is not important to another age-set in the same subgroup [5].

Location-specific IK fading also introduces conflicting stories, which are considered as cultural wicked problems [35]. Cultural wicked problems reveal aspects of the culture regarding location that are at the threshold of change. We elaborated on the conflicting narrative on the missing age set in the Findings. Another of such wicked problem occur in how the elders in our group considered the sanctity of the *sotet*–an artifact primarily used in the storage of milk, while the younger generation appropriate the design of the *sotet* as a house decoration or to inspire cake designs (Figure 5).

The wicked problems being inflection points of shifting IK present valuable opportunities for researchers to understand how culture evolves as it is being handed over from one generation to the next. How the community negotiates the cultural wicked problems reveal their IK use, and IK need that can be further assisted with technology for dialog or for preservation of the IK that is dying–if the community members wish to do so.

Amplifying the Griot: Preserving Storytelling Agency

Griots are community members tasked with record keeping of community stories, songs and performance. The term originates from West Africa, and it is used to describe the high status accorded to those that the community members. The elders of the Kalenjin community were accorded the

respect "of elders who had knowledge of 'custom, discretion and substance"' [32].

Throughout this work, we have discussed the various roles that location play in the preservation of IK. Situated, transitory and in-between. Scholars have proposed lenses to consider the importance of these locations [3], and the respectful way to incorporate technology in these spaces, if appropriate [21]. We add to these works by recommending the use of elders as griots–the discriminating force to determine what can be shared, and what cannot. They can also ascribe the respectful space for the use of technology to preserve IK, together with the discussion regarding cultural wicked problems.

We see the community need for elder knowledge by how they interview the elders in their own community [31], alongside proposing and effectuating a formal professional-grade interview with famous elders in the entire Kalenjin community (known for their oratory, their art, and/or their politics) [2, 28]. This approach would meet the need of communities who are scattered, or who do not have a firm grasp of the community language. This would in turn guide how the museums preserve and interact with these IK – giving the community the agency to determine future directions.

Other Design Implications

We recommend the incorporation of other design applications in interacting with these spaces: the use tools and technologies by previous work [4] that is fine-tuned to consider the context and considering the depth that location consideration imbues on IK passage.

Researchers tend to focus primarily on IK that focuses on small-scale location (local contexts and houses) towards leveraging spatial understanding to mapping for example. But as we have outlined based on community-needs, we find that community-members seeking specific contextual knowledge would have greater impact in understanding relationships, charting history and understanding how their IK evolves.

6 CONCLUSION

In this work we considered how Indigenous Knowledge (IK) and the role that indigenous communities play in the preservation, use and dissemination especially using social media. We found that location play an important role in the safeguarding the IK, especially giving context and highlighting disappearing IK. We contribute by providing an understanding on how IK knowledge depends on location. We also provide insights on how community members seek location-specific IK and their importance in giving context to disappearing and forgotten IK. Finally we highlight the implications of considering location in the narration and preservation of IK together with the role of technology in the preservation.

REFERENCES

[1] Mustafa Ali. 2014. Towards a Decolonial Computing. (2014).

[2] Christopher Kipterer arap Meli. 2020. Nyigoonikab Kalenjin: Christopher Meli. https://www.youtube.com/watch?v=ILrbcSjH-P4.

[3] Kagonya Awori, Frank Vetere, and Wally Smith. 2015. Transnationalism, Indigenous Knowledge and Technology: Insights from the Kenyan Diaspora. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. Association for Computing Machinery, New York, NY, USA, 3759–3768. https://doi.org/10.1145/2702123.2702488

[4] Kagonya Awori, Frank Vetere, and Wally Smith. 2016. Sessions with Grandma: Fostering Indigenous Knowledge through Video Mediated Communication. In *Proceedings of the First African Conference on Human Computer Interaction (AfriCHI'16)*. Association for Computing Machinery, New York, NY, USA, 1–11. https://doi.org/10.1145/2998581.2998585

[5] Heike Behrend. 1985. The Crooked Paths of Time: The Concept of History Among the Tugen of Kenya. *Journal of the Anthropological Society of Oxford* 16, 3 (1985), 188–196.

