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An Application of SWOT Analysis in Development of Underutilized Plant Species in a Rural Hot Spur in Africa

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Abstract: ***Various assessments on local and national food security and natural resources conservation efforts have reported results which are yet to change/improve the trend particularly on neglected food crops of local significance. SWOT analysis was applied in the study to analyse key strength, weakness, opportunities and threats to the development of selecte indigenous, underutilized and adaptable food crops (Solanum Spp, Amaranthus Spp, Gongronema Spp and Colocasia Spp) in Mbaise, SE Nigeria. Rural appraisal was conducted followed by administration of structured questionnaires on relevant stakeholders across the study area. Results obtained indicate that the food crops have high potential food value (98.4%) and the indigenes also do not lack needed skills in crops' propagation/cultivation (90.3%). The absences of agricultural based research/tertiary institution in addition to inherent poor access to extension service were top areas of weakness identified. Nonetheless, scores of opportunities presented by responding indigenes revealed high medicinal/health value of the crops (87.1%) and accessibility to local markets for produce disposal. Similarly, highest threats observed by the study were prevalence of various competing land uses in the area (50.0%) and incidence of pilfering in farmlands (40.3%). Public and private partnerships (PPP) can stimulate provision of utility and needed rural infrastructural services which can improve local capacity for sustainable food security and conservation.***

Keywords: stakeholders, adaptable food crops, rural appraisal, public and private partnerships

1. Introduction

Attempts to achieve environmental sustainability (through improved vegetation cover) and enhance global food security increasingly face a number of complex challenges which cut across regions and peoples. In different regions and in Africa in particular, producing enough food and wood to meet domestic and other needs appears to be a tall dream in spite of lofty policies on conservation, agriculture and biotechnology (Mayes *et al*., 2011; Sur and Emtage,2006). In regions where plant productivity is relatively optimal, their current production levels need to be sustained effectively through more efficient propagation/cultivation, harvesting, processing and distribution strategies. Of most concern is that the poor who constitute a significant proportion of the African population must be in the position to have at least the minimum requisite (e.g. purchasing power) in order to access and benefit from the results of such programme of action.

Strength, Weakness, Opportunity and Threat (SWOT) is a concept that is rapidly becoming a useful tool in organizations, disciplines, agencies and industries in achieving set desired goals and objectives. SWOT is not only a tool and concept for large organizations and industries, it is also applicable in small outfits and departments, sectors and sub-sectors of an industry (Bryson and Roering, 1987). In the agricultural sector, for instance, application of SWOT concept has led to huge transformations and where it is efficiently employed, it has stepped up production from subsistence to commercial agriculture especially in most Annex I countries. SWOT has been in use in Europe and other advanced countries since 1910 and in various sectors of their economy. Unfortunately, its application is unpopular in Africa and across some other Third World countries (Bolorunduro, 2009).

Reliance on only a few staple crops to meet human dietary requirements as is the case in most parts of Nigeria and the high cost of conventionally consumed food and plant products are driving forces behind the hidden hunger especially in Africa. The nutrient contents of underutilized leafy vegetables, fruits, herbal plants, seed oils etc have been reported across various regions and communities. Some common vegetables for instance bitters and pumpkin leaves possess medicinal properties which have been explored to improve health and longevity. Nutrients contained in some of these vegetables prevent certain forms of cancer in man and promote heart functioning. Again, scientific research in Asia and America has reported huge potentials of neglected plant species to improve human and livestock health and welfare. Their wider utilization, conservation, promotion and value-chain addition processes in these areas can potentially be viable drivers for development especially for farming populations (Afolabi *et al.*, 2012)

SWOT therefore has the potential of offering quick means of arriving at strategic management option that would stimulate growth, capacity, development and progressive enquiry to solutions to myriads of problems which periodically manifest in national and global development strides.

2. SWOT Survey Method and Study Area

The study adopted a participatory approach which involved different stages of Rural Appraisal and Group Discussion methodologies. FAO depository of 1995 documented adaptable crop species across different regions in Africa by country (Sarumi *et al*., 1995).

