



12

NORTH EAST ARID ZONE DEVELOPMENT PROGRAMME: DIASPORA PARTNERSHIP OPPORTUNITY IN RESEARCH AND DEVELOPMENT IN THE SAHEL OF NIGERIA

PROF. NJIDDA M. GADZAMA

University of Maiduguri, Nigeria
Biotechnology Centre, University of Maiduguri,
P.M.B. 1069. Maiduguri, Nigeria
Email: njiddagadzama@gmail.com

ABSTRACT

PURPOSE: The purpose of this paper is to showcase and share, at international level, the successes in the collaboration between the North-East Arid Zone Development Programme (NEAZDP) and the Center for Arid Zone Studies (CAZS), University of Maiduguri in research and development inputs. NEAZDP was designed for the improvement of rural sustainable livelihoods, thereby reducing poverty and soil degradation in Yobe and Borno States of Nigeria, with effects of climate change on rural communities.

DESIGN/METHODOLOGY/APPROACH: NEAZDP was a well-planned socio-agricultural livelihood project that had the support of base-line scientific data provided by the multi-disciplinary CAZS. Programme management and technical assistance services were provided by the Danish group of consultants (Danagro Adviser A/C and Hannemann A/S) in partnership with a Nigerian company, Diyam Consultants, for the period 1987-1995. An environmental impact assessment, community reconnaissance and needs assessments were all carried out as an initial part of pre-project activities, thereby making the communities more aware and educated about the accruable benefits of the projects for sustainable environment and livelihoods.

FINDINGS: Yobe and Borno States are the most desertification affected states in Nigeria. In fact, they are part of the country's *frontline* desert threatened states, constituting more than 40% of the total land mass of Nigeria. This strategic

intervention empowered the rural communities, improved livelihoods, and attenuated some of the detrimental social, economic and environmental impacts in the two states. The project has strengthened the people's resilience, encouraging participation in arid agriculture, aquaculture, Great Green Wall development, trading, dry season gardening and many other developments. Because of its success, especially what Yobe State has sustained to date, the NEAZAP concept of sustainable rural development was adopted.

ORIGINALITY AND VALUE: The successful implementation of the project is a case study of the collaborative efforts of NEAZDP and CAZS, both financially supported by the Delegation of European Communities, which has achieved the desired results for the benefit of the rural communities, environmentally friendly activities, and sound foundation for sustainable development. The success of the project is discussed, with recommendations for active future participation and collaboration of Diasporas in similar research and developments in Nigeria.

KEYWORDS: Partnership in research and development, sustainable livelihood, bilateral financial support, community participation, environmental impact assessment, Great Green Wall and sustainable rural development.

INTRODUCTION

The United Nations Conference on Environment and Development (UNCED, 1992) held in Rio de Janeiro (3-14 June 1992), was a landmark in providing international interest groups with a venue to express their specific concerns on the issues of the state of the world's environment. The basic recurring theme in the proclaimed 27 declarations of UNCED '92 was a call for all nations to co-operate in matters of the environment and development. In this regard, the principle of the declaration stipulated that to achieve sustainable development and higher quality of life for all people, states (countries) should reduce and eliminate unattainable patterns of production and consumption, and promote appropriate demographic policies (United Nations, 1992).

Unfortunately, perhaps due to poverty, lack of sound planning and based on scientific data, many developing countries have not developed the capability of assessing the environmental impact of projects. Many developing countries have few resources to commit to the assessment of environmental impact; in many cases the additional external support required to achieve a sound assessment is also lacking.

In this case, the spirit of Principle 6 is noteworthy. It states that "the special production and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interest and needs of all countries". It is quite obvious, therefore, that good

progress in both environmental matters and development, particularly in developing countries, requires a give-and-take relationship, understanding and collaboration between the north and south.

For the south, there are some who believe that two fundamental strategic objectives should determine the negotiating position of developing countries (The South Centre, Geneva, 1993). These are:

- 1 “to ensure that the South had adequate environmental space for its future development and
- 2 To modify global economic relation in such a way that the South obtains the required resources, technology, and access to market which would enable it to pursue a development process rapid enough to meet the needs aspirations of its growing population.”

It is interesting to observe that the recently enhanced activities and awareness of environmental issues in Nigeria coincide with the above objectives. The position of Nigeria internationally regarding the dumping of dangerous substances on the soils of developing countries is well known. Equally important is the active role played by Nigeria regarding the necessity for a Convention on Desertification, which was adopted by UNCED in 1992.

