Policy Brief

Centre for Minority Rights Development

Towards a Rights-based Innovative Traditional Knowledge Tool for Systematic Weather Forecasting and Decision Support by Indigenous and Local Communities

1.0 Key Messages

- For effective adaptation and hence resilience to climate change IPLCs, their human rights to ITKT/LKTK must be central to all climate change programming and action, including weather monitoring and forecasting.
- As per Article 18 and 19 of United Nations Declaration on the Rights of Peasants and Working in Rural Areas(UNDROP), adopted in 2017 by the UN and key to enhancing governance and accountability on the right to food and other related human rights, Peasants (who include indigenous peoples) have the right to contribute to climate action using indigenous traditional knowledge and technologies (ITKT). Further, States should protect the right of indigenous peoples to use ITKT (Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples UNDRIP).
- Climate monitoring and forecasting efforts should strengthen generation of community level weather forecasts to enhance community ownership of weather information processes.
- TILKITis thus a robust, versatile, replicable innovative tool for local climate monitoring, local weather forecasting for climate-informed action planning, that can be integrated and institutionalized within the national monitoring and forecasting system to be used by indigenous peoples and local communities to generate local climate and weather forecasts.
- Stakeholders should support the empowerment of indigenous peoples and local communities to undertake co-production of local weather forecasts, leading to locally relevant climate information and appropriate climate action

1.1 Introduction

Article 5 of the Paris Agreement supports participatory and fully transparent approach to adaptation action, taking into consideration vulnerable groups, communities, and ecosystems, based on, and guided by, the best available science as well asappropriate traditional and indigenous knowledge systems, to enhance integration adaptation into relevant socioeconomic and environmental policies and actions. Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) states that States should protect the right of indigenous peoples (IPs) to use indigenous traditional knowledge and technologies (ITKT). Article 18 and 19 of United Nations Declaration on the Rights of Peasants and Working in Rural Areas (UNDROP) states that peasants have the right to contribute to climate action using ITKT and to maintain, control, protect and develop local peasant ITKT. Article 69 (1) (C) and Article 11 (2) (b) of the Kenyan Constitution obligates the State to recognize and protect the role of ITKT in the development of the nation. Additionally, the National Climate Change Action Plan (2018-22) recognises that the livelihoods of IPs (pastoralists, hunter gatherers, and fisher communities) are at risk because of climate change, hence adaptation actions should ensure adequate and effective plans for their participation and representation.

2.0 Background to the Tool: The Gap and the Opportunity

This **traditional indigenous and local knowledge tool (TILKIT)** has been developed using the participatory scenario planning (PSP) process (CGIAR-CCAFS 2018), also known as County Climate Outlook Forum (CCOF) (ICPAC 2019). The integration of ITKT is area of growing interest in in many regions of the world (UNFCCC 2013), (ICPAC 2022). The IPCC AR6 report (2021) recognises the value of diverse forms of knowledge including local, indigenous, and traditional knowledge in understanding climate adaptation processes actions to reduce risks from human-induced climate change (Zachary et al. 2021). United Nations Framework Convention on Climate Change (UNFCCC), World Meteorological Organization (WMO), IGAD'S Climate Prediction and Applications Centre (ICPAC), Kenya Meteorological Department (KMD), development partners and actors acknowledge the role of indigenous peoples and local communities (IPLCs) and use of ITKT in weather forecasting (ICPAC 2021, 2022; UNFCCC 2013). In the recent past, many efforts have been mooted, to improve weather forecasting and the use of climate information at local community using ITKT (Lucio 1999, Ngugi 1999), (Esipisu 2012, 2016; Kagunyu et al. 2016; Moore 2010; Ochieng' et al. 2020; Zachary et al. 2021). Key climate change actors concur that integration of ITKT into design and development of climate services has shown strong potential for improved local relevance, legitimacy, integration, access, useability, and sustainability (ICPAC 2022). Despite this, there is still a challenge in understanding and handling of the forecast integration process, making the institutionalisation and uptake of weather and climate forecast information difficult (Esipisu 2012, 2016; Ochieng' et al. 2020). Thus, despite its benefits, ITKT has not been systematically integrated into the development of climate services alongside scientific knowledge, with scientific knowledge typically prioritised at the expense of ITKT forecast (ICPAC 2022).

