PN-ABH-707
isn 71020

CILSS / CAC / WMO

AGRHYMET PROGRAMME

Programme planning and identification of needs for the operational phase 1983-1986

ANNEXES TO THE REPORT

of the Mission of the Co-ordinating
and Advisory Committee of Donors (CAC) organized by WMO

(July-October 1982)

CONTENTS

Annex:

1. Establishment of the mission (8th session of CAC)

2. Terms of reference

3. Schedule of visits in countries and at Centre

4. List of persons met

5. Maps of meteorological, agrometeorological, climatological and rainfall networks

6. WWW network

7. Agrometeorological summary (Mali)

8. Statement of principles governing collaboration between ASECNA and the AGRHYMET Programme

9. Map of hydrological networks

10. Map of Sahel region

11. Plan of Niamey; location of AGRHYMET Centre

12. The experimental farm at the AGRHYMET Centre

13. Problems perceived by the Operational Activities Directorate at AGRHYMET

14. Applied research under the AGRHYMET Programme

15. Description of functions and qualifications of the regional expert in information and communication

16. Trends in annual discharge of Senegal and Niger rivers since the beginning of the century and Sahelian droughts

17. List of abbreviations

ESTABLISHMENT OF THE MISSION

Eighth session of the CAC for the AGRHYMET Programme, Niamey, 5-7 May 1981

Agenda item 8
Integrated systems study

The Committee asked that a Task Force consider the question of a planning mission to assess:

- the current capabilities and co-ordination of Meteorological, Hydrological and Agricultural Services;
- the integration of the national programmes and the Regional Centre;
- and to prepare a detailed implementation plan for execution of the second phase AGRHYMET Programme.

The Task Force, consisting of representatives of the FAO, WMO/AGRHYMET, the U.S.A. and Belgium, met and submitted its recommendations to the full Committee. The Task Force unanimously recommended that a mission be commissioned to:

- carefully assess the national AGRHYMET projects and relevant national Services;
- assess and make recommendations with respect to the co-ordination of the relevant national Services and to the effective dissemination of information generated by national Services and AGRHYMET;
- prepare and submit for approval to the donor countries and agencies, to the national authorities, the AGRHYMET Executive Committee and the CILSS a detailed implementation plan for the period 1983 through 1986.

The Task Force further recommended that:

- the mission be under the overall administrative direction of Mr. Gosset, WMO;
- the mission should have made available to it by WMO all relevant prior planning and other documents before beginning its work in Niamey about 1 July 1982;

- the mission would be headed by Prof. Bernard (Belgium). He would join the mission at the beginning and for the preparation of the team's report. Further, Prof. Bernard agreed to furnish detailed terms of reference to WMO within two weeks time. The team would consist of a meteorologist, hydrologist and an agronomist for the full 2 - 1/2 to 3 months (July-September) of the mission. Additionally, a communications expert would be made available for 2 to 3 weeks to assist in planning information dissemination in all countries.

USAID has agreed to contribute substantially to the financing of this mission.

The CAC approved the full report of the Task Force and asked WMO to ensure its formation, preparatory tasks (especially informing various agencies, authorities) and execution. The necessity to shift the AGRHYMET Programme to operations, that is, services to national projects and information to agricultural users, was underlined as a principal concern of the mission.

2

TERMS OF REFERENCE
of the CAC-WMO mission (July-October 1983

AGRHYMET Programme planning and identification of needs for the operational phase 1983-1986

A. GENERAL TERMS OF REFERENCE

1. Revised planning of activities

The purpose of the mission is to re-plan the activities of the AGRHYMET Programme (operations, studies, research, training) for the period 1983-1986, for each of the 8 countries of CILSS and for the Regional Centre at Niamey. Being the first objective of the mission, the plan to be drawn up will give a clear picture of the progress made and of the most recent needs in order that the objectives of the Programme as laid down in Document A can be achieved. To this end, the plan will lay down the improvements to be made in the structure of the Programme, in order that the objectives may be achieved in the shortest time and at the least cost, as a result of more consistent, more economic and more efficient activities.

In order to draw up this plan, the mission will analyse the following, from the national point of view for each country and from the regional point of view at the Centre:

(a) the problems of the operations for establishing daily agrometeorological information based on meteorological and hydrological information.

(b) the problems of the operations which, in co-ordination with the agricultural services and the broadcasting bodies, lead to the agrometeorological information being broadcast and use made of it in rural areas.

With a view to making economies, the mission will then once again study the priority needs of the National Services (meteorological and hydrological) and of the Centre, resulting from the analysis of the operational problems and the measures to be taken to resolve them.

The mission will examine the organization of the activities of the Centre in the light of recognized needs and objectives to be achieved. The mission will also recommend possible improvements to be made in the structure of the activities, to increase their efficiency.

As a consequence of the general objectives stated in paragraph 1, the activities of the mission will be as set out in paragraphs 2 to 7 below.

2. Preparation of agrometeorological information

The mission will analyse, by countries and at the Centre, the operational problems in the order in which they occur:

(a) Collection of the data from each country, checking the data, centralized transmission of the data from Niamey and processing the data;

(b) Preparation at the Centre of basic synoptic hydrometeorological information;

(c) Elaboration of the pertinent agrometeorological information at the Centre;

(d) Broadcasting this information to the national Services and thence to users (Government, administrations, the rural population).

Special attention will be given to studying the problems in connexion with the continuous co-ordination which must be established between the meteorological Service and the hydrological Service in each country in order to provide the basic hydrometeorological information. The difficulties of such co-ordination will become apparent and the means to effect a remedy will be proposed.

3. Broadcasting and practical use of the information

The mission will analyse, by countries and at the Centre the operation problems arising in connexion with:

(a) The regular broadcast of agrometeorological information by the national mass-media;

(b) The practical use of the information by farmers and livestock rearers.

The problems of the continuous co-ordination which should be established in each country between the Meteorological Service, the agricultural services for supervising and stimulating work among the rural population, and the broadcasting bodies, will be examined very carefully. The mission will suggest measures to be taken to ensure that such co-ordination, essential for the success of the Programme, exists.

The mission, together with the agricultural services, will study the priority needs of the rural masses, for agrometeorological information. The forms of broadcasting most likely to hold the interest of users will also be examined with responsible persons in charge of the mass-media.

The mission will prepare a first draft for implementing operations at the beginning of 1983 on the basis of the operational experience acquired by the Programme in 1982.

4. Needs of the national Services and of the Centre

The mission will re-define the needs of the Meteorological and Hydrological Services, as well as the needs of the Regional Centre, resulting from the foregoing matters. These needs will be based on the detailed organizational plans for these Services for the period 1983-1986.

In view of the fact that the activities of the Programme - operation, studies, training - form a system of activities harmonized between the Centre and the national Services, and in view of the fact that the planning of this system, which is the purpose of the mission, depends on the previous planning of the Services providing the data, it has been suggested to the responsible Directors that they should prepare such organizational plans. These main basic documents of the work of the mission will be discussed by the mission with the Directors in order that the needs which become apparent do in fact meet the combined interests of the Services and of the Centre.

In the analysis of needs, a clear distinction will be made between the progress made by the Programme from 1975 to 1982 and the new needs recognized for the period 1983-1986.

5. Training

In this re-examination of the needs, the mission will attach particular importance to the needs as regards qualified personnel for the national Services and particularly as regards agrometeorological and hydrological personnel with a view to planning training activities for the Centre from 1983 to 1986.

A replanning of the training programme prepared by the Centre will be discussed with the mission on the basis of the needs recognized for each country and which still remain to be covered. This replanning will be reviewed in the context of the sahelianization of teaching staff with a view to being able to devote costly international expertise more advantageously to the new operation tasks which, although difficult, are extremely profitable due to the hoped-for socio-economic impact.

6. Studies and applied research

The mission will examine for each country and at the Centre the problem of studies intended to improve operations and the research which it is necessary to undertake to support the Programme. This examination will be conducted with a view to associating the interested scientific institutions with the Centre to the maximum extent.

7. Recommendation

The mission will formulate, for the benefit of the Plan 1983-1986, all the recommendations discussed with the national Directors and the Director-General of the Centre and considered necessary in order that the Programme, optimized as regards structures, operation and cost, may be able to achieve fully its objectives at the end of 1986.

B. CHOICE OF CONSULTANTS AND THEIR SPECIFIC TERMS OF REFERENCE

I. METEOROLOGICAL CONSULTANT

1. Required qualifications

The meteorological consultant should be highly competent by virtue of:

(1) the duties he has carried out during his career;

(2) experience gained in organizing a meteorological service in West Africa and particularly in organizing the meteorological services of the CILSS countries, under the Programme;

(3) his technical knowledge for the operations to be implemented under the Programme;

(4) his scientific knowledge of synoptic meteorology and climatology of West Africa (problems associated with the monsoon).

A perfect knowledge of French is necessary. It would be an advantage to have a sufficient knowledge of English, for the mission to Gambia.

Terms of reference

The consultant will participate, together with all the members of the mission, in the preparatory briefing at the WMO Secretariat in Geneva and at the Centre in Niamey.

He will then visit the CILSS countries to discuss with the Directors of the Meteorological Services items 1 to 7 of the general terms of reference which are within his competence as meteorologist.

He will discuss specially with each Director, and in co-ordination with his agrometeorological colleague, the various sections of the "Organizational Plan of the National Meteorological Service", a plan previously drawn up by each Director in preparation for the mission. As a result of the discussions a clear and detailed statement will be drawn up showing:

(a) the progress achieved by the Programme from 1975 to 1982;

(b) the new needs and priorities for the operations of the Programme, suggesting equitable distribution of the financial costs, to meet these needs, between the country, the Programme and other sources of assistance such as the WMO Voluntary Co-operation Programme (VCP), and bilateral assistance.

-6-

The consultant will study the co-ordination problems of the Meteorological Service at the levels : meteorology (ASECNA), hydrometeorology (Hydrometeorological Service) and agrometeorology (Agricultural Service).

He will prepare tables and maps showing the situation as regards the networks of stations of various categories: at the start of the Programme (1975), at present (1982) and planned (1986).

He will define the organization of operations within his field of competence for the National Service - Centre system and formulate recommendations with a view to eliminating factors which hinder these operations.

At the end of the mission he will analyse the needs of the Regional Centre, with a view to harmonizing the integrated system of operations and also the problems of training, study and research, within his competence.

He will participate in the debriefing of the mission both in Niamey and Geneva. He will prepare the parts of the final document of the mission which lie within his competence.

II. HYDROLOGICAL CONSULTANT

1. Requirements

The hydrological consultant should be highly competent by virtue of:

(1) Duties performed during his career;

(2) Experience acquired in the organization of hydrology in West Africa and especially in the organization of the Hydrological Services of CILSS countries within the framework of the Programme;

(3) Technical knowledge regarding the implementation of the Programme's operations;

(4) Scientific knowledge of the hydrology of West Africa (evolution of the hydrological cycle and of its components in their relation with the monsoon; runoff measurements and predictions).

A perfect knowledge of French is necessary. It would be an advantage to have a sufficient knowledge of English for the mission to Gambia.

Terms of reference

The consultant will participate, together with all the members of the mission, in the preparatory briefing at the WMO Secretariat in Geneva and at the Niamey Centre.

He will then visit the CILSS countries to discuss with the Directors of the Hydrological Services items 1-7 of the general terms of reference which are within his compentence as a hydrologist.

In particular, he will discuss with each director the various sections of the "Plan for organizing the national Hydrological Service", which will have been drawn up in advance by each Director in preparation for the mission. The discussions should clarify and explain:

(a) Progress achieved by the Programme from 1975 to 1982;

(b) New priority needs for Programme operations, with a proposal for an equitable distribution of the financial cost to cover these needs between the country, the Programme and other sources of assistance, such as the WMO Voluntary Co-operation Programme (VCP) and bilateral assistance.

He will study the problems which the Hydrological Service has at national level in co-ordinating with the Meteorological Service and agricultural users of water, as well as those experienced at regional level in co-ordinating with projects to study and develop communal water resources.

He will draw up tables and maps of the networks of stations of various categories: at the start of the programme (1975), at present (1982) and planned (1986).

8

He will define the organization of operations within his field of competence for the national Service/Centre system and formulate recommendatons with a view to eliminating factors which hinder these operations.

At the end of his mission, he will analyse the needs of the Regional Centre, with a view to harmonizing the integrated system of operations, and also the problems of training, studies and research within his competence.

He will participate in the debriefing of the mission both in Niamey and Geneva. He will draft the parts of the final document of the mission which lie within his competence.

III. AGROMETEOROLOGICAL APPLICATIONS CONSULTANT

1. Requirements

The consultant in agrometeorological applications must be a trained agronomist with experience at a high level in tropical agrometeorology, in particular in West Africa, by virtue of:

(1) Duties performed during his career;

(2) Experience required in the organization of agrometeorological activities in West Africa, concerning:

- Organization of the agrometeorological divisions of the Meteorological Services and agriculture and agronomic research services;

- Co-ordination of the agrometeorological activities of these three Services at national and regional levels;

(3) Practical knowledge of the Sahelian agricultural community and its main requirements for agrometeorological information;

(4) Technical knowledge of the agrometeorological aspects of the operations to be implemented under the Programme in relation to the operations which have already been agreed on and which are at present in their experimental phase;

(5) Knowledge of the scientific problems concering the agrometeorology of West Africa in its relation to agriculture;

(6) Training experience in tropical agrometeorology.

A perfect knowledge of French is necessary. It would be an advantage to have sufficient knowledge of English for the mission to Gambia.

Terms of reference

The consultant will participate, together with all the members of the mission, in the preparatory briefing in the WMO Secretariat in Geneva and at the Niamey Centre.

He will then visit the CILSS countries to discuss with the Directors of the Meteorological Services items 1-7 of the general terms of reference which are within his competence as an agrometeorologist.

In particular, he will discuss with each Director of the Meteorological Services, and in co-ordination with his meteorological colleague, the organization of the agrometeorological division given in the "Plan for organizing the national Meteorological Service" which will have been drawn up in advance by each Director in preparation for the mission.

The discussions will clarify and explain, particularly from the agrometeorological point of view:

(a) Progress achieved by the Programme from 1975 to 1982;

(b) New priority needs for Programme operations, together with a proposal for fair distribution of the financial load to cover these needs between the country, the Programme and other sources of assistance, such as the WMO Voluntary Co-operation Programme (VCP) and bilateral assistance.

He will examine the problems of co-ordinating the agrometeorological operations of the Programme with those of the FAO Agrometeorological Group with the in the context of the secrutiy of food supply of the CILSS countries.

He will analyse the agrometeorological activities undertaken at national level by the Services concerned (meteorology, agriculture and agronomic research), in particular:

(a) Agroclimatological studies on the development of new land and on improving production planning,

(b) Current operations for monitoring crops and pasture land whose objectives are threefold:

- To forecast crop yields,
- To protect crops,
- To manage irrigation.

He will analyse the situation as regards co-ordination between the agrometeorological division of the Meteorological Service and the agriculture and the agronomic research services, in particular regarding the creation and operation of the Co-ordination Committee which has often been recommended. He will draw up new recommendations, as necessary, to ensure the indespensable co-ordination of agrometeorological activities at national level.

He will examine, in particular from the agrometeorological point of view, the situation of the networks planned by his meteorological colleague (tables and charts).

He will define operations within his field of competence for the national Service/Centre system and formulate recommendations in the view to eliminating factors which hinder these operations.

He will, at the end of the mission, analyse the Regional Centre's needs, with a view to harmonizing the integrated system of operations, as well as the problems of training, studies and research within his competence.

He will participate in the debriefing of the mission both in Niamey and Geneva. He will draft the parts of the final document of the mission which lie within his competence.

IV. COMMUNICATION CONSULTANT

The consultant will participate, together with the mission's members, in the preparatory briefing at the WMO Secretatiat in Geneva and at the Niamey Centre.

He will then visit the CILSS countries to discuss, with all the authorities concerned, item 3 of the general terms of reference which is particularly within his competence. He will also discuss relevant topics with the Director of the Meteorological Service, the directorate concerned with agriculture as well as the mass media (television, radio and newspapers).

At the end of the mission, at the Niamey Centre, he will examine the problems of disseminating the information at regional level. He will participate in the debriefing of the mission, both in Niamey and Geneva. He will draft the parts of the final document which lie within his field of competence.

Schedule of visits in countries and at Centre

Niger

Bernard	10-14 July
Garnier	10-17 July
Van de Vyvere	10-17 July
Hendler	13-17 July

Upper Volta

Bernard	14-17 July
Garnier	17-24 July
Van de Vyvere	17-24 July
Hendler	17-21 July

Mali

Bernard	17-21 July
Garnier	24-30 July
Hendler	21-24 July, 15-18 September
Rijks	26-31 August

Senegal

Bernard	21-24 July, 22-24 August
Garnier	22-29 August
Franquin	22-29 August
Hendler	24-27 July

Cape Verde

Hendler	27-31 July
Bernard-Gosset	24-29 August
Garnier	29 August - 4 September
Franquin	29 August - 4 September

Mauritania

Bernard	25-27 July
Garnier	5-9 September
Franquin	5-9 September
Hendler	7-9 September

Gambia

Bernard	24-25 July
Garnier	11-13 August
Franquin	11-13 August
Hendler	11-13 August

Regional Centre

Bernard	10-14 July, 15-25 September
Garnier	10-17 July, 14-25 September
Franquin	14-25 September
Hendler	13-17 July, 19-25 September
Van de Vyvere	10-17 July, 21-25 September
Echols	16-25 September

14'

LIST OF PERSONS MET

CAP VERT

A.O. LIMA	Secrétaire général du Ministère des transports et communication
V.G. MENDES	Directeur adjoint du Service métérologique national à SAL
V. FERNANDES	Directeur général du Plan
Mme L. LIMA	Directeur a.i. du développement rural
H. SOARES	Directeur général du Centre d'études Agraire
L. ALVES	Directeur de la division agrométéorologique
R. SILVA	Chef de la Section Hydrologie
M.C. BABAU	Expert Hydrologue OMM, Programme Agrhymet
R. TOURIGNY	Représentant résident adjoint du PNUD.

