



Aspects of indigenous knowledge system of weather prediction by peasants farmers in Akwa Ibom state, south-south, Nigeria

Williams JJ¹, Afangideh AI², Punyi P³, Peter A⁴

^{1,3,4} Dept. of Geography, Adamawa State College of Education, Adamawa State, Nigeria

²Department of Geography, University of Calabar, Calabar, Nigeria

Abstract

The completely local knowledge ideas comprising the sightings and sounds of uncommon birds (50%), low but widely indexed trees shedding of leaves (46.6%) and warmer than normal soil temperatures on bare foot equally have their places in weather and climatic prediction for sustainable agriculture and food production. One can effectively be made to monitor and document the onsets, number, types and duration's of these migratory seasonal birds the main ones being the cattle egrets and sundara eagle to be related with the onset character of the rains besides factoring same into the general equation for weather forecasting in the sub region as a whole. The almond tree and a few others (Amelina) in the study area are noted for the complete shedding off of leaves as the dry season approaches. Its timing, intensity and duration of this unique attribute when monitored and quantified may serve as additional local and indigenous tool in the prediction of the environment to come or used alongside modern weather and climate prediction tools for the peasants. Planned integration with trained personnel comprising the environmentalist, climatologist and meteorologist as well as the farmers themselves can revolutionize the rural mainstay consisting mainly peasant rain fed agricultural may be modernized and enhanced for sustainability from the above perspective.

Keywords: integration, indigenous knowledge, sustainable development, dynamic climatology

Introduction

Long before the advent of complex numerical climate models, indigenous communities have used changes in their environment to predict fluctuations in the weather and climate. Social and communal activities such as feasting, fishing and hunting were planned in response to changes in weather and climate and revolved around the different seasons. In Africa, local communities have well developed traditional indigenous knowledge systems for environmental management and coping strategies making them more resilient to environmental change. Indigenous knowledge is therefore an essential element in the development process and the livelihood of many local communities. A major challenge that African countries continue to face is how to reconcile indigenous knowledge and modern science without substituting each other; respecting the two sets of values, and building on their respective strengths. Recent studies in Kenya on the application and use of traditional knowledge cited examples of where such knowledge is still prevalent and harnessed (Kamara, 2002) ^[19]. As for coping with changes in the weather, traditional indigenous knowledge of storm routes and wind patterns enables people to design disaster management long in advance by constructing types shelter, wind breaks structures, walls and homestead fences appropriately. A hydrological disaster is obviously unmanageable when it starts. Similarly, knowledge of local rain corridors enables them to prepare for storms. Knowing that prolonged drought is followed by storm, thunder and lightning during the first few rains enables people to prepare or except disaster. A change in birds cries or the onset of their mating period

indicates a change of season. Similar application and use of indigenous knowledge for disaster management is also prevalent in Swaziland. Floods can be predicted from the heights of birds nests near rivers. Moth numbers can predict drought. The position of the sun and the cry of a specific bird on the trees near rivers may predict onset of the rainy season for farming. These examples underscore the importance of harnessing indigenous knowledge not only as a precious national resource but also as a vital element in environmental conservation and natural disaster prevention, preparedness and response.

While weather and climate pattern have been documented for many years. Little attention has been paid to documenting the traditional environmental observations made by indigenous peoples. It is possible that scientists may be missing some valuable insights into climate change, climate prediction and mechanisms for coping with climate variability by not taking this knowledge on board. As a result, there is the general lack of information and understanding of the need to integrate or mainstream indigenous knowledge into scientific knowledge systems for more sustainable development in agriculture within the continent in general. To achieve this integration would require a blend of approaches and methods from science and technology and from indigenous knowledge.

Research Objectives

The study aims at finding out the indigenous knowledge system of climate prediction of the farmer and relate same to the modern as an integrative system for efficiency and sustainability. Towards the attainment of the stated aim are the

following objectives.

1. To identify the main farm operations that could be weather related;
2. To review the main dynamic climatological features and controls in the sub-region;
3. To establish the main indigenous knowledge system of weather and climate prediction utilized by peasants in the area;
4. To suggest possible avenues for integration.