In the absence of reliable conventional weather information, many peasant farmers, fishers and pastoralists resort to traditional knowledge and technologies for climate and weather prediction, using indigenous and local indicators. Based on this reality, a tool has been developed to systematize traditional knowledge and technologies for local climate monitoring and weather forecasting by indigenous peoples and local communities (IPLCs) alongside conventional climate information and weather forecasting. The conceptual framework for the tool, herein called the traditional indigenous and local knowledge tool (TILKIT) is based on the following variables:

- Identification of local gendered vulnerabilities to climate change and knowledge of local climate risks and hazards;
- Monitoring of local climate and forecasting of local weather using locally appropriate and indigenous weather indicators;
- Analysis and forecasting of weather hazards and, loss and damage (including non-economic loss and damage-NELD);
- Dissemination and communication of advisories (warnings, alerts and suggestions) based on the local and indigenous forecasts using inclusive and disability friendly approaches; and
- Identification of local capabilities to respond to the warnings generated and/or received

This innovation is supported by policies, strategies, frameworks and action plans developed by WMO (GFCS), UNFCCC, UNDROP, UNDRIP, ICPAC, KMD (PSP-CCOF). Through the tool, local indicators that have become increasingly less reliable can be recalibrated and validated, and new emerging indicators can be identified and described. All the indicators are validated through local observation and monitoring to co-produce local weather information for community-based adaptation. Through the recalibration and validation peasant farmers, fishers and pastoralists will be able to take advantage of good seasons and minimize risks in bad seasons.

2. 1 The Case for the Traditional Indigenous and Local Knowledge Tool (TILKIT): The Arguments and the Innovation

A common argument against scaling climate and weather ITKT/LTKT is that it is context-specific and not often documented because the knowledge is passed on through oral history, local skills or experience. It thus further argued that the traditional 'elders', who are the custodians of weather ITKT/LTKT knowledge on weather, skills and experience are exiting the scene, thereby creating a wide inter-generational gap between the 'elders' and the current generation. These challenges, it is argued, are worsening with climate change, due to the changing behaviour and/or progressive disappearance of traditional indicators of local weather monitoring threatening the ability of peasant farmers, pastoralists and fishers to cope with and adapt to climate change (Ochieng', Recha, and Bebe 2020). Often there is pressure on researchers, practitioners and stakeholders to collect, preserve, validate, and adopt these weather ITKT/LTKT indicators. However, the initiatives introduced so far to address the problem have beenproject-based, ad hoc and academic, with no clear decision-support tool to move the conversation to a practical and sustainable model. The initiatives always fizzle out as soon as the projects close.

In most IPLCs, it is true that most elders (all male) who are ITKT/LTKT custodians are exiting, making it untenable to continue relying entirely on them. However, it is possible to build a new set of weather ITKT/LTKT knowledge using a new tool by opening the conversation with the whole community to recalibrate indicators that have become increasingly less reliable, and to identify emerging indicators. Such a conversation should be open both to males and females, the elderly, the youth, and PWDs, including the roles of all local stakeholders as change agents in using weather ITKT/LTKT. What is needed in the changing circumstances is not necessarily the uniformity of weather prediction indicators but an easy to administer decision-support tool that can be owned by communities, applicable across different ethnographic and socio-cultural contexts.

2.2 The Traditional indigenous and Local Knowledge Tool (TILKIT)

The traditional indigenous and local knowledge tool (TILKIT) is an innovative Community-based Adaptation (CBA) decision support tool to systematize weather ITKT/LTKT for local climate monitoring and weather forecasting.