GAMBIE

P. JARJUSEY	Acting Permanent Secretary, Vice President's Office
S. MAHONEY	Assistant Secretary, President's office
E. TAAL	Permanent Secretary, Ministry of Water Resources and the Evironment
S. JANNEH	Acting Director of Agriculture
E.A. NJIE	Director of Water Resources
M.M. SAHOR	Assistant Director of Water Resources
M.E. JASSEH	Hydrologist (Water Resources)
L.O. JOBE	Irrigation Engineer, Ministry of Water Resources and the Environment
A.E. BAH	Transport Supervision (Water Resources)
J.A. SAM	Meteorologist (Forecaster)
R. COLY	Chemist
A. DEMBA	Computer superintendant
A. TAAL	Senior planner, MEPID
P. HUTCHINSON	WMO Expert agroclimatologist Agrhymet Programme.
D.R.L. PRABHAKAR	WMO Expert hydrolgist, Agrhymet Programme
T.A. MOSER	USAID representative
Q. BENBOW	USAID Programme Office for the Agrhymet programme
B. DEMEKSA	UNDP Resident Representative
Miss N. BORTHWICK	UNDP Assistant Resident Representative
J.A. SCHWAGER	UNDP Deputy Resident Representative
Miss B. MILLER	UNDP Administrative Officer

HAUTE VOLTA

D. NIKIEMA	Président du Comité exécutif. Directeur de l'Hydraulique et de l'Equipement rural.
SECK MAME D'DIACK	Secrétaire exécutif du CILSS.
J.P. OUEDRAOGO	Directeur de la Météorologie Nationale.
F. GNOUMOU	Directeur adjoint de la Météorologie Nationale.
F. OUATTARA	Chef de la Division d'Agrométéorologie à la Météorologie Nationale.
H. KAMJIE	Représentant de l'ASECNA
L. LOMPO	Directeur des services Agricoles.
M. OUEDRAOGA	Direction des Services Agricoles au Ministère du développement rural.
J. MIEBE	Chef du Service de la Protection des végétaux.
M. SAMOU	Directeur du projet lutte intégré.
M. BIKIEMGA	Chef du Service dans la Division de la protection des Plantes, Co-directeur du Projet Phosphate.
H. ZAMPOLIGE	Service de la vulgarisation.
A. BOLY	Responsable du Stock Alimentaire, Division de la Protection des Végétaux.
A. ROCH	Chef d'Escadron, Ministère du Développement rural
O. KOUTIEBOU	Secrétaire-Général du Ministère des Travaux Publics, Transports et urbanisme.
K. SAVADOGO	Chef du Service Hydrologie
J.P. LAHAYE	Hydrologue du Centre Africain d'Etudes Hydraulique
PUECH	" " " " "
NOMBRE	Directeur de l'Office des Barrages et de l'irrigatio
FISON	Centre Régional de Télédétection de Ouagadougou (CRTO)
J.C. PION	Responsable des applications de la Télédétection à la Géologie au CRTO (chercheur ORSTOM).
M. MIETTOM	Maître-assistant en Géomophologie à l'Université d'Ouagadougou.
P.J. MATLOM	Directeur du Projet ICRISAT en Haute Volta.
R. SWANSON	Anthropologue (Projet économique et sociaux), Farming System Unit (FSU) du "Semi-Arid Food Grain Research and Development" (SAFGRAD).
A. DJIGMA	Directeur de l'Institut Voltaique de Recherche Agromique et Zóotechnique (IVRAZ)
J.-B. ILBOUDO	Directeur de la Radio Nationale.
D. KOGUIYAGDA	Chargé du Programme Agrhymet au PNUD.

J.-P. TRIBOULET	Expert en Hydrologie, Programme Agrhymet
S. VOOJDANI	Expert FAO au projet "Lutte intégrée".
P. MOITY	Consultant FAO pour la Communication et l'Audiovisuel
P. SCIARONE	Représentant de la Hollande auprès du CCC, Coordonnateur du Programme d' Aide Hollandais au Sahel.
K.-G. WIDSTRAND	Représentant Résident du PNUD
P. BAESSOU	Représentant adjoint du PAM, Représentant Résident a.i. du PNUD.
F.-M. BIABATANTOU	Chargé de Programme FAO.

MALI

M.A. GOLOGO	Directeur du Service météorologique national
K. KONARE	Directeur adjoint du Service météorologique national
M. KONATE	Agroclimatologue, Service météorologique national
D. DOUCOURE	Agrométéorologue, responsable du projet MLI/76/009, Programme Agrhymet
M. SANGATA	Directeur de l'agriculture
SAMAKE	Directeur général adjoint du genie rural
KEITA	Collaborateur de M. Samake
GADELLE	Collaborateur de M. SAMAKE
D. LASSINE	Chef de la Division agronomique, adjoint au directeur de l'IER
H. DIOP	Directeur général du développement national, de la formation et de l'animation rurale (DNFAR)
M. BA	Ingénieur Agronome à la DNFAR
SAMOGHO	Service des eaux et forêts
BERTHE	Service des eaux et forêts
CAMARA	Directeur de l'élevage
DRAVE	Conseiller technique au Ministère de l'agriculture
M. SACKO	Directeur général adjoint au Ministère de l'hydraulique
S. TRAORE	Directeur de l'Hydraulique
A. SIDIBE	Chef adjoint du Service hydrologique chargé du volet hydrologique project MLI/76/009, Programme Agrhymet
DIABATE	Chef adjoint du Service hydrologique, responsable du projet Hydroniger en Mali
MAIGA	Hydrologue, Service hydrologique
CHOURET	Chef de la Mission ORSTOM
DICKO	Directeur de la Radio nationale
M. RAHNEMA	Représentant résident du PNUD
E.P. NZEKIO	Représentant résident a.i. du PNUD
G. MAZZA	Chargé du Programme au PNUD

A. WOOD	Chargé du Programme au PNUD
P. ZAHND	Chargé du programme Agrhymet au PNUD
P. PLANTAGENEST	Conseiller PNUD au Ministère du Plan
A. JANNEH	Représentant de l'UNSO (New York)
M.J. MUKENDI	Représentant de l'FAO
TABET	Chargé du Programme FAO
LAM	Expert FAO, projet lutte intigué
FLEMING	Chargé du Programme à l'USAID

MAURITANIE:

A. AHMEDOU	Chef du Service Météorologique de l'ASECNA
HILLION	Conseiller technique auprès de M. Ahmedou
E. GANDEGA	Agrométéorologue
A.A. KANE	Agrométéorologue
B. ZEIDANE OULD SIDI	Agrométéorologue
A. MAOULOUD	Directeur adjoint de l'Agriculture
A. SALEM	Directeur adjoint de l'Agriculture
O.A. MOHAMED	Ministre du développement rural
A. ELFEKIH	Conseiller technique principal au Ministère du développement rural
M. SIDI	Chef du Service de la protection des végétaux
T. OULD MOUKHYAR	Chef du Service des statistiques agricoles
C. FODIE	Directeur du Centre national de recherche agronomique et de développement agricole de KAEDI
DIALLO	Chef du Service de la vulgarisation et des productions agricoles
A. SIDI MOCTAR	Directeur de l'hydraulique
D. SAAR	Chef de la Section hydrologie
M.F. SAADBOUH	Responsable des perimetres irrigués
M. KETATA	Expert agrométéorologue OMM, Programme Agrhymet
J.H. HOORELBECK	Hydrologue ORSTOM
M. GAUTIER	Représentant résident adjoint du PNUD
EL HADJ	Chargé du programme au PNUD
K. CHOUEIRI	Représentant de la FAO

NIGER

M. BOULAMA	Directeur de la Météorologie Nationale
S. MARAFA	Représentant de l'ASECNA
I. ALSO	Adjoint au Directeur de la Météorologie Nationale et Chef de la Division exploitation
M. DAOUDA	Chef de la Division de Traitement des Données à la Météorologie Nationale
A. MAIDOUKIA	Chef de la Division Agrométéorologique à la Météorologie Nationale
I. OUMAROU	Directeur des Services de l'Agriculture
S. WEINO	Directeur adjoint des Services de l'Agriculture
B. BAGNAN	Directeur des Ressources en Eaux
S. ISSA	Chef du Service Hydrologique
A. CHAIBOU	Chef de la Division de Mise en Valeur à l'ONAHA (Office Nigerien des Amménagements Hydro-Agricoles)
T. CHAIBOU	Chef de la Division des Infrastructures à l'ONAHA
A. OUMAROU	Directeur adjoint du Service de l'Elevage
M. SALEY	Directeur de l'INRAN
D. TOOKOUA	Chef de la Division des Etudes et Programmes de l'INRAN
K. NWANZE	Directeur a.i. du Centre Régional de l'ICRISAT
M. OUSMANE	Rédacteur en chef du Journal "Le Sahel"
A. BARRY	Directeur du Projet Hydro-Niger
E. BERNSTEN	Expert information OMM au Projet Hydro-Niger
M. LOVAAS	Représentant de l'USAID
J. SNYDER	" " "
R. PIERRE-LOUIS	Chargé de programme FAO
C. VAN WAGENINGEN	Administrateur FAO
W. SEMERDJIAN	Représentant Résident du PNUD
E. BOELENS	" " adjoint du PNUD

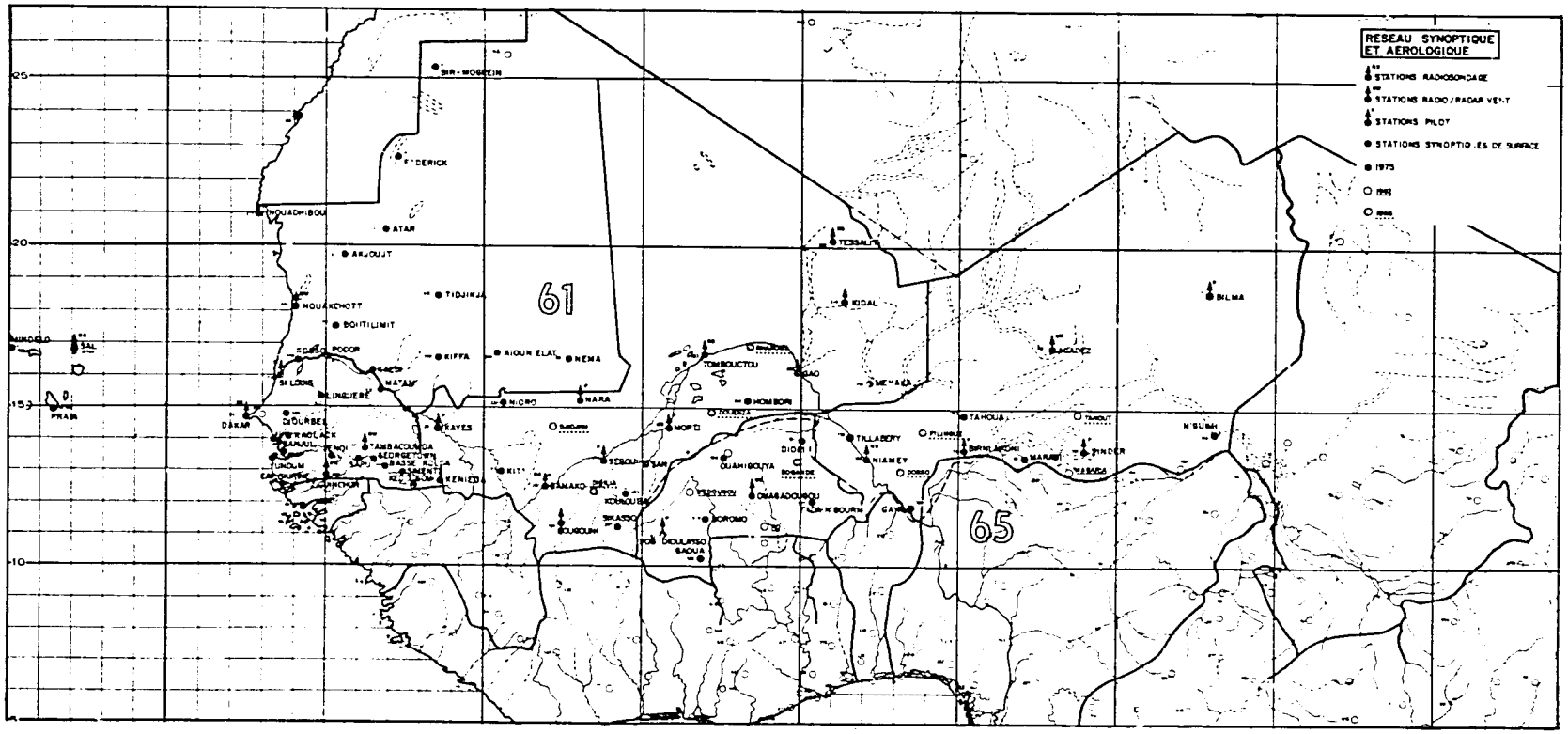
SENEGAL

M. SECK	Directeur de la Météorologie nationale
MANDENGUE	Directeur de l'exploitation météorologique de l'ASECNA.
D. TALL	Météorologie nationale
O. SALL	Météorologie nationale
I. SALL	Météorologie nationale, bureau des instruments
N'DENE N'DIAYE	Météorologue nationale, division agrométérologie
B. COLY	Directeur de la production agricole
N'DIAYE	Directeur a.i., Direction générale de la production agricole (DGPA)
FALL	Ingénieur agronome, Direction générale de la production agricole (DGPA), Services des études de la methode et du plan
BA	Agrométéorologist, conseiller du Directeur de la production agricole
DELBOSK	Service Semencier
BASSEME	Service Semencier
EL HADJI SENE	Directeur général des eaux et forêts
Dr. FALL	Directeur a.i. au ministère de la production et santé animale
PAPA DAOUDA FALL	Directeur adjoint, Direction de la production et santé animals, Ministère du Développement rural
BILQUEZ	Directeur adjoint de l'Institut national de développement rural (INDR)
M. DABO	Directeur général de la Société de développement agricole et industriel (SODAGRI)
B. DIOUF	Directeur technique de la Société de développement Agricole (SODEVA)
D. DIAGNE	Directeur de la protection des végétaux
M. MOTAR DIEYE	Directeur des Etudes hydraulique
S. TEWN	Chef de la division hydrologie
COLY	Hydrologue, Division hydrologie
SIDIBE	Hydrologue à l'O.M.V.S.
CURETTE	Hydro-geologue O.M.S.
J. SZKUTNICKI	Expert hydrologue OMM, Programme Agrhymet

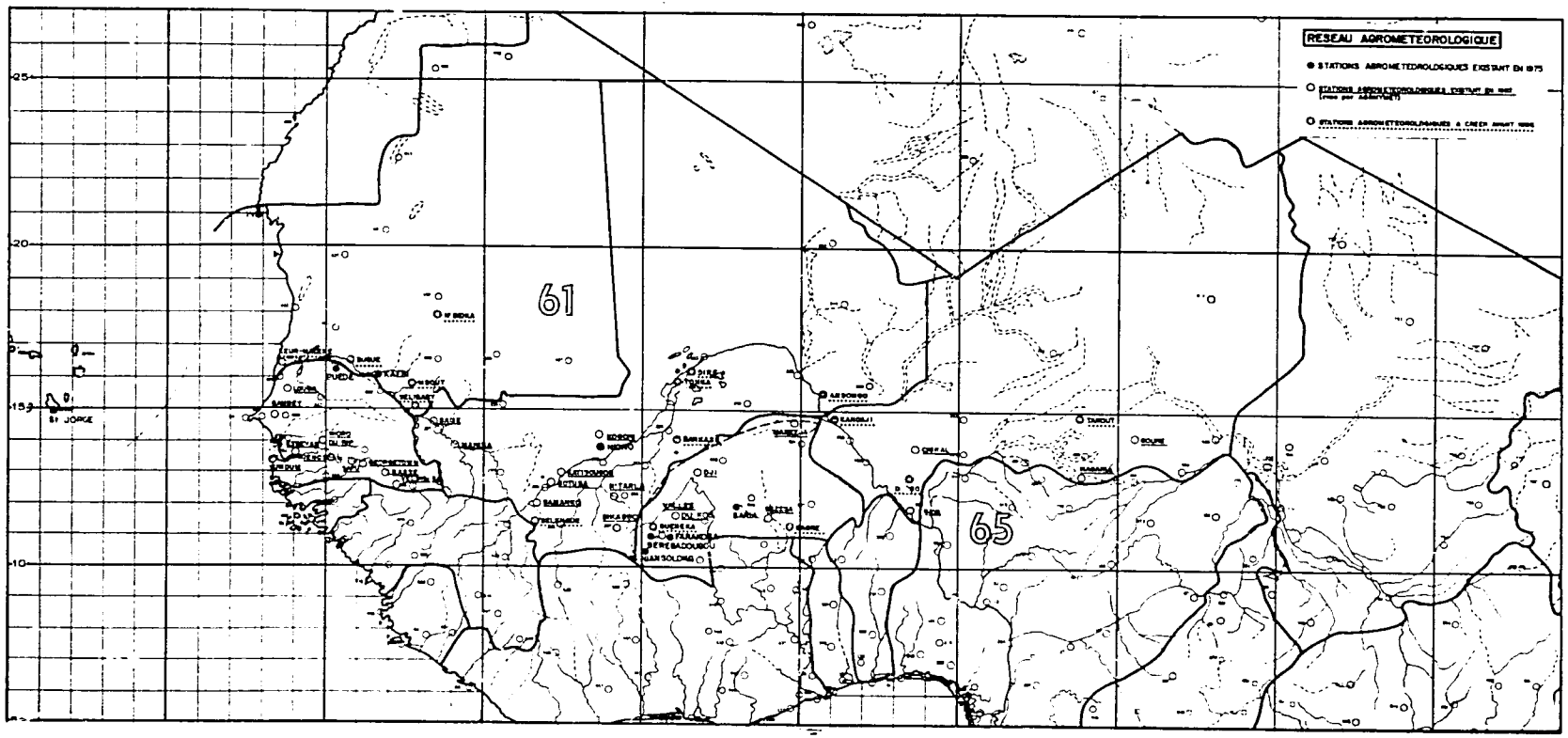
I. CISSE	Directeur du Cabinet du Ministère des transport et de l'equipement
M. KEBE	Secrétaire général du Ministère du Plan et de la coopération
DANCETTE	Bioclimatologiste, Centre national de recherche agronomique de BAMBEY (CNRA)
A. BELLOCQ	Expert agrométéorologiste OMM, Programme Agrhymet
B. BORNA	Représentant résident du PNUD
G. DAVIS	Représentant résident adjoint du PNUD
J. BLANCH-SOLER	Représentant résident du PNUD au Mozambique (de passage)
SCHWETZER	Représentant résident FAO adjoint Chargé du Programme à l'USAID

