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5. Author(s)

1. Crawford, Eric W.
2. Bingen, R. James
3. Versel, Malcolm

6. Contributing Organization(s)

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Bibliography contains 356 annotations of reports, articles, and books of relevance to agricultural development and policy in Senegal. Indexed by title, keyword, and relevance to USAID program planning. Covers materials in French and English, but all annotations in English. Prepared as Phase I of the Senegal Agricultural Sector Analysis. Annotations summarize the objectives, time period, methodology, and findings/recommendations of each study.

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**AGRICULTURAL DEVELOPMENT AND POLICY IN SENEGAL:  
ANNOTATED BIBLIOGRAPHY OF RECENT STUDIES, 1983-89**

By

Eric W. Crawford, R. James Bingen, and Malcolm Versel

with

Pat Smith, Karin Steffens, Duncan Boughton, Anne Kreutz Hughes,  
Stephan Goetz, Ousseynou Ndoeye, and Katherine Baird

January 15, 1990

Department of Agricultural Economics  
and  
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On campus, Jennifer Kucharski did library searches and managed the document inventory and handling, Jeff Wilson assisted with computerization of the bibliography, Melba Lacey provided editorial and administrative assistance and produced the printed document, Chris DeFouw helped with the travel arrangements, Pauline Sondag advised on bibliographic search procedures, and Valentina Mazzucato and Kim Aldridge did additional annotations.

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## **PREFACE**

### **Principles Used to Select Documents**

The terms of reference for preparation of this bibliography call for inclusion of "research and analysis relevant to the development of policy and programs and to the evaluation of economic development in the agricultural sector." Later in the terms of reference the focus is stated as "all recent and relevant documents covering the agricultural sector in Senegal."

Based on these guidelines, and discussions with USAID personnel, the emphasis was placed on Senegal-specific documents, with the inclusion of a small number of general works whose relevance to USAID programs was considered high. The terms of reference indicated that a broad range of subjects should be considered. However, it was agreed that relatively limited attention should be paid to industrial marine fishing, and that limited coverage would be given to natural resources and health since similar bibliographic reviews were anticipated in those areas. Nonetheless, land and tree tenure issues are covered in this bibliography.

"Recent" studies means 1983 and later, marking the period since the formulation and enunciation of the New Agricultural Policy. Selected studies prior to 1983 are included if they were judged to be relevant to current issues and debates.

A wide net was cast in searching for relevant documents (see Appendix 1 for details of the sources consulted and search procedure). As anticipated at the outset, a much larger number of documents was found than could be annotated given the time and resources available. Accordingly, each document was assigned a priority for annotation, to ensure coverage of the highest priority items. In both the search and priority-setting procedures, preference was given (other things equal) to French-language documents and to documents which USAID was considered less likely to have seen or to have access to. Documents for which copies could not be obtained in the time available had to be excluded.

### **Overall Organization of the Bibliography**

The bibliography consists of a computer database and a printed bibliography. The printed bibliography contains the following elements:

- Preface
- List of references and annotations in alphabetical order by author, with each entry numbered sequentially<sup>1</sup>
- Title index, showing title, first author, year, and document number (as indicated in the author list)
- Keyword index, showing each keyword cited with the numbers of the documents in which the keyword reference appears

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<sup>1</sup>Note that the accented French characters are sorted in the following order: a, â, ä, à; e, é, è; i, î, î; o, ô; u, û, ù. Thus, Reveyrand follows Republic, and République follows Reveyrand.

- Relevance/title index, showing the title and number of documents under the three relevance categories
- Appendix 1: Document search procedures and sources consulted
- Appendix 2: Bibliography preparation and printing procedures.

### **Structure of the Individual Entries**

Each entry consists of a bibliographic reference and an annotation. Elements of the reference and annotation for which no information was available or relevant were not printed. The bibliographic reference is arranged as follows:

Document number / author(s) (last name, first name) / year / title (in boldface type) / journal (in italics) / series or number / place published / publisher / month / pages.

If the information was available, our preference was to list persons rather than institutions as authors (e.g., Magnuson, et al., rather than Abt Associates), and the firm which did the study rather than the agency which commissioned it (e.g., SOFRECO, not MDR). For GOS documents, the Ministry or agency is listed, but not République du Sénégal. French Ministries can be identified by Paris as the place published, or by "Ministère Français...". The abbreviation "n.d." means no date of publication was indicated. The abbreviation "n.m." means no month was indicated.