The TILKIT tool has been developed over time from 2016 CRAFT East Africa, CGIAR, AICCRA, ILRI, ICCASA and CEMIRIDE

The tool was conceptualized, developed, tested and validated in various local level training sessions under two training-of-trainers (ToT) initiatives and farmer group trainings on Climate-Smart Agriculture (CSA) in Kenya, Tanzania and Uganda from March 2016 to December 2021 (Osumba, Recha, and Oroma 2021). The tool underwent further refining in 2021. The tool adopts a transdisciplinary or participatory learning and action research (PLAR) model to drive self-organisation processes to bring ITKT/LTKT on weather into a common knowledge pool at local community level. The aim is to draw upon common knowledge among all members of the community.
ITKT methods of weather forecasting validated by local community members is more sustainable (Onyango, Ouma, and Ogallo 2010). It is meant to build capacity for local weather forecasts and agro-weather advisories using consensus-based weather indicators to improve climate infromation services. For the first time, results of a weather ITKT/LTKT forecast is presented in a systematic manner, in probabilistic terms that local communities can associate with, and which can compare empirically with conventional weather forecast language. A screenshot image of the tool is presented in Figure 1, using actual groupwork sample. A sample of identified indicators are presented in Table 1.

Table 1: Example of actual groupwork output using the tool, Narok County, Kenya, July 2021

Groupwork: Traditional, indigenous and local community weather forecasting exercise:
In groups, share your experiences on traditional indigenous and local knowledge indicators (TILKI) of rainfall in your community

A1	B2	C3	D4	E5		
Traditional, indigenous and local indicator of weather in your area	**Local meaning for weather in the locality (in terms of whether there will be rain or drought, or whether the rains will be normal, more or less)**	**How long does it take for the prediction after witnessing the indicator**	**Have you already seen it this season? – meaning do we have a forecast based on this indicator**	**In view of, and based on, the information so far available from the weather indicator, by the rating of this locality:**		
				Is the rain for the season likely 0) no forecast yet 1) above normal or 2) normal, 3) below normal?	**When (dates range) is the rain likely to start or stop if it will happen?**	**What farming plans or actions, or strategies will you adopt based on this traditional weather forecast information available to you?**
Dew after long dry spell	Onset of rain	1 week	yes	2	Rains expected within days	Planting, planning for fertilizer application.
Clouds at 5am	Onset of rain	1 week	yes	2	Rains expected within a week	Planting, weed control
Lightning at the west	Onset of rain	1 week	no	0	Days after occurrence	Planting, weeding, fertilizer application.
Very Chilly morning	Beginning of dry spell	2 days	no	0	After a long time (not defined)	Water conservation, mulching,
When Moon disappears	Onset of 1 week-long rain	3 days	Yes	3	Days after occurrence	Planting, setting of farm structures.
Total tally for normal, above normal and below normal scores	**Summary of meanings for the indicators**	**Summary of lead times for indicator prediction**	**Tallies for Yes and No**	**Above normal = Y% Normal = X% Below normal = Z%**	**Summary of expected dates of onset**	**Summary of adaptation options suggested**

From Table 1, it is shown that the shortest lead time in the forecast is one day, and the longest lead time is three months. The tool was developed with peasant farmers but can be improved and customised, for instance to be used by fishers and pastoralist communities.

Table 1: Demonstration of the TILKIT weather forecast using traditional and local indicators

