AFRICAN INDIGENOUS KNOWLEDGE SYSTEMS - 1

The late Jan van der Westhuizen,
≠Khomani medicine man *@ N. Crawhall*

Assessing and Certifying Indigenous Tracking Expertise and Skills

Prepared for UNESCO by Louis Liebenberg et al, Indigenous Peoples of Africa Coordinating Committee

September 2021

About the paper:

This paper has been commissioned by the UNESCO Local and Indigenous Knowledge Systems (LINKS) section within the UNESCO Natural Sciences Sector.

The main author, Louis Liebenberg is a renowned specialist in wildlife tracking, tracker training and certification, and the inventor of Cybertracker geo-referenced technology. He has worked with the Indigenous Peoples of Africa Coordinating Committee (IPACC) as well as with indigenous peoples in the Kalahari and Central Africa.

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Cooperation with knowledge holders was done with Free Prior and Informed Consent.

This paper is part of a series of commissioned works on indigenous knowledge systems and sustainable development. These may be found at: https://en.unesco.org/links.

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Author'sAcknowledgement

This paper is the collective work of Louis Liebenberg, Nxjouklau Kashe, ǀUase Xhukwe, ǀUi Gǀaq'o, ǀUi ǀKunta, ≠Oma Daqm, Dam Debe, Jan Kirrie, Omakai Kruiper and Klaas Kruiper.

Acknowledgement to the wisdom of the late !Nam!kabe Molote, !Nate Brahman, Horekhwe (Karoha) Langwane, Wilson Masia, Karel Kleinman, ǀUi ǀUkxa, Dabe Dahm and ǀKun ǁXari.

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Assessing and Certifying Indigenous Tracking Expertise and Skills

Foreword

In the past decade, there has been a substantial shift in both the United Nations and the environmental conservation sector toward giving greater recognition and respect to the knowledge systems of indigenous peoples. For two decades, the UNESCO Local and Indigenous Knowledge Systems programme has contributed to the promotion of indigenous peoples' participation in the UN system and supporting their advocacy for greater understanding of their knowledge, systems of transmission, their values, practices, beliefs, languages and ways of understanding the world.

Major global platforms are currently upgrading their understanding of indigenous knowledge and the participation of knowledge holders in knowledge production, scientific assessment, and eventually in shaping decision-making and policies at different scales. The Intergovernmental Science Policy Platform on Biodiversity and Ecosystems Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) are systematically including indigenous and local knowledge in assessments. The UN Framework Convention on Climate Change has created the Local Communities and Indigenous Knowledge Platform and the UN Convention on Biological Diversity, building on Articles 8j and 10c, plus a decade of cooperation with UNESCO, is negotiating the place of indigenous people and indigenous knowledge in the post-2020 Global Biodiversity Framework.

A challenging area of the interface of formal science and indigenous knowledge systems revolves around evidence, data and validation of knowledge. Scientific method is based on the principle of independent verification and validation of the findings of others in their system. Indigenous knowledge is produced *in situ* for different purposes than science, through different means and by different institutions. Indigenous knowledge is part of a social and cultural system that goes beyond the modalities of science and is an inherent part of daily life. Given the colonial history of marginalisation of indigenous peoples and a legacy of European knowledge systems being considered superior to others, there is a reluctance by many indigenous peoples to offer up their observations and analyses to another set of practitioners in the context of highly unequal power relations.

Liebenberg has been one of the advocates for recognising the similarities between indigenous knowledge of biodiversity and complementary aspects of Western science. Indigenous peoples deal with observable facts, have highly developed understanding, analytical capacity and discernment about animal behaviour, tracks and traces, and this body of knowledge is passed from generation to generation through didactic methods, that involve precision, accuracy and verification within the parameters of their own systems.

As scientists begin to recognise the importance of multiple evidence-based approaches to research, scenarios, modelling and assessments, there is an opportunity that the historical discrimination experienced by indigenous peoples may start to wane. This could, if fully implemented, address the exclusion of indigenous peoples from formal employment and

remunerated roles in wildlife conservation, as well as transform their role in decision-making and natural resource governance. Today, very few indigenous peoples in Africa are able to be formally employed in protected areas and wildlife conservation, as they do not have requisite qualifications from schooling, despite often having highly developed knowledge of biodiversity, ecosystem functions, weather and climate change.

In this article, Liebenberg, drawing on his decades of working with highly skilled San trackers, discusses and describes his experience of working with indigenous peoples to create a standardised and credible system of assessing knowledge of wildlife tracking and trailing, and evolving this into a system of certification that has international validity.

For UNESCO, this is an opportunity to create dialogue about diverse knowledge systems, explore how different indigenous peoples are dealing with their interface with science, and promoting options which can both address historical discrimination and provide new opportunities for sustaining indigenous knowledge with greater scope for application inside and outside the wage economy.

Nigel Crawhall, Chief of Section, LINKS

08 November 2021

Objectives

The objectives of the Indigenous Tracker Certification include the recognition of indigenous knowledge and the promotion of the cultural, social and economic benefits of the art of tracking. The employment of trackers also helps to retain indigenous skills that may otherwise be lost in the near future.

In a traditional hunter-gatherer context, the success (or failure) of hunts acted as a test of trackers' skills. As hunter-gatherer communities transition to a mixed cash economy and spend less time hunting, their tracking skills are being lost. To compensate for this culture change, tracker certification and potential employment opportunities provide not only an objective test of their skills, but also an incentive to revitalize and sustain their tracking skills into the future. Employment opportunities that require high levels of tracking skills, equivalent to that required for traditional hunting, include scientific research and wildlife monitoring in biodiversity conservation.