The 1980s and 1990s were periods of active environmental conservation for Nigeria. In the 1970s, most of the protective reserve areas were delineated into parks or animal sanctuaries, but overt conservation efforts were manifested more in the 1980s, when major national funding agencies and commissions, such as the Ecological Disaster Fund, National Conservation Foundation, Federal Environmental Protection Agency (FEPA) and National Resources Conservation Council were established. In fact, a national policy on the environment was adopted for Nigeria in 1989.

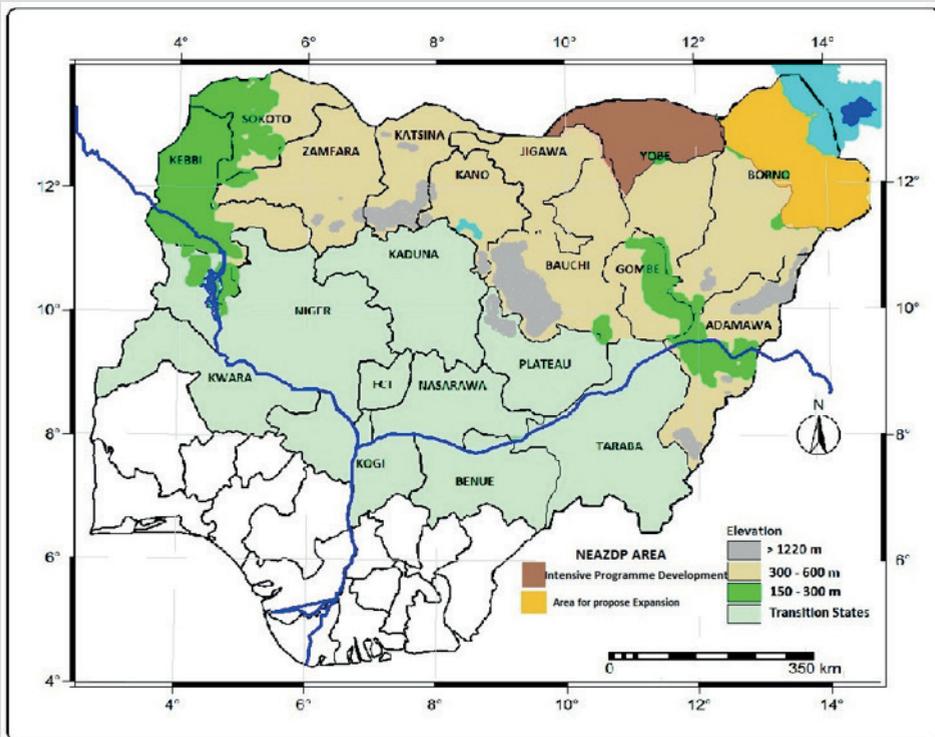
This period of encouraging environmental awareness unfortunately coincided with a period of economic uncertainty for the country, which has an increasing external debt. In addition, FEPA reports that environmental neglect may cost Nigeria N15 billion due to wind and water erosion, drought and desertification, uncontrolled logging, uncontrolled use of agro-chemicals, bush burning and pollution. It is not the purpose of this paper to go into details of the effects of each of these ecological problems on the economic and water resources development of the country, although it is obvious that more funds would have to be sourced to maintain any environmental friendly developments. The Project NEZDP is worth mentioning again in view of its positive impacts on sustainable livelihoods and its friendly environmental activities.

NORTH-EAST ARID ZONE DEVELOPMENT PROGRAMME (NEAZDP): PROGRAMME FOR SUSTAINABLE DEVELOPMENT AND RURAL COMMUNITY EMPOWERMENT

Sub-Regional Location

The NEAZDP area of operation lies in the Sudano-Sahelian zone of Nigeria in the historically rich Borno, which now constitutes Borno and Yobe States (Figure 1). The Sahelian Zone is considered one of the most sensitive and delicately balanced ecological systems in the world. With increased pressure of drought and desertification during the past 30 years, it has become increasingly difficult to maintain sustainable development on the fragile lands. In this zone, livestock, which is a major factor in land degradation, takes pre-eminence over crops, owing to the reduced precipitation of about 400mm per rainy season. Coupled with a constrained transportation system in view of the sandy terrain, poverty and disease become very serious issues (Gadzama and Ayuba, 2016; the South Centre, Geneva, 1993).

