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Indigenous Technical Knowledge in Weather Forecasting

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Indigenous knowledge

Indigenous knowledge is a generic term that consists of the actual knowledge, skills and practices or methods of doing things based on local materials developed through various types of experimentation and practical experience over time by the people of the place and adapted to the local situation. Incorporating indigenous knowledge into weather forecasting and climate change policies can lead to the development of effective adaptation strategies that are cost-effective, participatory and sustainable. IKS's are known by other names, and among them are indigenous ways of knowing traditional knowledge, indigenous technical knowledge, rural knowledge as well as ethno-science (or people's science).

Weather forecasting, water detection, indicators of soil fertility and other events often interpreted from the behaviour of certain animals and birds or changes in the vegetation can be achieved through the use of IK. When indigenous knowledge gets adopted for widespread use, it becomes common or traditional knowledge. This way it becomes subject to change or improvement by the users without any control or reference to the original source.

Therefore, the original idea, knowledge, skills and practices can be improved over time according to the influence of outside information or may even be abandoned in favours of new technology which is considered better/modern.

It may therefore be hard to distinguish between indigenous and scientific/western/modern knowledge in some situations. Indigenous knowledge can also be used to predict the amount of rainfall for that agricultural season and inform the farmers cropping activities. This is especially common in cases where conventional weather information is not easily accessed.

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Indicators from animals, birds and insects

The behaviour of animals and the appearance and movement of birds and insects are frequently used by elders in the area to predict weather and climate in their communities. The migratory tendency of the white and black stock is associated with the approaching summer season. Modern scholars have also reported that many animal species undergo movements of varying distances depending on the prevailing rainfall patterns. Land preparations and precautionary measures are adopted as a safeguard from the impending storms that could be linked to the expected rains. Heavy rains are predicted when ants emerge from their holes in large numbers to collect food from homes and this is associated with an impending long wet spell. The ants disappear less than twenty-four hours before the storm. Ant behaviour triggers farmers to collect firewood to dry places in preparation for a long wet spell. Ant behaviour has long since been regarded as a portent indicator of rain to come. Thirst is related to heavy sweating when there is a high vapour pressure gradient between the atmosphere and the body during hot dry days. A high vapour pressure gradient stimulates thirst and apparently on such dry days, evaporation rates are high and when the rising water is cooled sufficiently to condense, convectional rains can be received (Barry and Chorley, 1998). The rate of water loss from the body can be linked to the rate at which that water must be replaced. If these two variables do not match then it leads to dehydration and consequently death.

Table1: Comparison of IKF and SCF Methods

INDIGENOUS KNOWLEDGE FORECASTS	SCIENTIFIC SEASONAL CLIMATE FORECASTS
Use biophysical indicators of the environment as well as spiritual methods	Use weather and climate models of measurable meteorological data
Forecast methods are seldom documented	Forecast methods are more developed and documented
Up-scaling and down-scaling are usually complex	Up-scaling and down-scaling are relatively simple
Indicators are mostly observed	Indicators are usually measurable
Application of forecast output is less developed	Application of forecast output is more developed
Communication is usually oral	Communication is usually written
Explanation is based on spiritual and social values	Explanation is theoretical
Taught by observation and experience	Taught through lectures and readings

Source: Adopted from Ziervogel, G. and Opere, A. (2010).

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Table 2: Notes on IK Indicators Used by Communities to Predict on-set of Dry Season

INDICATORS TO PREDICT ONSET OF DRY SEASON	EXPLANATION OF THE INDICATOR	REMARKS
Easterly winds (winds blowing from East to West)	Whenever prevailing wind blows from East to West, this indicates that it will not rain, this is because these are dry winds which carry no rains and hence onset of dry season	Being used, reliable
Clear sky/white clouds	Clear sky (blue sky) is a clear indication of no rain while white clouds may mean very little or no rain, when this is observed then it clearly indicates the onset of dry season	Being used, reliable
Weathering of plants/trees/shading of leaves	Whenever trees (especially big ones such as:- "Mivule") starts to shade off their leaves, this is a clear indication of onset of dry season, this occurs from around January and by March the trees will be completely bare, when trees remain bare for longer than expected this is indicative of prolonged dry season as well.	Being used, reliable
Presences of Butterflies	Whenever, butterflies are seen in their numbers, this indicate that there will be no rains	Being used, reliable
Drop in temperatures at night/Coldness at night	Whenever there is unusual drop in temperature characterized by coldness at night, this indicates that dry season is soon starting	Being used, reliable
Dew or mist forms in the morning/cold breeze	When mist/dew form especially In morning hours accompanied with cool breeze, this indicate no possibility of rains and also signify that the onset of dry season is about to start. Likewise.	Being used, reliable
Others (Thunder, calm lake waters,)		Limited used, reliable
Flowering of plants in the hills ("Ehongwe")	Whenever plants such as "ehogwe" start to flower it's an indication of onset of dry season, the mango trees have also been proven to flower during onset of dry season.	Being used, reliable
High temperatures during day/ Hot morning sunrise	When there is hot morning sunrise, with high temperatures during the day these indicate no rains and also mean that dry season is soon approaching.	Limited use, reliable
Bees come out of hives	Whenever this happens it signifies no rains and hence onset of dry season, it is alleged that these bees come out to collect nectar from most of the plants that are flowering at around this time.	Limited use, reliable
Strong winds/spiral	Whenever strong winds/ whirlwinds are felt, this is a clear indication of onset of dry seasons. The whirlwinds do normally occur during hot, calm days.	Being used, reliable
Reddish/brownish sky at sunset	Whenever the sky at sunset is reddish/brownish, it's an indication of no rain and hence onset of dry season,	Limited use, sometimes reliable
Migratory birds "White" fly and Leave the community, "Kamakomati"	When the migratory birds fly usually in large groups and leave the community, it's an indication of no rains and therefore onset of dry season	Limited use, reliable

1. Winds:

- If the wind blows from north to east direction then rain will come.
- High wind activity in "Arudra" constellation indicates drought.
- If rain will occur in the entrance of "Arurdra" constellation, then there will be dry spell for the coming 60 days. If rain in the night at the entrance of "Arurdra" constellation then the future occurrence of rain in the night only.

2. Clouds: based on cloud colour, distance and movement farmers decide the occurance of rain

- Presence of more dark coloured clouds without wind and closure to the earth, indicates occurrence of rain within 2-3 hours.
- Black/dark colour clouds with fast movement and far from earth, indicate rain will not come.

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- Presence of red clouds in the western side with gaps, the rain will come within 5-6 hours.

3. Stars:

- If there is a ring around moon, then rain will come. If ring is close to the moon, in far places rain will occur, if ring is distance to the moon, in nearer places rain will occur.
- Stars movement from north to south towards east bending, indicates occurrence of rains.

Conclusion

This study takes a part of researches proposing to identify indigenous knowledge on agriculture, livestock and human health. Agricultural decisions are made according to traditional knowledge and understanding of these environmental conditions of their local area, obtained through years of experience. Understanding of the farmers' perceptions of weather and climate is a critical step to facilitate effective communication on science-based agro meteorological knowledge. This learning is necessary for scientists.