Research Methodology

The research design used in this study is the survey design. A research design is the strategy adopted by the researcher in the carrying out investigation and consequently answer research questions and test hypothesis postulated for the study. The decision to adopt the survey research in this study derives

from its economic stand point, amongst others.

Study Area

The study is conducted in Akwa Ibom State, Nigeria (fig. 1). Studies are based on the agro-ecological zones ‘sculptured’ from the Agricultural Development programmes (ADPs) of the Federal Republic of Nigeria. Located within latitudes $4^{\circ}32'$ and $5^{\circ}63'$ north of the equator the climate is characteristically humid with two seasons. The wet or raining season with annual precipitation of over 2,200mm begins in April and ends in October. The dry season, begins in November and ends in March.

The State exploits three farming seasons – early, late and dry season farming periods. Major food crops include cassava, rice, maize, yam, cocoyam, water yam, melon etc. vegetable are also grown extensively and such include fluted pumpkin, bitter leaf,

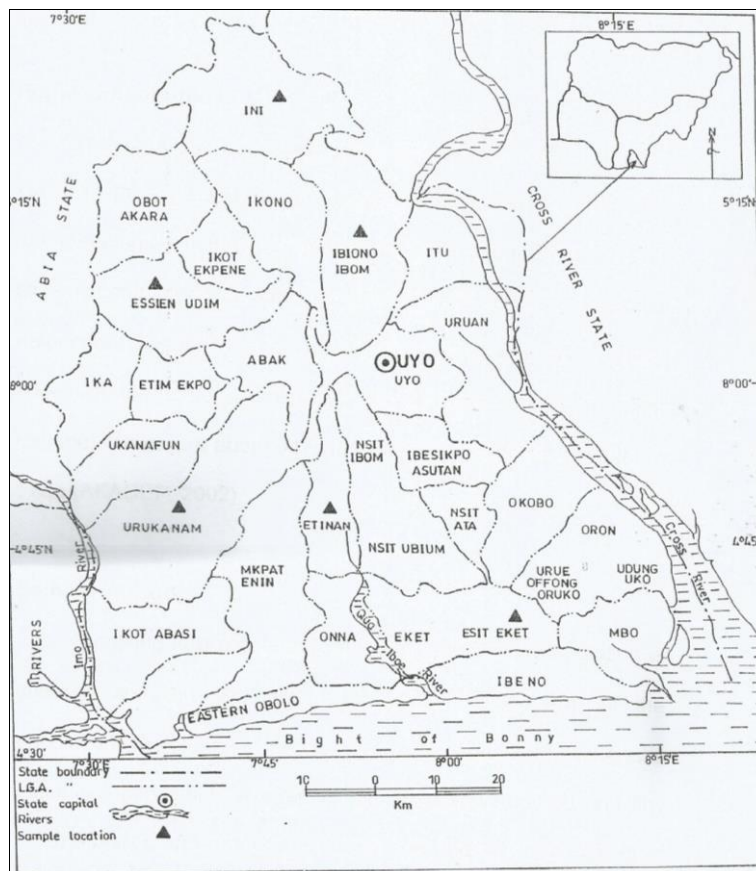


Fig 1: Akwa Ibom State Map Showing Locatins

Water leaf, Okra, pepper and afang (*Gnetum africanum*). Besides it is also rich in cash crops such as oil palm, rubber etc.

Population of study

The population of study comprise all the agro-ecological zones of the state and the corresponding local government areas, to the ecological belt. Consequently, the six ecological zones. The study is conducted with an estimated population of three thousand respondent peasant farmers drawn from the six agro-ecological zones of the state. (Abak, Uyo, Eket, Etinah,

Oron and Ikot Ekpene). There are about 342,131 farming families in Akwa Ibom State (AKADEP, 2002).

Sample of study

Sampling is a process in which a portion of a population is carefully selected and taken as being representative of the population” (Awolunde *et al.*, 1997). Consequently, out of the total estimated population of three thousand, seven hundred and fifty (750) staple crop farmers are drawn from the six agro-ecological zones one hundred and twenty-five (125) each from each zone randomly selected. The sample (750)

represents 25% of the total estimated population under study. Pell (1982) argues that it is a proportion reasonable enough for research work.