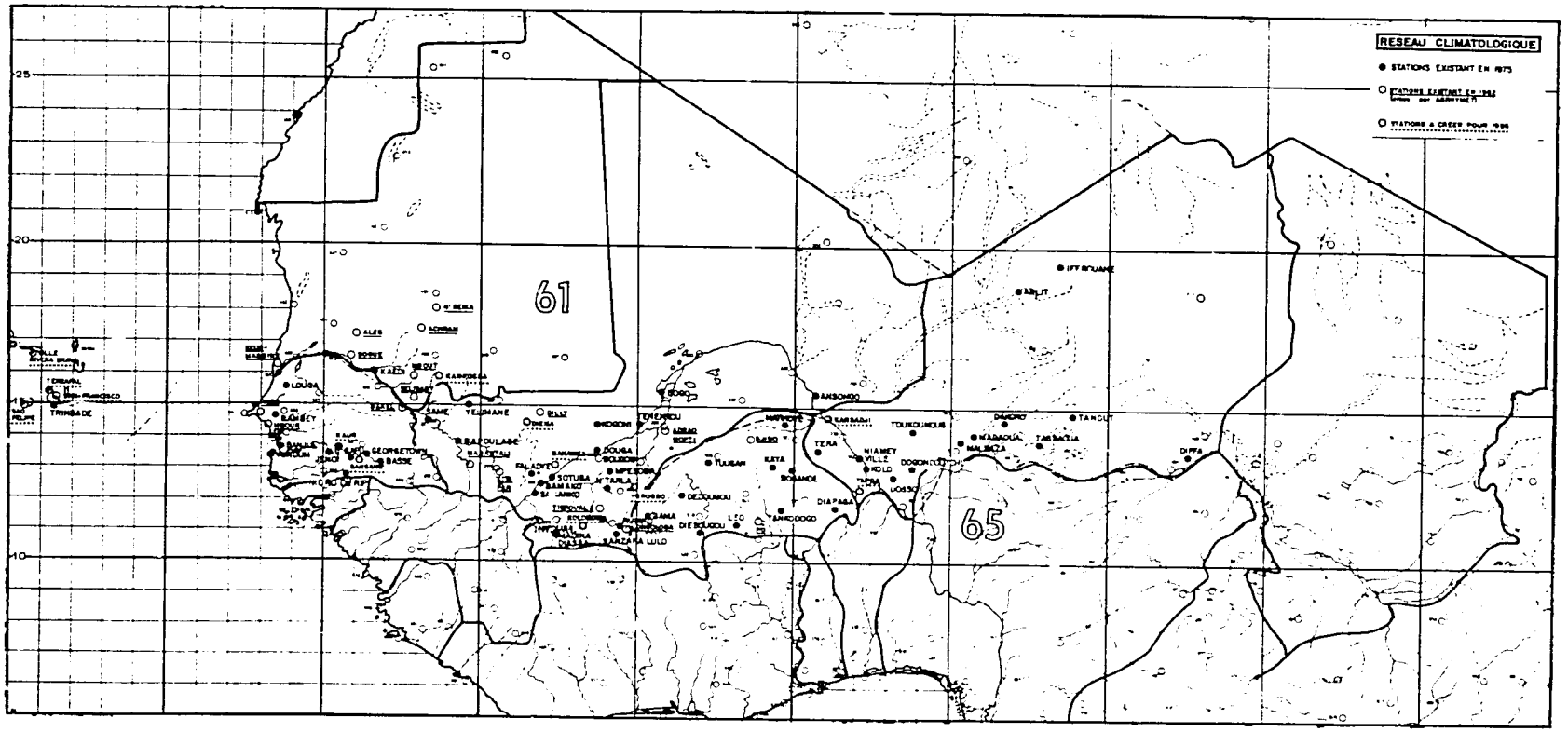
CENTRE REGIONAL AGRHYMET

E. COLY	Directeur Général, Centre Agrhymet
D. LAMBERGEON	Directeur des activités opérationnelles
A. MUSY	Directeur des Recherches Appliquées
J.J. DEVYNCK	Directeur de la Formation
J.J. DENIS	Chef de la Division Agrométéorologie
P. VOSSEN	Expert en agrométéorologie
E. MELLAART	Instructeur en Agrométéorologie
J. STOMPH	Chercheur, Agronomie Tropicale.
G. DEROO	Chef de la Division Instruments
J.J. LE FLEM	Instructeur en Instrument
A. BALIKIN	" " "
G. SERRA BERTRAL	Chef de la Division Hydrologie
H. BIJNSDORP	Expert associé en Hydrologie
SOK SAING IM	Expert associé en Hydrologie
Mme. MORIN	Professeur de Physiologie végétale,Univ. de Niamey
I. OUEDRAOGO	Instructeur en Météorologie et Mathématique
F. WELDON	Conseiller technique (NOAA)
Mme. S. ROSENTHAL	Informaticienne
S.K. KAW	Expert software (détaché de NOAA)
M. BOBILLIER	Expert associé en Informatique
J. GIGAULT	Traducteur (Volontaire du Service National - VSN)
J.P. RATTE	Documentaliste (VSN)
A. ROUSSELOT	Fonctionnaire administratif Principal
M. BERNARDI	Expert FAO, coordonnateur régional du projet lutte intégrée.

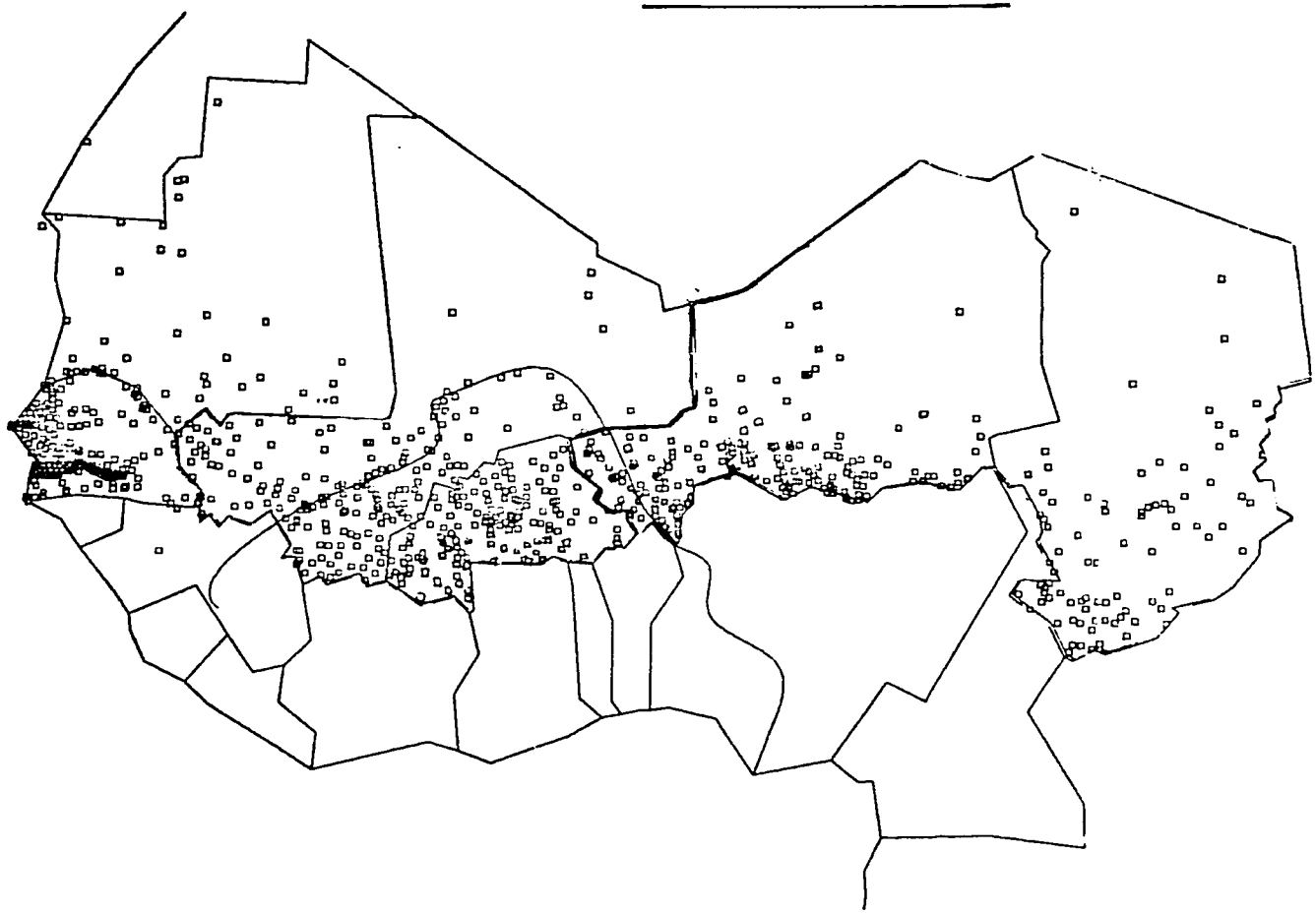


ANNEX 5 (II.2.1.5.1)


RESEAU AGROMETEOROLOGIQUE
STATIONS AGROMETEOROLOGIQUES EXISTANT EN 1975
61
65
25
20
15
10
ST JORGE
W BIDHA
BARGE
BARAKA
BARAMANGA
BERE BADOUSOU
NIAN SOLDING
DIKA
BARGUILI
DEKAL
TAROUT
BOUNE
BARAMBA


RESEAU CLIMATOLOGIQUE
STATIONS EXISTANT EN 1973
STATIONS EXISTANT EN 1982
STATIONS A CREER POUR 1985
61
65
25
20
15
10
ALES
LOUGA
TELIMANE
BOUSSA
NIAMEY
TOUKOUNOUS
TANOUT
DIFFA
TERA
DOSSO
TRINDADE

POSTES PLUVIOMETRIQUES

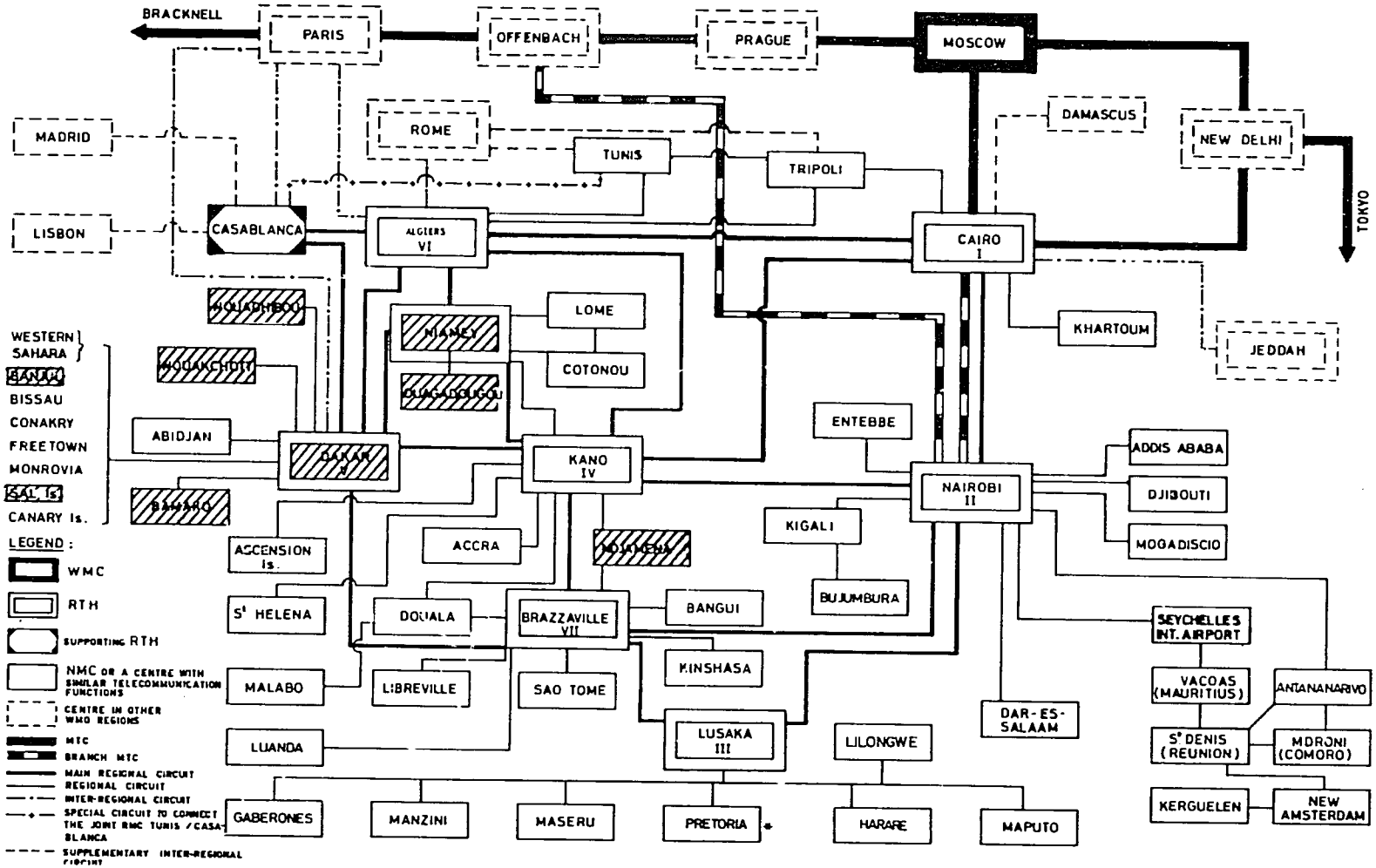


SEMIS: 268 MAILLE: 300.00

POINTS 280 A 560

ISOVALES . LATITUDES

ECHELLE: 1/2



Réseau de la VMM

ANNEX 6 (II.2.1.5.4)

ANNEX 7 (II.2.1.8.1)