Indicator category	A1	B2	C3	D4	E5
	Traditional indicator of indigenous weather prediction in the community/ locality/ area	Description: Local meaning for weather – Local meaning for weather in the locality (In terms of whether there will be rain or drought, or whether the rains will be normal, more or less)	How long does it take for the prediction, after witnessing the indicator?	Forecast (Y=Yes)	In view of, and based on, the information so far available from the weather indicator, by the rating of this locality: Is the rain for the season likely: 1) above normal or 2) normal, 3) below normal?
Celestial/ Astrological	Whirling wind from the lake	Depressed rain within a week	1-2 weeks	Y	Below Normal
	Whirlwind-to east	Rainfall	One week	Y	Above normal
	Whirlwind-West wards	Dry spell	One week	Y	Below normal
	When at Mwingi and the new moon faces Tanzania	Dry spell	3 months	Y	Below normal
	Full moon with halo (kivuuvo)	Rain expected	1-2 weeks	Y	Above normal
Physical	Absence of dew on leaves in the morning	Rain on the same day	1 day	Y	Normal
	Morning Dew & fog	Dry spell	1-2 weeks	Y	Below Normal
	Lightning around Kisumu and Tinderet area	Rainfall	2/3 months	Y	Above normal
Biological	Regeneration of new leaves in acacia tree species/ Acacia starts to sprout	rains are approaching	1-2 weeks	Y	Normal to above normal
	Blooming of baobab trees.	Rains in few weeks	2-3 weeks	Y	Normal
	Shedding of leaves- Baobab	Dry spell	1-2 weeks	Y	Below Normal
	Frequent encounter of snakes, rodents and rabbits etc out of their habits	Dry spell	One month	Y	Below normal
	Touching down of dragon flies	Rain same day	1 day	Y	Normal to above normal (when they are many) Below normal (when they are few)
	Livestock restlessness	Dry spell	2 weeks	Y	Below normal
	Livestock oversleeping	More rain	2 weeks	Y	Above normal
	Croaking of frogs	Rain expected	1 to 2 weeks	Y	Normal
	Bee migration	Dry spell	1 to 2 weeks	Y	Below normal
	White butterflies	Rainfall	After-two weeks	Y	Above normal
	White birds/ chebiswet	Rainfall	One day	Y	Above normal
	Army worm	Dry spell	2 months	Y	Below normal
	Presence of red ants/ kumbe kumbe/ kongaek	Rain	One week	Y	Above normal
Human body behaviour (sensing)	High temperature (Yiungu)	Rain	1 to 2 weeks	Y	Above normal
	Soil smell- "pleasant"	Rain	1-2 weeks	Y	Normal
Forecast for the season: Total tally for normal, above normal and below normal scores; Summary of meanings for the indicators; Summary of lead times for indicator prediction			Above normal = 8 Normal to above normal = 6 Below normal = 10 Total = 24	Y	Above normal = 33% Normal to above normal = 25% Below normal = 42%

2.3 Methodology and Conceptual Framework for the TILKIT Tool

The methodology accompanying the TILKIT tool focuses on local agroclimate risk management as the main basis for devising local level adaptation strategies. The approach combines a desktop synthesis with a consensus-based fieldwork. Fieldwork is conducted in the form of Training-of-Trainers (ToT) and focus group discussion (FGD) with community group leaders. Participants are divided into FGD groups to identify locally observable indicators, describe what the indicators mean (=the likely scenario), and suggest advisories (=possible action required) based on the identified indicators and what that means for local weather forecasting. The identified weather indicators are recorded, analysed and reported. The developed scenarios and advisories (using agreed indicators) are presented in plenary to assess their validity. The approach is to

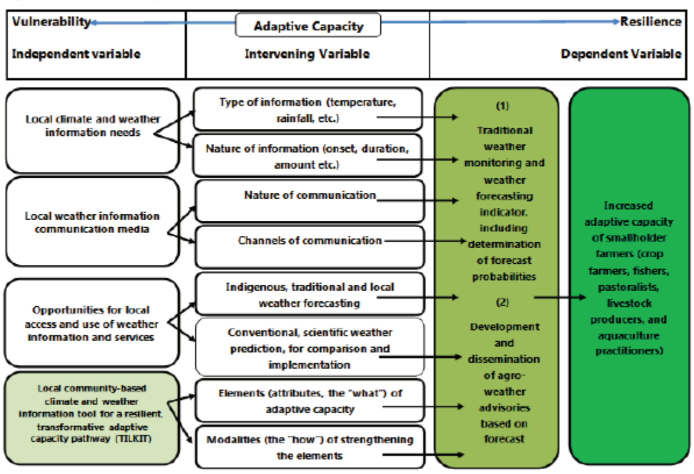
1. identify and confirm, i.e., groupworks propose and plenary concurs on known local indicators that signal rain issues,
2. describe what that indicator means in terms rainfall forecasting in the locality,
3. determine whether or not the indicator has been observed in the season,
4. specify where the indicator has been observed if already observed, and
5. interpret what the observation means for weather in the coming season. Interpretation is in terms of whether, based on the indicator, the rains can be normal or above or below normal. Normal in this case is defined as local historical expectation.