Figure 1: Desertification frontline States and the Buffer Zone



Source: Gadzama and Ayuba (2014); Gadzama (2009)

Programme profile

The North-East Arid Zone Development Programme was a multi-million European Currency Unit (ECU) project under a financing agreement of the Federal Government of Nigeria (FGN) with the European Economic Community (EEC). It was signed in 1988 for socio-economic and agricultural development by the NEAZDP. The significance of this agreement is that although it was initially a soft loan of ECU 29 million, with Nigeria contributing ECU 5 million in support of this medium-term project, the loan has now become a grant by the EEC, in realization of the social and environmental significance and success of the project (NEAZDP, 1991).

From the graphic presentation, the main initial thrust of programme implementation was located in Yobe state, with Programme Headquarters in Garin Alkali (near Gashua, Bede Local Government). On a long-term basis, activity would spread eastwards into Borno State to meet the shores of the great Lake Chad (Figures 1, 2 and 3). Programme execution was carried out by Borno and Yobe State Government and the Federal Government of Nigeria, and financed by the European Development Fund, under the Lome III Convention. Programme management and technical assistance services were provided by the Danish group of consultants, Danagro Advisor A/C and Hannemann A/S, in partnership with a Nigerian Company, Diyam Consultants.

Figure 2: Map of Borno and Yobe States and location of programme activities in the states

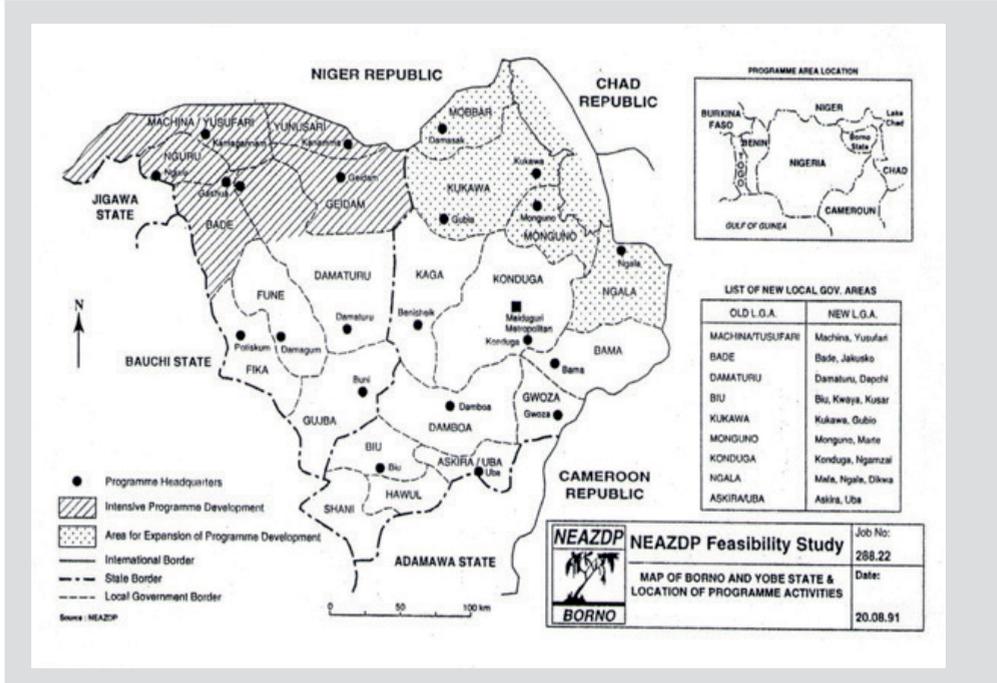
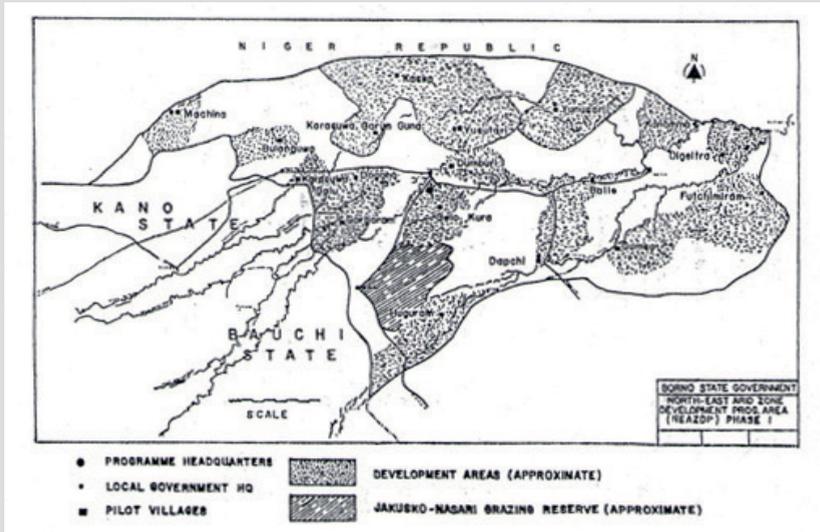