Sampling Technique

The sampling procedure adopted for this study is the purposive multi-stage random sampling technique. In each LGA, five farming communities are selected using stratified random techniques which gives a total of thirty communities. Thereafter twenty-five farming house holds selected making a total of seven hundred and fifty peasants farmers used for the stud. Stratification helps to ensure representativeness of the different farming peasantry groups of the population (Enoh, 2004).

Instrumentation

This study utilizes the questionnaire, unstructured interview and participatory observation methods to collect the needed data. Such structured questionnaire sought the respondents opinion on the subject of climate and climate prediction specifically and generally. The face-to-face method is used to administer the questionnaire. This method is appropriate because apart from ensuring a high response rate, the possibility of misinterpretation of the questions by the respondents is eliminated. Besides, it ensures accurate sampling and collection of relevant data from the respondents. The Likert-type response categories are preferred because the format apart from other advantages increases comparability.

Validation and Reliability of instrument

The questionnaire item are tested using a pilot study technique where 50 questionnaire are initially distributed the respondents. The essence of this study however, is to test how it will work and how it can be improved upon for proficiency. The test re-test technique is used to establish the reliability of the instrument. And as defined by Kerlingei (1973), William (1979), Bowel *et al.* (1980), it is a process of obtaining information on the degree to which a measure will yield similar results for the same respondents at different times.

Data Presentation and Analysis

Frequency and percentages are utilized in assessing the degree of the respondents acceptance or otherwise of the specified environmental events and cultural beliefs. The contingency table, the chi-square test is used in testing the hypothesis that the respondent indigenous level of weather and climate prediction and forecast is as would have been expected, from a theoretical standpoint. The null hypothesis rejection level is put at the 99% confidence level.

Conceptual Framework

Sustainable development concept

The concept of sustainable development in as first used by the International Union for the Conservation of Nature (IUCN) and strictly applied for the sustainability of the global ecosystem for humanity. The interest of this world body was restricted to three cardinal areas namely; the sustainable use of resources, maintenance of ecological processes and balance and the maintenance of genetic diversity. But the common usage of the term was popularized by the Brundtland

commission of the world commission on Environment and Development that defines sustainable development as “meeting the needs of the present without compromising the ability of the future generation generations to meet their own need: According to the World Development Report 1992, “the idea of sustaining the earth has proved a powerful metaphor in raising public awareness and focusing on the need for better environmental stewardship. In the words of Cunnigham and Saigo(1997) it is progress in human well-being that can be extended or prolonged over many genera over many generations rather than a few years.

In the present study, to stay alive is to be sustainable and the concept of sustainable development is crucial in its entirety to human survival and well-being. The peasants have had to harness all including his knowledge of the immediate environment to sustain his farm enterprise. In all of human endeavours be it socio-economic, political and technological, one is believe ng that there is certainly a tomorrow that must be better than today. He therefore attempts putting in place policies and directives that if followed will make the tomorrow better than today. The farmer in this study does not only rely upon his knowledge of weather and climate of the immediate vicinity for the commencement of his operations but also the soils and its state as well as the seedlings for planting. The above knowledge are essential sense material inputs for sustained output and an economically sustainable farm business. Particularly the integration of the indigenous ideas with the orthodox can give rise to reduced risks while productivity may be sustained.

Among the several rationale of the sustainable development concept, the fifth and the last that touches on the increasing poverty of many people, especially in the developing world like ours, and the inadequate human and organizational capacity to redress the situation renders it apt for the study. The terms of reference of the commission set-up to identify the objectives of the concept includes the proposition of long-term environmental strategies for archiving sustainable development by year 2000 and beyond; the identification of how relationships among people, resources, environment and development could be incorporated into national and international policies. Consequently the commission identified six critical areas to focus on including population, food security, loss of species and genetic resources, energy and human settlement. The objectives as clearly enunciated include reviving growth, changing the quality of growth, meeting the essential needs of people for job, food, energy, re-orienting technology and managing risk as well as merging environment and economics in decision making.