The *Community Indigenous Tracker Certification* provide guidelines that will empower indigenous communities to develop their own tracker certification system. A community of trackers may choose to maintain their own independent tracker certification.

Some communities may choose to adopt the *CyberTracker Indigenous Tracker Certification* standards currently adopted by indigenous Kalahari San trackers in order to develop a consistent international standard for indigenous trackers.

The objective of the *Community Indigenous Tracker Certification* is to revitalize and stimulate the growth of practical tracking skills and expertise within a community. Following

the formal certification process outlined in this paper will: (1) *Identify the best trackers* within a community and (2) Provide an effective *training tool* that will increase tracking skills over time. We acknowledge that since this process is applied at the local community level, standards may be inconsistent with those of other communities. The emphasis is on critical discussion, peer review within the community and scientific reasoning.

The objective of the *CyberTracker Indigenous Tracker Certification* is to maintain *consistent certification standards* across different communities. The emphasis is on critical discussion, peer review, scientific reasoning and regular *External CyberTracker Evaluations* to maintain standards. These are the evaluation standards that have been and continue to be practiced wherever CyberTracker is active in different parts of the world.

Why We Need Tracker Certification

The world is experiencing a period of rapid environmental change linked to habitat change, pollution, and climate change. Monitoring biodiversity is critical for effective conservation management. However, there are too few professional ecologists to deal with the scale of environmental challenges. Furthermore, global biodiversity conservation is seriously challenged by gaps in the geographical coverage of existing information. Locally based monitoring is particularly important in developing countries, where it can empower local communities to manage their natural resources while simultaneously gathering data needed to fill these gaps. Trackers can play a critical role in preventing poaching of endangered species such as rhino, elephant, tigers and pangolins. Trackers can also be of great value for monitoring rare and endangered species. The case studies discussed in the attached paper (Liebenberg, et al 2017) demonstrates the value of employing trackers using smartphones in large-scale, long-term monitoring of ecosystems for conservation management.

Over the last thirty years indigenous tracking skills in southern Africa have been lost at an alarming rate. About 90% of the Kalahari San Elder Trackers have passed away, their knowledge and skills irretrievably lost. Meanwhile, the younger generations lacked incentive to become expert trackers. Among hunter-gathers, bow-and-arrow and persistence hunting have been abandoned as the use of dogs and horses were introduced. This has resulted in a decline in tracking skills.

In some parts of the world, indigenous tracking skills may have been retained, but in other parts it may have been completely lost. In order to *stimulate the growth* of the tracker community, we need to introduce community tracker certificates where the emphasis will be on *identifying the best trackers* within a community and the *learning process* to develop the skills of the younger generation.

The CyberTracker Tracker Certification system has proved to be a very efficient *training tool*. In national parks and in the ecotourism industry there has been an increasing need to *certify* the field skills of rangers and trackers. Rangers are used to gather data for monitoring wildlife and it is important to validate that the data they gather is accurate. Expert trackers can give valuable assistance to researchers studying animal behavior. The employment of trackers in scientific research requires the highest level of tracking expertise. Tracker certificates provide a validation tool for data collected by trackers, by providing an objective test of *observer reliability*.

The art of tracking should therefore be recognized as a specialized profession. In order to develop the art of tracking as a modern profession, very high standards of certification need to be maintained. During evaluations, trackers are graded in order to determine their level of expertise, so that they can be promoted for different roles, contributions, and salaries. This provides an incentive for trackers to develop their skills and strive towards the highest levels of excellence.

The guidelines in this paper are based on 25 years of experience in developing the CyberTracker Tracker Certification. The CyberTracker Tracker Certification was originally developed to recognize the indigenous tracking skills of Shangaan and Kalahari San trackers. However, a distinction is made between *Community Indigenous Tracker Certification* and the *CyberTracker Indigenous Tracker Certification*.

The *Community Indigenous Tracker Certification* empowers Indigenous trackers to issue their own tracker certificates. The *CyberTracker Indigenous Tracker Certification* maintains the standards defined by the CyberTracker Certification Standards Committee and is described in a separate document.

The interface between scientific norms and indigenous knowledge approaches to accuracy and validation

Understanding and perceptions of indigenous knowledge varies within indigenous communities as well as amongst natural scientists, anthropologists and sociologists. This paper will make a clear distinction between evidence-based scientific knowledge and beliefs, including "ways of knowing" which may be at variance with an evidence-based science.

For example, within the Kalahari San communities, some individuals have a more spiritual approach and believe in traditional mythologies that explain nature and the Universe. However, some indigenous Kalahari San trackers make a clear distinction between myths and religious/spiritual beliefs, on the one hand, and knowledge based on empirical evidence, on the other. Some express scepticism about the stories of the Old People (the original humans when all animals were believed to be human), saying that they tested these stories and think that the stories of the Old People are not true. For example, elder tracker !Namka of Bere in the central Kalahari, who related story of the sun cycles, where a shoulder blade of the sun/eland is believed to be thrown from the west to the east, where it grows into a new sun in the morning. It is said that if you listen you can sometimes hear the swishing noise as the shoulder blade flies through the air. !Namka concluded that he has never heard this swishing noise and therefore does not believe that the story of the Old People is true (Liebenberg, 2013).