[6] Nicola Bidwell and Dianna Hardy. 2009. Dilemmas in Situating Participation in Rural Ways of Saying *(OZCHI '09)*. Association for Computing Machinery, New York, NY, USA, 145–152. https://doi.org/10.1145/1738826.1738850

[7] Nicola J. Bidwell, Heike Winschiers-Theophilus, Gereon Koch Kapuire, and Mathias Rehm. 2011. Pushing personhood into place: Situating media in rural knowledge in Africa. *International Journal of Human-Computer Studies* 69, 10 (2011), 618 – 631. https://doi.org/10.1016/j.ijhcs.2011.02.002 Locative media and communities.

[8] Susie Cagle. 2019. 'Fire is Medicine': The Tribes Burning California Forests to Save Them. https://www.theguardian.com/us-news/2019/nov/21/wildfire-prescribed-burns-california-native-americans.

[9] Noga Collins-Kreiner and Nurit Kliot. 2017. Why Do People Hike? Hiking the Israel National Trail. *Tijdschrift voor economische en sociale geografie* 108, 5 (2017), 669–687.

[10] Lucas Cooper. 2014. *Returning from the Wild: Exploring Participant's Experiences of Re-entry from Extended Wilderness Trips.* Master's thesis. Brock University, St. Catherines, Ontario, Canada.

[11] Peter Gallert, Heike Winschiers-Theophilus, Gereon K. Kapuire, Colin Stanley, Daniel G. Cabrero, and Bobby Shabangu. 2016. Indigenous Knowledge for Wikipedia: A Case Study with an OvaHerero Community in Eastern Namibia. In *Proceedings of the First African Conference on Human Computer Interaction (AfriCHI'16)*. Association for Computing Machinery, New York, NY, USA, 155–159. https://doi.org/10.1145/2998581.2998600

[12] Thomas A Hale. 2007. *Griots and Griottes: Masters of Words and Music.* Indiana University Press, Bloomington, Indiana, United States.

[13] Alfred Claud Hollis. 1909. *The Nandi, their Language and Folk-Lore.* Clarendon Press, Oxford, United Kingdom.

[14] Lilly Irani, Janet Vertesi, Paul Dourish, Kavita Philip, and Rebecca E. Grinter. 2010. Postcolonial Computing: A Lens on Design and Development. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '10)*. ACM, New York, NY, USA, 1311–1320. https://doi.org/10.1145/1753326.1753522

[15] Kasper L. Jensen, Heike Winschiers-Theophilus, and Kasper Rodil. 2012. Tapping into Local Lore: Toward Scalable Local Mapping and Tagging for Rural Africa Using Mobile Devices. In *Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design (NordiCHI '12)*. Association for Computing Machinery, New York, NY, USA, 631âĂŞ634. https://doi.org/10.1145/2399016.2399112

[16] Nobert Jere, Ndahafa Mungonena, and Anicia Peters. 2016. Social Media Usage in Africa and Its Ethical Implications *(AfriCHI'16)*. Association for Computing Machinery, New York, NY, USA, 263–266. https://doi.org/10.1145/2998581.2998617

[17] Gereon Koch Kapuire, Daniel G. Cabrero, Colin Stanley, and Heike Winschiers-Theophilus. 2015. Framing Technology Design in Ubuntu: Two Locales in Pastoral Namibia. In *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction (OzCHI '15)*. Association for Computing Machinery, New York, NY, USA, 212–216. https://doi.org/10.1145/2838739.2838788

[18] J.U. Kavari and Laura E. Bleckmann. 2009. *Otjiherero Praises of Places*. Springer New York, New York, NY, 473–500. https://doi.org/10.1007/978-0-387-78682-7_18

[19] Charles E. Kay. 1998. Are Ecosystems Structured from the Top-Down or Bottom-Up: A New Look at an Old Debate. *Wildlife Society Bulletin (1973-2006)* 26, 3 (1998), 484–498. http://www.jstor.org/stable/3783761

[20] David Killingray and Martin Plaut. 2012. *Fighting for Britain: African Soldiers in the Second World War*. Boydell & Brewer Ltd, Rochester, NY, USA.