Findings and Discussions

A. Weather-related farm preparatory activities in Akwa Ibom State Southeastern Nigeria.

Located within the equatorial tropics with two distinct seasons, the work of the average farmer particularly those leading upto the cropping or planting stages appear to be largely tide to the average atmospheric expressions or conditions of the area. Of the seasons, the rainy (April – October) may be regarded as the growing and harvesting season for most of the crops, while the dry season (November – March) where the study is most focused, is rather seen as

period for the continuation of harvesting and primarily, the land preparatory period for the forthcoming farming season. In practice or as gathered from the field survey and interactions, the farm preparatory processes are far more tasking and demanding because of the need to 'roundup' the processes involved before the first theoretical rains, about the 15th pentale (middle to end of March) (Adefolalu, 1981). In practice also, the actual preparations begin about February due

to late harvesting of some late crops and the shredding of the bush with the high sun and temperatures for ease of the operations particularly the first stage.

The weather-related farming calendar as gathered from field interactions consisting broadly of clearing, gathering and burning, tilling or hoeing, and the actual planting or sowing (Table 1).

Table 1: Farm preparatory processes and cropping calendar farmers in Akwa Ibom State, south-eastern Nigeria

S/N	Activities	Duration	Specific month of year	Mean weather on conditions
1.	Bush Clearings	2-4 weeks	February/March	Partly Harmattan, sunny
2.	Gathering and Burning	2 weeks	Late March	Sunny, highest temperature
3.	Tilling / Hoeing	2 – 4 weeks	Late March / April	Sunny with cumulus clouds build-up; slight rains
4.	Seed sowing and Planning	2 – 4 weeks	April	Sunny, Cumulonimbus clouds/full rains
5.	Growing; weeding, harvesting	Normal Crop cycle	May – October November	Normal weather requirements for growth

Source: Field Survey, 2006.

In the tropical rainfall agriculture of the study area, the type of clearing work and order it takes should vary according to the vegetation that is to be cleared, the rainfall distribution pattern, the crops to be grown, availability of tools and the cultural background of the farmers (Miracle, 1907 pp 41-7). For the peasants in the study area the farm clearing system is usually the complete removal of the weeds, leaving standing few secondary trees to serve as climbers for pumpkins and water yam. The month of February is about the middle of the dry season month (locally though) with less than 5% percentage probability for any active convective activity (Adetolalu, 1981; Inyang, 1981). Armed with this knowledge and the diurnal and monthly average temperatures of over 30°C, the fallow is shredded enough to attract or enhance the first process of bush or farmland clearings. Men of ages thirty-five and above or school dropout armed with machetes or the cutlass as the main capital tool irk their living through the rendering of this services as professionals in the villages. Alongside friends, associates and groups may be invited to facilitate the exercise in cases where the farmland is about an acre or more.

The actual bush clearing exercise either by the farmer, groups or the professionals usually commences as early as six in the morning. By mid-day or 1 pm, the team is either on break or closes for the day; avoiding thereby the period of intense sun. In some cases, the team gathers back from 5 or thereabout in the evening to continue the work for large farmlands or as demanded by the farmer so as to catch-up with others if he/she had commenced her preparation lately. Normally, the bush clearing phase of the exercises is completed within a week.

Gathering and Burning

Soon as the clearing is completed and the cuttings left to be dried two weeks after, the stage is set for the next procedure which is the gathering and burning in the month of March. Though are agriculture extension agents of the ministry of Agriculture and Natural Resources as well as the Environmental officers in the ministry of the Environment often advice against the habit, the peasant farming populace in the study area are holding on fast to this practice. "If it is possible I will set fire on every inch of my farm as growths / yields are always better on those spots where the cuttings are

gathered and burnt", they insisted.