Figure 3: NEAZDP Village Cluster 1991-1992



Source: NEAZDP

Methodology/Approach: Programme Implementation

From its inception, the programme had a thorough background check undertaken to discover the most appropriate implementation strategy, based on a pilot assessment. Management finally settled for a special feature that based its Work-Plan/Cost-Estimate (WP/CE) for rural development on the village level experience, with direct participation of the villagers and management hierarchy, which strongly reflected an advisory, rather than executive, role. Central to its implementation was the Development Area Promoter (DAP), who was advised by villagers in his pilot Village Development Programmes (VDP) of the 18 cluster villages (Figure 3). Through this, a “list of activities, requirements and projects, reflecting the villagers’ perceived needs and priorities”, was drawn up.

It is noted that an environmental impact assessment or community reconnaissance and needs assessments were an important part of the NEAZDP. It was also noted by Yusuf (2014) that participatory rural appraisal (PRA) may be a more adequate method than rapid rural appraisal (RRA) in the study of the inadequacy of environmental and infrastructural resources to “satisfy basic needs results in deprivation” among rural people. Both systems were relevant in this project.

Teams of specialists were formed at the NEAZAP management level, representing all components of NEAZDP management, including CAZS staff, who were to advise and guide the DAPS and village representatives to finalize realistic, technically sound, coherent and feasible village development plans within the limits of available funds.

Management of NEAZDP in turn has four Sub-Programmes:

Sub-Programme 1: Includes management, administration and major projects and services.

Sub-Programme 2: Directly responsible for the technical supervision of the Village Development Plan; for the generation of base line information, supervision of the VDP; for demonstrating and adopting new technologies and practices; and for the training, communication and media production needed for the entire process.

Sub-Programme 3: Civil, mechanical and electrical engineering and appropriate technology services required for adequate implementation of the VDP.

Sub-Programme 4: Formal training of Nigerian staff outside the NEAZDP area, considered essential to match staff skills with the requirements of the VDP. Collaboration of CAZS was often required in the implementation of this sub-programme, and possible inputs of Diasporas would be most useful and beneficial.

After drawing up the VDP, components of the four sub-programmes prepared their work programme in direct support and response to VDP with special emphasis on the DAPs and the villages. This strengthened the VDP's advisory role in organizing and testing applied research, demonstrating viable results, and, through DAPs, supervising their adoption by the rural population. This implementation strategy was achieved with considerable success, thereby providing confidence for the executive powers to authorize the second phase of the programme. At the same time it provided ample opportunity for the research component to demonstrate its usefulness in continuous back-up, in terms of the provision of appropriate baseline data to support development.

The first phase of the programme (Figures 1, 2 and 3), which was mainly in Yobe State, was largely completed in the third/fourth year.

CENTRE FOR ARID ZONE STUDIES, UNIVERSITY OF MAIDUGURI: ITS SPECIAL ROLE IN THE BACK-UP RESEARCH DATABASE.

Research objectives

The Centre for Arid Zone Studies (CAZS) was established about the same time as NEAZDP in 1987. It was established as a multi-disciplinary research centre to provide and develop the necessary baseline information bank, in order to support implementation programmes of developmental agencies and government, in addressing the local ecological problems in dry lands of Nigeria. Its activities were also to encourage and stimulate appropriate and practical inputs in rural projects, thereby encouraging self-sustainable rural developments at project sites in harmony with farming and other land use activities. By implication, and in terms of financial

support and location, the major research inputs of CAZS would be in the delineated zone of operation of the NEAZDP.

Therefore, in addition to its strong training component, the research programmes coordinated by CAZS strengthened initiation on a series of developmental undertakings with a view to:

1. the improvement, rehabilitation and restoration of target areas and natural resources, with regard to water use, farming practice and desert encroachment;
2. long-term utilization of water, plant and animal resources, both wild and domesticated;
3. long-term development of windbreak systems by processing tree species sustainable to the target areas, also for satisfying fuel-wood requirements under controlled harvesting systems;
4. long-term stabilization of the ecosystem and its natural resources; and
5. the improvement of the standard of living of both the rural and urban communities in the arid Yobe and Borno States, and other Sahelian States of Nigeria and the sub-region.