Different conservation-based groups and NGOs report that Mbaise is one out of a few regions in Nigeria which are agriculturally enterprising and research has cited the above region as being home to a variety of wildlife species including endemic monkeys (Baker, 2013). Edible food crops including fruits, tubers, spices, leafy vegetables and endemic wildlife species occur in Mbaise (Nwachukwu *et al*., 2010). Again, information as contained in CERCOPAN (2002) confirms report of adaptability of important neglected species in the area. More so, some plant species which occur in the above area have been gazetted for improvement and development across West African sub-region by the IFS (2012). Mbaise (Fig 1) is dominantly a rural area inhabited by farmers who largely practice subsistence farming with traditional farming methods and techniques.

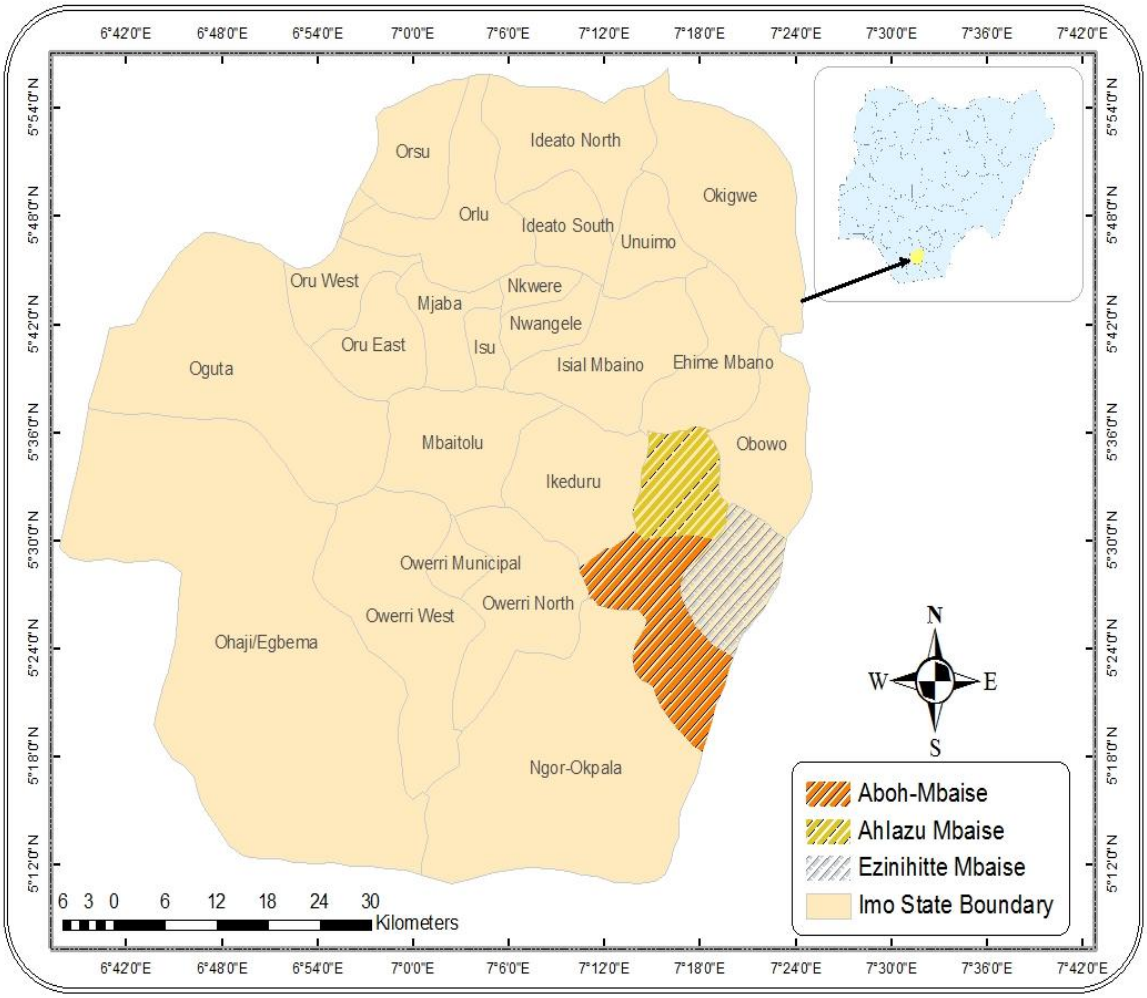

Figure 1: Geographical location of Mbaise in Imo State, Nigeria

Preliminary levels of the research involved stakeholder analysis and consultations to underpin top four (4) of the above classes of edible food crop species with high adaptability rate relative to others across the study area. Rural Appraisal was thereafter done with assistance from co-opted project facilitators (Field Assistants) who have experiences and expertise in rural learning, agricultural extension and field survey. They assisted to drive the field research processes particularly explanations to local respondents on the importance and purpose of the exercise and explaining key questions: strengths, weaknesses, opportunities and threats. Useful information on each of the above SWOT parameters was supplied by respondents themselves having beforehand been explained to that there was no wrong or right answer. Furthermore, respondents were guided through plotting action points to consolidate their strengths, overcome weaknesses, avail opportunities and guard against threats.

Qualitative data were obtained from the study. Based on discretionary judgement of the facilitating team, some of the responses obtained from individual respondents were tallied to denote a given issue. For instance, for crops utilized for their medicinal value, the following were used to denote the same under their given context: used for treating kidney ailments, increasing blood flow, improve sight etc. In effect, this represented a content analysis of the various responses provided by respondents.