The burning phase, first involves a sub-process, termed collecting or gathering whereby the sun-dried cuttings from the previous clearing or cuttings are gathered into heaps randomly on the farm plot. Usually carried out by the farmer, the exact timings is late March when the highest diurnal temperatures of 33°C and above might have completely sun-dried the material vegetal wastes as much as possible. With completion of the gathering sub-process the setting on fire of the heaps, of the dried plant residues follows almost immediately to avoid the rain that can occur without much warning as a result of a random convection activity. The disadvantages of the exercise are as many beginning with the ecological problems of bush burning, to life and material losses from farmland fires near residential abodes or farmsteads.

Tilling and Hoeing

This farm preparatory process like the two other activities earlier described is weather dependent. To begin with tilling is a more capital intensive venture that majority of farmers can hardly do without due to its somewhat direct influence on yield. However, most peasant do not venture into it except where the farm plot is small; commercial food croppers however do venture into tilling cost notwithstanding.

Tilling the soil is delayed until the first rains to soften the soil which might have been sun-dried with the removal of the surface cover by clearing a month or earlier. With alluvial soils near water bodies or rich secondary forests etc. tilling and cropping may commence almost immediately after as such soils are still wet and moist. Other farmlands are usually left until the first rains in late March before tilling.

For food crop farmers in the study area tilling are broadly of two types, depending on the crops planted and income. The plain tilling, without mounts is the commonest practiced mainly by the aged small holding farmer for cassava, okra, fruited pumpkins, water leaf, cocoyam and maize etc. Except for cassava which are processed and sold either as garri or fofo, tilling the soil without mounts is akin to small holding vegetable growers with the sole aim of farming for self-sufficiency and sustenance.

Tilling with mounts involves the moulding or making of heaps

or mounts about one meter or so high on the plot. Mostly croppers of yam, maize, melon, water yam and cassava (of late), with relative economic power often till the farm land with mounts. With the mounts also such farms are always spared erosion and severe moisture loss as well as crops being washed away when flooded from the characteristic torrential downpours.

Planting

Planting, the last of the preparatory processes of the peasant farmer is very much weather dependent as the seeds, tubers and / or stems must be buried (planted) in most cases a week or so to the first rains or soon after the first rains that moisturizes and cools the soil. However, in the absence of weather extension services (Afangideh, 2006) due to the government's apparently nonchalant attitude towards the development of this field of weather forecasting and extension for agriculture, to the very dynamic and variable nature of the tropical weather and climate system, the farmer is left with the high risk of embarking on planting without firm assurance that the much awaited active connective activity is expectedly arriving. Quite often, the peasant farmer is at the mercy of the weather and climate system of his immediate locality a times with fastings and prayers for the first rains and effective commencement of the summer seasons of which he has no control over. Occasionally, he incurs early losses and setbacks soon after committing part of his 'floral capital' into the soil based totally on his local deductive knowledge of the village farming calendar tied to his limited and unscientific years of observations and interpretation of the environment around him. Replanting in such cases is always the only solution following delayed or outright extreme soil temperature and heat as the germinating seeds, stems or tuber withers with soil and terrestrial temperatures of 35°C and above. Alternatively, the harvest for that year is certainly about the poorest if the means for replanting cannot be embarked upon by the farmer.

B. Summary of dynamic climatology of Akwa Ibom, Southeast Nigeria

The area of study is located in the Humid Tropical (Af) climate type (Koppen schema) within latitudes 4°32' and 5°53'

North and longitudes 7°25' and 8°25' East (Akwa Ibom pages, 2005). It has a strong oceanic influence being bordered by the Atlantic Ocean (the Gulf of Guinea) in the south. Geomorphologically, the entire study areas lies in five main terrain's viz the alluvial plains, coastal ridge sands, rolling sandy plains, dissected upland and the Obotme isolated hills (a collection of hills that rise to 150 metres above sea level. The major soils of the state belong to the ultisol order of the USA soil taxonomy characterized by deep and well weathered profile and a pattern of clay bulge profile. They generally have loamy-sand to sandy-loam surface layers over sandy clay loam to sandy clay subsoils. (Akwa Ibom Yellow pages, 2005).

However, the Dynamic climatology of the sub-region have been well documented (Archold, 1972; 1987 and 1981a; Hamilton, Archold 1945; Obasi, 1966; Krishnamurti *et al.*, 1973; Nicholson, 2000; 1981, 1993, 1997). The main dynamic climatological features of the sub-region therefore include the inter-tropical. Discontinuity and the low and high levels perturbations (winds) amongst a few other synoptic scale features (figure 11).