Some anthropologists use the term "ways of knowing" to refer to indigenous beliefs that are not evidence-based, and maintain that these beliefs have the same status as Western science and that Western science is just another belief system. Spiritual beliefs in one culture should not be compared to evidence-based science in another culture. Rather, spiritual beliefs in one culture should be compared to the spiritual beliefs in another culture, while evidence-based science in the first culture should be compared to evidence-based science in the second culture. For example, this paper maintains that a distinction should be made between indigenous spiritual beliefs that are equivalent to European religious and spiritual beliefs, one

the one hand, and evidence-based indigenous knowledge that are equivalent to Western science, on the other.

The art of tracking involves scientific reasoning (Liebenberg, 1990 and 2013). Similar elements of knowledge are commensurable across societies. Furthermore, in contemporary times, Indigenous communities have been involved in scientific research as well as biodiversity and environmental monitoring in as far afield as the Kalahari in Africa (Stander et al. 1997; Liebenberg et al. 2017; Keeping et al. 2018), the Arctic (Danielsen et al. 2014; Johnson et al. 2015), and Australia (Ansell and Koening 2011; Ens 2012), to name but a few examples

Within the Kalahari, Master Trackers from Lone Tree in the central Kalahari are acting as external evaluators for trackers from Zutshwa in south-western Kalahari in Botswana. In future, exchange programmes amongst the Ju|'hoansi San trackers from the Nyae Nyae Conservancy in Namibia, the !Xõó and |Gwi San trackers from Lone Tree in Botswana and the ≠Khomani San trackers in South Africa will help to set standards across the Kalahari in southern Africa.

Exchange of knowledge also occur between scientists and indigenous trackers in conducting scientific research and animal track surveys. The tracker certification is a critical component in ensuring high standards are maintained for scientific track surveys.

Modern Indigenous Culture

There is a Eurocentric perception that indigenous knowledge is static and exists out of time or experience. Indigenous knowledge, like all other knowledge systems, is creative and involves innovation. It is constantly being revised, transformed and developed to adapt to changing circumstances.

For example, the Kalahari San have adopted the CyberTracker name as their own, taking ownership of it in a way that is very important to them. The tracker certification system was developed within the context of employing indigenous Kalahari trackers to conduct scientific monitoring and surveys, using the CyberTracker software for smartphones. The CyberTracker Tracker certification was developed to ensure observer reliability of trackers who capture data based on tracks and signs.

It is no longer viable for the Kalahari San to subsist primarily as hunter-gatherers, due to encroachment of cattle farming and the fact that they lost most of their land due to colonialism. In Botswana indigenous hunting was banned for a number of years. Many of these communities need economic development that will create sustainable employment opportunities.

For more than half a century San have moved away from a primarily hunter-gatherer subsistence towards a mixed economy. Their mixed economy includes hunting, plant food gathering, farming with cattle, goats, vegetable gardens, and doing part-time work for cash income. Throughout history, indigenous cultures have adopted artifacts and technologies from other cultures when it was to their own advantage. For example, horses were introduced to North America by Spanish colonialists, after which native American hunter-gatherers

adopted horses, in the same way that horses and dogs were adopted by the Kalahari San for hunting since the 1960's. Kalahari San arrow points have been made from European fencing wire since it was introduced by European farmers more than a century ago.

The Kalahari San are modern people with modern aspirations. They have adopted western clothes. Their children go to school to prepare them for modern employment opportunities. They use smartphones and social media. What is invaluable is their intangible cultural heritage in the form of their indigenous knowledge and expertise, such as the art of tracking, their knowledge of plants, how to hunt with bow-and-arrow, how to make fire, how to construct a grass hut... these are valuable aspects of their culture which they still practise within a mixed economy.

In 1990 !Nate Brahman, who is depicted in the CyberTracker logo, told co-author Liebenberg that they are struggling to survive as hunter-gatherers and asked him to help them create jobs for trackers. They have had lengthy discussions around the fire over many years and this has been the primary focus of CyberTracker.

What we are trying to promote is a form of modern indigenous culture that combines the best of traditional indigenous knowledge and skills with modern skills and technology, including the use of the CyberTracker software to gather scientific data and the CyberTracker Tracker Certification in order to create new employment opportunities. In principle, from an indigenous cultural point of view, there is no difference between the Kalahari San adopting European fencing wire for arrow points more than a century ago and adopting modern smartphones using the CyberTracker software.

Pierre du Plessis, who wrote *Tracking Knowledge: Science, Tracking, and Technology* on the CyberTracker project in the Kalahari, found that the Kalahari San takes great pride in knowing that they played an important role in the development of the CyberTracker software and the vital role of their tracking expertise, and that they took ownership of the CyberTracker name as their own. Throughout the Kalahari, the "CyberTrackers" are known and highly regarded within their own communities.

Du Plessis writes: "!Nate and Karoha were key players in the creation of CyberTracker. Louis Liebenberg's ideas about developing CyberTracker came about through his work with !Nate and Karoha while researching the depth of tracking knowledge in the Kalahari. The two, especially Karoha, also played an integral role in its pilot testing. This is tremendously important to the trackers and has major implications in the way that they have incorporated this technology into their lives, to the extent that they have come to consider themselves 'CyberTrackers'.

