

**ENVIRONMENTAL DEVELOPMENT AND WATER
IN THE FRAGILE SAHELIAN ZONE OF NIGERIA
AND STRUCTURAL ADJUSTMENT
A CASE STUDY**

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Abstract

The state of climatic change and the recent unprecedented inflation due partly to the effects of the structural adjustment in Nigeria, has had far-reaching consequences not only on the living standard of the citizens, but on ways and means of developmental undertakings. This is particularly visible in problems of socio-agricultural development in the fragile Sahelian zone of Africa threatened by incessant desertification. This paper outlines case study of North-East Arid Zone Development Programme (NEAZDP) located in Yobe and Borno States of Nigeria; a well-planned socio-agricultural project supported by base line scientific data by multi-disciplinary Research Centre for Arid Zone Studies (CAZS), University of Maiduguri. The case study discusses how NEAZDP and the Centre, both financially supported in operations by the Delegation of the European Communities, derive mutual benefits in co-operation for successful programme implementation under the structural adjustment.

Keywords: environmental development, desertification, structural adjustment.

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INTRODUCTION

The United Nations Conference on Environment and Development (UNCED, 1992) held in Rio de Janeiro (3-14 June, 1992), is a landmark in providing international interest groups the venue to express their specific concern on the issues of the state of the world environment¹. The basic recurring theme in the proclaimed 27 declaration of UNCED '92 is the call for all nations to co-operate in matters of environment and development. In this regard, the principle of the declaration stipulates 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 (1). Unfortunately many developing countries, perhaps due to poverty and lack of sound planning based on scientific data, have not developed the capability for environmental impact assessment of projects. Many developing countries have little resource to commit on environmental impact assessment; in many cases additional external back-up required for achieving sound assessment is also lacking.

In this case, the spirit of principle (6) is noteworthy. It states, "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 the developing countries, requires give-and-take relationship of understanding and collaboration between the North and the South.

For the South, there are some that believe that two fundamental strategic objectives should determine the negotiating position of the developing countries. 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 could enable it to pursue a development process rapid enough to meet the needs and aspirations of its growing population." (2)

It is interesting to observe that the recently enhanced activities and awareness on environmental issues in Nigeria coincides with the above objectives. The stand of Nigeria internationally on the dumping of dangerous substances on the soils of the developing countries is well known. Equally important is the active role

¹ The bibliographical references are signalled by figures between brackets.

played by Nigeria on the necessity for a convention on desertification which was adopted by UNCED, 1992. The past two decades are 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 Ecological Disaster Fund, National Conservation Foundation, Federal Environmental Protection Agency (FEPA) and National Resources Conservation Council were established. In fact a national policy on environment has been adopted for Nigeria in 1989.