NATIONAL METEOROLOGY
DIRECTORATE
BAMAKO – P.O BOX 237

AGROMETEOROLOGICAL BULLETIN DIVISION:
THIRD DECADE OF JUNE 1982 AGROMETEOROLOGY

STATIONS	TEMPERATURES IN DEG C								RELATIVE AIR HUMIDITY AS A %	
	SHADE				SOIL		SOIL AT 12.00			
	MEAN MAX	MEAN MIN	AVERAGE	INTER.	MEAN MAX	MEAN MIN	AT 10 CM	AT 20 CM	MEAN MAX	MEAN MIN
TESSALIT	42.1	29.2	35.7	35.7	52.3	28.2	39.1	38.4	32.0	10.0
KIDAL	41.4	27.3	34.4	35.4	45.1	21.3	43.0	37.9	44.0	13.0
TOMBOUCTOU	39.1	26.2	33.0	33.6	44.7	23.6	38.2	34.4	74.0	30.0
GAO	40.1	28.3	34.5	34.2	52.1	27.3	38.5	38.0	62.0	23.0
NIORO	39.6	27.8	33.7	31.9	43.8	24.1	37.3	37.0	62.0	24.0
NARA	38.1	27.5	32.8	30.6	42.8	26.5	37.2	36.6	66.0	29.0
HOMBORI	38.7	27.0	32.8	32.9	44.6	25.4	36.5	35.0	66.0	32.0
MENAKA	39.6	28.1	34.1	34.0	47.3	24.3	38.5	36.4	59.0	23.0
KAYES	38.2	26.2	32.2	30.4	42.2	24.3	36.7	34.3	75.0	35.0
MOPTI	36.3	25.5	31.0	30.6	40.1	23.2	36.6	33.8	79.0	36.0
NIOTA	32.1	21.9	26.9	26.2	36.7	21.5	31.3	29.6	94.0	56.0
SEGOU	35.2	24.7	30.5	29.4	42.6	22.2	33.5	30.2	89.0	39.0
SAN	34.5	24.2	29.2	24.5	41.1	22.3	34.7	31.6	86.0	48.0
KENIEBA	32.9	23.4	28.2	28.3	38.4	21.9	33.8	32.0	89.0	57.0
BKO-VILLE	32.1	22.5	27.3	27.7	36.0	16.6	31.8	29.8	97.0	62.0
BRO-TOWN	31.6	22.2	26.9	27.7	35.3	17.9	31.7	31.4	93.0	55.0
KOUTIALA	31.5	22.5	26.9	27.8	35.3	19.5	31.4	29.8	91.0	53.0
FOUSSOUNI	31.1	22.3	26.7	26.8	36.0	21.2	33.7	31.6	92.0	57.0
SIKASSO	31.4	21.8	26.6	27.2	39.8	21.0	30.9	28.8	93.0	58.0
NIONO	35.3	25.1	30.2	30.6	41.9	22.0	31.9	30.1	83.0	42.0
SOTUBA	31.6	22.3	27.0	27.8	36.3	19.4	30.1	29.7	88.0	65.0
KATIBOUGOU	33.8	23.8	28.8	X	38.1	22.4	33.2	31.3	90.0	43.0
KOGONI	35.9	25.8	30.8	31.1	X	X	X	X	73.0	44.0
SAME	38.7	28.0	33.2	X	47.0	27.0	38.7	35.2	X	X
MAHINA	35.0	23.5	29.0	30.1	42.0	22.8	38.1	34.6	81.0	51.0
NIAMLA	34.3	23.3	28.8	27.8	X	X	33.8	31.0	76	53

(BULLETIN BASED ON FIRST CABLED DATA RECEIVED)

31

STATIONS	RAINFALL					EVAPORATION AND EVAPO-TRANPIRATION (MM)		RADIATION (CAL/CM2/D) INSOLATION (H AND I/10)			POTENTIAL WATER BALANCE
	P(MM)	P. MOY	N D	N.M.J	CUMUL.	ETP.	TANK A	PICHE	RG	INSOL	P-ETP
TESSALIT	0.8	2.1	1	0.9	1.4	93.0	X	203.1	445.3	63.2	-92.2
KIDAL	7.1	5.1	2	1.1	19.2	73.7	X	116.7	520.9	87.3	-66.6
TOMBOUCTOU	22.6	7.1	2	1.6	26.4	70.0	X	95.5	551.6	97.7	-47.4
GAO	11.5	7.3	2	1.6	31.3	93.1	143.3	131.1	509.7	85.0	-81.6
NIORO	3.4	24.2	2	2.9	16.1	83.5	X	146.4	541.4	95.5	-80.1
NARA	0.4	22.4	1	2.1	13.8	70.5	X	116.8	477.2	75.6	-70.1
HOMBORI	39.4	22.6	2	2.4	61.7	74.0	X	80.4	496.6	81.2	-34.6
MENAKA	10.0	11.4	2	2.0	24.0	63.3	X	155.8	501.8	83.1	-53.3
KAYES	11.1	40.1	1	3.4	40.1	72.4	121.5	85.7	549.9	98.7	-61.3
MOPTI	32.5	25.7	5	3.1	75.3	65.7	110.5	76.8	515.0	87.8	-33.2
KITA	62.7	52.7	6	4.3	259.5	41.8	63.0	34.6	448.1	76.0	+20.9
SEGOU	7.4	31.7	3	3.7	27.1	52.8	77.9	55.4	416.3	57.9	-45.4
SAN	24.2	36.3	4	3.2	150.9	52.5	X	56.0	494.6	82.3	-28.3
KENIEBA	61.1	58.2	6	4.7	247.3	44.1	X	31.0	486.3	80.1	17.0
BKO-TOWN	65.6	49.3	7	4.4	201.1	44.5	52.6	28.1	451.8	69.5	21.1
BKO-SENOU	31.6	50.6	3	4.1	191.5	47.6	X	33.0	445.1	67.8	-16.0
KOUTIALA	25.8	44.9	5	4.2	205.2	49.2	63.4	37.3	488.2	81.0	-23.4
BOUGOUNI	61.8	53.4	4	4.6	265.0	41.2	43.5	18.6	470.7	76.3	20.6
SIKASSO	16.5	56.8	3	4.9	198.8	37.8	22.3	20.5	401.9	54.8	-21.3
NIONO	27.9	21.9	4	2.3	59.7	50.1	81.3	53.0	433.0	62.5	-22.2
SOTUBA	58.0	44.7	7	3.6	271.3	41.6	53.1	29.3	409.0	56.1	16.4
KATIBOUGOU	22.8	X	5	X	107.0	49.5	X	44.9	438.4	65.1	-26.7
KOGONI	8.2	24.3	4	1.6	17.0	59.9	X	69.5	507.4	85.3	-51.7
SAME	12.6	404	3	3.4	39.5	77.3	111.1	102.0	532.1	93.1	-64.7
NAKINA	27.3	35.2	4	3.1	119.2	62.4	X	46.0	469.0	74.0	-35.1
N'TARLA	13.3	49.9	4	4.2	144.0	53.8	X	36.0	348.3	41.8	-40.5

P (MM) = AMOUNT RECORDED
N.D = No. OF DAYS
CUMUL = CUMULATIVE RAINFALL SINCE I MAY
RG = CALCULATED TOTAL RADIATION
X = NOT RECEIVED OR OBSERVATION NOT PERFORMED

P. MOY = IN TERANNUAL AVERAGE
N.MJ = AVERAGE No. OF DAYS OF RAINFALL
ETP = PENMAN EVAPOTRANSPIRATION
INSOL = DURATION OF INSOLATION
BAC A = PAN A

READY

AGROMETEOROLOGICAL SUMMARY

(Period 21-30 June)

The pressure field still shows a depression over the Sahara and the two anticyclones, Azores and Libyan.

The Intertropical Front (ITF) has ranged between 16 and 21 degrees North.

The penetration of moist air has not fallen much below 1000 metres of altitude and winds out of the south-west have been weak.

The observed phenomena have been:

- south of the fourteenth parallel : frequent local thunderstorms, rarely accompanied by rain;

- north of the fourteenth parallel :wind-blown sand, less dense than during the preceding ten days but still reducing visibility.

I RAINFALL :

Recorded rainfalls were equal to or higher than normal at Kidal, Tombouctou, Gao, Hombori, Mopti, Niono, Kéniéba, Bamako-Town, Sotuba, and Bougouni, while elsewhere rainfall was very low. But as a whole, the outbreaks of rain were quite well distributed in time.

Cumulative rainfall between 1 May and 30 June was normal or in excess of normal at all stations except for Ménaka, Mopti, Mahina, and N'Tarla, where it was below normal; and at Tessalit, Nioro, Nara, Kayes, and Ségou, where it was much below normal.

II OTHER PARAMETERS :

1) Shade temperatures

The mean maximum temperature ranged between 42.1°C at Tessalit and 31.1°C at Bougouni, and the mean minimum between 29.2 at Tessalit and 21.8°C at Sikasso. The widest temperature range was recorded at Tessalit and Tombouctou with 12.9°C, and the narrowest at Bougouni with 8.8°C.

2) Relative air humidity

The maximum varied between 97% at Bamako and 32% at Tessalit, and the minimum between 65% at Sotuba and 10% at Tessalit.

3) Potential evapotranspiration :

The greatest potential evapotranspiration, at Gao, was 93.1 mm and the lowest was 37.8 mm at Sikasso.

4) The greatest amount of sunshine was recorded at Nioro with 95.5 hours, and the least at N'Tarla with 41.8 hours.

5) The potential water balance was positive at Kéniéba, Bamako Town, Bougouni and Sotuba.

III IMPACT ON AGRICULTURE :

An analysis of the effective water balance shows that :

1) In the First Region :

The amount of moisture is not yet favourable for sowing at Kayes and Nioro; it is therefore advisable to wait.

Conversely, at Kita and Kéniéba, the amount of moisture in the soil is enough for crops and should continue to be so during the coming ten days.

2) In the Second Region and Bamako District :

At Bamako-Sénou, Bamako Town, Sotuba, Katibougou, and Samanko PAR crops have received the moisture needed in the past ten days, and the coming ten days also have a good outlook.

On the other hand, at Nara neither the present moisture content of the soil nor the prospects for the forthcoming ten days allow planting to take place at this moment.

3) In the Third Region :

Crops have benefited from the good moisture situation at Sikasso, Bougouni and Koutiala; this should hold true for the next ten days.

4) In the Fourth Region :

Crops have received enough moisture at San, and it is expected that this should remain the same during the next ten days.

Soil humidity permits the initiation of sowing at Nioni and the chances of having the right conditions for good growth in the next ten days are in the 87%-92% range. However, at Ségou it is advisable to wait before sowing.

5) In the Fifth Region :

The moisture state of the soil is good for sowing at Mopti, and the probability of having the right amount of moisture for good growth during the following ten days stands at between 75% and 90%.

-34

A S E C N A
DIRECTORATE OF METEOROLOGY

STATEMENT OF PRINCIPLES GOVERNING COLLABORATION BETWEEN ASECNA AND THE AGRHYMET PROGRAMME

ASECNA, established under the December 1959 Convention of St Louis, has the task of ensuring the regularity and safety of international air navigation in the air space of its Member States. As part of this, for meteorology, and at the airfields coming under the community activity of the Agency, ASECNA has been entrusted with the responsibility for:

- observations (ground and high-level)

- meteorological telecommunications (GTS and OPMET)

- forecasting and assistance to air navigation.

In each country it is the National Meteorological Centre, in the WMO sense of the term, which is concerned in this activity.

In addition, special contracts signed with each of the States have entrusted the Agency with the management of activities within its competence relating to matters of national interest.

With regard to meteorology this refers:

- to the synoptic network

- to the climatological and raingauge networks, and to climatology.

In this way ASECNA, an agency with a basically air navigation function, came to be entrusted at its establishment with responsibility for all meteorological activities of the States (apart from Cameroon and Madagascar, where the Directorates of National Meteorology have since the outset undertaken some of the national activities and have continued to develop in terms of equipment and manpower).

This situation has changed little. New Directorates of National Meteorology have been set up in nearly all the States but they are only really separate from ASECNA (Director, separate services) in a little over half of them. Even in these cases, they are far from having taken direct responsibility for the management of all so-called national activities. Thus, and confining our attention to the States of the CILSS (Mauritania, Senegal, Mali, Upper Volta, Niger, Chad):

- 3 States have a national meteorological Service separate from ASECNA: Senegal, Upper Volta and Chad;

- only 2 manage the corresponding climatology activities and networks: Senegal and Chad;

- in all these cases the synoptic network remains in the hands of ASECNA.

In this context the applications of meteorology other than assistance to air navigation have remained a marginal activity and have undergone little or no development.

For its part the AGRHYMET Programme aims at contributing to the economic expansion of the countries by developing assistance activities in the spheres of agrometeorology and hydrology. This goal is pursued by strengthening the observation networks, the operations concerned in the collection and processing of data, and the organizing of Agrometeorological and Hydrological Services.

It appears clear that the tasks of ASECNA on the one hand and the goals of the AGRHYMET Programme on the other, far from making rivals of them, make them in fact complement one another. Their activities should therefore be developed in parallel. This occasion should be used to achieve better distribution of responsibilities between ASECNA and national Services, with the latter gradually taking charge, amongst other matters, of the climatological and rainfall measurement networks.

In any event, close collaboration between ASECNA and the AGRHYMET Programme is essential because their respective activities rest on common basic elements: the observation networks, the data collection and exchange networks, and the data processing systems.

It is highly desirable for existing installations operated for ASECNA purposes, to be as far as possible the same as those used in the AGRHYMET Programme. Duplication would be tantamount to a regrettable waste of the limited material, human and financial resources of the States concerned. Contributions of the AGRHYMET Programme will thus be utilized to back up and supplement existing structures when the latter contribute to its objectives or when specific structures have to be set up.

The foregoing may form a basis for eliciting certain principles which are essential in governing relations between ASECNA and the AGRHYMET Programme in their different spheres of collaboration, and which may be classified under the following headings:

- observation networks (equipment and exploitation);

- data collection and exchange networks (equipment and operation);

- data processing system;

- staff.

a) Observation networks

This heading concerns the observation networks (synoptic, climatological, rainfall measurement) managed by ASECNA.

- The equipment provided under the AGRHYMET Programme to strengthen the portion of the network managed by ASECNA (replacement or specific items) will be installed by agreement between the two parties and handed over to ASECNA for its use.

- ASECNA will use such material in accordance with the instructions in force or in accordance with particular directives issued by the AGRHYMET Programme in respect of specific equipment.

- Generally speaking, ASECNA will operate its networks in such a fashion as to meet the specific needs of the AGRHYMET Programme.

- The equipment supplied for the Programme will remain the property of UNDP or the National Meteorological Service.

- To ensure the proper functioning of the networks, regular inspections will be made by ASECNA, or by the National Meteorological Service, or by both. The vehicles needed for such tours of inspection may be made available to either one or the other, as necessary, by agreement between the two parties.

b) Data collection and exchange networks

The data collection network is the network (usually SSB) permitting the real time collection of observations from the national networks at the National Meteorological Centre.

The data exchange network is the network which permits national units of different countries to exchange data (GTS and WMO).

These networks are operated by ASECNA on behalf of the individual countries.

With regard to the collection networks:

- The telecommunication equipment supplied by the Programme to strengthen and develop the networks (spare parts and supplies, and equipment for new stations) will be set up by the two parties in collaboration with one another;

- The equipment will be of a type (modulation, frequency) which allows it to be incorporated in the existing network. It will be operated according to the instructions in effect in the particular network;

- Particular hours of operation set aside for the needs of the AGRHYMET Programme may be laid down outside those required for the concentration of synoptic data or airfield observations;

- The equipment provided under the Programme will remain the property of the National Meteorological Service or the Programme.

With regard to data exchange between States, the Programme is making provision for concentration of collected agrometeorological and hydrological observations at the AGRHYMET Centre at Niamey. In return, the Centre will disseminate processed data bulletins and warnings to the different States.

To this end:

- The AGRHYMET Programme will be responsible for the necessary links once the network is completed, i.e., a radioteletype link between the meteorological centres of N'Djamena and Niamey, and in the latter city a landline teletype link between the telecommunications centre at the airport and the AGRHYMET Centre.

- agrometeorological and hydrological bulletins being passed to or from the AGRHYMET Centre will be channelled over the GTS, the Niamey telecommunications centre serving as an input/output point.

- These bulletins will be prepared and transmitted in accordance with WMO procedures and instructions in force at ASECNA.

- In each country, links will be established as needed between the National Meteorological Centre and the National Meteorology Service (landline, telephone).

- The National Meteorology Service and ASECNA will issue joint instructions for the preparation of bulletins and the dissemination of warnings to local users.

c) Data-processing system

This heading concerns climatology on the one hand and analysis and forecasting activities on the other.

In climatology, ASECNA carries out centralized processing of all data of the States' (at the Dakar Data-Processing Centre). This processing includes a quality control, storing on magnetic tape and the publication of monthly summaries.

- The present system utilized by ASECNA, which is in line with certain general needs among its users, will be continued until further notice.

- At the same time, the AGRHYMET Programme will prepare and set up its own data-processing system to meet the specific needs of its users.

- Both parties will freely exchange their basic data with a view to ensuring the effective operation of both systems. They will also freely exchange the results of data processing.

- These provisions may be revised later, in the light of experience acquired.

Analysis of the meteorological situation and general forecasting are provided by ASECNA at each National Meteorological Centre.

- The relevant products (bulletins, charts, ...) will be made available to the National Meteorology Service as and when required and by methods to be established under local agreement.

- Products of the National Meteorology Services may be made available to ASECNA under the same conditions.

- Similar arrangements will be made at Niamey for the exchange of products between the AGRHYMET Centre and the National Meteorological Centre.

c) Staff

ASECNA and the AGRHYMET Programme may collaborate on personnel matters in the operation and maintenance of equipment.

- Where relevant, additional personnel may be assigned to ASECNA stations which are inadequately staffed, so as to increase the observation programme or to cover special observation needs.

- Such personnel come under the National Meteorological Service and are its responsibility. They are made available to ASECNA for employment purposes.

- As time passes, development of traffic may require additional staff in the ASECNA communications centres. These staff may be employed subject to the conditions described above.

- At each national Centre ASECNA has a telecommunications equipment maintenance section. This section will maintain additional equipment installed as part of network development. Fairly soon it will be necessary to strengthen this section and staff may be assigned to it under the same administrative conditions as mentioned previously.

- For maintaining equipment, it seems desirable to have a single section, making common use of material and staff available. A local agreement in each country will set out the procedures for establishing and operating such a joint section.

- In the same way, a local agreement may be used to lay down conditions of use for joint service vehicle maintenance equipment and facilities.