!Nate's account speak to the ways that he views the technology as representative of the interest and value people have in his knowledge: "Louis came to me! He was looking for someone who knows how to track. He wanted me to work with him to so he could make CyberTracker. He found me at Lone Tree, and he learned that I am the chasing guy for the kudus (persistence hunting). He said, "I want you to teach me how to chase the kudu, and give me the knowledge of the tracks for all of the animals." So I worked with him and then Louis said he's going to make this computer, the CyberTracker, with the knowledge of my father, of my mother, of my mother's mother's mother. They are going to be the knowledge of my uncles! That is how he made CyberTracker.

Du Plessis continues: "One of the key points reiterated here is that Louis Liebenberg came to !Nate. This allowed !Nate to assume the position of Louis's teacher. !Nate takes pride in this and is quick to mention it when discussing CyberTracker. The work that they did together led to the development of a technology that utilizes !Nate's knowledge, while also recognizing that of his ancestors. The knowledge trails of his predecessors are present in the very existence of CyberTracker. Though he has had relatively little interaction with computers, he now has computer software designed specifically for his knowledge that is often regarded as an extension of himself (remember !Nate referring to his 'knowledge' as his 'CyberTracker'). CyberTracker owes its very existence to the world of tracking and, to a degree, has been embraced by the trackers as such. During my fieldwork it was immediately evident that all of the trackers take pride in calling themselves 'CyberTrackers'.

In contrast to the misleading stereotypes perpetuated by the Eurocentric "Living Museum" projects, The Old Way project is promoting the Kalahari San in a modern context to provide a more authentic experience to visitors. The objective is to create employment opportunities and generate income by combining the best aspects of their indigenous culture with modern science and technology.

Within this context of a modern indigenous culture, tracker certification will incentivise young members of the community to improve their tracking skills. Tracker certification provide an economic opportunity when visitors from Europe and the USA come to earn tracker certificates issued by indigenous Kalahari San Master Trackers. Tracker certification also provides opportunities to be employed by researchers and government conservation agencies to monitor and survey wildlife, as well as doing research on animal behaviour.

Challenges and opportunities, lessons learned, and the potential for upscaling.

One of the greatest challenges is funding to support tracker training and certification. Communities living in extreme poverty find it difficult to devote the time needed when they are forced to find other means of earning a basic subsistence. Many communities can no longer support themselves as hunter-gatherers, due to restricted land rights and diminished wildlife. They therefore depend on a mixed economy that requires them to seek various forms of casual employment for cash income.

With climate change becoming an urgent problem, a renewed interest in biodiversity conservation provides opportunities for indigenous communities to be employed in scientific research and wildlife monitoring. In addition, the increase in interest in practical tracking skills in USA and Europe provide an opportunity for indigenous trackers to provide learning opportunities for visitors from abroad. Rewilding and traditional skills are gaining in popularity in some parts of Europe and the USA, providing a potential market for indigenous trackers to provide tracker training. The Tracking School at Klein Dobe, Nyae Nyae, demonstrate the potential for income generation.

Over the years, setbacks and lessons learned include: (1) Setbacks due to lack of sustainable funding. New business models for funding needs to be explored to sustain employment of trackers in the long term. (2) Setbacks due to key individuals who passed away, making projects vulnerable if they become too dependent on key individuals. It is important to

establish a core group of trackers who can sustain tracking skills as an interacting community who can share their knowledge across large regions as well as over time. (3) Dependence on key facilitators make programmes vulnerable if these facilitators are no longer available. There is a need to put in place a resilient process that can be sustained even if setbacks occur.

Remote financial support of trackers that became necessary during the Covid-19 pandemic have demonstrated the potential for upscaling indigenous tracker programmes. This required greater reliance on leadership within communities and less reliance on outside consultants and field workers. This not only empowers communities to manage their own affairs, but in the long term may prove to be more cost-effective and provide greater direct economic benefits to communities.

Community Indigenous Tracker Certification and CyberTracker Tracker Certification

CyberTracker Conservation is a non-profit organisation that maintains the CyberTracker Tracker Certification Standards. This includes the CyberTracker Indigenous Tracker Certification, which at present has been adopted by Indigenous Kalahari San trackers in Namibia, Botswana and South Africa, and the CyberTracker Universal Tracker Certification, which applies to anyone regardless of cultural background. The Universal Tracker Certification has been adopted internationally in a number of countries in southern Africa, north America and Europe. The CyberTracker Certification Standards Committee is responsible for maintaining international certification standards.

While the Kalahari San adopted and participated in the development of the CyberTracker peer review system of maintaining standards, some indigenous communities may choose to initiate their own tracker training and certification system. Furthermore, there are currently not enough CyberTracker External Evaluators to facilitate tracker certification in all indigenous communities worldwide. We therefore need to introduce guidelines that can be adopted by all indigenous communities, regardless of whether they chose to become part of the CyberTracker network.

The objective of the Indigenous Tracker Certification is to empower Indigenous communities to develop their own tracker certification system. A community of trackers may choose to maintain their own Community Indigenous Tracker certification independent of the established CyberTracker certification. Or they may at some point choose to adopt the CyberTracker Indigenous Tracker Certification standards. Or a community may choose to maintain their own tribal tracker certification, while some individual trackers within the tribe may obtain a CyberTracker Indigenous Tracker certificate or even a CyberTracker Universal Tracker certificate. This may help to introduce a cross-fertilisation of tracker expertise that may enrich the broader tracker community.

Community Indigenous Tracker Certificates

Objectives: The Community Indigenous Tracker Certificates is essentially a *training tool* and a *method to identify the best trackers within a community*, following the *formal Evaluation Process.* Since some communities may initiate their own tracker certification, it

may not follow standards that are consistent with those of other communities.