Table 1: Focus areas of SWOT parameters in identification of strengths, weaknesses, opportunities and threats

Factors	Explanation points as related to the underutilized crop species
Social issues	Land owners' attitude to the crops; general community's attitude to underutilized crops; conflict incidence and cases; their resolution/management options etc
Resources	Labour, capital, management skills, crop species, seed stock, infrastructure etc
Economic factors	Cost of planting, transportation, livelihood issues, markets and marketing linkages
Physical environment	Wildlife,; pest and diseases; climate and weather condition
Capacity	Knowledge access and availability; existing government policies on crops' cultivation etc

3. Definition of SWOT parameters

SWOT is an acronym which stands for Strength, Weakness, Opportunity and Threat. These four attributes are called SWOT parameters. Table 1 presents focus areas considered (although not exhaustive) in SWOT survey.

- **Strength**: This is anything that is positive that helps an activity or project to succeed. Development of NUS would aim to take advantage of any identified strength factors.
- **Weakness**: This denotes any negative condition that hampers the success of an activity or project. Thus, it reflects an unfavourable condition which limits profitability or productivity of an activity or project. Development of NUS should aim at avoiding or overcoming such factors.
- **Opportunity**: This is an exploratory or potentially innovative way to make an activity or project more successful. This objective or essence is to create an environment more favourable to achieving success and productivity. Development of NUS aims at exploring and exploiting available opportunities in the area.
- **Threat**: This is something inhibitory such that should it happen, it will harm the activity or project and thus reduce its chance of success. Development of NUS aims to avoid or overcome any identified threat.
- Below gives the perceived relative levels of adaptation of some selected crop species grown across the study area by a cross-section of target rural farmer respondents.

Table 2: Adaptability levels of selected underutilized crops in the study area

NUS	*Frequency*	*Percentage*
Solanum Spp	38	61.3
Amaranthus Spp	40	64.5
Gongronema Spp	38	61.3
Murraya Spp	27	43.5
Colocasia Spp	39	62.9

Findings from the SWOT Analysis

The results of the study are presented in Figs 2, 3, 4 and 5 corresponding to Strength, Weaknesses, Opportunities and Threats.