Research Programme of the Centre

From the various national and international contacts and collaborations, CAZS has now firmly established itself as a regional research unit at the University of Maiduguri. The most extensive research undertaking was financially supported by the EEC, through the Authorizing Federal Ministry of Finance and Economic Development. The EEC grant of about ECU 4 million was for a period of five years, for the training of study fellows and about 20 staff research projects designed to have direct application on the NEAZDP. As described earlier, this programme was one of rural development in sustainable growth and socio-economic input.

The research programmes for both staff and post-graduate students were organized under five units, with full technical back-up and collaboration by Silsoe College of Cranfield University, United Kingdom, the European Linkage Partners. These areas of research activities (Gadzama, 1991) included:

Hydrology and Hydrogeology- Water Resources

(F.A. Adeniji, R.C. Carter, M.R. Islam, A.A. Qureshy, A.G. Alkali (Study Fellow), and A. Alhassan (Study Fellow)) Research Plans were aimed at generating reliable information in order to quantify and describe surface and ground water within the NEAZDP area. Work was initiated to model the Yobe River Flow at Gashua in view of the upstream dam building activities in Kano and Bauchi States.

Work has also been ongoing in respect of the ground water recharge of the alluvial aquifer underlying the riverine *fadama* at Gashua (Alkali's work) since 1990. Preliminary results indicate the effect on the confined ground water conditions

before, during and after Yobe flood, and that there is a rapid rise induced by the head changes on the river channel boundary, followed by an equally rapid fall as the flood in the river fell. The implication of this finding in relation to what is generally found in *fadama* along the River Yobe was the subject of intense research undertaking and interpretation, even after the project was completed.

Another area of good progress is on the study of ground water resources of the oases of Manga grass lands, north of Gashua (R. Carter, A. Alhassan). This was to investigate the quantity and quality of the water resource of the oases. The interim findings were that the ground water resources of the oases were very limited and had a delicate equilibrium. This may have serious implications for abstraction well development in the area.

Arid Agriculture and Rural Development

A wide variety of research activities were listed under this subheading. Therefore, only those initiated in implementing the project will be discussed.

- (i) *Productivity of Mullet-Cowpea Intercrops as influenced by Cowpea Cultivars and Sowing Density*
(P. Ugherughe, M.K.V. Carr, W. Stephens, T.M. Hess, A.K. Grema (Study Fellow))

This is the main crop production system in the NEAZDP area. Millet is the main staple food, proving about 70% of the energy of farming families, while cowpea is an important protein source. A study on inter-cropping shows that the choice of cowpea cultivar rather than the sowing density within millet caused a significantly positive effect on productivity of the system (A.K. Grema, M.K.V. Garr and P. Ugherughe). This is important in terms of extension and adoption trials, and is particularly relevant to the work at the VDP level.

- (ii) *Other trials were on water stress as a mark of drought resistance of the cultivars with regard to their appropriate use.*

Climatic Variability and Rangeland Productivity in Yobe State (G.G.R. Thambyahpillay, M. Keech, W. Stephens, and U.M. Maryah (Study Fellow))

Extensive grazing and poor utilization of the forage produced under the rangelands adversely affected the feed requirements of livestock operators. The aim of the study, which started in 1991, was to develop a method capable of predicting forage production and determining the resultant stocking levels. The preliminary results so far by Maryah demonstrated a positive correlation between rainfall amount and rangeland productivity.

The results also confirmed the variable nature of rainfall distribution in the area in terms of the dates of onset, retreat of rains and the length of the growing season.

State of Livestock Health in Northern Yobe State (D. Kalra, A. Ambali, S.S. Baba, M. Askira)

The pilot survey was to provide specialists with an overview of the livestock

disease problem of the site visited so that attention could later be given in follow-up research on serious problems. In general, the common diseases are foot and mouth diseases, diarrhoea, bloat, blood protozoan infections, Ringa-Ringa disease, abortion, mastitis and contagious bovine pleuro-pneumonia. Other problems were inadequate water supply for livestock, lack of grazing reserves and feed supplements, which all affected livestock productivity.