The Community Indigenous Tracker Certificates will be used: (1) To introduce tracker certification into indigenous communities where there is no formal tracker certification available to maintain or set up consistent standards. (2) As an assessment tool to identify the best trackers within a community. The best trackers can then choose to participate in the standardized CyberTracker Certification where available. (3) As a training tool to increase tracking skills over time.

Standards: Community Indigenous Tracker Certificates may be awarded following the *formal certification process* set out by this paper. The emphasis is on critical discussion, peer review and scientific reasoning. As long as the Community Indigenous Tracker Certification follow the prescribed protocols and *process*, they should eventually reach the same standards as the CyberTracker Indigenous Tracker Certificates. From time to time, depending on progress and available financial resources, a community may, (if they choose to), invite a certified CyberTracker External Evaluator to assess progress made.

Evaluators: The Evaluator may be an Elder Tracker nominated by the community. The Elder Tracker may be the most experienced indigenous hunter who still actively hunt using indigenous hunting methods, or may be the most experienced tracker as recognized by the community.

Modules

The Community Indigenous Tracker Certification consists of two parallel sets of modules for Track & Sign Interpretation and Trailing.

Tracker Level (I) require both Track & Sign Level (I) and Trailing Level (I).
Tracker Level (II) requires both Track & Sign Level (II) and Trailing Level (II).
Tracker Level (III) requires both Track & Sign Level (III) and Trailing Level (III).

The highest level awarded is the Indigenous Elder Tracker Certificate.

Track & Sign Interpretation Evaluation

Definitions of Points Awarded for Tracks and Signs

In the Track & Sign Interpretation evaluation the points scored for specific tracks are defined as 1-Point (easy track or sign), 2-Point (difficult track or sign), or 3-Point (very difficult track or sign). These depend on the species, condition of the track and/or the context.

Easy Tracks and Signs (1-Point): Clear, complete, typical, zero similar species:

The margins of the sign are clear and distinct and the track or other sign is complete in its typical form. The sign is typical in every way: It is not exceptionally small (e.g., young animal), it is not abnormally large, and toes and claws that usually do not show have not marked in the track. There are no similar signs of other species that could easily be confused

with the question present in the area.

Difficult Tracks and Signs (2-Point): Unclear, incomplete, typical, (and/or) similar species:

A track or other sign but with margins unclear or indistinct. Or the sign is slightly incomplete in its typical form. The sign is still typical in every way - It is not exceptionally small (e.g. young animal), it is not abnormally large, and toes and claws that usually do not show have not marked in the track. There are no similar species present in the area with which it can be confused.

Or it is a clear track or other sign that is similar and could be confused with that of a single other species.

Very Difficult Tracks and Signs (3-Point): Obscure, partial, atypical, (and/or) similar species:

A track or other sign that is very unclear and indistinct, or severely incomplete, yet still distinguishable (e.g., badger claw marks on hard substrate). The margins of the sign are obscure and indistinct and/or the sign is mostly incomplete and/or the sign is not in its typical form and/or there are similar species in the area with which it could be confused.

A track or other sign where the margins are unclear and indistinct. Or the sign is slightly incomplete in its typical form. The sign is still typical in every way - It is not exceptionally small (e.g. young animal), it is not abnormally large, and toes and claws that usually do not show have not marked in the track. There are no similar species present in the area with which it can be confused.

A clear and distinct track or other sign from a small animal, a rare species in an area, or a species poorly covered in tracking resources. Or it is a track or sign that is similar and could be confused with that of two or more species that occur in the same area.

There is no limit to how difficult a 3-Point question can be, as long as the Evaluator and at least 70% of the group can reach consensus on what the correct answer is.

In summary, a 1-Point track or sign is a sign of medium to large species that are clearly defined and therefore unmistakable. 2-Point track or sign includes signs of small species, such as mongoose species, that are clearly defined and spoor of medium to large species that are partially obliterated or indistinct due to soft sand or hard substrate. 2-Point tracks and signs requires an ability to interpret the way the spoor was formed in difficult substrate and are therefore not easy to identify. 3-Point track or sign includes fractions of footprints and very indistinct spoor that requires considerable experience to identify, or that of a very rare animal in the area.

Awarding of Points and Scoring for Track & Sign Evaluations

In the Track & Sign Interpretation evaluation the candidate is awarded one positive point (✓) for correct interpretation of a 1-Point spoor, or three negative points (×××) for a mistake on a 1-Point spoor. Two positive points (✓✓) are awarded for correct interpretation of a 2-Point spoor, or two negative points (××) for a mistake on 2-Point spoor. Three positive points

(✓✓✓) are awarded for correct interpretation of a 3-Point spoor, or one negative point (×) for a mistake on a 3-Point spoor.

The total number of correct positive points (✓) are divided by the sum of all the correct positive points (✓) and the incorrect negative points (×). The final score for each participant is expressed as a percentage.

Track & Sign Evaluation

20% of spoor tested may be 1-Point spoor and 20% may be 3-Point spoor. The first ten 1-Point scoring spoors, thirty 2-Point scoring spoors, and ten 3-Point scoring spoors will count, (ratio of 10:30:10 for 50 questions), and percentage should be rounded off to the nearest 0,1 (one tenth of a percentage point). Nevertheless, we admit that variation in the proportion of questions in these 3 categories may vary with venue and local animal diversity.

Some of the best trackers often get the very first question wrong due to nervousness, which is not a reflection on their knowledge. To give trackers the opportunity to gain confidence, the first three questions will not be scored. 50 questions will then follow.