Strength

Food value of underutilized plant species (98.4%) and their cultivation/propagation skills by the respondents (90.3%) were major items of strength to consider in the advancement of the underutilized crop species (Fig 2). Again, the high adaptability of these crops in the study area can as well be sufficiently corroborated to their respective long histories of culinary, domestic and traditional uses and importance.

Essien *et al.*(2013) has documented the use of fruits of *Solanum Spp* for household and community entertainments. Its role in improving health especially bloodflow has also been reported (Afolabi *et al.*, 2012). The use of *Colocasia Spp* as food particularly as soup thickener, *Gongronema Spp* as invaluable condiment/supplement in most local foods and *Amaranthus Spp* as cheap vegetable (Okeke *et al.*, 2008). From the result presented in Fig. 2, an important asset which residents in the study area can effectively utilize is to mainstream available cooperation/collaboration strategies among themselves and other residents to form a formidable front to enhance shift from subsistence to commercial scale enterprise. This is in addition to the availability of fertile lands to local farmers in the region which could potentially spur the growth and cultivation of NUS adaptable in the area.

Weaknesses

Fig. 3 showed that some reasons can be adduced which potentially set back development of NUS among farmers. Analysis of the above indicates that the underlying factors revolve around lack of information and capacity. Non-availability of public or private agency/ institution with focus on agriculture or related discipline had highest percentage (71.0%). This situation, perhaps, accounted for the difficulty as reported by the respondents in accessing the services of crop specialists and experts where they can be found. Action points plotted by respondents to check this incidence include provision of incentives to crop growers by public and private organizations in addition to the provision of sustainable extension services to build and strengthen capacity of farmers. This is hoped to focus more on teaching/demonstrating different methods of growing NUS at different agricultural seasons to ensure farmer understanding and adoption which will translate into crop availability and market.

Opportunity

Various opportunities abound which can be utilized for development of underutilized crop plants within the African continent (Bello, 2013). In Fig. 4, each of the ten (10) different opportunities identified by the research stand to leverage NUS development especially in terms of improving utilization of the crops and their popularization. Table 1 provides a mix of various factors/issues relating to livelihood, capacity, infrastructure and climate which could influence development of neglected and underutilized plant species (NUS). These can be applicable in other locations especially those which have social, environmental and institutional similarities with the study area.

In Fig. 4, results showed evidence of the contribution of the intake of the plant species to good health (87.1%). This is in addition to the easy accessibility to market by respondents (83.9%) to dispose of the produce from the farms. These represent some key items of opportunity to underline in positioning possible plan of action for wider acceptance and

promotion by other relevant stakeholder and government decision makers.

In general, the research observed the entrepreneurial spirit of Africans especially in their quest to improve their livelihood through progressive and persistent search for alternative and/or supplementary income generation. This indeed is an asset which ought to be consolidated to enhance needed rural development and livelihood. Similarly, telephony is reportedly one of the essential infrastructure in most areas both urban and rural. This facilitates information access and dissemination, improves market linkages and promotes healthy relationships amongst players and stakeholders at different scales and levels of operation in the NUS industry.

Like in other sectors and sub-sectors, urbanization impedes conservation and biological development. In the result contained in Fig. 5, competition with agricultural land uses (50.0%) is one observed major threat to the development of NUS. Also, harvest pilfering (40.3%) tends to threaten household and the private sector in the development of neglected crop species. Climate change phenomenon which presents harsh/adverse weather for crops' performance (38.7%) and pest/disease incidence (32.3%) were similarly identified during the survey. Modern land management techniques and multiple land use technologies to ensure productivity of available croplands and cheap/affordable pest/disease control methods, strengthening local security were significant action points presented by respondents.