Depending on the number of ITKT/LTKT indicators the community identifies, and the weather signals each indicator exhibits, it is possible to tally the observations and estimate the percentages of the normal, above or below normal rainfall predictions in the community. Each indicator forecast is identified with clear lead times for onset and cessation rainfall. Locally appropriate advisories are then derived for the season from the individual indicator advisories. The recorded scenarios and advisories were merged, tallied, analysed, integrated, packaged and reported to determine local weather forecast probabilities.

"The efficacy of the TILKIT forecast is premised on monitoring and observing as many local indicators as possible, tabulating the observations and their implications, and summing up their predictions to obtain forecast. The findings presented in this brief mainly refer to work done with smallholder farming systems. However, the TILKIT tool can also be applied uner fisheries and pastoralism."

The conceptual framework for the TILKIT tool is based on the variables that feed into the tool (Figure 1). The concept comprises four key elements, viz., i) identification of local vulnerabilities to climate change and knowledge of local climate risks; ii) monitoring of local climate and forecasting of local weather using locally appropriate weather indicators; iii) analysis and forecasting of weather hazards based on indicator behaviour; iv) dissemination and communication of advisories (warnings, alerts and suggestions) based on the forecasts; and v) Identification of local capabilities to respond to the warnings generated and/or received.

Figure 1: Conceptual Framework for the TILKIT



In the process of using the tool, similarities and differences between traditional and conventional forecast can be identified and described. During its development similarities were found to be as follows (they both):

i. are based on observation of nature;
ii. have a scientific basis;
iii. can forecast onset and the quality of the season to come;
iv. are accompanied by warnings and alerts on likely risks and hazards;
v. use signs/indicators and patterns;
vi. use observance of wind;
vii. can forecast below normal rainfall or an impending dry spell.

Each of the two models of weather forecasting and climate information generation and dissemination has its strengths and weaknesses, but each also provide opportunities for synergy between the traditional and conventional forecasts.

2.4 Key Conclusions

The TILKIT approach adopts a diverse stakeholder participation. The tool is robust enough to be replicable, scalable and good for institutionalization of weather ITKT-LTKT under local contexts. The tool is considered a living instrument that can be used to share traditional forecast information, updated regularly as per local arrangements – e.g., pre-season, monthly, weekly, daily.

2.5 Key Recommendations

To apply the tool at scale, it will need to be institutionalised and embedded in frontline weather forecasting frameworks to strengthen self-sustaining climate information, with support from relevant authorities for the data networks, including civil society, development actors, media and private sector. The tool can be applied earlier in the season before the conventional weather forecast is released, to serve as community preparedness mechanism for the season. For the tool to be successfully and effectively integrated with the conventional climate and weather forecast information, the conventional forecasting will need to be downscaled to the level of the traditional forecasting – the community level. The tool can be used for sensitisation to catalyse policy implementation or influence policy reforms at various levels among relevant stakeholders in the region.

This policy brief is based on fieldwork supported by DFID-StARCKPlusFICCF, SNV-CRAFT East Africa, CGIAR-AICCRA-ILRI, and ICCASA, whose production was supported by the Centre for Minority Rights Development (CEMIRIDE).

For further information, please contact CEMIRIDE.

Published November 2022

Design by CEMIRIDE.

Printed in Kenya on recycled paper.

This Policy brief on Towards a rights-based innovative traditional knowledge tool for systematic weather forecasting by indigenous and local communities is published by CEMIRIDE as a contribution to public understanding of the issue which forms its subject. The text and views of the author do not necessarily represent in every detail and in all its aspects, the collective view of CEMIRIDE, or RAISE Consortium partners.