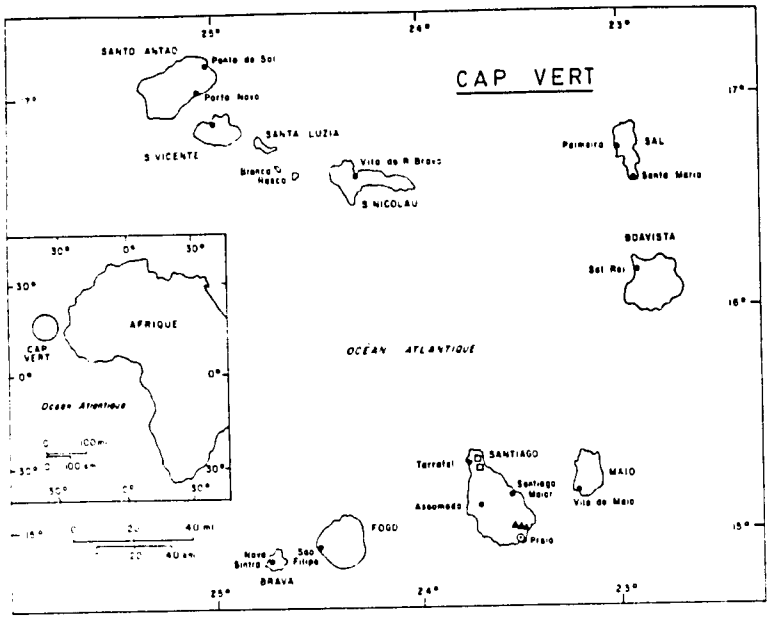
An additional principle governs the distribution of operating costs between ASECNA and the AGRHYMET Programme.

- Both parties shall be responsible for the staff listed in their establishments who will work directly for them or be seconded to the other party.

- Operational expenditure (operations, maintenance) on equipment remains the responsibility of the party to whom it belongs. (However, special arrangements may be found for equipment supplied in replacement, through local agreements.)

In addition, in each State, the national meteorological Service and ASECNA may, if they consider it useful, come to a more detailed cooperation agreement which shall be based on these principles and will take account of local conditions and contingencies.

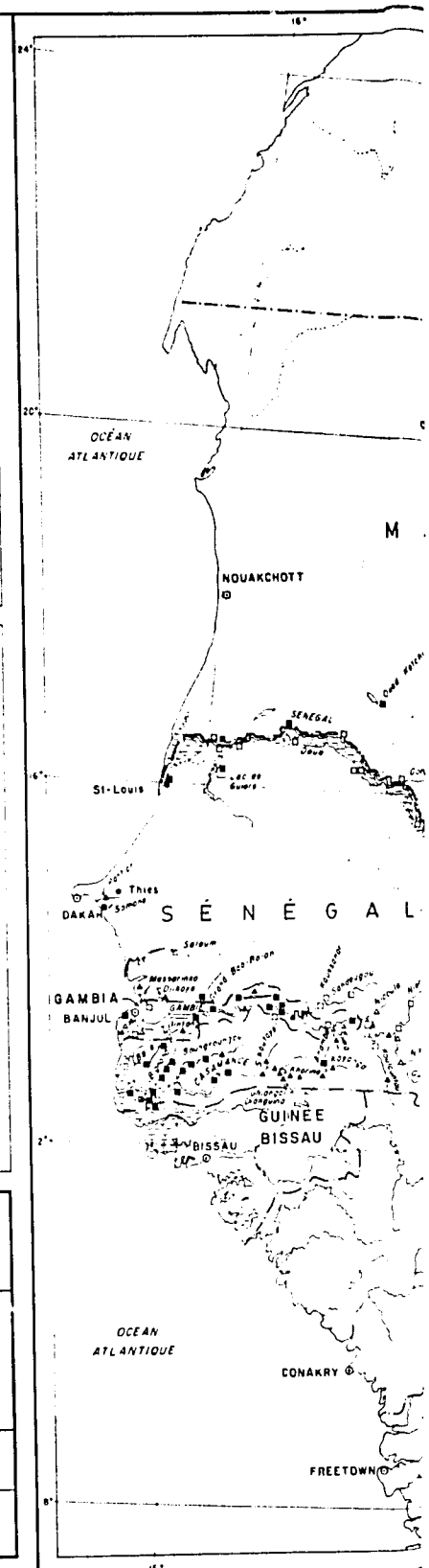
In conclusion, ASECNA and the AGRHYMET Programme anticipate that the application of the principles laid down above will make for a harmonious and beneficial use of the systems and resources both existing at present and to come and will help promote better development of meteorology and its applications in the service of the States.



Légende

- Capitales
- Autres villes
- Frontières
- Cours d'eau permanents
- Cours d'eau intermittents
- Zone inondable
- Stations de niveau d'eau (limnimètres)
- Stations de niveau d'eau (limnigraphes)
- Stations de débit (limnimètres)
- Stations de débit (limnigraphes)

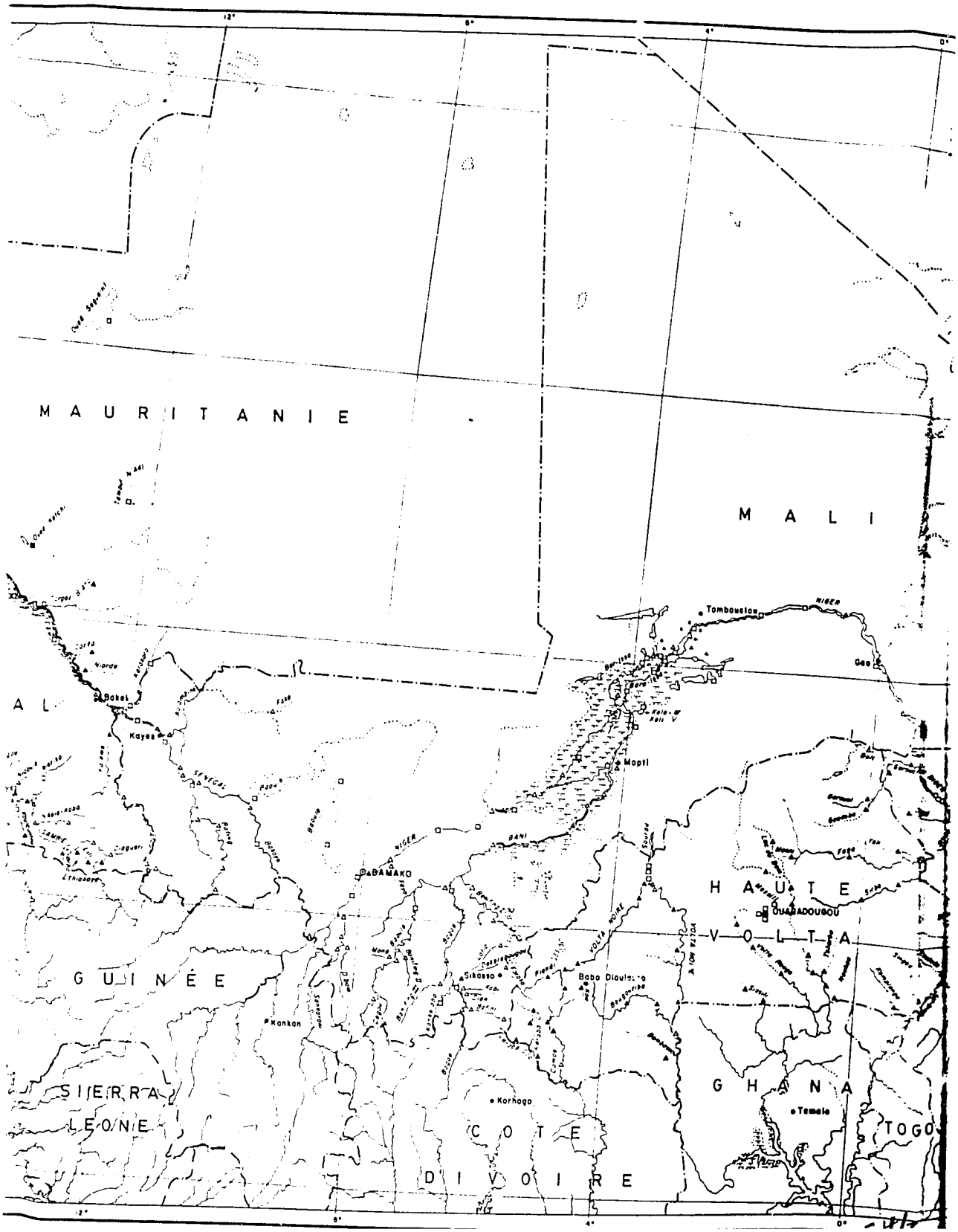
RÉFÉRENCE Les données de base apparaissant sur ce plan ont été tirées de la carte MICHELIN, Afrique Nord et Ouest, no 153, 1973



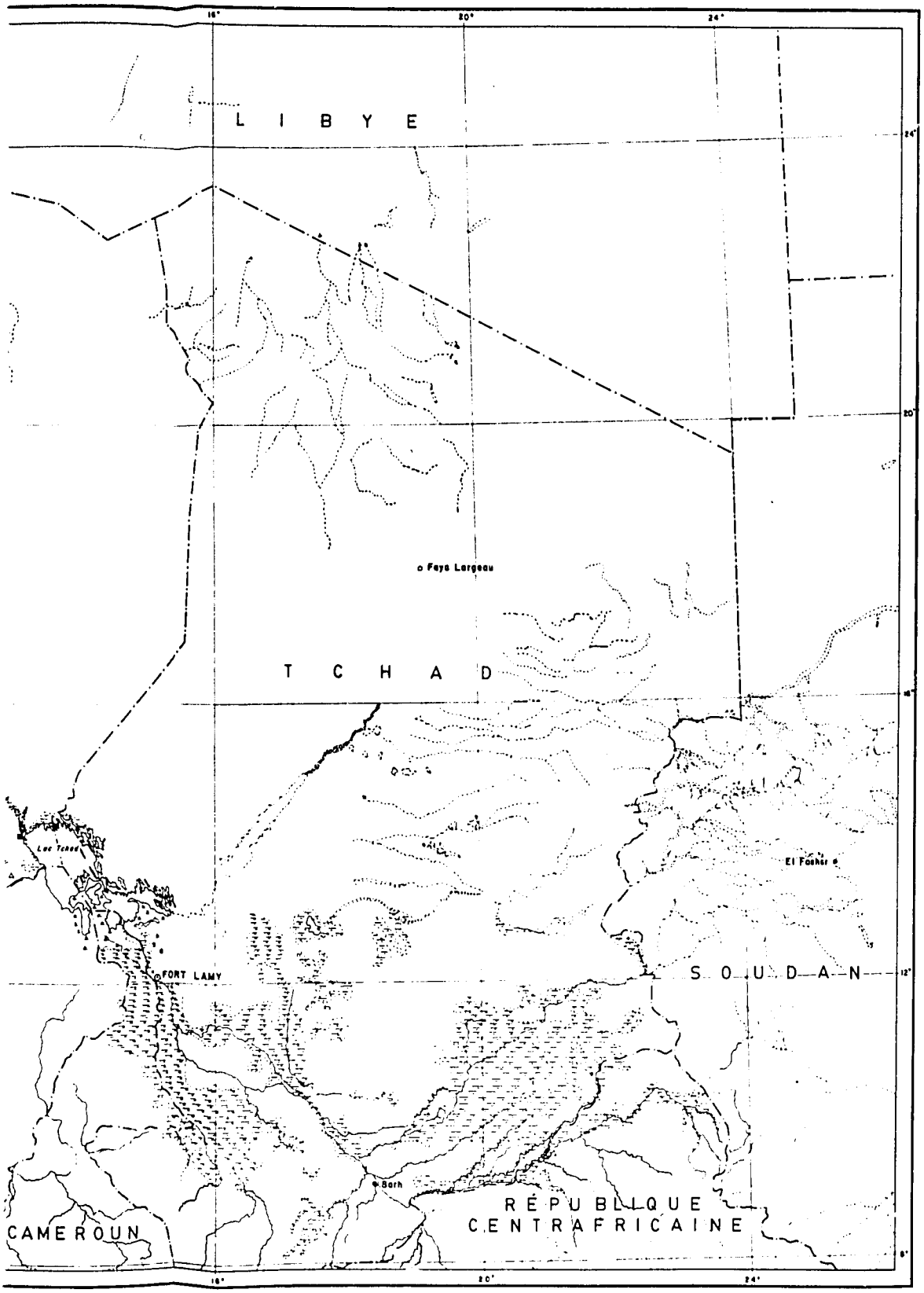
PAYS DU SAHEL

STATIONS HYDROLOGIQUES-1982

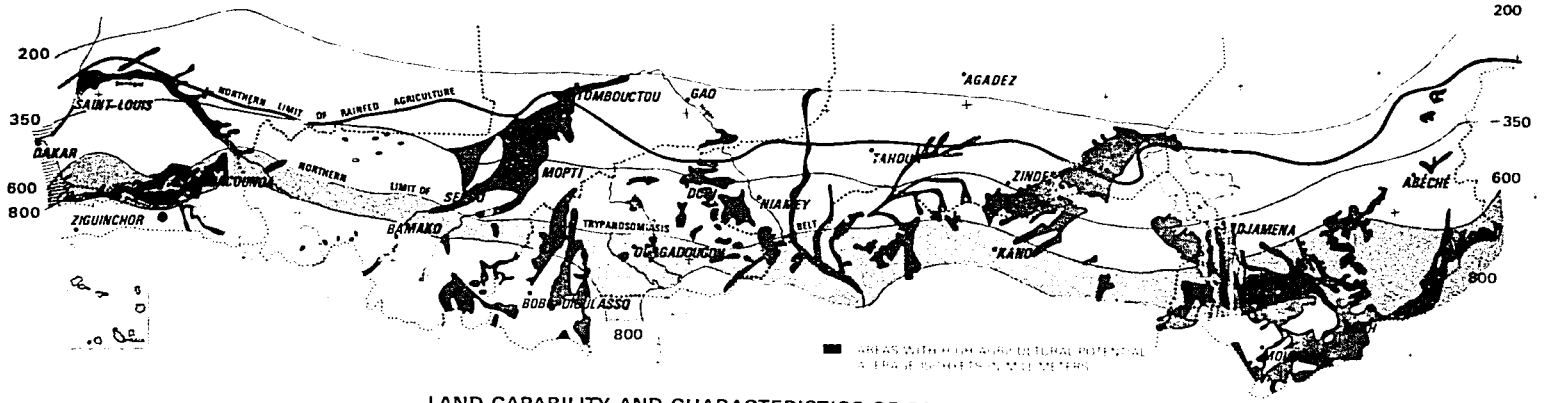
DATE 28 Octobre 1982	DESSINÉ PAR Rachelle Charron
ECHELLE 1 4,000,000	VÉRIFIÉ PAR M Hendler, Ing


MAURITANIE
MALI
Tombouctou
NIGER
Gao
Bakel
Kayes
SENEGAL
Mopti
BANI
BAMAKO
HAUTE
VOLTA
OUAGADOUGOU
GUINÉE
Sikasso
Bobo Dioulasso
Kankan
SIERRA
LEONE
Korhogo
COTE
D'IVOIRE
GHANA
Tamale
TOGO

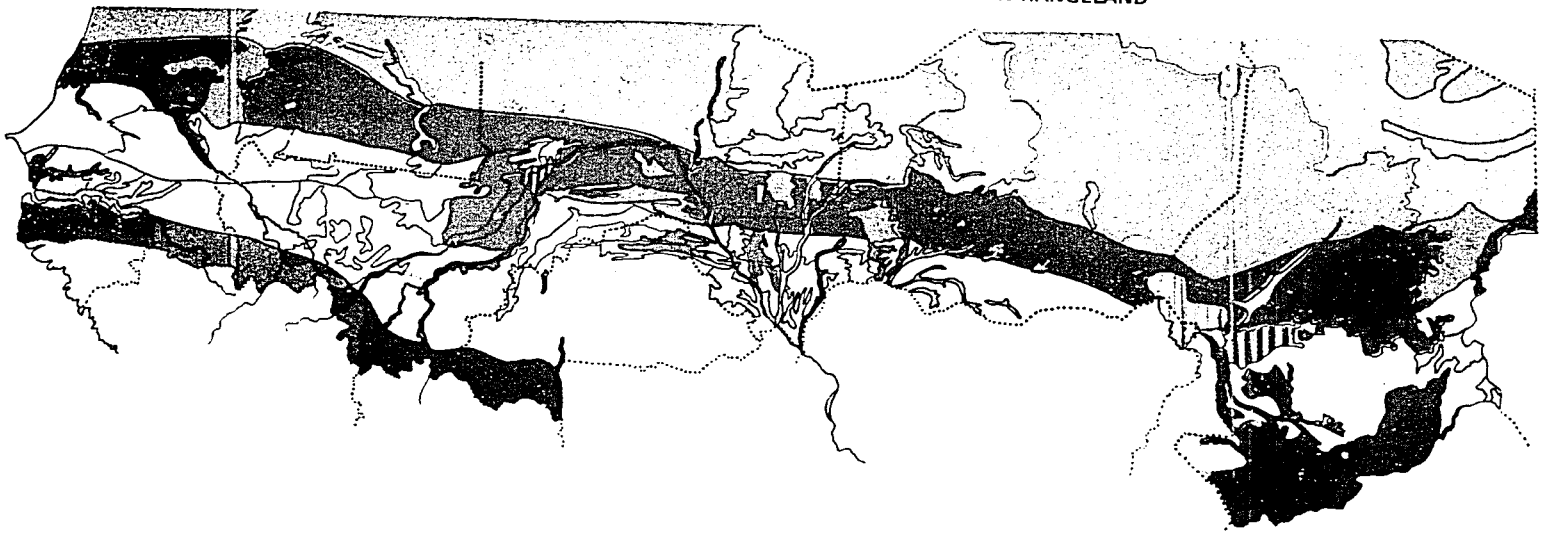
0°
4°
8°
12°
A L G É R I E
N I G E R
N I G É R I A
BÉNIN
CAMEROUN
NIAMEY
Niger
Gusau
Kano
Kaduna
Lac Tchad
FORT LA
Tempe
Tibesti
Tarf Arkenu
Tarf Toussu
Tibesti
Zar Sar Ren
Fort Archambault
Gouda
Bagirmi
Chari
Logone
Fort Lamy
Diamberin
Sokoto
Gorouba
Bénoué
GO