Threat

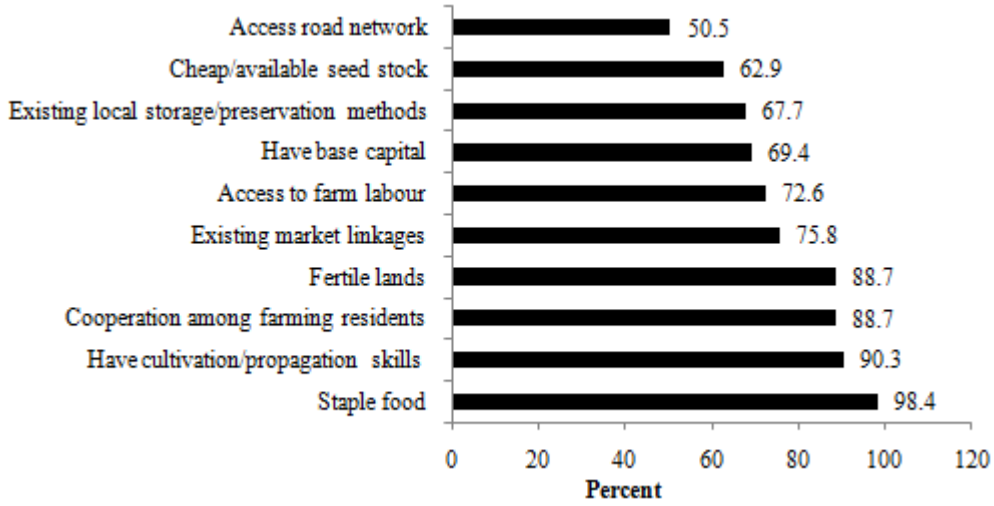

Figure 2: Identified strength factors in the development of NUS in the study area

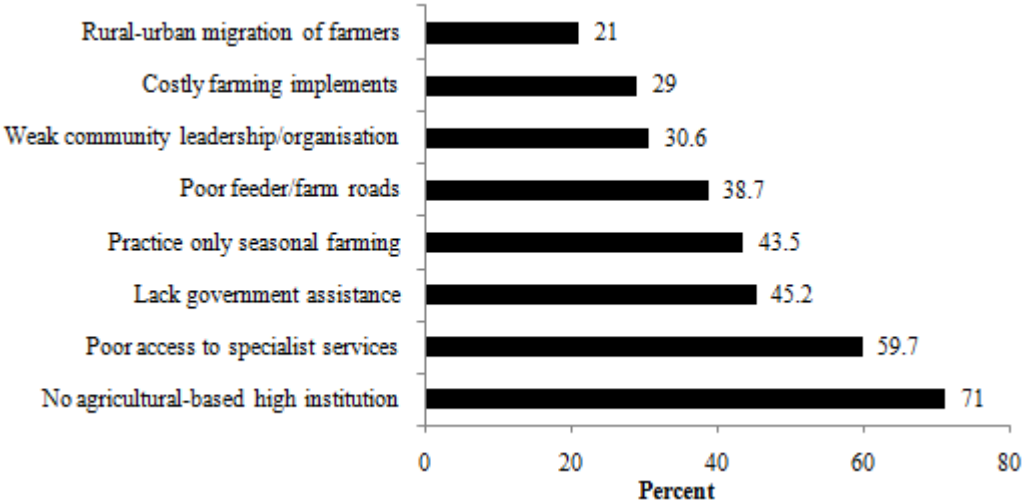

Figure 3: Identified weakness factors in the development of NUS in the study area