The annotation consists of the following items. All items were reviewed by the annotators, but where no information was available or relevant the field heading was not printed.

- Objectives
- Time period covered by the document or study
- Methodology used
- Data collected or presented
- Findings and/or recommendations
- Relevance (see below)
- Comments
- Keywords

The annotations include some degree of detail on objectives, methodology, and findings. An exhaustive précis was not attempted, however. Since copies of all documents annotated are being provided to the Mission, the goal was to provide enough information for the reader to decide whether to obtain the document from the ADO library. In some cases, readers might consider that the annotation contains enough information so that the document itself need not be consulted. This may be risky, despite our efforts to prepare accurate and complete annotations.



## **Assessment of Relevance**

A relevance rating (high, medium, low) was assigned to each document annotated. The ratings are subjective and were based on a narrow criterion of relevance, namely estimated pertinence to and value for USAID program planning purposes. The question asked of each document was: How useful/important would this document be to those preparing an agricultural sector assessment or country strategy statement? In some cases, a word of explanation is added to the relevance rating. An effort was made to rank documents of a given type or focus, so that only the most useful are assigned a high relevance rating. We recognize, however, that what is relevant to one person may be of no use to another.

## **Structure of the Indexes**

The title index also includes information on the first author and year. We felt this would help users of the title index to decide whether a particular document would be worth examining. Alphabetization is based on the title as listed, including any initial articles such as "The" and "An." The keyword index contains only the document numbers shown in the main author listing. There is no author index because the main list of references and annotations is ordered by author.

## **Other Uses of the Computer Database**

The bibliography database, prepared with Notebook II (supplied to the Mission), can easily be sorted or searched or indexed according to criteria other than author, title, and keyword. An index by publisher could be prepared, for example, although the process would not be as straightforward as preparing a keyword index.

The database can be easily updated to include new documents acquired by the Mission. There is no limit on database size.

An additional field could be inserted into the database and used to code each document in a manner consistent with the Mission's main documentation system. Also, entries from the Notebook II database could be written to a disk file in a format which could be read into and merged with the Mission's main documentation files.

Notebook II contains a good report format editor. Reports can be printed to a disk file in a format which can be edited in WordPerfect 5.0, and then saved and imported back into a Notebook database. See Appendix 2 for details.

## ACRONYMS

ABC	African Associated Business and Engineering Consultants
ACOPAM	Appui Coopératif aux Activités de Développement Assistées par le Programme Alimentaire Mondial en zone soudano-sahélienne
ADO	Agricultural Development Office
AEB	Agriculture- and employment-based
AF	Amélioration Foncière
AID	Agency for International Development
AMIS	Agricultural Marketing Improvement Strategies Project
APDAA	Association pour le Développement de l'Agriculture en Afrique
APS	Agricultural Production Support Project
BAME	Bureau d'Analyses Macro-Economiques
BCEAO	Banque Centrale de l'Afrique de l'Ouest
BNDS	Banque Nationale de Développement du Sénégal
CAB	Commonwealth Agricultural Bureau
CADEF	Comité d'Action pour le Développement du Fogny
CAIDS	Center for Applied International Development Studies
CCCE	Caisse Centrale de Coopération Economique
CDH	Centre pour le Développement Horticole
CER	Centre d'Expansion Rural Polyvalent
CFA	Communauté Financière Africaine
CFAF	CFA Franc (Francophone West African Franc)
CFDT	Compagnie Française de Développement des Textiles
CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CIE	Centre International d'Enfance
CIF	Cost, insurance, freight
CILSS	Comité Permanent Inter-Etats de la Lutte contre la Sécheresse dans le Sahel
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement (ex-GERDAT)
CNCA	Caisse Nationale de Crédit Agricole du Sénégal
CNEARC	Centre National d'Etudes Agronomiques des Régions Chaudes
CNRF	Centre National de Recherches Forestières
CPSP	Caisse de Péréquation et de Stabilisation des Prix
CRA/BAMBEY	Centre de Recherches Agricoles de Bambey
CRA/DJIBELOR	Centre de Recherches Agricoles de Djibélor
CRA/St-Louis	Centre de Recherches Agricoles de Saint-Louis
CRAD	Centre Régional d'Assistance au Développement
CRED	Center for Research on Economic Development
CRODT	Centre de Recherches Océanographiques Dakar-Thiaroye
CRSP	Collaborative Research Support Program
CRZ/DAHRA	Centre de Recherches Zootechniques de Dahra
CRZ/KOLDA	Centre de Recherches Zootechniques de Kolda