Socio-Economics (Population Mobility in North Borno and Yobe States) (D.K. Fiawoo, J.A. Ijere, L.O. Omoja and Magaji)

A preliminary survey of thirteen settlements in five local government areas (LGAs) of North Borno and Yobe States was carried out in 1991. From the survey, it was estimated that 2,400 people had moved into the villages of Machina Local Government Area (which was selected for a detailed study) between 1971 and 1991; 520 people had moved out during the same period (Ijere and Gadzama, 1993). The majority of those who moved into the settlements were from Niger Republic, which lies immediately to the North of the LGA. The main pull factors were identified as water supply and good farmland: language and religion were other factors. The majority of the people that moved out went to Jigawa state, and the push factors were identified as drought, lack of roads and better basic amenities.

Other Areas of CAZS Close Collaboration with NEAZDP and Linkage Partners

Many other areas also existed where basic questions needed to be asked and answered. Specialists of CAZS, NEAZDP and the linkage partners cooperated in the development and use of the following technologies and studies:

- i. *Geographic Information System (GIS) satellite imagery and interpretation* (A.C. Bird, J. Dickinson, K. Kimmage, B. Hassan (Civil Servant), J. Abdalla (Study Fellow), M.D. Pratt and A.I. Lawan (Study Fellow)): for evaluating the potential of Fadama on the long-term monitoring of land use and land cover in the NEAZDP area initially, and for the provision of back-up data for planning and management.
- ii. *Pest Survey* (G. Buahim and associates): systematic surveillance of eruptive grasshopper pests in the area.
- iii. *Natural Regeneration Trials* (S. Sanusi, W.S. Richards): assessment of vegetative potentials of native and exotic plants for economic use and for desertification management.
- iv. *Soil and Land Suitability* (P. Bullock, G.I.C. Nwaka, M.G. Jarvis, A.O. Folorunso, A.M. Kundiri (Study Fellow) and A.B. Alhassan (Study Fellow)): for appropriate agricultural development and general land use.
- v. *Fisheries* (W.S. Richards, S. Madakan, B. Haman (Civil Servant), and A. Bananda): biological and commercial status of fish among the inhabitants and in view of dwindling water resources.

CAZS Support and Achievements in Research, Human Development and Reports on Thesis

The following activities were supported and funded by the European Economic Commission (1989-1995):

Gadzama, N.M. (1991). Sustainable development in arid zone of Nigeria. Keynote address to Nigeria Environmental Study/Action Team (NEST) Workshop, Kano, September, 1991. Published as Centre for Arid Zone Studies, Monograph Series N0.1, University of Maiduguri Press, 1995.

Gadzama, N.M. and Maryah, U.M. (1992). Climatic change in North-eastern Nigeria: the CAZS experience with reference to the IGBP-related research. Proceedings of the International Workshop of the Regional Climate Center, MEDIAS on the Mediterranean Basin and Sub-Tropical Africa, Toulouse, France, 17-20 February, 1992.

Abdalla, J.D. (1994). The Evaluation of Satellite Imagery in Geographic Information System (GIS) for Monitoring Land Cover Changes in a Semi-Arid area of north-Eastern Nigeria, PhD Thesis, Cranfield University.

Grema, A.K. (1994). Productivity of millet-cowpea intercrop in north-east Nigeria. PhD Thesis, Cranfield University.

Alkali, A.G. (1995). Groundwater Recharge to the Alluvial Aquifer of the Yobe River. PhD Thesis, Cranfield University.

Kundiri, A.M. (1995). Soils, land management and crop suitability in a semi-arid environment: a case study of the Yobe River Fadama in north Eastern Nigeria. PhD Thesis, Cranfield University.

Alhassan, A.B. (1996). Water Management for Crop Production on the Lowland Soils of the Manga Oases, Northeastern Nigeria. PhD Thesis Cranfield University.

Lawan, A.I. (1996). Application of High Spatial Resolution data for Land Use and land Cover Mapping in Northern Nigeria. PhD Thesis, Cranfield University.

Maryah, U.M. (1997). Climatic variability and rangeland productivity in the arid zone of Yobe State, Northeastern Nigeria. PhD Thesis, Cranfield University.

Murry, N.J.A. (1997). A study of the socio-economic factors which affect the adoption of agricultural technology in the Northeastern arid zone. PhD Thesis, Cranfield University.

Ugherughe, P.O. (1994). Towards improving the rangeland and livestock resources of the Semi-arid zone of Nigeria. Lead paper presented at the International Conference on Research for Development in Arid Zone of Nigeria, Maiduguri, 19-25 June, 1994.

REPORTS

Buahir, G.K.A. and Donli, P.O. (1994). Survey of pest and diseases of rain fed crops in the EEC north-east arid Zone Development Programme Area.