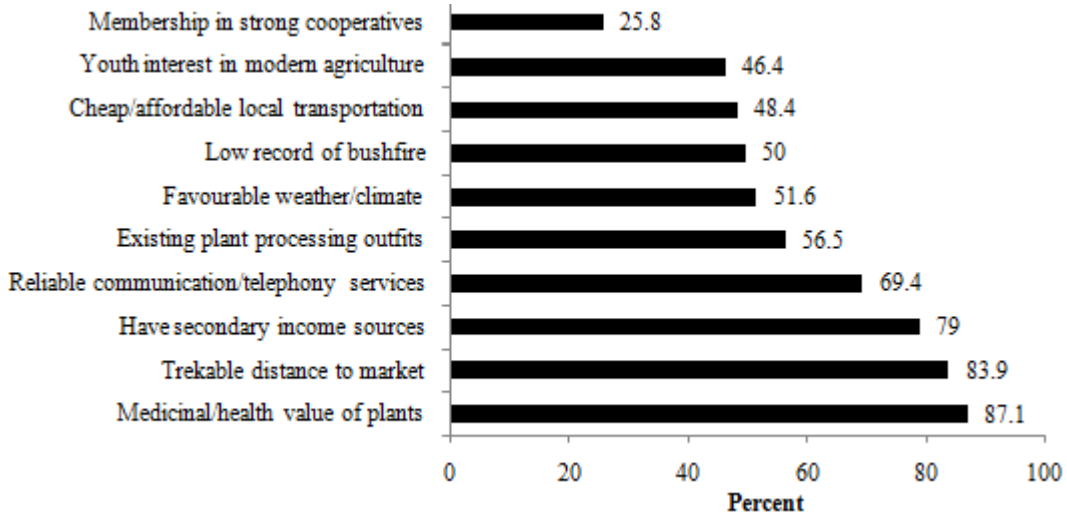

Figure 4: Opportunities for the development of NUS in the study area

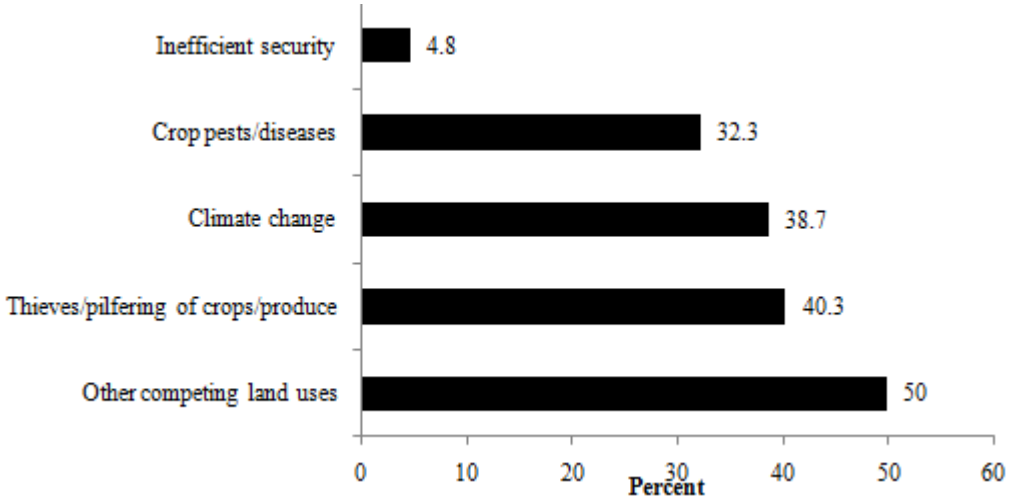

Figure 5: Threats to the development of NUS in the study area

4. Discussions and Policy Implications

Strategic development plan in an organization, industry, sector or sub-sector demands the setting up of goals and targets, identifying and consolidating on identified areas of strength, success or achievements as well as plugging up loop holes or possible areas of losses (Viruthiyel and Jonsson, 2008). To achieve sustainability in any development, policy issues should revolve sustenance of areas of strength with a view to adopting same as a possible institutionalized plan. In the result (Fig. 2), about half of the respondents (50.5%) enjoy accessible roads network in the area. It is reasonable to imply from the above result that about one in every two across the study area resides within an environment where transportation is limited due possibly to bad road network. This depicts likely weak management and culture especially in terms of maintenance of existing infrastructure and public utility. In Nigeria and to an extent in other developing African countries, road construction, rehabilitation and maintenance are exclusive preserve and mandate of the government. Public and private partnerships (PPP) can stimulate provision of utility and needed rural infrastructural services which in many instances show capacity of having positive multiplier effect on agricultural productivity and food security (NARSP, 1995).