CSA	Commissariat à la Sécurité Alimentaire
CSPT	Compagnie Sénégalaise de Phosphates de Taiba
CSS	Compagnie Sucrière Sénégalaise
CTFT	Centre Technique Forestier Tropical
DAO/PSE	Département d'Appui aux Opérations, Division des Politiques Sectorielles et des Evaluations Retrospectives
DBCP	Dibromochloropropane
DGPA	Direction Générale de la Production Agricole
DPCS	Direction de Production et de Contrôle des Semences
DRPA	Direction de Recherches sur les Productions Animales
DRPF	Direction de Recherches sur les Productions Forestières
DRPHO/OCEANO	Direction des Recherches sur les Productions Halieutiques et Océanographiques
DRPV	Direction de Recherches sur les Productions Végétales
DRSAEA	Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole
EDI	Economic Development Institute (World Bank)
EEC	European Economic Community
EMTIE	Europe, Middle East and North Africa--Technical Department, Industry and Energy Division (World Bank)
ENDA	Environnement et Développement Action dans le Tiers-Monde
ENEA	Ecole Nationale d'Economie Appliquée
EPIC	Etablissement Public à Caractère Industrielle et Commerciale
ERC	Espace Regional Céréaliier
FAC ex FIDES	Fonds d'Aide et de Coopération
FAO	Food and Agriculture Organization of the United Nations
FCCAA	Fonds Commun de Contrepartie de l'Aide Alimentaire
FCFA	Franc CFA
FED	Fonds Européen de Développement
FO	Farmer Organizations
FONGS	Federation des Organisations Non-Gouvernementales du Sénégal
GDP	Gross Domestic Product
GIE	Groupement d'Intérêt Economique
GNP	Gross National Product
GOS	Government of Senegal
GRAND	Gender Resource Awareness for National Development Project
GRET	Groupe de Recherche et d'Echanges Technologiques
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HCH	(chemical)
IBRD	International Bank for Reconstruction and Development (World Bank)
ICRISAT	International Center for Research in the Semi-Arid Tropics
ICS	Industries Chimiques du Sénégal
IDA	International Development Association
IDP	International Development Paper
IDRC	International Development Research Center
IEMVT	Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux
IFAN	Institut Fondamental d'Afrique Noire
IFC	International Finance Corporation

IFDC	International Fertilizer Development Center
IFPRI	International Food Policy Research Institute
IITA	International Institute for Tropical Agriculture
ILCA	International Livestock Center for Africa
IMF	International Monetary Fund
INDR	Institut National de Développement Rural
INRA	Institut National de Recherche Agronomique (France)
IRAM	Institut de Recherches et d'Applications des Méthodes de Développement
IRAT	Institut de Recherches Agronomiques et Tropicales
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
ISRA	Institut Sénégalais de Recherches Agricoles
ITA	Institut de Technologie Alimentaire
LDC	Less Developed Country
LNERV	Laboratoire National d'Élevage et de Recherches Vétérinaires
MADIA	Managing Agricultural Development in Africa
MDR	Ministère du Développement Rural
MMC	Marketing, Management, Conseil
MSU	Michigan State University
NAP	New Agricultural Policy
NARS	National Agricultural Research System
NFI	National Financial Institutions
NFM	National Financial Markets
NGO	Non-Governmental Organization
NPA	Nouvelle Politique Agricole
NPI	Nouvelle Politique Industrielle
OCDE	Organisation de Coopération et de Développement Economiques
ODA	Overseas Development Agency; or, Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OFADEC	Office Africain pour le Développement et la Coopération
OFCOR	On-Farm Client-Oriented Research
OFR	On-Farm Research
OMVG	Organisation pour la Mise en Valeur de la Gambie
OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal
ONCAD	Office National de Coopération et d'Assistance au Développement
OP	Organisation de producteurs
ORANA	Organisme de Recherches sur l'Alimentation et la Nutrition Africaines
ORSTOM	Institut Français de Recherche Scientifique et Technique pour le Développement en Coopération
PAM	Policy Analysis Matrix
PARCE	Projet d'Aménagement et de Reboisement des Forêts du Centre-Est
PCA	Programmes de Crédit Agricole
PIDAC	Projet Intégré de Développement Agricole de la Casamance
PNRM	Plan for Supporting Natural Resources Management in Sub-Saharan Africa
PRONAT	Projet Protection Naturelle
PRS	Projet Rural de Sédhiou
PRS-II	Rural Project of Sédiou