Kwari, J.D., Shukla, U.C. and Nwaka, G.I.C. (1994). On farm soil fertility/crop response studies in rain fed farming in the North East Arid Zone Development Programme Area of Nigeria.

Folorunso, A.O. and Dunham, R.J. (1994). Rehabilitation of Yau Irrigation Scheme: survey to assess limitations due to soil salinity.

Carter, R.C., Alkali, A.G. and Agbo, J.U. (1994). Water resources research in support of development in North-east Arid Zone of Nigeria.

Audu, I. and Hess, T.M. (1994). A simulation of the potential benefits of water conservation in the North East Arid Zone of Nigeria.

Folorunso, O.A., Usman, H, Shukla U.C. Hess, T.M. and Dunham, R.J. (1994). Rainwater harvesting for efficient water utilization by rain fed crops in semi-arid northeastern Nigeria.

Odo, P.E., Kabura, H.H. and Ogunbameru, B.O. (1994). Cropping systems survey of the North-East Arid Zone: A study of Yobe State, Nigeria.

Kabura, B.H. and Odo, P.E. (1994). Prospects and constraints of irrigated vegetable

Odihi, J.O. (1994). Afforestation response to the environmental challenge in the north east Arid Zone of Nigeria: a lesson of experience.

Kalra, D.S., Zaria, L.T., Ambali, A.G. and Chaudhri, S.U.R. (1994). Studies on diarrhoea and abortion in ruminants in the North-East Arid Zone Development Programme (NEAZDP) Area.

OBSERVATIONS AND CONCLUSIONS

As can be seen from the above discussion, Yobe State, the major benefactor of the Phase 1 Project, has adopted the framework of NEAZDP for its present sustainable rural development activities, although not on the same scale as the initial programme descriptions. In view of their acceptability and achievements in the relatively short period of five years, the NEAZDP and CAZS programmes justify closer examination for a model future rural development. In addition, these programmes are good examples of North-South collaboration where environmental and water issues play a central role in development. In fact, environmental education as part of a mass enlightenment campaign is included in NEAZDP as "Community Awareness and Mass Mobilization", including the gender issue (Okpara, 1997).

However, perhaps the most serious factor that contributed greatly to the success of the programme is the fact that a great deal of pilot study work and time had been devoted to the programme's foundation. This took over one year during which implementation strategies were tested: this was a sufficient review period, with all interest groups participating. The consequence was that a bottom-to-top based programme was formulated with a strong affinity to middle-level advisory capabilities. The Village Development Plan (VDP) became a central focus of the project (Figure 3).

Phase I of the project (Figure 2), mainly based in Yobe State, has been a considerable success with immense popularity among the local people. In fact, there was constant competition among non-participating villagers to be enrolled in the programme. In the light of this good base for sustainability at the local level, both the Federal Government of Nigeria and the EEC agreed to extend the programme eastwards to the shores of Lake Chad. Eventually the demand of the populace is that the programme should be expanded to cover all the remaining parts of Yobe and Borno States also being threatened by desertification, although to a lesser extent. However, this worthy programme came to sudden closure due to macro-economic issues that made the EEC pull out of the project.

The intimate relationship between NEAZDP and CAZS is mandatory, obligatory and desirable as their complementary roles in both mandates and application is unique in terms of project implementation. For this reason, there is constant dialogue and free flow of information for mutual benefit between the two and the international partners.

It must be said in conclusion that, but for the funding agreement between the Federal Government of Nigeria and the EEC (NEAZDP, 1991; Gadzama, 1991), during the Structural Adjustment programme (SAP) period, it would have been difficult to source equivalent resources to fund these two successful activities. In addition, the location of these two programmes seems to be ideal for regional cooperation with similar organizations operating in Niger Republic and the other member countries of Lake Chad Basin Commission (Federal Ministry of Environment, 2002).

With peace returning to the North-Eastern part of Nigeria, we invite the Nigerian Diasporas and other concerned nationals to fully participate in research and development as part of the rehabilitation currently taking place. In view of the contributions of the project to improved sustainable livelihoods and the positive policy thrust of the present Nigerian Government, we appeal to the EU to fund the completion of the second phase of NEAZDP in Borno State.