16°
20°
24°
24°
20°
16°
12°
8°
L I B Y E
Faya Largeau
T C H A D
Lac Tchad
FORT LAMY
El Fasher
S O U D A N
Sarh
RÉPUBLIQUE
CENTRAFRICAINE
CAMEROUN

THE SAHEL



LAND CAPABILITY AND CHARACTERISTICS OF SAHELIAN RANGELAND



Not for grazing except at the bottom of valleys

Used for a short period by small ruminants and for a longer period by camels

Pastures suitable for small ruminant grazing with monitoring of the capacity to conserve the tree cover

Pastures adapted to small ruminants & bovines. Possibility to stock standing fodder crops for use during the dry season (temporarily forbidding access to grazing animals and protection against bushfires)

Pastures suitable for small ruminant grazing with monitoring of the capacity to conserve the tree cover

Pastures for small ruminants & bovines. Possibility to conserve stock standing fodder crops for use during the dry season (temporarily forbidding access to grazing animals and protection against bushfires)

Pastures suitable for small ruminants and bovines

Pastures suitable for small ruminants and bovines

Pastures with bushfire control. Establishing a fodder stock by mowing the Andropogon grasses. Fodder farming to be envisaged

Development of the natural grazing land through selective slashing

Developed meadows and fodder farming preferable to forest pastures

Pastures suitable for small bovine ruminants & camels

Pastures important because their production bridges gaps during periods of shortage. Pastoral areas compete with the development of rice farming

Pastures for temporary use by small ruminants, camels & bovines

ANNEX 10 (II.3)

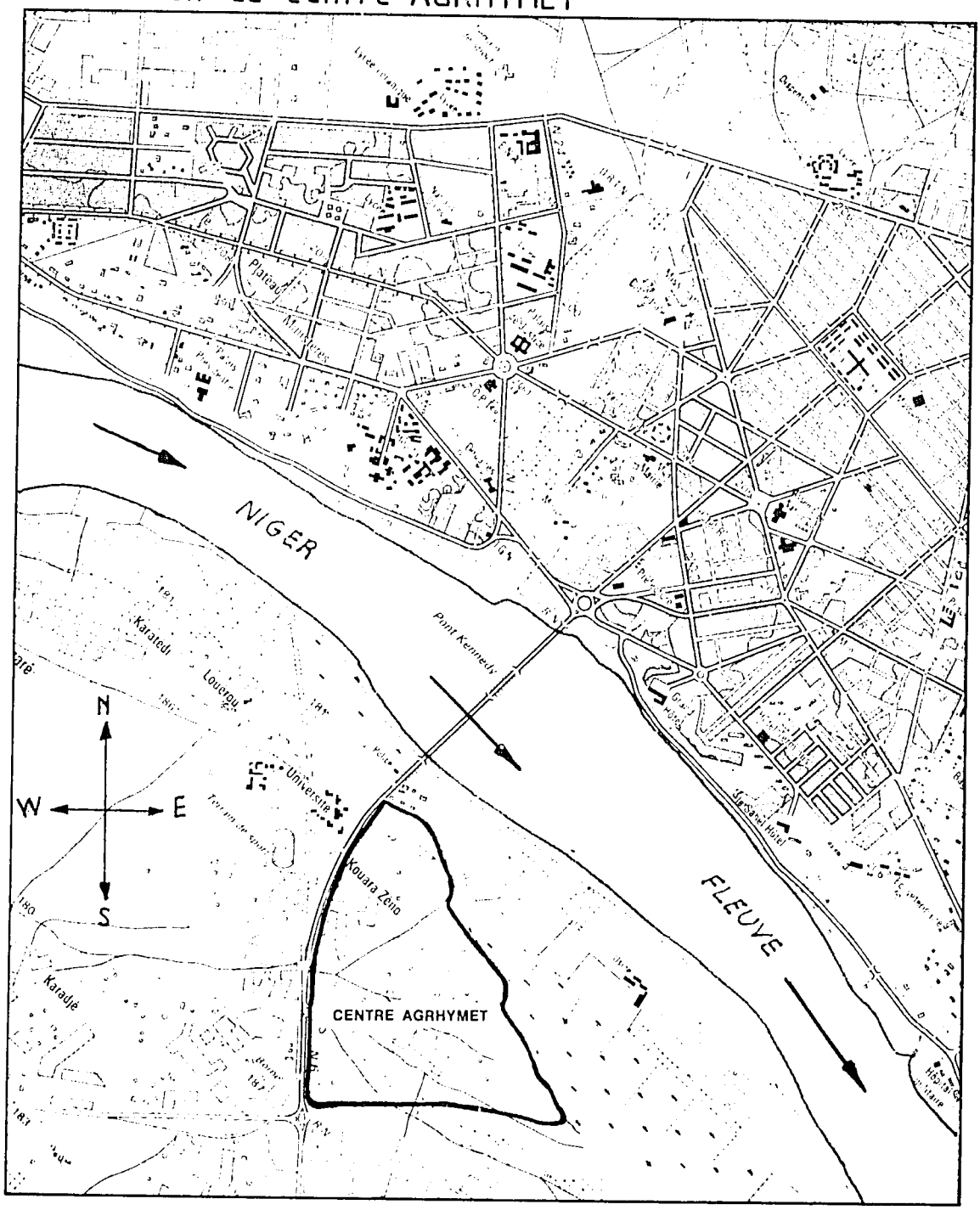
Extrait du No. 52 d'Afrique Agriculture

'44'

PLAN DE NIAMEY (IGN, 1978)

ANNEX 11 (II.5.3)

Situation du Centre AGRHYMET



Echelle 1 : 20 000
(1 cm représente 200 m)

0 500 1000 1500 2000 m

ANNEX 12 (III.6.1)

THE EXPERIMENTAL FARM AT THE AGRHYMET CENTRE

I. AIMS AND OBJECTIVES

I.1 Teaching aims

a. Cultivation, during the dry and rain seasons, of the principal food crops in the Sahel for practical work in agrometeorology, agronomy and plant protection, as a study of the natural herbaceous cover in the Sahel and applied botany, for students of the AGRHYMET Centre.

b. Cultivation of demonstration crops.

I.2 Agrometeorological and teaching aims

a. Set up a "complete agrometeorological station" at the AGRHYMET Regional Centre, i.e.a station also equipped with certain instruments for use in agrometeorology and having in its immediate neighbourhood typical reference crops for the region. The observations performed on these crops are those which would be performed in an agrometeorological station set up on a proper footing.

b. Gradually compile, over the years, a steadily increasing number of agrometeorological observations on representative crops for the rural world. These observations will permit an interpretation of trends in the state of crops during the rain seasons, as a function of the pertaining agrometeorological conditions.

c. Develop and improve crop observation methods.

d. Have reference crops that would permit in-depth monitoring of trends in crops as a function of the physical environment (soil, water, climate, ...) and permitting comparison with so-called "traditional" crops.

e. To constitute, in the Sahelian environment, one of a number of established centre for agrometeorological research, on:

- micrometeorology and the growth of crops
- water balance
- root development, resistance to drought, etc.
- calculation of potential yields from existing simulation models, as a function of meteorological conditions, observations of the crops and fertility of the soil. Possible modifications of these models.
- verification of whether the results of observations over a number of years may be used to make improvements to crop monitoring models for the Sahelian zone (e.g. Frère-Popov/FAO and Franquin/ORSTOM).

f. Correlate quantitative observations of certain insects present in crops through night captures using the light trap of the meteorological section. The numbers of insects captured are in their turn analysed as a function of environmental and meteorological factors.

g. Have available an area of natural Sahelian herbaceous cover permitting study, demonstration and practical work on the effects of agrometeorological conditions in the progress of a rain season on the characteristics of herbaceous cover (gross production, load capacity, dangers of overgrazing and degradation, recovery, etc.)

h. Establishment of varieties popularized in Niger under promotional directives of the National Institute for Agronomy Research in Niger (INRAN) and the Directorate of Agriculture. (The results of observations carried out between 1979 and 1981 have already been passed to INRAN, as well as to other research institutes in the Sahel.)

i. Participate in agrometeorological monitoring of crops in the Niamey region, in collaboration with the National Meteorological Service of Niger.

j. Collaborate in research by specialized institutes or possibly provide "pilot plots" for use by them. In this way the AGRHYMET Centre has in the past collaborated directly or indirectly with:
- INRAN (water balance, profiles of losses in tradition millet stores, establishment of popularized varieties, ...)
- INRAN/FAO (improvement of Sahelian pastures)
- FAO (fertilizer project)
- University of Niamey (Sahelian herbaceous cover, phytopathology, insect captures)
- The integrated control project (observations of crops, insect captures, phytopathology, entomology)
- The TAMSAT Programme (water balance, temperature, etc.)
- The AZ 3 Programme (provision of observation results)
- The Universities of Reading and Nottingham, United Kingdom (agrometeorology of millet: trials)
- ICRISAT (allocation of plots)
- The National Meteorology Service of Niger (allocation of plots for agrometeorological crop monitoring)
- The International Institute for Tropical Agriculture (IITA, Ibadan, Nigeria) (phenology of niébé)
- Protection of Plants (USAID) (phytosanitary crop monitoring)
- The Universities of Wageningen, Groningen, Reading (in various areas).

II. CROPS

II.1 as a priority: millet, sorghum, beans, groundnuts, maize
II.2 for specific requirements: cotton, rice, wheat, fodder crops
II.3 herbaceous cover: natural cover on an 11-hectare plot

III. EXISTING PLOTS

- rainfed crops:	30-40 hectares
- irrigated crops:	5-10 hectares (to be developed)
- natural herbaceous cover:	11 hectares
- meteorological section:	0.5 hectare
- miscellaneous:	
- buildings	
- improved roads	
- orchards and plantations	
- field borders	
- uncultivable land (stoney, gravelly soil)	
- natural depression (rice crop and market garden cultivation):	2 hectares
- fallow land making proper rotation possible:	remainder.

48

ANNEX 13
(III.4.6)

PROBLEMS PERCEIVED BY THE OPERATIONAL ACTIVITIES DIRECTORATE AT AGRHYMET

by

D. Lambergeon

I. INTRODUCTION

For some time, the AGRHYMET Programme has been moving towards its operational phase, the philosophy of which consists in collecting and processing data and in disseminating pertinent advice to the Agriculture and Hydrology Services of the countries of the CILSS so that the management of their resources may be improved.

The Operational Activities Directorate (DAO), established recently, is responsible for the specific attainment of these goals and provision of sufficient means.

The DAO plans to direct its activities along the following lines:

- The Data Processing Centre, staffed by two teams, one for operations and one for software. Its task is the management and scientific processing of data that lend themselves to this task.

- A synoptic monitoring centre, bringing together specialists in each discipline involved in the AGRHYMET Programme, in charge of evaluating the situation and preparing notifications.

- A data bank, with the task of providing climatological support to the member countries and of preserving the climatology heritage (in the broad sense) of member countries of the CILSS.

Although at the time of writing, the AGRHYMET Centre had only limited experience of operational activities, nonetheless certain problems which are bound to arise in the near future can already be identified.

These problems have been broken down into four major categories:

- Personnel at the Centre level
- Equipment (Centre and countries)
- Management
- Overall Programme policy and external relations.

It will be seen that some of these problems are very specific, while others have a more abstract character but are nonetheless of great importance. It has also been stressed that the Operational Activities Directorate considers as its first priorities those matters which, if not dealt with, might seriously jeopardize its activities.

II. PERSONNEL PROBLEMS

The staffing problems faced by the Operational Activities Directorate arise in connexion with:

- The Data Processing Centre
- Operations of the Analysis Centre that is still to be set up
- Operation of the microformat data bank

II.1 DATA PROCESSING CENTRE

II.1.1 Analysts

At the present moment, there are two computer specialists working on the AGRHYMET regional computer. These two individuals should undertake, amongst other tasks:

- introduce and operate logistical and management programmes;
- devise, develop and operate data-processing systems for AGRO, HYDRO, METEO (semi-real time);
- supervise data acquisition operations;
- develop standardized data products for the Member States in collaboration with the latter;
- carry out climatology work (deferred time);
- manage a data bank with a computer-compatible support.

It should be said outright that this is impossible. The recruitment of an additional high-level systems analyst experienced in the management of meteorology and climatology data is a top priority, and an additional systems analyst would be welcome so that each member of the team does not have his work fragmented among multiple responsibilities.

II.1.2 Operators

(a) Operator(s) in the computer room

The AGRHYMET Centre employs a single operator in the computer room. (Although willing, the latter was not qualified for this work and had to be trained on the spot. This raises the problem of the skills it is possible to find on the job market in Niger.) For technical reasons relating to transmissions the Data Processing Centre will have to operate on a round-the-clock basis when operational activities begin. This means that, if one person is to be on duty at all times in the computer room, a five-man team will be needed.

It should be clearly stated that if it is impossible to operate on a round-the-clock basis the data acquisition operations would be very definitely placed in jeopardy and the products that the Regional Centre could disseminate would be drastically limited. The recruitment of operators is therefore a top priority.

(b) Key-puncchers

The AGRHYMET Centre has as a prime task in data acquisition operations. The question of finding qualified personnel in Niamey is still unresolved. The problem is compounded by the fact that the Centre's only key-puncher left on maternity leave at a particularly critical moment during the '82 rain season. The Centre must have a minimum number of staff for information acquisition of every type. Although it lacks experience in this area, the Operational Activities Directorate considers that as a first step an acceptable solution would be for two individuals to be employed on a full-time basis, while two others could be added during the rain season (if available funds do not permit recruitment of all four on a full-time basis).

(c) Head of operations

A head of operations is needed to provide supervision of operators, to organize the work entrusted to the AGRHYMET Centre Data Processing Unit and generally to ensure the best possible utilization of the data-processing and transmission equipment possessed by the Centre.

II.1.3 Maintenance staff

Although the problem of equipment maintenance is not the task of the Operational Activities Directorate in the narrow sense of the word, it is a subject which the latter cannot remain indifferent to.

It should be noted that at the present moment one person is in charge of maintenance, to which, it is true, the NOAA representative may be added. In view of the time required to train such personnel would it not be the right moment to increase the establishment?

II.1.4 Back-up Assistance

This is at the moment provided by a systems engineer from the Digital Equipment Co. This assistance should be continued.

II.2 FUTURE SYNOPTIC ANALYSIS CENTRE

The Operational Activities Directorate plans to set up an analysis centre which will monitor the progress of the rain season at regional level by studying data fed into the Centre in (semi-) real time and produce bulletins and notifications. The personnel requirement for providing minimum follow-up is a top priority. For success in this project it would be desirable to plan for:

- a head of the Centre,
- a specialist in spatial meteorology,
- a synoptic meteorologist,
- an agrometeorologist,
- a hydrologist.

All these personnel would also have a knowledge of data-processing. The need for data-processing skills is due to the fact that, outside the rain season, they would probably be given climatology work or studies requiring skill in using such systems.

51

In addition, the recruitment of an APT operator is essential and provision should be made for training one.

II.3 DATA BANK

The "data bank" activity has the task of assisting in and/or providing for the long-term storage of climatology information of interest to AGRHYMET and the member countries of the CILSS and of providing support to these countries in the management and provision of data, within the purview of the World Climatology Programme of WMO.

This activity comes under two headings:

- a data bank on a computer-compatible support, with all the facilities of automated information processing;

- a microformat data bank where primary sources (or rather copies thereof) may be stored in the best possible conditions.

A climatologist should head the data bank and be in charge of operations. He would be supported by the Division of Software, for dealing with computer-compatible data, which should be sufficient for the first stage.

The microformat data bank is dealt with in an annex to the present document.

The recruitment of one staff member will be required to perform the essential work outstanding before beginning on semi-operational microformat documentation. If, in this matter the recommendations put forward by the Director of Operational Activities elsewhere (1) are followed, and a decision to increase efforts in this area is taken (and if the necessary funds are made available), the problem of staffing will arise here also, with particular regard to the microfiche data bank.

II.4 GENERAL STAFF

The absence of a properly staffed Directorate of General Services hampers the work of the Operational Activities Directorate (cf. III.1).

III. PROBLEMS OF RESOURCES

III.1 GENERAL

The Operational Activities Directorate has already encountered problems resulting from inadequate supplies of general resources: orders of fuel, consumables, completion of various maintenance works (air-conditioning, which is essential for the proper performance of the computer centre) or minor alterations in layout. Unless it has secure logistical support, the Operational Activities Directorate will be in no position to carry out its activities with the requisite orderliness.

(1) cf. mission by D. Lambergeon to Senegal and the Gambia: 10 September 1982.