More efficient local seed preservation methods to complement most times the conventionally open drying and smoking methods that can ensure longer seed viability and which does not require skills and expertise to handling as presented in Fig. 2 will improve sustainability in NUS cultivation. Communities and regions can be empowered by government to produce crops best adaptable in their respective and immediate areas/environments. The available fertile lands in the area, market linkages already available to the farmers and the huge values and utility which staple food provide are notable strength factors which should stimulate agro-exhibition and fairs for rural development. Exhibitions and fairs on domestic agro-allied products of local people have opened up trade linkages and promoted local development in many poor countries. Such exercise will open wider platforms for publicity and competitions which will translate into increased price returns for crop purchases, improved income for farmers, their households and their communities.

Improvements in access to information/awareness of local people are forms of capacity building. Ecological specialization which regrettably is not often considered in agricultural policy implementation has in this study been shown to be imperative for consideration especially for local agricultural development plan. This can form a major action

plan of local agricultural policy formulation. This involves the utilization of resources (human, natural, social and economic) in the planning processes and execution of programmes of local empowerment in an area where a given community or region has comparatively better advantage in than others. Again, with good planning and collaboration, monotechnic or similar higher institution with focus on agricultural and plant sciences will serve useful instruments towards providing the needed capacity, information access and support especially in terms of demonstration and popularization of such initiative. In the light of the above, as a progress marker to success in capacity building, the local farmers should be made to access needed services with minimal assistance, supervision and support. Such a capacity development/building will help surmount the difficulty perennially observed particularly in growing agricultural crops in season as well as off-season periods (Fig. 3).

Across most African communities, climatic variables are minimally optimal for crop/wildlife growth and performance. This is an area where botanists, plant/wildlife conservationists, foresters, crop geneticists and ecologists should cash in to take food production and security to the next level. Various promising varieties of fruits and vegetables have successfully been grown in harsher Australian climate which can be well domesticated in Africa (Morgan and Scholar, 2009). This is in addition to the low records of bush fire in Nigeria which are often a recurring decimal in other drier regions of Nigeria.

Although feeder/farm roads were reported to be in poor state (Fig. 3), proximity of respondents abode (settlement area) to market place should not be a sufficient reason to allow farm roads be in more deplorable condition. This will necessitate the establishment of Ecological Specialization Fund and broadening the mandate of the State and Federal Ministries of Agriculture, Departments of Rural Development and similar agencies/parastatals where they exist towards articulating and addressing key food production needs/challenges for different regions and areas. If production of these crops becomes high in the near future, there could be possibility of the region becoming an attraction point/hub for tourism, commerce, research and collaboration.

More importantly, having identified huge values in underutilized species to cure ailments and possibly be a remedy to most persistent and contemporary ill-health conditions particularly in the face of fake and adulterated synthetic drugs, biologists and agriculturists can now favourably partner with global, regional and national health workers to ensure popularization of these potential plant species.

5. Conclusion

The huge attention being focused on conventional food crops with their attendant low productivity and the neglect of other valuable crop alternatives is one of the many reasons for the growing food security dilemma across the globe and Africa in particular. Rightly put, the agricultural sector is one foremost sector which stands to benefit from SWOT research if promoted at different agricultural processes and also at the different value-chain levels. Strength factors vary across communities and regions. This is same with weaknesses, opportunities and threats. In Mbaise region of Nigeria where significant records of NUS abound, development of functional small/medium scale cottage industries to process and increase value of the NUS cultivated and used as staple food will promote their use, conservation and further domestication. Again, collaboration and capacity building especially of the rural farmers should be stepped up through educational empowerment for instance establishment of agro-based institutions which is top identified weakness. The rural farmers seemed non-conversant with modern multiple land use practices which offer an integrated approach to check poor land management and minimize adverse and competing land use influences. This should be as a matter of urgent local policy discourse and supported by relevant government agencies to ensure its success.

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