REFERENCES

- Federal Ministry of Environment (2002): National Report on Biodiversity: Integrated Management of Natural Resources in Transboundary Areas of Nigeria and Niger Republic. (FDFB UNEP/GEF Assisted Project).
- Gadzama, N.M. (1991): The Centre for Arid Zone Studies. University of Maiduguri: General Report 1988/1989. *Annals of Borno*, Vol. 6/7 (1989/90), pp.325-334.
- Gadzama, N.M. (2009): Sustainability Science for Arid Zone of Africa: Future Prospects with the New Partnership for African Development (NEPAD). Chapter 5 in Animalu, A.O.E, Osakwe, E.N.C. and Akuru, U.B. (Eds): *Solar & Renewable Energy Company (Nig.) Ltd: Proceedings of Meeting of R&D Commercialization Challenge*, pp.138-158.
- Gadzama, N.M. and Ayuba, H.K. (2014): Desertification in Nigeria, in Okali, D., Paoola, L., Lucas, A.O. and Oladipo E.O. (Eds): *Proceedings of the Symposium on the Nigerian Environment: Past 100 Years and the Future*, held at University of Ibadan, September, 2014. In press. NEST, Ibadan.
- Gadzama, N.M. and Ayuba, H.K. (2016): On major environmental problem of desertification in northern Nigeria with sustainable efforts to managing it. *World Journal of Science, Technology and Sustainable Development*, Vol. 13, No.1, pp.18-30.
- Ijere, J.A. and Gadzama, N.M. (1993): Migration as response to environmental PUSH and PULL factors: A case study of Northern Borno and Yobe States, 1971-1991. *Berichtedes Sondersforschungsbereichs 268*, Bd. 2, Frankfurt a.m., pp.145-159.
- Nigeria Environmental Study/Action Team (NEST).
- North-East Arid Zone Development Programme (1991): Work Plan-Cost Estimate for 1992 Vol. 1:1-115 and Reports.
- Okpara, E.E. (1997): *Mobilizing Local Communities Towards Combating Desertification in Nigeria*. NEST Occasional Publication, Ibadan, 17pp.
- The South Centre, Geneva (1993): Environment and Development: Towards a Common Strategy for the South in the UNCED Negotiations and Beyond. *Development and Socio-Economic Progress*, No 53, pp.069-89.
- United Nations (1992): Report of the United Nations Conference on Environment and Development held in Rio de Janeiro. A/Conf. 151/26, Vol. 1, pp.8-13.
- University of Maiduguri/Silsoe College Linkage (1992): Work Plan-Cost Estimate for 1992 and Reports.
- Yusuf, R.O. (2014): Participatory Rural Appraisal of Basic Needs Deprivation among Rural Dwellers of Borno State, Nigeria. *Asian Journal of Agriculture and Rural Development*, 4(3), pp.200-211.

ABBREVIATIONS

CAZS	Centre for Arid Zone Studies, University of Maiduguri.
DAP	Development Area Promoter
ECU	European Currency Unit
EEC	European Economic Community
FEPA	Federal Environmental Protection Agency
GIS	Geographic Information System
LGA	Local Government Area.
NEAZDP	North-East Arid Zone Development Programme
UNCED	United Nations Conference on Environment and Development
VDP	Village Development programme.

BIOGRAPHY

Prof Njidda M. Gadzama is Professor Emeritus of Zoology and Environmental Science at the University of Maiduguri, Borno State, Nigeria. He is an academic leader having been pioneer Pro-Chancellor of the National Open University of Nigeria, Vice-Chancellor, University of Maiduguri, and the Acting Vice-Chancellor, University of Port Harcourt. He graduated with a BA (Biology), from McPherson College, Kansas (1964), an MSc (Zoology), Long Island University (1967), PhD (Entomology), New York University (1971). He has in excess of 80 scholarly publications in refereed journals, conference proceedings, edited books and monographs. He is also the founding Director of the Centre for Arid Zone Studies and Biotechnology Centre at the University of Maiduguri. He has published in leading journals such as the *Journal of Experimental Zoology, Tissue and Cell, Journal of Morphology, Journal of Tropical Medicine and Hygiene, World Journal of Science, Technology and Sustainable Development*, and many others. He is a Fellow of the Nigerian Academy of Science, Entomological Society of Nigeria and the Environmental Society of Nigeria. He was a Visiting Professor at the University of Frankfurt and the Office of Arid Land Studies, University of Arizona. He has travelled widely to more than 30 countries and is the recipient of many awards, the latest, in May 2016, being *Hallmarks of Labour Foundation Award: Umaru Shehu Life-Time Achievement Award to the Most Consistent Advocate for Positive Change within the University System in Nigeria.*