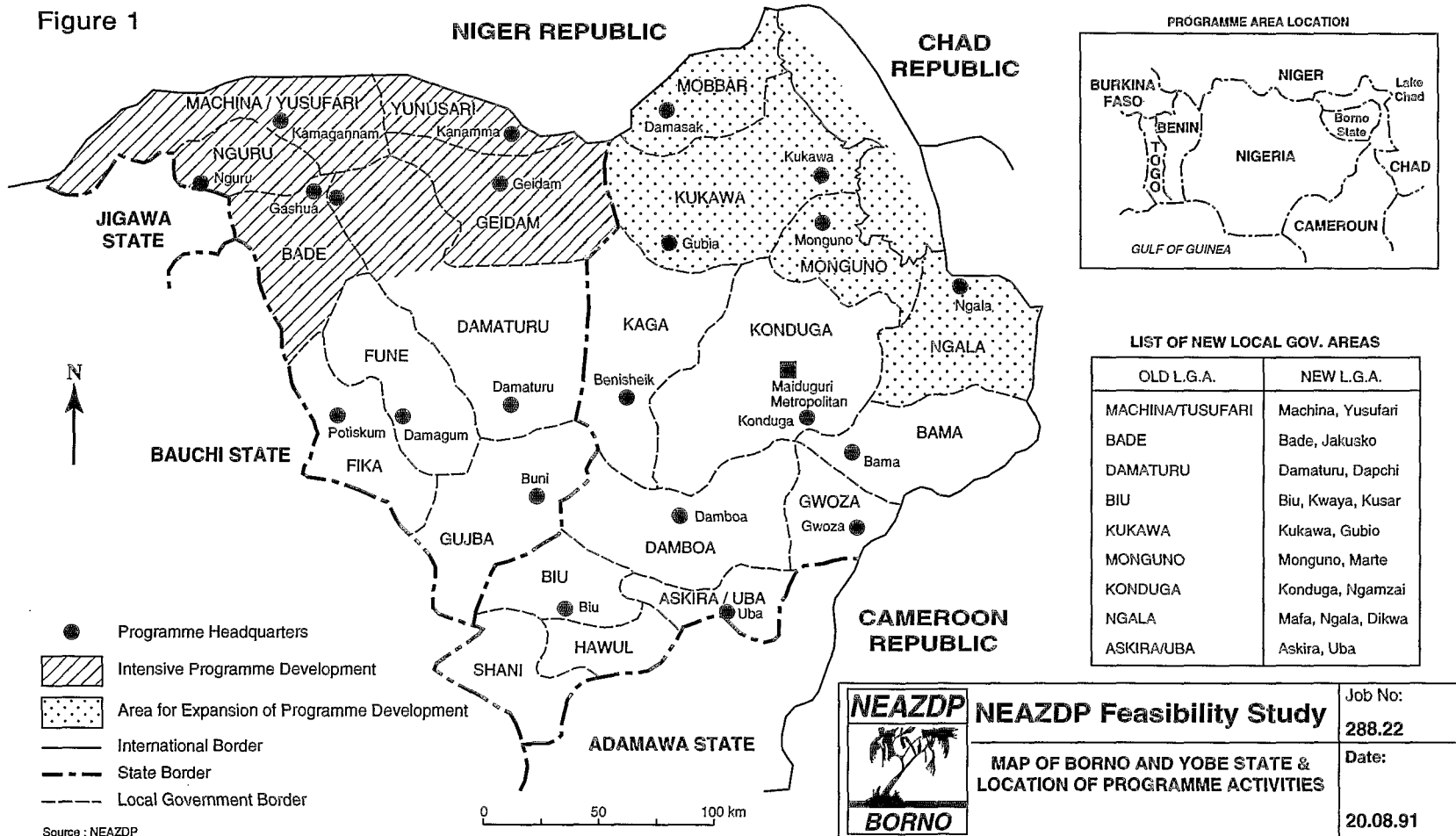
This period of encouraging environmental awareness unfortunately coincided with a period of economic trial for the country, with increasing burden of external debt. And yet FEPA reports that environmental neglect may cost Nigeria N 15 billion due to wind and water erosion, draught and desertification, uncontrolled logging, uncontrolled use of agrochemicals, bush burning and pollution problems. 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 a great more funds will have to be sourced to maintain an environmentally friendly development. It is however perceived that this international seminar on Mega-Chad provides an appropriate circumstance to report an example of a North-South partnership efforts in sustainable development with reference to water resource utility which takes serious consideration of the environmental implications in programme implementation.

NORTH-EAST ARID ZONE DEVELOPMENT PROGRAMMES (NEAZDP): A PROGRAMME FOR SUSTAINABLE DEVELOPMENT

Sub-Regional Location

NEAZDP area of operation lies in the Sudano-Sahelian Savanna of Nigeria in the historically rich Borno which is now Borno and Yobe States. The Sahelian zone is now considered one of the most sensitive and delicately balanced ecological systems in the world. With increased pressure of draught and desertification for the past 20 years, it has become increasingly difficult to maintain sustainable development on the fragile lands (3). In this zone, livestock which is a major factor in land degradation takes preeminence over crops due to the reduced precipitation of about 400 mm per rainy season. Coupled with constrained transportation system in view of the sandy terrain, poverty and disease become very serious issues (see figures 1 and 2).