[21] Lindah Kotut, Neelma Bhatti, Morva Saaty, Derek Haqq, Timothy L. Stelter, and D. Scott McCrickard. 2020. Clash of Times: Respectful Technology Space for Integrating Community Stories in Intangible Exhibits. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–13. https://doi.org/10.1145/3313831.3376354

[22] Lindah Kotut, Ann Hoang, Jennifer Shenk, Havisha Panda, and D. Scott McCrickard. 2018. Technology at the Museum: The Missing Voice. In *Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities (AfriCHI '18)*. ACM, New York, NY, USA, Article 20, 5 pages. https://doi.org/10.1145/3283458.3283491

[23] Lindah Kotut, Michael Horning, Timothy L. Stelter, and D. Scott McCrickard. 2020. Preparing for the Unexpected: Community Framework for Social Media Use and Social Support by Trail Thru-Hikers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '20)*. ACM, New York, NY, USA. https://doi.org/10.1145/3313831.3376391

[24] Lindah Kotut and D Scott McCrickard. 2020. Amplifying the Griot: Design Fiction for Development as an Inclusivity Lens. *EasyChair Preprint* (2020).

[25] Mrrtle S. Langley. 1979. *The Nandi of Kenya: Life Crisis Rituals in a Period of Change*. C. Hurst & Co., London, United Kingdom.

[26] Zhicong Lu, Michelle Annett, Mingming Fan, and Daniel Wigdor. 2019. "I Feel It is My Responsibility to Stream": Streaming and Engaging with Intangible Cultural Heritage Through Livestreaming. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. ACM, New York, NY, USA, Article 229, 14 pages. https://doi.org/10.1145/3290605.3300459

[27] Gabrielle Lynch. 2011. *I Say to You: Ethnic Politics and the Kalenjin in Kenya*. University of Chicago Press, Chicago, Illinois, USA.

[28] Jesse Kibet Arap Mais. 2020. Nyigoonikab Kalenjin: Christopher Meli. https://www.youtube.com/watch?v=czv5bkkARSU.

[29] Joseph Kipchirchir Maiyo. 2019. *Local Native Councils and the Development of Western Education Among the Nandi of Kenya*. Master's thesis. Mount Kenya University, Thika, Kenya.

[30] Muthoni Masinde. 2014. An Effective Drought Early Warning System for Sub-Saharan Africa: Integrating Modern and Indigenous Approaches. In *Proceedings of the Southern African Institute for Computer Scientist and Information Technologists Annual Conference 2014 on SAICSIT 2014 Empowered by Technology (SAICSIT '14)*. Association for Computing Machinery, New York, NY, USA, 60–69. https://doi.org/10.1145/2664591.2664629

[31] Konte News. 2019. Tulwap Kipsigis: A Kalenjin Dispersal Point as Described by Mzee Joseph Koskei. https://www.youtube.com/watch?v=7SJql-7NbWA.

[32] Bethwell A Ogot, CE Ehret, JEG Sutton, and WR Ochieng. 1976. *Kenya Before 1900*. East African Publishing House, Nairobi, Kenya.

[33] Anicia N. Peters, Heike Winschiers-Theophilus, and Brian E. Mennecke. 2015. Cultural Influences on Facebook Practices. *Comput. Hum. Behav.* 49, C (Aug. 2015), 259–271. https://doi.org/10.1016/j.chb.2015.02.065

[34] Katie Prescott, Sarah Treanor, and BBC World Service. 2020. The Documentary: Unmapped World. https://www.bbc.co.uk/mediacentre/proginfo/2020/27/the-documentary.

[35] Norman W. Sheehan. 2011. Indigenous Knowledge and Respectful Design: An Evidence-Based Approach. *Design Issues* 27, 4 (2011), 68–80. http://www.jstor.org/stable/41261957

[36] Milo Marsfeldt Skovfoged, Martin Viktor, Miroslav Kalinov Sokolov, Anders Hansen, Helene Høgh Nielsen, and Kasper Rodil. 2018. The Tales of the Tokoloshe: Safeguarding Intangible Cultural Heritage Using Virtual Reality. In *Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities (AfriCHI '18)*. ACM, New York, NY, USA, Article 66, 4 pages. https://doi.org/10.1145/3283458.3283484

[37] Andrew Cyrus Smith and Nomusa Dlodlo. 2018. Preserving the Ndebele Dress Code through the Internet of Things Technologies. In *Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities (AfriCHI '18)*. Association for Computing Machinery, New York, NY, USA, Article 23, 4 pages. https://doi.org/10.1145/3283458.3283469

[38] Geoffrey Stuart Snell. 1954. *Nandi Customary Law*. Macmillan, London, UK.