The Inter-Tropical Discontinuity (ITD) that marks the separation point between the two major wind systems in the sub-region is utilized for weather and climates classification and prediction once its east – west orientation has been ascertained. This synoptic feature forming a trough at the meeting point of the two airmasses has a 4 to 6 day meridional oscillations, there is a time lag of between 6 and 12 hours for the surge to extend from lower levels (850mb) to 700mb and, the occurrence of a peak at the station to the east precedes that to the west. (Adefolalu, 1974, 1981). The airmass school of thought utilizing the North / South oscillation of the feature has been able to demarcate the zone into A, B, C & D that approximates largely the Desert, Semi-desert, Tropical and Equatorial weather and climates types. Season after season, in practices; north of the feature is the zone A (Desert type) while immediately below it is the zone B or the semi desert climate type; and so on natural climate change and variability is best understood with the feature. The main wind systems that directly determine the weather and climate of the entire West African sub-region where the study area situates are continental North-easterlies and the maritime.

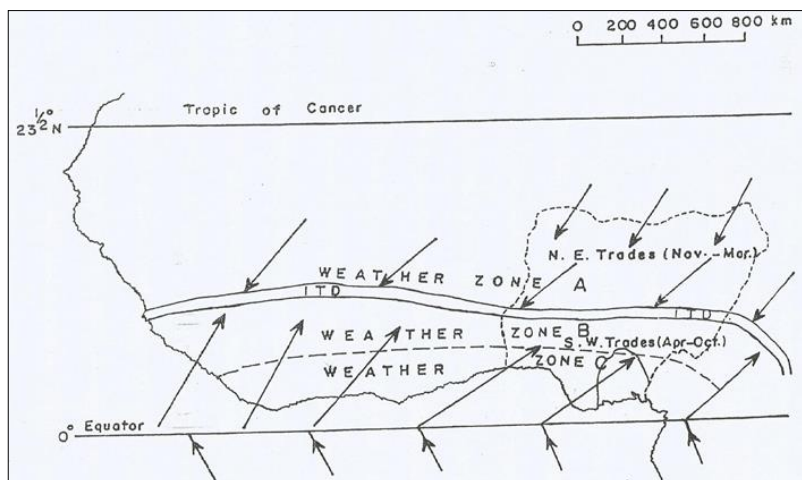


Fig 2: mean weather zones in west Africa during the northern summer April- October

South – westerlies. While the former, locally known as the ‘harmattan’ with the source region being the Sahara desert is the main surface wind system between the months of November and March (locally the dry season in the entire sub-region). Fig. 1 refer, the maritime southwest trade wind or the monsoon, is moisture laden with the south Atlantic as its source region, blows mainly during the northern summer (April to October). Advance knowledge of the variations and the strength of the operational capacity for the air masses, particularly the Southwest monsoon, are important to the average farmer as amongst other things it marks the beginning as well as the end of the preparation stages for farm activities. With years of deductive observations the average farmer can to some great extend be able to relate some to characteristic changes in some components of his biotic and abiotic environment to embark on his farm work year in year out with the knowledge of the apparent onset or cessation of the maritime southwesterly particularly.

Indigenous knowledge system of climate prediction in Akwa Ibom State South Eastern, Nigeria.

Table II below indicates the results of a checklist designed specifically to assess the degree of respondents’ acceptance or otherwise on a 14 commonly held weather-related local beliefs and/or myths on the subject matter. To provide immediate and easy hints for comparisons, frequencies and percentages are used. In doing this however the high and very high categories on the Likert scale measurement instruments were collapsed into one category ‘high’ giving us a total of three categories of responses namely ‘high’ ‘low’ ‘not at all’. The results of the analysis is presented below.