PSR	Production Systems Research
PUF	Presses Universitaires de France
PVO	Private Voluntary Organization
R and D	Research and Development
R&DO	River Basin Development Office
RDA	Rural Development Agency
RESADOC	Reseau Sahelien de Documentation (Institut du Sahel)
RFA	République Fédérale d'Allemagne
RFI	Rural Financial Institutions
RFM	Rural Financial Markets
ROAPE	Review of African Political Economy
SAED	Société d'Aménagement et d'Exploitation des Terres du Delta, des Vallées du Fleuve Sénégal et de la Falémé
SAFGRAD	Programme de Recherche et de Développement des Cultures Vivrières dans les Zones Semi-Arides de l'Organisation de l'Unité Africaine
SAIS	School of Advanced International Studies (The Johns Hopkins University)
SAL	Structural Adjustment Loan
SATEC	Société d'Aide Technique et de Coopération
SEDES	Société d'Etudes pour le Développement Economique et Social
SEIB	Société Electrique et Industrielle du Baol
SENCHEM	Société de Commercialisation de Productions des Industries Chimiques du Sénégal
SERST	Secrétariat d'Etat à la Recherche Scientifique et Technique
SISMAR	Société Industrielle et Sahélienne de Matériels Agricoles et de Représentation
SODAGRI	Société de Développement Agricole et Industriel du Sénégal
SODEFITEX	Société de Développement des Fibres Textiles
SODEVA	Société de Développement et de Vulgarisation Agricole
SOFRECO	Société Française de Réalisation d'Etudes et de Conseil
SOMIVAC	Société de Mise en Valeur Agricole de la Casamance
SONACOS	Société Nationale de Commercialisation des Oléagineux du Sénégal
SONAR	Société Nationale d'Approvisionnement du Monde Rural
SONED	Société National d'Etudes pour le Développement
SRDR	Société Régionale de Développement Rural
SRV	Senegal River Valley
SSRA	Sahel Sub-Regional Natural Resources Management Assessment Report
SV	Sections Villageoises
UESS	Unités Expérimentales du Sine-Saloum
UNDP	United Nations Development Program
UNESCO	United Nations Economic, Social and Cultural Organization
UNIVAL	Unité d'Information et de Valorisation de l'ISRA
UNSO	United Nations Sahelian Office
USAID	United States Agency for International Development
USED	Unité Socioéconomique et de Démographie
WARDA	West African Rice Development Association
WB	World Bank

**ANNOTATED BIBLIOGRAPHY OF RECENT STUDIES  
(1983-89)**

**Alphabetical List by Author**

- [1] ABC (African Associated Business and Engineering Consultants). (n.d. [1989]) **Etude de marché sur l'utilisation du maïs au Sénégal: Rapport final.** Dakar: ABC. N.m. [October]. 63 p (text) + ca. 80 p (annexes).

**Objectives:** To determine present and potential markets for corn-based products in Senegal.

**Methodology:** Studied corn use for human consumption, animal consumption and agricultural industries.

**Data Collected:** Interviewed producers, consumers, livestock and hen breeders, and food industry representatives in Dakar, Saint-Louis, Thiès and Kolda; market surveys in Tilène, NDiobène Taye and Castor.

**Findings/Recommendations:** Provides overview and some detail of corn use for human consumption, chicken and cattle feed, and beer-making. Proposes terms of reference for several additional studies: (1) production (quantity, price, varieties, quality), marketing channels (actors, prices, margins), consumer motivation; (2) consumer preferences; (3) chicken and livestock markets for corn. Authors refer to an ITA study on maize technology which notes that corn is less preferred than rice because rice has higher prestige, consumers do not know how to prepare corn, and prices for corn are relatively high. Recommends the improvement of corn marketing.

**Relevance:** Low.

**Comments:** Primary data, although critical for a study of this nature, were not collected and the analysis is unsophisticated. Section II is not based on substantive data and it contributes little. Section IV on chicken and cattle feed is the most rigorously presented chapter, yet the authors apparently assumed that all chickens are fed with commercial feed, which is doubtful.