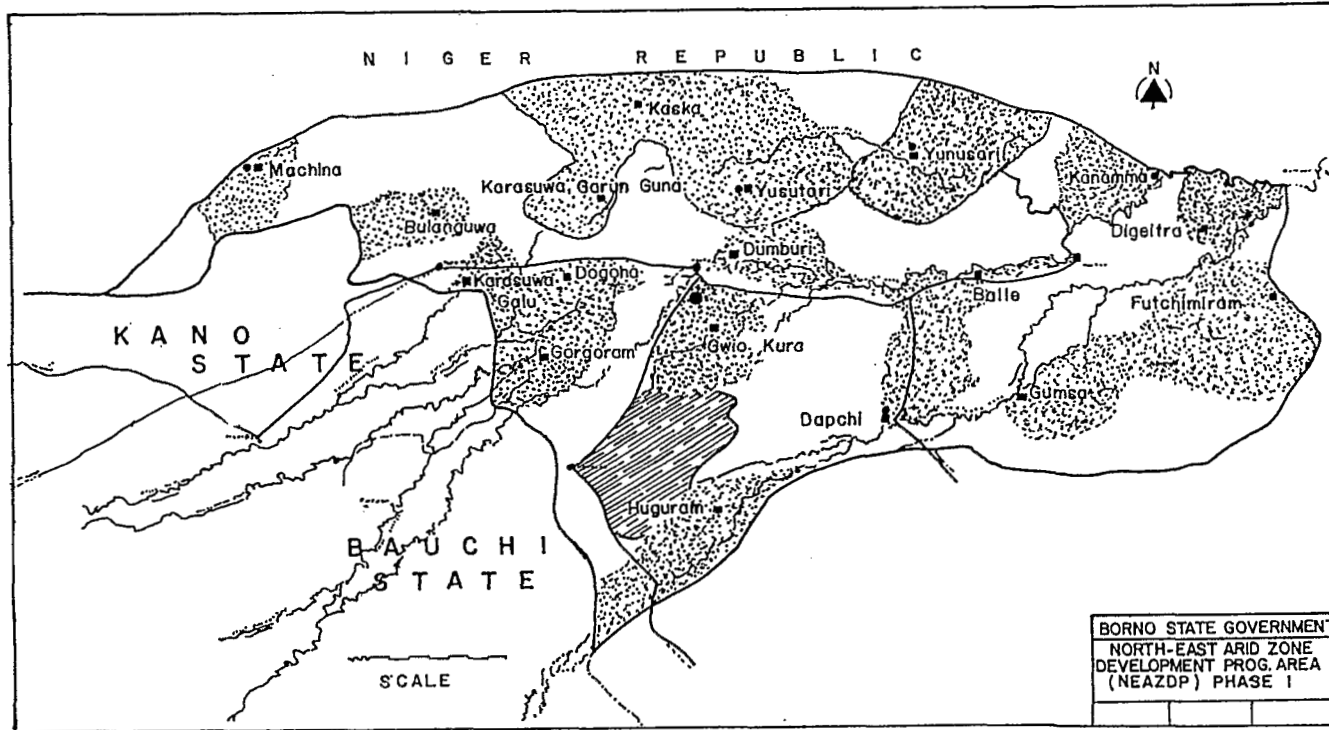
Figure 1



Source : NEAZDP

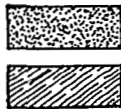
Figure 2

NEAZDP VILLAGE CLUSTER 1991 - 1992



BORNO STATE GOVERNMENT
 NORTH-EAST ARID ZONE
 DEVELOPMENT PROG AREA
 (NEAZDP) PHASE I

- PROGRAMME HEADQUARTERS
- LOCAL GOVERNMENT HQ
- PILOT VILLAGES



DEVELOPMENT AREAS (APPROXIMATE)

JAKUSKO-NASARI GRAZING RESERVE (APPROXIMATE)

SOURCE - NEAZDP

Programme profile

North-East Arid Zone Development Programme is a multi-million European Currency Unit (ECU) project under financing agreement of the Federal Government of Nigeria (FGN) with the European Economic Community (EEC) which was signed in 1988 for socio-economic and agricultural development of the NEAZDP. The significance of this agreement is that, although it was initially a soft loan of ECU 9 million and Nigeria contributing ECU 5 million to support this medium-term project, the loan has now become a grant by the EEC in realization of the social and environmental significance of the project.