A general problem is that of the Directorate's offices. This problem emerges when the available premises are considered in relation to the staffing implications implicit in the present report. A number of additional offices (at least three for the Division of Synoptic Monitoring, two for the Data Bank Division, and one for the head of the Operations Division; the Division of Software has sufficient office space) would need to be built, together with an office for analysis activities (containing terminals, with provision of notice-boards for charts and photographs, reproduction machines and desk space) where the team responsible for synoptic monitoring would be located, and an operations room for the operating staff.

III.2 PROBLEMS OF A MATERIAL NATURE ARISING FROM THE COMPUTER CENTRE AND DATA MANAGEMENT

III.2.1 Fixed equipment

In its present shape, the Data Processing Centre, together with the equipment supplying it, is capable of functioning. However, a meeting of the Operational Activities Directorate programming team came to the conclusion that the Centre's data-processing facilities would soon become handicapped by limitations, some of which were already noticeable.

The following remarks are based on the hypothesis that two PDP 11/60 machines would have the maximum memory banks specified by the designer (120 K) - not the case at present although the additional memory has been ordered - and that the Centre would have additional terminals, already ordered, necessary for carrying out large numbers of acquisition operations, for example.

In the light of the foregoing the Directorate would nonetheless wish to draw attention to the following matters:

(a) The Data Processing Centre has only one rapid print-out facility, doubling as a graphic print-out machine. This machine, of the VERSATEC label, is somewhat of a special case, standing as it does amidst equipment totally provided by the Digital Equipment Company. For this reason, it is sometimes difficult to maintain and it is important to stress that when the machine breaks down the Centre has no graphic output terminal and has very limited print-out facilities. (Only slow terminals of the typewriter kind are available.) It is a first priority for the Centre to be equipped with a second, back-up machine.

(b) The Centre is to process meteorological information transmitted by telex from Niamey Airport. The link between the latter and the Regional Centre has no back-up system; in other words, when it breaks down the operational activities are brought to a halt through lack of data input. It should be recalled that during the rain season of 1982 the link remained out of action, and that we are not therefore talking of a hypothetical risk.

It is a first priority for the AGRHYMET Centre to be equipped with radio teletype receiver units (of the type existing at ASECNA).

(c) Although the Operational Activities Directorate is not in a position at the moment to set out its exact requirements in this sphere, the graphic resources it has available to it are limited, being based on the single VERSATEC printer.

The Directorate recommends that the Centre be equipped with a graphic display terminal of the Tecktronic screen type, much more flexible than a print-out or plotting table.

The acquisition of data coming over the meteorological channel (GTS) is to be performed on a PDP 11/34 computer. In view of the latter's storage capacity (two floppy disks, including one systems diskette) it would be desirable for primary data to be stored on magnetic tape which would then be processed by a PDP 11/60. An additional magnetic tape transport would be needed in order to do so. The degree of priority to be attached to this equipment should be evaluated soon.

III.2.2 Supplies

Although the Data Processing Centre's experience in requirements for expendable materials is still limited, some remarks may nonetheless be in order:

- Niger is a relatively isolated country in terms of transport. Delivery times are very long, at least where overland ground communications are concerned. Air transport costs are very high.

- The ASECNA Computing Centre, which has many years of faultless operating experience, has always taken major precautions for its supplies, and has back-up stocks of expendable items sufficient to last between six months and one year. This is despite the fact that the ASECNA Centre is located in Dakar, a city with first-class communications.

Consequently, the Directorate considers it essential for the AGRHYMET Centre to have one-year supplies of expendables in hand, which would make it possible to offset the vagaries of supply before the forthcoming 1983 rainy season.

III.3 MICROFORMAT EQUIPMENT

The Directorate's suggestions have already been detailed in a note setting out the requisite activities in this area as part of the AGRHYMET Programme. This document forms an Appendix to the present report, but must be added to and given greater detail when and if the "microformat bank" project is taken up.

It is noted that the equipment suggested for the member countries can only be profitably used when the transfer of microfilm data onto original microfiches is completed and when they have then been copied, which will involve considerable effort and for which the AGRHYMET Centre will have to have qualified personnel and enough equipment.

III.4 APT

The satellite imagery receiver (APT) should have an automatic switching system that turns it on when the transmission programme is of concern to the AGRHYMET operations. When a qualified operator for this type of equipment is absent, the present situation involves continuous operation, resulting in prohibitive paper consumption.

IV. MANAGEMENT PROBLEMS

IV.1 AWARENESS OF THE RESOURCES AVAILABLE

Strange as it may seem, the Operational Activities Directorate is in total ignorance of the financial resources available to it for its activities.

At present, for example, when the Directorate requests a purchase, it submits its order without having any idea of the funds available. The order is sent to Geneva, which passes it on to the supplier if the money can be found. A Director cannot consider working in such conditions unless his available resources are virtually unlimited, which is by no means the case in the AGRHYMET Programme.

A new system must be set up allowing the Director-General and the various Directors in service in Niamey to know at any moment what resources they have available to them so as to enable them to make the necessary choices.

IV.2 EXTERNAL LOGISTICAL SUPPORT

In the past there have been many occasions when urgent orders non-fulfilment of which meant running out of supplies and bringing activities to a halt) sent to Geneva have been delayed (sometimes by many months) for all kinds of non-technical reasons.

It is important to make the external logistical support system aware that it is impossible to carry out operations properly without prompt and effective material support. If necessary the support system should be rethought and/or strengthened.

V. GENERAL AGRHYMET PROGRAMME PROBLEMS AS SEEN BY THE OPERATIONAL ACTIVITIES DIRECTORATE

V.1 GENERAL PROBLEM OF DATA FLOW

From the operational point of view, the AGRHYMET Programme consists in setting up a system in which the requisite information for reaching its goals, will circulate. This involves establishing a data flow plan which will be governed by certain overriding principles but will also include in-depth analysis of the technical implications.

At the present moment this plan may be reduced to the following few words: "Data are collected from the stations by SSB and assembled in the National Centres which retransmit them to the Regional Centre where they are processed".

The technical procedures underlying these overall principles are extremely vague, which has forced the AGRHYMET Programme to resort to ASECNA for its transmission needs as a whole or for supplementing them. However, ASECNA is an agency subject to its own constraints, which presupposes that the solution can only be a temporary one. In addition, at the present moment there are no solutions other than the postal system for transmitting back to the Member Countries analyses made by the Regional Centre. It is urgent for this problem to be dealt with.

In addition there are some programmes and/or activities being conducted in West Africa which presuppose the establishment of a telecommunications system (and perhaps an infrastructure for it). Obviously AGRHYMET is one of these but so also are the "Integrated Control Project", "HYDRONIGER", and some of the operations that OMVS, OMVG, etc. wish to carry out.

The Directorate has the impression for the moment that all of the foregoing is very chaotic. In addition, the AGRHYMET Programme has no employee with a knowledge of transmissions from any other point of view than that of infrastructure. Finally, all these various programmes, including AGRHYMET, seem still to have no precise idea of what data should be processed and circulated, neither in terms of quantity, quality or format.

The AGRHYMET Programme looks as though it may be capable of arriving at a precise identification of some of the aspects of the latter (1), it would be laudable if this was the case for the other programmes too. In the light of the requirements expressed, it would be possible for the resources to be put to use to be studied. The task of co-ordination and/or analysis of the situation and its future development should probably be given to a telecommunications expert who would be asked to recommend solutions.

Whatever happens, it is important to be aware that to transmit information means devoting resources to the task, and that a separate technical back-up belonging to the Programme itself or to other institutions or operators should be utilized.

V.2 RELATIONS WITH ASECNA

Relations between the AGRHYMET Programme and ASECNA are very close, as the Programme is now using (or will use) a major part of the meteorological information collected by the Agency and is supported by the Agency's transmission system. In addition, there have been numerous exchanges of data and information in the past.

(1) cf. Proceedings of the Panel on Operational Products of the AGRHYMET Centre.

Although relations are generally very good, it is known that in collaboration with the Programme, the Agency is sometimes hampered because of the air navigation function laid down in the regulations governing it.

To offset these limitations, it might be a sensible idea for the Programme and the Agency to reach a general agreement at the highest level. At the same time it is important to note the difficulty that arises here from the fact that ASECNA has members who are not members of the AGRHYMET Programme. The Operational Activities Directorate feels that action should be taken at the international level to deal with the vagueness that exists at present in this area and to clarify the responsibilities of each. The economic interest of the Member States is involved.

On the other hand, it is important to consider the future level of collaboration between the AGRHYMET Programme and ASECNA, in view of the statutory limits on the Agency. In the light of what has been mentioned in the preceding paragraph, it seems a bad idea for the major projects under way in West Africa to be based on support systems operated by an agency for its own needs and which must above all solve its own problems.

VI. CONCLUSION

Apart from the major management and policy questions requiring solution under the AGRHYMET Programme, it will be noted that the problems referred to in this document all focus on a single question:

What financial resources will the AGRHYMET Programme in general, and the Operational Activities Directorate in particular have effectively available to it both in terms of staff and equipment, in the years to come? The effort which is required of the Operational Activities Directorate, principally in terms of staff, finds its justification in the considerable equipment and facilities already in place, which can only be utilized to the full if the Centre has a team of sufficient quality and of enough numbers to utilize it. It will be noted that the staff referred to here are only slightly different from those given in the document on the Programme "Development Phase 82-86" but that the functions of the posts contained therein have been somewhat revised.

Annexed hereto are the requirements expressed by the Directorate for carrying out serious work from the "operational" viewpoint, i.e. subject to operating constraints and to the concept of continuity.

Niamey, 10 September 1982

Directorate of Operational Activities

Denis Lambergeon

57

ANNEX I

REQUIREMENTS EXPRESSED BY THE OPERATIONAL ACTIVITIES DIRECTORATE

(Summary by sector of activity)

(A) DATA BANK

Provision must be made for a climatologist to act as head of the data bank. The development of a "microformat bank" involves the purchase of equipment and the recruitment of personnel to carry out the operation, both at the level of the Centre and in the Member Countries.

(B) DATA PROCESSING CENTRE

(It is supposed for this purpose that additional terminals have been ordered, together with the necessary items for extending the memory of the PDP 11/60 units.)

1. Major priorities:

- a second VERSATEC graphic printer as back-up.
- a year's supply of expendable items.
- a high-level systems analyst for the post of head of the Software Division.
- a team of operators for the machine room capable of maintaining round-the-clock operations.

2. Other requirements:

- an officer in charge of data processing and telecomunnications operations.
- a magnetic tape transport (for real-time data acquisition). Priority to be evaluated subsequently.
- a graphic screen terminal.

(C) DATA RECEPTION:

1. Major priority:

- a radio-teletype receiver unit.

2. Other requirements:

- a key-punch team: two permanent and two seasonal staff.
- additional equipment for APT (programmer).
- an APT operator.

(D) ANALYSIS CENTRE:

- qualified (agro) meteorologists, agronomists, hydrologists (and in addition data-processing experts) for analysis and situation monitoring: 5 persons. The early employment of a minimum number of staff is a "major priority", in particular a head of the Division of Synoptic Monitoring.

- Office space:
  - one large office for the Analysis Centre itself,
  - offices for the personnel who are to work there.

(E) LOGISTICAL BACK-UP: to be taken note of.

Niamey, 14 July 1982

INTERNAL MEMORANDUM

FROM: D. LAMBERGEON, Director of Operational Activities

TO: MR CHEIKH BOCAR COLY, Director General

RE: Transition to operational level of microformat data bank: Later developments.

I. Present situation

At present we have:

- a set of microfilms supplied by Mr Drèze for the member countries of the CILSS,

- a Kodak 322 microfilm reader,

- a Kodak 323 microfilm reproducer, for adaptation to the 322 reader, for reproduction of photocopies from images recorded on microfilm,

We do not have the instructions for assembling the two Kodak machines. They have also been stored for a long time without protective cover and should be completely overhauled and cleaned.

- a microfiche reader-copier,

- six two-litre cans of liquid for the copier,

- one thousand sheets of special paper for the copier,

Although the items are already old, there is nothing to indicate that they are (not) capable of being used.

Copying liquid reconditioner is in short supply but this is not too serious for the immediate future.

II. First level of operation

If the equipment available is used after overhaul, the establishment of an information service for users can be considered, consisting in providing them with several copies of monthly climatological tables containing information they need. But although it will be possible to consider answering very specific requests to a limited extent (when we have the contents lists for the microfilms, which are to be sent by Mr. Drèze), the regular supply of a large amount of information will be impossible. The service will find itself swiftly limited through difficulties of utilizing the microfilm back-up, compounded by the fact that the information on these films is very crudely sorted, and not in strict order. A second level of operation should therefore be planned.

III. Second level of operation

1. From the conceptual standpoint it is planned here to:

   - use microfiches, a back-up system that is much more easy to handle than microfilm;

   - make a strict rearrangement of the information available on this medium;

   - make it possible to disseminate information on microfiches to users;

   - communicate microfiche data to national centres and establishment of ways for using them.

2. To reach these goals, the following activities must be undertaken:

   (a) Purchase of films so that spare sets of existing microfilms may be made. The finance remains to be obtained; it amounts to $6 (per film) and $4 (for development), i.e. $10 per film, times 320 films, i.e. $3200. Belgium has proposed to do the work on condition that the films are paid for; the prices given being those obtaining on the Belgian market.

   (b) To use the new set of microfilms to produce original microfiches. Belgium has proposed carrying out this work but the cost remains to be studied. The set of original microfiches would be kept by the AGRHYMET Centre.

   (c) To produce sets of microfiche copies to be sent to the member countries. Belgium has proposed carrying out the work, but the costs remain to be studied.

   (d) Introduction of equipment for using the microfiches:

   - reader and paper copier at the level of national centres; at the moment these centres have only readers;

   - reader-copier plus duplication equipment for the AGRHYMET Centre (the Centre has a reader-copier but no duplicator) so that it would be capable of using paper copying equipment or microfiche to disseminate such information.

IV. Subsequent possible operation levels

Thought should be given to the way in which the microformat data bank would be kept up to date, in particular:

- for the microfilming of "recent" documentation;

- for producing the related microfiches;

- for redistributing the information to country level.

V. Conclusions

The provision of information to users must be adapted to the latters' needs and to the resources at their disposal.

For users requiring information in very small quantities on paper back-up, the first level operation is sufficient. I propose testing demand by establishing a first level and informing the countries of the new situation, while pointing out that it is a pre-operational phase.

For users requiring information in large quantities and who are likely to have a microfiche reader without having sufficient resources to have an automatic information processing system, the second level of operation will be necessary. In addition, dissemination of the microfiche data set looks as if it would meet one requirement by the national Services.

In conclusion, the AGRHYMET Centre's complete microformat system must be available not only to the Operational Activities Directorate but also to the documentation department, as some reviews and journals are circulated in microform at reduced cost (in addition to the speed-up in arrival times by low-cost airmail routing for one or two microfiches at a time).

Denis LAMBERGEON

62

ANNEX 14
(III.3.3.2)

APPLIED RESEARCH UNDER THE AGRHYMET PROGRAMME

by

André Musy

Director of Applied Research

I. OBJECTIVES:

(1) To promote certain practical experiments as part of the final objective of the AGRHYMET Programme so as to be able to provide small-scale demonstrations of the prospects for, and ways and means of attaining, the different aims of the AGRHYMET Programme over the whole of the Sahel for example, pilot project in agrometeorology in Mali.

(2) Develop certain precise research topics the results of which will be used directly in "operations", for example: identification of characteristic thresholds at which a given phenomenon may or may not appear.

(3) Assist the various national Services in each country to evaluate and/or apply a particular technique, for example: method for forecasting yields using agrometeorological models.

(4) Make suitable technical information on a precise subject available to national Services.

(5) Standardize calculation methods and techniques, criteria and basic hypotheses for determining parameters, for example: evapotranspiration calculation techniques, ten-day bulletins, etc.

II. IMPLEMENTATION:

- through national projects,

  to be developed in line with sections I.1 and I.3 above, taking into account the Programme priorities and objectives.

- at the Regional Centre,

  to be developed in line with sections I.2, I.4 and I.5 above, taking account of the "operations" launched by the AGRHYMET Centre.

III. CHIEF LINES OF RESEARCH:

(1) Agrometeorology

- test and intercomparison of agrometeorological models used in monitoring and forecasting of yields.

- study of the relationship between certain phenomena observed in crops and characteristics of a hydrometeorological nature.

(2) Hydrology

- investigation of an optimum method for storing, managing and publishing hydrological data using a PDP 11/34 computer.

- study of the intensity of rain and methods of erosion control in drainage basins used for agriculture.

(3) Meteorology

- study of disturbances and the onset of the monsoon.

- evaluation of precipitations and the water balance using conventional and satellite measurements.

OTHER LINES OF RESEARCH:

(4) Agrostology:

- inter-annual trends in natural herbaceous cover characteristics as compared to those pertaining during the rain season.

(5) Renewable energy:

- utilization of renewable energy for pumping irrigation water and storing agricultural produce.

IV. PRACTICAL EXPERIMENTS

- At the Regional Centre:

  As part of agricultural work conducted on the AGRHYMET Centre's experimental farm.

- In the countries of the CILSS:

  As part of each national Service, depending on the initiative of the senior officials, resources and possibilities under the national project.

V. ORGANIZATION

Research and experimentation at the Regional Centre must be organized and coordinated through the Applied Research Directorate (DAR) and must be undertaken by the staff (at the moment one individual) of this Directorate, the analysts coming under the Operations Directorate, and to some extent the instructors of the Training Directorate. Close co-operation must be established between the three Directorates, in particular with the DOA and the officer in charge of the experimental farm, which should be more closely attached to the DAR institutionally.