**Keywords:** Consumption, maize, imports, market prospects, nutrition, processing, prices.

- [2] Adambounou, T. L.; Castaigne, F. (1983) **Modèle d'évaluation micro-économique d'une méthode de conservation post-récolte de légumes tropicaux par saumurage.** *Food and Nutrition Bulletin.* Vol. 5, No. 3: 35-39.

**Objectives:** To discuss methods and costs of preserving vegetables by brining; to describe the price and marketing systems for vegetables in Senegal.

**Time Period:** Data given for 1980.

**Methodology:** Description of preservation experiments; market price survey; analysis of survey and secondary data.

**Data Collected:** Producer and consumer prices for 7 vegetables; marketing costs; estimated costs of brining for 4 vegetables.

**Findings/Recommendations:** Cost of brined vegetables was lower than the price of fresh vegetables (if they were brined during period of abundant supply). Introducing such a method in rural Senegal would help control price fluctuations which are caused by supply and demand and speculation by intermediaries.

**Relevance:** Low.

**Comments:** Old data and naive economic analysis.

**Keywords:** Nutrition, horticulture, processing.

- [3] Agel, C.; Yung, J. M. (1985) *La filière maïs au Sénégal*. Paris: Ministère des Relations Extérieures; SEDES. Avril. ca. 50 p (excerpts from full report).

**Objectives:** Examine whether increased maize production can reduce cereal deficit and reduce the dependence on imported cereals.

**Methodology:** See comments.

**Data Collected:** See comments.

**Findings/Recommendations:** Expansion of maize production is favored since it is already integrated into farming systems. Constraints on further expansion include the crops high nutrient demand, high cost of production, competition for peak period labor and drought sensitivity. Assessing the potential for maize requires information on its degree of substitutability in the diet of urban and rural deficit areas, the acceptability of processed forms, labor requirements and returns using alternative production techniques, the adaptability of recently developed varieties, and the impact of increased urban demand on the welfare of rural food deficit households.

**Relevance:** Medium.

**Comments:** Only excerpts from the conclusions and annexes have been reviewed; hence, knowledge of the methodology and data collected are incomplete. Methodology includes descriptive analysis of farming system constraints and opportunities, and coarse grain marketing channels, participants and seasonality; secondary data include cereal marketing margin analyses and partial budget analysis of the use of improved seed. Conclusions rather general. The authors do not appear to have taken account of the study by Ross (1980) which provides indicative but pessimistic estimates of the potential substitutability of maize for rice in the urban diet. The experience of the USAID-funded Gambia Mixed Farming and Resource Management project is also relevant. A concerted effort to promote a maize package led to a threefold increase in area cultivated over a five-year period, but lack of timely access to inputs resulted in a one-third decline in the years immediately following project completion. Evidence from on-farm maize demonstrations in The Gambia suggests that maize has little tolerance for sub-optimal management practices.

**Keywords:** Production, food security, cereals marketing.

- [4] Allaya, Mahmoud. (1984) *Etude des marchés et des perspectives d'échanges céréaliers des pays de l'Afrique de l'Ouest: Sénégal, Mali, Haute Volta, Côte d'Ivoire, Ghana, Nigeria, Cameroun*. *Africa Development/Afrique et Développement*. Vol. IX, No. 2: 93-143.

**Objectives:** To outline development of cereals production, consumption, exports and imports up to 1980; to project variables up to 1985-1990 with emphasis on trade between countries of the sub-region, obstacles to trade and trade prospects.

**Time Period:** 1970-1980 with projections for 1985-1990.

**Methodology:** Compilation of statistical data from various secondary sources and from survey conducted in various countries in March-April 1979.

**Data Collected:** Secondary data on cereals consumption patterns, self-sufficiency, imports, exports, stocks, demography.

**Findings/Recommendations:** To reduce dependency on cereal imports, Senegal introduced a policy to favor consumption and production of local cereals (millet, sorghum, maize). If the objectives are reached, self-sufficiency in millet and maize could be reached in 1985 and 80% of the demand for rice could be covered domestically. Production incentives and consumption subsidies are policy tools, raising prices and preventing export of possible surplus.

**Relevance:** High.

**Comments:** A lot of statistics, little analysis. Since data are old and come from a variety of sources, results need to be carefully interpreted.