Table 2: Percentage use of indigenous knowledge system as farm preparatory guides

S/N	Item Description	High	Low	Not	Grand %
1	Clear night skies	60	31	8.9	99.9
2	Rise in tidal currents	37	35.5	26.4	99.7
3	Sights and sounds of uncommon birds	50.5	39.5	10	100
4	High sunny afternoons	49.2	40.9	9.9	100
5	Rainfall in nearby villages	61.3	34.7	6.0	99.6
6	High velocity winds	48.4	42.4	8.8	99.7
7	Low dark cloud cover	67.0	25.6	7.1	100
8	Thunder and lightning	57	37.5	5.5	100
9	Trees shedding of leaves	46.6	38.5	14.9	100
10	Sightings of the rainbow	68.1	25.3	6.6	100
11	Death of a village personality	24	23	52.2	99.3
12	Sighting the moon	35.8	37.8	26.4	100
13	Bush / wild fires	10.1	12.9	77.1	100
14	High soil temperatures	44.1	41.9	14	100

Source: Field Survey, 2006

The results show that a greater proportion of the respondents (above 50%) tend to agree that clear night skies, sighting and sounds of uncommon or migratory birds, rainfall in nearby villages, thunder and lightning, low dark cloud cover, the sighting of the rainbow serve as potent climate and weather predictive tools in their farm work. Of minimal or not so high importance however include soil temperatures. The result also indicate that 60% of respondents on the average tend to agree

that the death of a village personality and bush/wild fires are not of any relevance weather-wise in their farm preparatory operations.

As a way of concluding whether indeed the responses above does meet theoretically expectation or otherwise the field responses are subjected to a contingency test with the chi-square technique at 99% level of confidence below (Table III).

Table 3: Contingency Table and Test

High		Low		Not at all		Grand
O	E	O	E	O	E	
408	352	271	269	50	139	729
283	362	253	277	213	143	749
378	362	296	277	76	143	750
316	362	360	277	24	143	750
444	362	260	277	45	143	749
363	362	312	277	66	143	750
492	362	321	277	27	143	750
427	362	281	277	41	143	749
345	362	290	277	115	143	750
510	358	187	274	45	142	742
187	357	172	274	382	142	741
243	357	283	273	213	141	739
79	362	155	277	516	143	750
345	348	330	266	45	137	720

Into the chi-square test given as:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

$$= \frac{(403 - 354)^2}{352} + \frac{(271 - 264)^2}{264} + \frac{(50 - 139)^2}{139}$$

$$+ \frac{(283 - 362)^2}{362} + \frac{(253 - 277)^2}{277} + \frac{(213 - 143)^2}{143}$$

$$+ \frac{(378 - 362)^2}{362} + \frac{(296 - 277)^2}{277} + \frac{(76 - 143)^2}{143}$$

$$+ \frac{(316 - 362)^2}{362} + \frac{(366 - 277)^2}{277} + \frac{(74 - 143)^2}{143}$$

$$+ \frac{(444 - 362)^2}{362} + \frac{(260 - 277)^2}{277} + \frac{(45 - 143)^2}{143}$$

$$+ \frac{(363 - 362)^2}{362} + \frac{(321 - 277)^2}{277} + \frac{(66 - 143)^2}{143}$$

$$+ \frac{(492 - 362)^2}{362} + \frac{(231 - 277)^2}{277} + \frac{(27 - 143)^2}{143}$$

$$+ \frac{(427 - 362)^2}{362} + \frac{(281 - 277)^2}{277} + \frac{(41 - 143)^2}{143}$$

$$+ \frac{(345 - 362)^2}{362} + \frac{(290 - 277)^2}{277} + \frac{(115 - 143)^2}{143}$$

$$+ \frac{(510 - 358)^2}{358} + \frac{(187 - 274)^2}{274} + \frac{(45 - 143)^2}{143}$$

$$+ \frac{(187 - 358)^2}{358} + \frac{(172 - 274)^2}{274} + \frac{(182 - 142)^2}{142}$$

$$+ \frac{(243 - 357)^2}{357} + \frac{(283 - 273)^2}{273} + \frac{(213 - 141)^2}{141}$$

$$+ \frac{(79 - 362)^2}{362} + \frac{(255 - 277)^2}{277} + \frac{(516 - 143)^2}{143}$$

$$+ \frac{(345 - 348)^2}{348} + \frac{(330 - 266)^2}{266} + \frac{(45 - 137)^2}{137}$$

Chi – square calculated:
0.70+1.3+31.2+5.8+28.5+33+2+18.5+1.04+67.1+0.0+6.9+41.