From the graphic presentation, the main initial thrust of programme implementation is located in Yobe State with programme headquarters in Garin Alkali (near Gashua, Bede Local Government). On long-term basis, activity will spread eastwards in Borno State to meet the shores of the great Lake Chad. Programme execution is by Borno and Yobe State Governments and Federal Government of Nigeria, financed by European Development Fund under the Lome III Convention. Programme management and technical assistance services are provided by the Danish group of consultants (Danagro Advisor A/C and Hannemann A/S) in partnership with a Nigerian company, Diyam Consultants.

Programme implementation

The programme from its inception had a thorough background work for the most appropriate implementation strategy, based on pilot assessment. Management finally settled for a special feature that based its work plan-cost estimate (WP/CE) for rural development on village level experience with direct participation of the villagers and management hierarchy that strongly reflected advisory than executive role. Central to implementation is the Development Area Promoter (DAP) that is advised by villagers in his pilot (village development programmes VDP advisors) and 18 cluster villages. Through this a "list of activities, requirements and projects reflecting their [villagers'] perceived needs and priorities" are drawn up.

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

Management of NEAZAP 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, supervision of the VDP; for demonstration 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.

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

CENTRE FOR ARID ZONE STUDIES, UNIVERSITY OF MAIDUGURI: ITS SPECIAL ROLE IN BACK-UP RESEARCH DATA BASE

Research objectives

The Centre for Arid Zone Studies (CAZS) was established about the same time as NEADZDP in 1987. It was established as a multidisciplinary research centre to provide and develop the necessary base-line 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 are to also encourage and stimulate appropriate and practical inputs in rural projects, thereby encouraging self-sustaining rural developments at protect sites in harmony with farming and other land use activities. By

implication in terms of source of financial support and location, the major research inputs of CAZS would in the delineated zone of operation of the NEAZDP.

Therefore, beside its strong training component, the research programmes co-ordinated by CAZS strengthens initiation on 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 suitable to the target areas, and also for satisfying fuel wood requirement needs under controlled harvesting system;
- 4) long-term stabilization of the ecosystem and its natural resources; and
- 5) the improvement of standard of living of both the rural and urban communities in the arid Borno, Yobe and other Sahelian States of Nigeria and the sub-region.

Research programmes of the centre

From the various national and international contact and collaborations, CAZS has now firmly established itself as a regional research unit. The most extensive research undertaking is financially supported by the EEC through the Authorizing Federal Ministry of Finance and Economic Development. The EEC grant of about ECU 4 million is for a period of 5 years, supporting training of study fellows and about 20 staff research projects designed to have direct application to the NEAZDP, a programme as described earlier, of rural development in sustainable growth and socio-economic input.

The research programmes for both staff and students are organised under five units with full technical back-up and collaboration by Silsoe College, Cranfield Institute of Technology, UK - our European Linkage Partners. These areas of present research activities include (6, 7):

1) 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 here are to generate reliable information in order to quantify and describe surface and ground water within the NEAZDP area. Work is being

initiated to model Yobe river flow at Gashua in view of the upstream dam building activities in Kano and Bauchi States.

Work has also been going on in respect of ground water recharge of the alluvial aquifer underlying 10 the riverine, *fadama* at Gashua (ALKALI's work) since 1990. Preliminary results indicate effect on the confined ground water conditions before, during and after Yobe flood and that there is a rapid rise induced by the head change on the river channel boundary, followed by equally rapid fall as the flood in the river fell. The implication of this finding in relation to what obtains generally in *fadama* along River Yobe is the subject of intense research undertaking and interpretation in the future.

Another area of good progress is on the study of ground water resources of the oases of Manga grasslands, north of Gashua (R. CARTER and A. ALHASSAN). This is to investigate and quantify the water resources of the oases. The interim findings indicate that the ground water resources of the oases are very limited and with delicate equilibrium. This has serious implication for abstraction well development in the area.