Track & Sign (I) Certificate

The Track & Sign (I) candidate must be able to interpret the spoor of small to large animals and must have a fair knowledge of animal behaviour. To qualify for the Track & Sign (I) certificate the candidate must obtain 70% for the Track & Sign Interpretation evaluation of 50 signs.

Track & Sign (II) Certificate

The Track & Sign (II) candidate must be able to interpret the spoor of small to large animals and must have a good knowledge of animal behaviour. To qualify for the Track & Sign (II) certificate the candidate must obtain 80% for the Track & Sign Interpretation evaluation of 50 signs.

Track & Sign (III) Certificate

The Track & Sign (III) candidate must be able to interpret the spoor of small to large animals and must have a very good knowledge of animal behaviour. To qualify for the Track & Sign (III) certificate the candidate must obtain 90% for the Track & Sign Interpretation evaluation of 50 signs.

Some of the best trackers often get the very first question wrong due to nervousness, which is not a reflection on their knowledge. To give trackers the opportunity to gain confidence, the first three questions are not included in the evaluation.

Trailing Evaluation

The **Trailing** evaluation is done in varying terrain on an animal such as a hoofed animal, rhino or lion. Varying terrain includes areas of hard substrate or dense vegetation where tracks may often not be visible for at least ten meters and sometimes for up to 50 meters or more. The

minimum duration of a trail for evaluation purposes is 30 minutes, but for higher skills more time is needed to test under different trailing conditions. Five aspects are evaluated.

(1) Spoor recognition is the ability of the tracker to recognize and follow spoor at a reasonably good rate. Indicators may include:

- Not looking down in front of feet, but looking for signs 5 to 10 meters ahead.
- Moving at a steady rate, not in stop-start manner.
- Recognizing signs in grass or hard substrate.
- Recognizing when there are no signs when no longer on trail.
- Ability to recognize signs after losing spoor.

(2) Spoor anticipation is the ability of the tracker to anticipate where the animal was going and therefore where he or she will find the spoor further ahead. Indicators may include:

- Looking well ahead, reading the terrain to look for most probably route.
- Interpret behaviour from tracks.
- Using knowledge of terrain (water, dongas, clearings) to predict movements of animal.
- Not over cautious (too slow), but not too confident (too fast).
- Anticipate where to find tracks after losing spoor.

(3) Anticipation of dangerous situations is the ability of the tracker to read the terrain and be able to anticipate situations that may be dangerous. Indicators may include:

- Awareness of wind direction.
- Knowledge of behaviour, e.g., animals resting at mid-day.
- Animal behaviour indicating danger.
- Avoid danger be leaving the spoor and picking up the spoor further ahead.
- Determine the position of dangerous animals without putting him/herself at risk.

(4) Alertness is the ability of the tracker to spot animals before the animals spot him or her. Indicators may include:

- Looking well ahead for signs of danger.
- Stop to listen when necessary.
- Warning signs, alarm calls and smells.
- Signs of other animals.
- Seeing the animal before it sees the tracker.

(5) Stealth is the ability to approach animals without being detected by the animals, nor being a disturbance in the bush. Indicators may include:

- Minimize noise levels (walking, talking vs. hand signals, etc.).
- Low impact on other animals.
- Use of cover to approach animal and exit route.
- Appropriate proximity to animal (close enough to observe, but not too close).
- Animal unaware of tracker.

In each of these aspects the tracker will be given points from 0 to 10: Not Yet Competent (0 - 6 points); Fair (7 points); Good (8 points); Very Good (9 points); Excellent (10 points). The total number of points scored would be expressed as a percentage for Trailing. Depending on circumstances, some indicators may not be applicable (N/A). The total score would be divided by the number of aspects scored multiplied by 10 to obtain a percentage.

To obtain realistic scores points are deducted for mistakes, rather than ‘giving’ points for level of skill. Points deducted would give the candidate an indication of how to improve his or her tracking skills.

If the tracker struggles to get started due to nervousness, the first five minutes will not be used to penalize the tracker.

Tracking Evaluation Sheet

Tracker:	Specie:
Evaluators:	Group Size:
Location:	Group Composition:
Date:	Wet/Dry
Time Started:	Windy: Yes/No
Time Completed:	Cloudy: Yes/No
Time Duration:	Animal Found: Yes/No

(1) Spoor recognition

- ☐ Not looking down in front of feet, but looking for signs five to ten metres ahead.
- ☐ Moving at a steady rate, not in stop-start manner.
- ☐ Recognising signs in grass or hard substrate.
- ☐ Recognising when there are no signs when no longer on trail.
- ☐ Ability to recognise signs after losing spoor.

(2) Spoor anticipation

- ☐ Looking well ahead, reading the terrain to look for most probable route.
- ☐ Interpret behaviour from tracks.
- ☐ Using knowledge of terrain (water, dongas, clearings) to predict movements of animal.
- ☐ Not over cautious (too slow), but not too confident (too fast).
- ☐ Anticipate where to find tracks after losing spoor.

(3) Anticipation of dangerous situations

- ☐ Awareness of wind direction.
- ☐ Knowledge of behaviour, e.g. animals resting at mid-day.
- ☐ Animal behaviour indicating danger.
- ☐ Avoid danger by leaving the spoor and picking it up further ahead, but not over cautious.
- ☐ Determine the position of dangerous animals without putting him or herself at risk.