[39] Anselm Strauss and Juliet Corbin. 1994. Grounded Theory Methodology. *Handbook of Qualitative Research* 17 (1994), 273–85.

[40] John EG Sutton. 1987. Hyrax Hill and the Sirikwa: new excavations on Site II. *AZANIA: Journal of the British Institute in Eastern Africa* 22, 1 (1987), 1–36.

[41] Kentaro Toyama. 2011. Technology As Amplifier in International Development. In *Proceedings of the 2011 iConference (iConference '11)*. ACM, New York, NY, USA, 75–82. https://doi.org/10.1145/1940761.1940772

[42] UNESCO. 2013. Intangible cultural heritage: A force for sustainable development. http://www.unesco.org/new/en/media-services/in-focus-articles/intangible-cultural-heritage-for-sustainable-development/.

[43] UNESCO. 2015. Ethical Principles for Safeguarding Intangible Cultural Heritage. https://ich.unesco.org/en/Decisions/10.COM/15.a.

[44] UNESCO. 2017. Local Knowledge, Global Goals. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/ILK_ex_publication_E.pdf.

[45] UNESCO. 2020. Vanuatu's traditional architecture makes a community more resilient in the face of climate change-related disasters. https://en.unesco.org/news/vanuatus-traditional-architecture-makes-community-more-resilient-face-climate-cha

[46] UNESCO and Hampaté Bâ. 2003. The intangible heritage (Archived). https://web.archive.org/web/20030817054300/http://mirror-us.unesco.org/culture/heritage/intangible/html_eng/index_en.shtml.

[47] Maja Van der Velden. 2013. Decentering Design: Wikipedia and Indigenous Knowledge. *International Journal of Human-Computer Interaction* 29, 4 (2013), 308–316.

[48] Helen Verran, Michael Christie, Bryce Anbins-King, Trevor Van Weeren, and Wulumdhuna Yunupingu. 2007. Designing digital knowledge management tools with Aboriginal Australians. *Digital Creativity* 18, 3 (2007), 129–142. https://doi.org/10.1080/14626260701531944

[49] Elizabeth Warrick, Jennifer Preece, Jedidah Kibutu, and Ben Sihanya. 2016. Social Media as an Indigenized Information World For Environmental Stewardship. In *Proceedings of the First African Conference on Human Computer Interaction (AfriCHI'16)*. Association for Computing Machinery, New York, NY, USA, 126–137. https://doi.org/10.1145/2998581.2998587

[50] Heike Winschiers-Theophilus, Nicola J. Bidwell, Shilumbe Chivuno-Kuria, and Gereon Koch Kapuire. 2010. Determining Requirements within an Indigenous Knowledge System of African Rural Communities. In *Proceedings of the 2010 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT '10)*. Association for Computing Machinery, New York, NY, USA, 332–340. https://doi.org/10.1145/1899503.1899540

[51] Heike Winschiers-Theophilus, Shilumbe Chivuno-Kuria, Gereon Koch Kapuire, Nicola J. Bidwell, and Edwin Blake. 2010. Being Participated: A Community Approach. In *Proceedings of the 11th Biennial Participatory Design Conference (PDC '10)*. Association for Computing Machinery, New York, NY, USA, 1–10. https://doi.org/10.1145/1900441.1900443

[52] Susan P. Wyche, Sarita Yardi Schoenebeck, and Andrea Forte. 2013. "Facebook is a Luxury": An Exploratory Study of Social Media Use in Rural Kenya. In *Proceedings of the 2013 Conference on Computer Supported Cooperative Work (CSCW '13)*. Association for Computing Machinery, New York, NY, USA, 33–44. https://doi.org/10.1145/2441776.2441783

[53] Dingqi Yang, Daqing Zhang, and Bingqing Qu. 2016. Participatory Cultural Mapping Based on Collective Behavior Data in Location-Based Social Networks. *ACM Trans. Intell. Syst. Technol.* 7, 3, Article 30 (Jan. 2016), 23 pages. https://doi.org/10.1145/2814575