2) Arid agriculture and rural development

A wide variety of research activities are listed under this subheading. Therefore only those presently in progress will be discussed.

i) Productivity of millet-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 providing about 70% of the energy of the farming family here while cowpea is an important protein source. Inter-cropping study 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. CARR and P. UGHERUGHE). This is important in terms of extension and adoption trials and is particularly relevant to the work at VDP level. Other trials are in water stress as a mark of draught resistance of the cultivars with regard to their appropriate use.

ii) Climatic variability and rangeland productivity in Yobe State

(P.O. UGHERUGHE, 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 incapable of producing enough forage to meet the feed requirements of livestock operators. The aim of this study which started since 1991, is to develop a method capable of predicting forage production and determining the resultant stocking levels. The preliminary results so far demonstrate a positive correlation between rainfall amount and rangeland productivity. The results also confirm 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.

iii) State of livestock health in Northern Yobe State

(D.S. KALRA, A.G. ABALI, L.T. ZARIA, S.S. BABA and M. ASKIRA)

The pilot survey was to provide the specialist with overview of the livestock disease problems 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 protozoans infections, Ringa-Ringa disease, abortion, mastitis and contagious bovine pleuropneumonia. Other problems were inadequate water supply for livestock, lack of grazing reserves and feed supplements which all affected livestock productivity.

3) Socio-Economics

i) 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 detailed study) between 1971 and 1991; 520 people had moved out (IJERE). Majority of those who moved into the settlements 13 were from Niger Republic which lies immediately to the North of the LGA. The main pull factors were identified as being 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 available in Jigawa State.

4) Areas of close collaboration of NEAZDP and linkage partners

Many other areas also do exist where basic questions needed to be asked and answered. Specialists of NEAZDP and the Linkage partners, are cooperating in the development and use of the following technologies and studies:

i) **Geographic information system (G.I.S.), Satellite imagery and interpretation**

(A.C. BIRD, J. DICKINSON, K. KIMMAGE, B. HASSAN, J. ABDALLA [Study Fellow], M. D. PRATT and A. I. LAWAN [Study Fellow]): for evaluating the potential of fadama, on long-term monitoring of land use and land cover in the NEAZDP area initially, and for the provision of backup data for planning and management.

ii) **Pest Surveys (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, and A. BANANDA):** biological and commercial status of fish among the inhabitants and in view of dwindling water resources.

OBSERVATION AND CONCLUSIONS

From the foregoing descriptions, the NEAZDP and CAZS programmes justify closer examination for future development as a model in view of their acceptability and achievements in a relatively short period. Beside, these programmes are good examples of North-South collaboration where environmental and water issues play central part of development. In fact environmental education as part of mass enlightenment campaign is included in NEAZDP programme as "*Community awareness and mass mobilization*", including the gender issue.

But perhaps the most serious factor that immensely contributed to the success of the programme, is the fact that a lot of pilot study work and time had been allocated for the foundation of the programme. This took over one year when implementation strategies were tested and had sufficient review period, with all interest groups participating. The consequence was that a bottom-to-top based programme was formulated with strong affinity to middle level advisory

capability. Village development plan (VDP) became a central focus of the project.

Phase I project, mainly based in Yobe State has been a considerable success with immense popularity among the local people. In fact there is now constant competition among non-participating villagers to be enrolled in the programme. In the light of this good base for sustainability at local level, both the Federal Government of Nigeria and the EEC have 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 being also threatened, although to lesser extent, by desertification.

The intimate relationship between NEAZDP and CAZS is both mandatory, obligatory and desirable as their complementarity in both mandate 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.

It must be said in conclusion that, but for the funding agreement between Federal Government of Nigeria and EEC, it would appear difficult in this SAP period, to source equivalent moneys to fund these two successful projects. Beside, the location of these two programmes seems as ideal for regional cooperation with similar organizations operating in Niger Republic and the other member countries of Lake Chad Basin Commission.

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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.