**Keywords:** Millet, sorghum, rice, maize, marketing, storage, exports, imports, trade, cereals imports, consumption, production, taxes/tariffs, transport.

[5] Arcia, Gustavo; Ri, Mary Young; Sidibé, Mamadou; Lô-N'Diaye, Khardiata. (1989)

**Improving family welfare through women's work in farming systems in Senegal.** Draft. Research Triangle Institute, Gender Resource Awareness for National Development (GRAND) Project. June. 24 p (text), 5 p (annex), ca. 30 p figures.

**Objectives:** To show the differential impacts of agricultural policies and technology on women's work and income, and on family income and consumption; to give policy makers better information on role of women in economic development in Senegal.

**Methodology:** Review of literature, and development of 3 linear programming models (adapted from Martin (1988) and Sidibé (1988), and based on secondary data) covering the Middle Valley of Senegal River, southeastern Peanut Basin, and Lower Casamance. Models differentiate male and female production, labor use, access to credit, and household duties. Models used to simulate effect of technological change, savings in time spent in household duties, increased access to credit, and additional/improved land.

**Findings/Recommendations:** [see Comments]; Peanut Basin: (a) availability of new technology has little impact (for men or women) unless additional capital is available, (b) combining improved technology, time savings, and credit leads to substantial improvement in women's incomes, (c) improved technology was profitable enough to cover full costs of borrowed capital. Lower Casamance: (a) additional land has more significant effect (doubling upland vegetable production) than new technology or reducing women's household work time, (b) constraints are labor and availability of lowland. Middle Valley: (a) farms show double the per capita income of other 2 zones, (b) women's time very constrained, (c) new technology plus savings in women's household time lead to increase in women's income, but significant reduction in men's income, (d) increasing the area of irrigated land and providing women access to technology and time savings leads to net decrease in total income [sic].



**Relevance:** Low.

**Comments:** Study results are poorly presented and interpreted, and presentation of model not consistent with model actually used. Results of limited credibility given (a) lack of gender-specific empirical data as basis for coefficients, (b) limited gender differentiation of model (same weight given to male and female revenues), (c) apparent errors in results.

**Keywords:** Women, production, model, rural incomes, technology.

- [6] Ariza-Niño, Edgar; Goheen-Fjellman, Miriam; Matt, Lisa; and Rice, Richard (Cameroun case study). Jossierand, Henri P.; and Ross, Clark G. (Senegal case study). (1982) *Les effets des politiques agricoles sur la consommation alimentaire: Cameroun et Sénégal. Partie I. Rapports de pays*. Ann Arbor: University of Michigan, CRED. August. 346 p + annexes.

**Relevance:** Low.

**Comments:** This document contains the full country reports for Cameroun and Senegal in French. A full annotation of the Senegal report in English can be found under Jossierand and Ross (1982).

**Keywords:** Consumption, agricultural policy.

- [7] Ariza-Niño, Edgar J. (1982) *Les effets des politiques agricoles sur la consommation alimentaire: Cameroun et Sénégal. Partie II. Méthodologies d'analyse et modalités d'enquête*. Ann Arbor: University of Michigan, CRED. August. 268 p + annexes.

**Objectives:** To document methodologies for rapid data collection and analysis used in the study of the effects of agricultural policies on food consumption in Cameroon and Senegal.

**Time Period:** Data collection May-August 1981.

**Methodology:** Linear programming, consumption elasticities, survey methods.

**Data Collected:** Data collection instruments for demographic, activity calendar, field area, production technique, consumption, marketing, income, and anthropometric information.

**Findings/Recommendations:** Rapid data collection methods can provide useful information for policymakers. Nutritional survey data and anthropometric measurements gave contradictory results, casting doubt on the efficacy of the latter for diagnosing cases of acute malnutrition.

**Relevance:** Low.

**Comments:** See annotation of Jossierand and Ross (1982) for policy-relevant findings of this study.

**Keywords:** Consumption, policy analysis, research methods.

- [8] Ariza-Niño, Edgar J. (1982) *PROSUMER FARMER--A linear model of peasant farming in Casamance, Senegal*. In *Consumption effects of agricultural policies, part II: Analytical methods and field survey techniques*, 284-313. University of Michigan, Center for Research on Economic Development.

**Objectives:** To integrate family food consumption considerations in the production decision-making model of a peasant farming family.

**Methodology:** Links a system of linear demand equations (for rice and millet/sorghum) with a simple linear production model.