In its optimum phase, the DAR should consist of:

- a director of research;

- two agrometeorologists, specialists in applied agrometeorology, agrostology and phytosanitary treatment;

- two hydrologists, specialists in applied hydrology and rural development;

- a data-processing specialist;

- two senior technicians (agronomy/hydraulics)

and should be able to draw on the services of other experts in the Centre working for the other Directorates.

In the immediate future, it seems essential to strengthen the DAR by one agrometeorologist and one hydrologist.

In addition, the AGRHYMET Centre should be capable of taking on students from foreign universities and institutions for short periods who would be working on a graduation thesis connected with certain aspects of the AGRHYMET Programme.

Practical experimentation within each national component is organized by the respective national Services, as a function of their available technicians and resources. The DAR's role is to co-ordinate, advise, support and supervise as and when necessary the execution of such experiments. It is also the province of the DAR to promote collaboration among certain foreign institutions concerned with Sahelian agroand hydrometeorology and the AGRHYMET Centre, as well as with certain national Services in regard to various specific applications.

VI. FINANCIAL RESOURCES

To enable it to carry out such a programme, and in addition to personnel support, the DAR must have available to it the financial resources permitting:

- the introduction of practical experiments on the AGRHYMET Centre site (equipment, field workers, observers, etc.);

- the establishment of experiments conducted as part of national projects;

- the purchase of materials or of applications software;

- travel and visits by consultants to the AGRHYMET Centre or in various countries of the CILSS, and by officers of the Centre on mission to the countries of the CILSS and/or international institutions;

An overall amount of US$ 70,000 per annum would seem to be the minimum necessary for this purpose.

III. PRESENT SITUATION:

With the support of the some of the Centre's experts, the DAR has nevertheless been able to undertake certain limited activities, the chief ones being:

- introduction of basic software for statistical data processing;
- general cartographic methods for giving isovalues for each country in the Sahel;
- method for analysing the variation of a parameter in space in order to represent it graphically;
- development of a general methodology for crop monitoring(observation cards, organization of monitoring, data processing, publication of results);
- organization and preparation of the 1982 crop season on the AGRHYMET Centre's experimental plots;
- development of collaboration agreements between certain foreign institutions, the AGRHYMET Centre and various national projects as part of specific research projects, for example:

- NIGER:	TAMSAT Project	- collaboration with the Meteorology Department of the University of Reading, United Kingdom
	AZ 3 Project	- Department of Meteorology, Paris, WMO, University of Reading
	Agricultural monitoring	- plant protection service, "Integrated Control Project" University of Groningen, Netherlands
	Monitoring of natural water storages	- University of Zurich, Switzerland
- UPPER VOLTA:	AGRISK Project	- University of Groningen, Netherlands
- MALI:	Pilot project in Agrometeorology	- National Institute for Agricultural Research, National Centre for Agricultural Research, University of Reading, Federal Polytechnic, Lausanne, Switzerland.

It is also important to note the thesis studies conducted by agrometeorological engineer students, some of which may be put to direct use in "operations".

Finally, the undersigned is giving some logistical and technical support to the Directorate General of the AGRHYMET Centre in certain aspects of the Programme.

VIII. FUTURE ACTIVITIES:

- Continue the actions undertaken at the Regional Centre, in particular the millet monitoring trial so that the DOA may next year have available to it a complete year's figures on which to base its activities;

- Undertake as soon as possible the activities planned in I.2 and I.3 above so as to better identify possible "operations";

- Promote other types of experiment and international collaboration as part of the different national projects;

- Arrange for an international meeting on certain aspects of agro-hydrometeorology in the Sahel zone.

IX. PROBLEMS ENCOUNTERED:

- A lack of staff attached to the DAR or capable of undertaking research activities at the AGRHYMET Centre;

- A lack of "respondents" at the national level in the Hydrological Services, because of the lack of trained class II applied hydrology engineers;

- A lack of financial resources under national projects, particularly for agricultural monitoring;

- Difficulty of co-ordinating research and experimentation because of the insufficient communication between experts, national officials and projects.

Possible main remedies:

- Assign to the DAR at the earliest possible moment an experienced agrometeorologist and a senior hydrologist.

- Establish a training programme for Class II applied hydrologists as soon as possible at the AGRHYMET Centre .

- More frequent travel by staff of the DAR to national projects.

Niamey, 23 September 1982

Director of Applied Research

A. Musy

67

REGIONAL EXPERT IN INFORMATION AND COMMUNICATION

Description of functions and qualifications

The regional expert in information and communication will be responsible, under the authority of the AGRHYMET Director, for a regional programme in information and communication in the eight countries. He (or she) will arrange for the dissemination of information produced regularly by AGRHYMET in a language that is accessible to end-users and in a form that is easily adaptable to the various information media, including radio, television, the press, publications, brochures and posters. He will produce the information obtained in the interpersonal communication process conducted by the national rural development agencies and others.

He (or she) will be responsible for the information and communications office under the authority of the Directorate General of AGRHYMET and will supervise the national officers in charge of information and communication in each of the eight countries. He (or she) will maintain continuous collaboration with the Director of Operations in compiling daily information bulletins. He (or she) will be responsible for setting up national information and communications programmes as part of the pattern devised for each country by AGRHYMET and the national agency. He (or she) will give guidance and training to the eight national officials and will assist in setting up and managing the information and communication programmes.

Working in close collaboration with the AGRHYMET Training Directorate and national staff employed in training, the regional expert will also be in charge of all the information and communications training activities undertaken as part of AGRHYMET and of programmes developed in the eight countries, including the annual national and regional seminars for the personnel concerned. He (or she) will be responsible also for making a selection and supervising all audiovisual material produced for information and communications purposes, including the written documents and a film on AGRHYMET.

Qualifications: The expert shall have a suitable university background or equivalent and have proved himself (or herself) through extensive practice in the field of information, mass media communication or a related area. The expert will have a perfect knowledge of French and a good knowledge of English. He (or she) should be preferably of African origin. The regional expert will be attached to the Regional Centre, but will be required to travel frequently to the eight countries. He (or she) must have considerable experience in developing countries and if possible have carried out or directed activities as part of a multinational information project, a training programme or in the media.

NATIONAL OFFICER FOR INFORMATION AND COMMUNICATION

Ideally, this post should be taken up by a seconded national official

Description of functions and qualifications

Each of the eight national officials will be responsible, under the supervision of the regional expert in information and communication based in Niamey, for a national information and communication programme regularly compiled by the AGRHYMET Programme. He will adapt such information into a shape intelligible to the end-users and in a form easily usable for various communications media, including radio, television, the press, publications, brochures and pamphlets, and posters. He will compile this information in the inter-personal communication process conducted by the national rural development and other agencies.

The officer will be in charge of an information and communication office to be directly attached to the national Director of the AGRHYMET Programme. He will work on a regular basis with the Agrometeorology Division in drawing up daily information bulletins.

He (or she) will work in direct contact with national information and communication media personnel. He (or she) will be responsible for preparing the documentation the latter are required to produce as part of their programmes. He (or she) will be responsible for the national seminars organized each year on information and communications for personnel involved in the national programmes. He (or she) will assist in producing regional information and communication material and will be responsible for an annual evaluation survey.

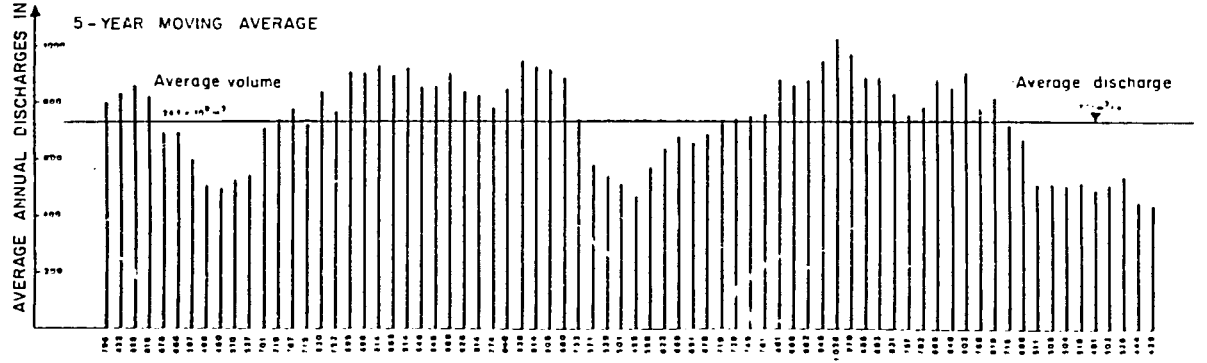
Qualifications: The information and communication officer must have a suitable university background or equivalent and have had sufficient practical experience in the information and communication sphere or in an allied field. He (or she) must have a perfect knowledge of the official language and a rudimentary knowledge of the national languages spoken in the country. He (or she) will be required to travel within the country.

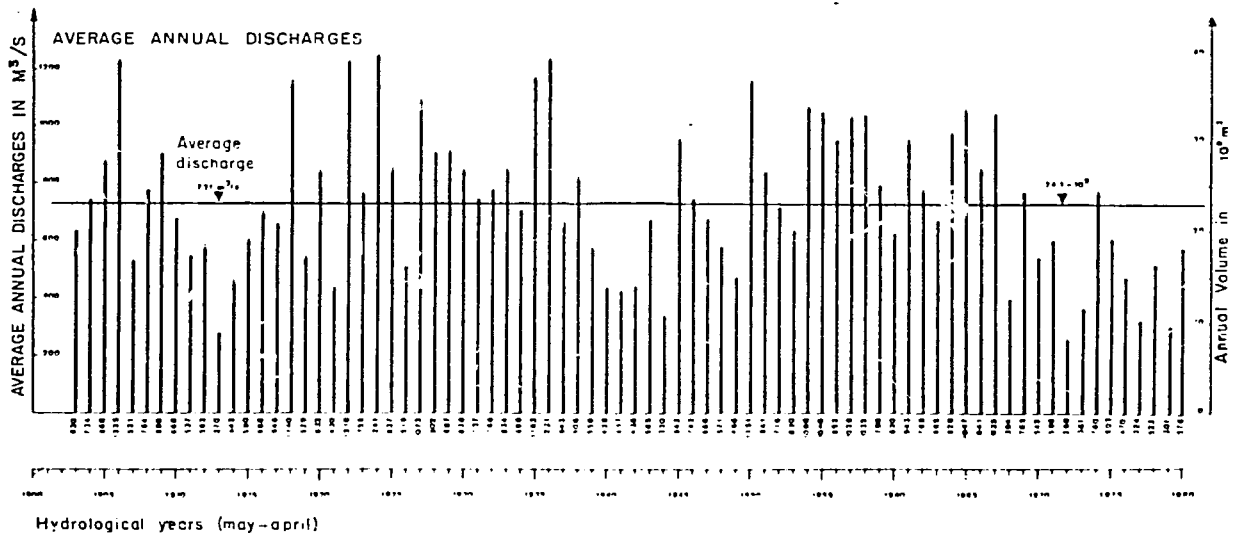
ANNEX 16

TRENDS IN ANNUAL DISCHARGE OF SENEGAL AND NIGER RIVERS SINCE THE BEGINNING OF THE CENTURY AND SAHELIAN DROUGHTS

Document compiled for the CAC-WMO mission
Source : DR. CH. REIZER,
Les pêches continentales du Bassin du Sénégal Ann. Musée Royal d'Afrique Centrale, Brussels, 1982

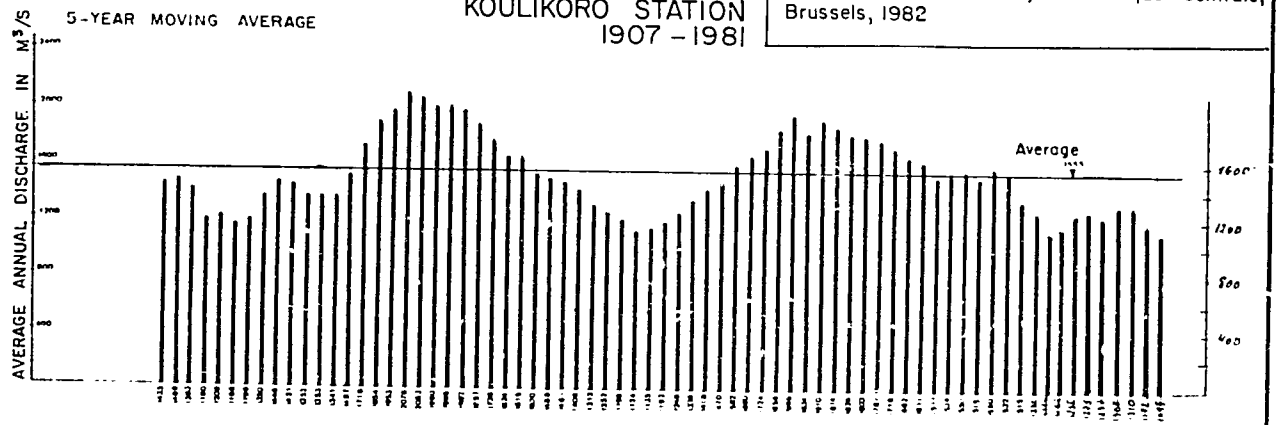
SENEGAL RIVER (BAKEL)
1903-1980

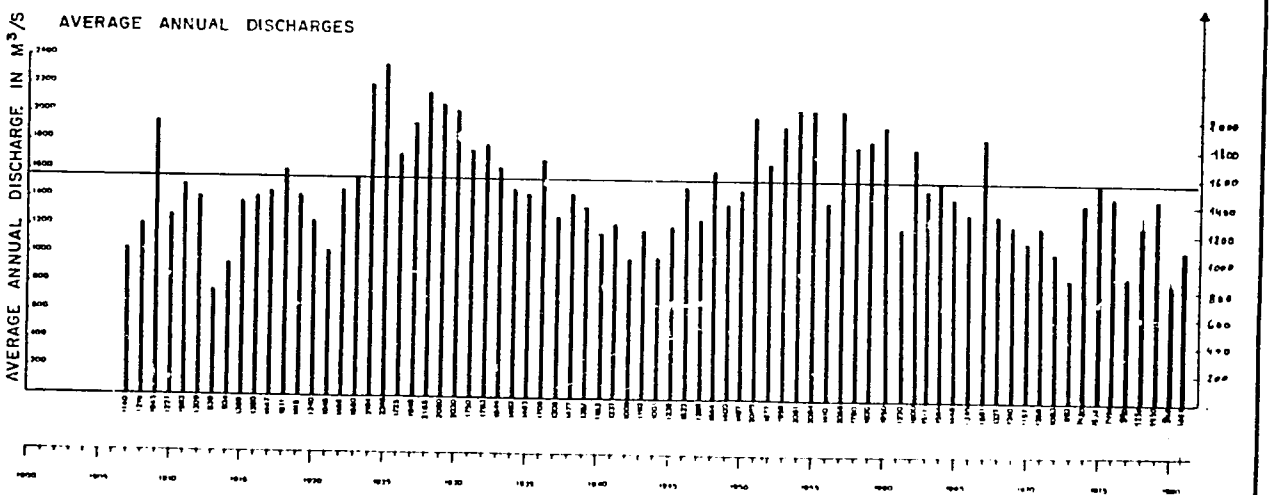




Document compiled for the CAC-WMO mission Source: DR. CH. REIZER, Les pêches continentales du Bassin du Sénégal Ann. Musée Royal d' Afrique Centrale, Brussels, 1982

NIGER RIVER KOULIKORO STATION 1907 – 1981





12

LIST OF ABBREVIATIONS

ABN	: Niger Basin Authority
AGRHYMET	: Programme for strengthening the Agrometeorological and Hydrological Services in the countries of the Sahel and for establishing a Centre for training and applications of agrometeorology and operational hydrology
ASECNA	: Association for Air Navigation Safety in Africa and Madagascar
CAC	: AGRHYMET Programme Co-ordinating and Advisory Committee
CBLT	: Lake Chad Basin Commission
CIRTEF	: International Council for French Language Radio and Television Services
EAMAC	: African School of Meteorology and Civil Aviation
FAO	: United Nations Food and Agriculture Organization
FGGE	: First Global GARP Experiment (this experiment was held under the auspices of WMO and the ICSU in 1979)
FIT	: Fund-in-Trust
GARP	: Global Atmospheric Research Programme
GATE	: Atlantic Tropical Experiment (this experiment was held off the coast of Senegal in 1974)
HYDRONIGER	: Project for Hydrological Forecasting System for the River Niger Basin
IBRD	: International Bank for Reconstruction and Development
ICRISAT	: International Crops Research Institute for the Semi-Arid Tropics
NOAA	: National Oceanic and Atmospheric Administration
OMVG	: Organization for the Development of the Gambia River
OMVS	: Organization for the Development of the Senegal River
ORSTOM	: French National Office for Overseas Scientific and Technical Research
RMC	: WWW Regional Meteorological Centre
SAED	: Senegal River Delta Development and Exploitation Corporation

SSB	: Single side band radio transmitters and receivers
SODAGRI	: Agricultural Development and Educational Society
SONADER	: National Society for Rural Development
UNDP	: United Nations Development Programme
UNFPA	: United Nations Fund for Population Activities
URTNA	: Union of National Radio and Television Corporations of Africa
USAID	: United States Agency for International Development
WAMEX	: West African Monsoon Experiment (regional experiment conducted as part of the FGTE in 1979)
WMO	: World Meteorological Organization
WWW	: World Weather Watch