$4+46.4+7.6+94.0+16.6+0.0+72.7+0.7+0.61+5.4+64.5+27.6+67.1+81.0+37.9+40.5+36.4+0.3+36.7+22.2+53.7+72.9+0.0+15.3+16.7= 1097.7.$

X^2 Critical at 99% confidence

= (number of rows – 1) x (number of columns – 1)

= (14 – 1) x (3 – 1) = 13 x 2 = 26 degree of freedom = 45.642 = 45.642.

Decision: With the calculated X^2 value higher than the critical, the null hypothesis stating that the responses are not in line with theoretical expectation is rejected for the alternative.

Discussion of findings and Conclusion

There is no doubt that the peasant farming populace in the study area and elsewhere do rely greatly on a number of weather related indigenous ideas and myths in their enterprise particularly during the farm preparatory stages. Together with a few other objectives, the overriding objective were to determine the major weather – related farm preparatory activities as well as the indigenous or local knowledge system of weather and climatic predictions of the peasants. Such can be further developed in partnership with the modern technique of weather forecasting for "... Social learning and more efficient management for agricultural and food crop sustainability through greater inclusion and integration (Kates, 200; Kane and Yohee, 2000; Adger and Tompkin, 2002) if developed. Results of the statistical hypothesis testing established significantly the fact that the respondents local knowledge have a theoretically basic at 99% probability and (Row – 1) (column – 1) = 26 degrees of freedom ($X^2_{c} > X^2_t = 1097 > 45.9$) that led to the rejection of the null for the alternative hypothesis.

Firstly on meteorological and dynamic climatological basis, the high percentage responses reveal some established micro weather producing systems of the tropics and atmospheric states not understood by the peasant farmer due to their low or lack of education. For instance, rainfall in neighboring villages (61.13%), low dark cloud cover presumably of the cumulus family (67%), as well as incidences of thunder and lightning. (Although low 57%). These are situations of barometric tendency, or instability with slight to heavy rains the obvious-resultant for which the village regard as a myth for it is unexplainable. On the other hand, bright night skies, (60%), and the sightings of the rainbows are indicative generally of stability in the atmosphere (anticyclonicity) or fine weather; rains may not be so immediately envisaged. The farmer does not again realize this fact appearing to him as yet a myth. Year in and out, the village farmer have been relying on visual observations of the atmospheric environment around him for the start-off of his farming year without an academic dimension directly by him or indirectly by agencies of the state. The appropriate authorities of the state can be made to partner with them regarding the monitoring, observation and documentation of these weather – related phenomena, and their farm enterprise may be more enhanced and sustainably managed. Weather and climate predictions may be based on it or such observations can be agency.

The completely local knowledge ideas comprising the sightings and sounds of uncommon birds (50%), low but widely indexed trees shedding of leaves (46.6%) and warmer than normal soil temperatures on bare foot equally have their

places in weather and climatic prediction for sustainable agriculture and food production. One can effectively be made to monitor and document the onsets, number, types and duration's of these migratory seasonal birds the main ones being the cattle egrets and sundara eagle to be related with the onset character of the rains besides factoring same into the general equation for weather forecasting in the sub region as a whole. The almond tree and a few others (amelina) in the study area are noted for the complete shedding off of leaves as the dry season approaches. Its timing, intensity and duration of this unique attribute when monitored and quantified may serve as additional local and indigenous tool in the prediction of the environment to come or used alongside modern weather and climate prediction tools for the peasants. Planned integration with trained personnel comprising the environmentalist, climatologist and meteorologist as well as the farmers themselves can revolutionize the rural mainstay consisting mainly peasant rain fed agricultural may be modernized and enhanced for sustainability from the above perspective. Key words: Integration, Indigenous Knowledge, sustainable development dynamic climatology.

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