(4) Alertness

- ☐ Looking well ahead for signs of danger.
- ☐ Stop to listen when necessary.
- ☐ Warning signs, alarm calls and smells.
- ☐ Signs of other animals.
- ☐ Seeing an animal before it sees the tracker.

(5) Stealth

- ☐ Minimise noise levels (walking, talking vs hand signals, etc.).
- ☐ Low impact on other animals.
- ☐ Use of cover to approach animal and exit route.
- ☐ Appropriate proximity to animal (close enough to observe, but not too close).
- ☐ Animal unaware of tracker

Comments:

Trailing (I) Certificate

The Trailing (I) candidate must be a fair systematic tracker and be able to track large animals. He or she must have a fair ability to judge the age of spoor. To qualify for the Trailing (I) certificate the candidate must obtain 70% for the Trailing of a large mammal spoor.

Trailing (II) Certificate

The Trailing (II) candidate must be a good systematic tracker and be able to track large animals. He or she must have a fair ability to judge the age of spoor. To qualify for the Trailing (II) certificate the candidate must obtain 80% for the Trailing of a large mammal spoor.

Trailing (III) Certificate

The Trailing (III) candidate must be a good systematic tracker and be able to track medium or large animals. He or she must have a fair ability to judge the age of spoor. To qualify for the Trailing (III) certificate the candidate must obtain 90% for the Trailing of a medium or large mammal spoor.

The number of persons evaluated at one time must be limited to four maximum, with two working the trail at a time. Depending on the venue, it may not always be possible to find the animal. A venue must be selected where it is possible to find the animal on at least one assessment, even if the candidate did not find the animal on the final assessment.

Tracker Certificates

Tracker (I) Certificate

The Tracker (I) must be able to interpret the spoor of small to large animals and must have a fair knowledge of animal behaviour. He or she must be a fair systematic tracker and be able to track large mammals. He or she must have a fair ability to judge the age of spoor. To qualify for the Tracker (I) certificate the candidate must obtain 70% for the Track & Sign Interpretation evaluation of 50 signs and at least 70% for the Trailing of a large mammal spoor. The candidate will most likely not achieve this level without at least one year experience in the field.

Tracker (II) Certificate

The Tracker (II) must be able to interpret the spoor of small to large animals and must have a fair knowledge of animal behaviour. He or she must be able to make empirical inductive-deductive interpretation of spoor and be a good systematic tracker. He or she must be able to track large animals. He or she must have a fair ability to judge the age of spoor. The Tracker will be qualified to be employed in ecotourism and anti-poaching. To qualify for the Tracker (II) certificate the candidate must obtain 80% for the Track & Sign Interpretation evaluation of 50 signs and at least 80% for the Trailing of a large animal that is not easy to follow. The candidate will most likely not achieve this level without at least two years' experience in the field.

Tracker (III) Certificate

The Tracker (III) must be able to interpret the spoor of small to large animals and must have a fair knowledge of animal behaviour. He or she must be able to make empirical inductive-

deductive interpretation of spoor and be a good systematic tracker. He or she must be able to track medium to large animals. He or she must have a fair ability to judge the age of spoor. The Tracker will be qualified to be employed in ecotourism, ecological research, and anti-poaching. To qualify for the Tracker (III) certificate the candidate must obtain 90% for the Track & Sign Interpretation evaluation of 50 signs and at least 90% for the Trailing of a medium to large animal that is not easy to follow. The candidate will most likely not achieve this level without at least three years' experience in the field.

Protocols: Track & Sign Interpretation Evaluations

The Track & Sign evaluation should be objective and a fair representation of what is in the area. On evaluations, the following protocols should apply:

1. The evaluation will be composed of 3 warm-up questions that will not be included in scoring and 50 questions. This means an evaluation will include 53 total questions.
2. The 50 questions follow a ratio of 20% one-point questions, 60% two-point questions, and 20% three-point questions.
3. Trackers are not allowed to use any mechanical tool or equipment to measure a track or sign, and no reference material is allowed.
4. No cell phones are allowed.
5. Trackers are not allowed to touch or disturbed anything inside the question zone.
6. Trackers are allowed unrestricted access to the trail beyond the question as long as they stay outside the clearly marked question zone, unless a limiting demarcation line is indicated.
7. The evaluator must indicate the question to all the trackers in the same way, to ensure fairness.
8. No sign may be disturbed or altered by the evaluator. If the rating of a sign changes during the evaluation, due to changing light or other environmental on human factors, the question must be taken out of the evaluation.
9. Trackers are not allowed to communicate their answers to the evaluator in such a way that the other trackers being evaluated will become aware of their answer.
10. Once the evaluator has recorded an answer on paper, or in the case of multiple questions at a single station, once a participant leaves the station, answers cannot be changed.

Protocols: Trailing Evaluations

1. If the tracker is put on an animal trail, the trail must be followed for at least 30 minutes before it constitutes an evaluation.
2. If a group of trackers are evaluated on a Trailing Evaluation, two trackers can follow the same trail, one as first tracker, and the other as second tracker behind the evaluator. The Evaluator can at any stage of the trail ask the second tracker questions about the trail, or swap the two trackers around, or have both trackers in front of him. The second tracker can also be called in to assist the first tracker when he or she lost the trail. The performance of a tracker when functioning as second tracker will also be considered when he or she is scored.
3. If enough evidence was not presented on a trail to accurately score the first tracker, he or she must be put on the next available trail as first tracker until enough evidence is gathered.
4. A trail can be cut short if enough mistakes are made to determine the Tracker's skill early.

Protocols: Safety

If the candidate does anything that endangers his or her own life or the life of someone else, the Evaluator will terminate the evaluation, without further scoring the evaluation, irrespective of the tracker's performance.

Principles

Developing standards are guided by a set of Principles which all Evaluators should follow.

Ethics

Conventional classroom-based examinations are easy to validate, since the questions and answers are documented on paper and can therefore be subjected to external evaluations after the tests have been conducted. Tracker evaluations are practical field tests and cannot be conducted in a classroom with pen and paper. The evaluation depends on the observations of the Evaluator who records the evaluation on paper. But once the evaluation is completed, it is impossible to conduct an external evaluation afterwards to determine whether or not the Evaluator maintained the required standards.

The Indigenous Tracker Certification system depends on collaboration based on mutual respect, integrity, honesty and humility. These values are essential in maintaining the integrity of the Indigenous Tracker Certification system.

Objective Reference

An essential part of the tracker evaluation process is the use of an accurate field guide(s) to animal tracks and signs that provides an objective reference. The field guide serves to provide an objective reference to demonstrate to the candidates that the interpretation of the evaluator is correct. It also provides a reference to explain the details of tracks and signs to candidates.

If a reliable field guide is not available, a community of trackers should initiate a research project to develop an accurate reference guide.

Critical Discussion, Peer Review and Scientific Reasoning

The process of critical discussion observed among indigenous Kalahari San trackers while they are hunting represent scientific reasoning and peer review at its most basic level. This principle is an effective teaching tool that will help to *accelerate the learning process* while developing rigorous *scientific reasoning*.

It is a practical demonstration of scientific peer review in tracking and is therefore a valuable way to teach evidence based scientific reasoning at its most basic level. The process of critical discussion brings out all the evidence that some of the participants may not have noticed. Participants may change their minds (when they made a mistake) based on new evidence that they did not see on their own. Critical discussion and scientific reasoning are therefore a self-correcting process.

Based on the Principle of Critical Discussion and Scientific Reasoning, Track & Sign evaluations may include these three steps for any of the questions: (1) First test each

participant on an individual basis, (2) then ask all participants to discuss the track and come up with a consensus answer (which gets recorded), and (3) only then do the evaluator explain the track to the participants.

Note that they do not always agree on a consensus. The evaluator would therefore record: (1) Consensus answer correct (2) No consensus (3) Consensus answer incorrect.

This is a practical demonstration of scientific peer review in tracking and is a valuable way to teach evidence based scientific reasoning at its most basic level in tracking.

Research indicates that for indigenous Kalahari San trackers the consensus answer has been correct most of the time, even if the elder trackers got it wrong and only one of the younger trackers got it right. So even if the tracker who gets it right is in a minority, after looking at all the evidence and debating it through critical discussion, they usually come up with the correct answer. Over time the same groups have shown an increase in the success rate of the consensus answers, until the consensus for a particular group of trackers reaches 100%.

It should be noted that this process is not about a democratic vote to reach a majority consensus, or about who can dominate the discussion. The process of critical discussion brings out all the evidence that some of the participants may not have noticed. Participants may change their minds (when they made a mistake) based on new evidence that they did not see on their own.

This protocol will introduce the element of critical discussion, peer review and scientific reasoning into evaluations, as a *learning process*. It will also encourage open discussion and transparency, which is essential in scientific reasoning.

Principle of Peer Review among Evaluators

Evaluators are encouraged to attend tracker evaluations conducted by other Evaluators as often as possible as observers in order to conduct voluntary peer review of each other's tracking skills and evaluation standards. This process helps to improve overall standards to the benefit of the tracking community as a whole.

The Indigenous Elder Tracker

The exceptional skills of indigenous Elder Trackers may soon be lost. It is crucial that the last remaining Elder Trackers are identified and that a programme of employment be initiated in order to ensure that their invaluable expertise is passed on to younger generations and trackers worldwide.

The Elder Tracker must have an excellent knowledge of animal behavior and be capable of a highly refined interpretation of spoor in difficult terrain. He or she must have originality and creative insight and must have well-developed intuitive abilities. Qualities of the Elder Tracker include: Exceptional skill, extensive knowledge and experience, endurance, concentration, wisdom, humility, creativity, insight, intuition, curiosity, the ability to make an original contribution to our understanding of tracking and/or knowledge of animal behavior.

In indigenous hunter-gatherer communities, the best hunters were expected to show humility. Individuals who boasted about their skills or achievements were quickly put in their place. This helped to avoid jealousy in small communities that depended on cooperation and social harmony. Humility in tracking is more than a social necessity. The Elder Tracker has acquired the wisdom to know that even the best trackers can sometimes be wrong and make mistakes.

Scientific understanding is fundamentally fallible. This is why Karl Popper (1959) proposed that falsifiability should be the criteria for whether a hypothesis is scientific or not. Elder Trackers are quick to admit their own mistakes or if they do not know something and recognize when someone else is right. Conversely, a lack of humility results in an inability to recognize mistakes.

Community Indigenous Tracker Certificate Designs

Communities may choose their own tribal logos to distinguish their own indigenous tracker certificates.

Community certificates may not use the CyberTracker logos, or use the CyberTracker brand name, without permission, since it is protected by trademarks. This is to protect the standards of the CyberTracker Indigenous Tracker Certification. Indigenous communities are welcome to join the worldwide CyberTracker tracker network.

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