**Data Collected:** Demand and production models based on secondary data and previous studies.

**Findings/Recommendations:** Base results show consumption of entire millet crop, sale of 2/3 of rice crop and all of peanut crop; due to labor constraints, less than half of available land is used; impact of changes in off-farm income, family composition, and peanut and rice prices is examined; nutritional status is assessed.

**Relevance:** Low.

**Comments:** Method of interest, but results not useful given the simple model specification and weak empirical data base.

**Keywords:** Production, consumption, model, food security, nutrition.

- [9] Arthur Young Conseil. (1987) **SONACOS-SEIB: Examen des divers aspects particuliers. Rapport.** March. 150 p (text), 75 p (annexes, as separate document).

**Objectives:** To analyze the variability in costs of marketing primary products and processing of grain; to compare production costs across various industrial units; to identify and calculate constraints imposed by the public authorities on the peanut industry; to compare profitability in the domestic and foreign markets.

**Time Period:** 1980-1986?

**Methodology:** Descriptive and statistical analysis.

**Data Collected:** Data on production, inputs used in peanut processing, output, capacity, oil processing conversion coefficients, sales, costs, prices [including world prices of peanut oil and cake (1950-86)].

**Findings/Recommendations:** Analysis of utilization of the means of production, variability of primary marketing costs, variability of costs with respect to the different production plants, comparative study of production costs, analysis of profitability threshold, profitability with respect to the various markets, analysis of constraints imposed by the government.

**Relevance:** Medium.

**Keywords:** Peanuts, prices, organizational performance, marketing.

- [10] Ba, Mamadou; Diagne, Youssou; Sarr, Mbaye; Diaw, Mbaye; Fournier, Yves. (1989a) **Proposition de plan d'actions en matière d'épargne et de crédit rural: Rapport provisoire.** Dakar: Ministère du Développement Agricole. Juillet. 71 p (text) + 81 p (appendices).

**Objectives:** To evaluate the quality/quantity of financial services required in rural areas of Senegal, including savings, loans, and other financial services; to study institutional structures which can meet those needs (types of banks and rural savings/loan associations); to recommend and develop an action plan.

**Time Period:** Mars-Avril 1989.

**Findings/Recommendations:** Recommendations: rural credit needs should be considered globally, not just for agricultural production; each production system merits a different approach for agricultural/rural credit (debatable); credit procedures should be simplified; extension and publicity about credit institutions is essential; interest rates should be reviewed; especially the requirement for 100 percent repayment before new loans are granted; an evaluation/monitoring system should be an integral part of any credit scheme; the networks for agricultural marketing need to be improved; institutionally, incentives can be provided to facilitate rural credit. Experiments with different types of rural credit institutions are recommended, and specific short-, medium- and long-term strategies are presented. The authors estimate that for the period 1990/91 to 1994/95, short- and long-term rural credit requirements for individuals will grow 45 to 50 percent, medium-term credit needs about 6 percent, and collective credit needs about 13 percent.

**Relevance:** High.

**Comments:** As an action plan the study could be more specific, but as a survey of various approaches to rural credit it seems useful; appendices 2 and 3 provide interesting case histories on the rural credit systems in Rwanda and Bangladesh (the Grameen Bank); appendix 7 details the bases for calculations the authors used to estimate rural credit needs for each major agricultural activity; this study is a follow-on to the "Etude comparative des programmes de crédit agricole (PCA)," (Ba, et al., Juin 1989).

**Keywords:** Credit, farmer organizations, GIEs, banking, institutions, NGOs, organizational performance, RDAs, savings.

- [11] Ba, Mamadou; Diagne, Youssou; Sarr, Mbaye; Diaw, Mbaye; Fournier, Yves. (1989b) *Etude comparative des programmes de crédit agricole (P.C.A.): Rapport principal et rapport annexe*. Dakar: Ministère du Développement Rural. Juin. 72 p (text) + 10 p (references) + 170 p (appendices).

**Objectives:** To compare different agricultural credit programs (PCA) and to propose an action plan for rural savings and credit.

**Methodology:** Interviews with 51 individuals, 34 groups (producer groups, GIEs, etc.) and 26 PCAs from 8 regions; the individuals belonged to the groups and the groups to the PCAs.

**Findings/Recommendations:** PCA loans made primarily for purchase of inputs, equipment or food. The length of loan and interest rate varies for each PCA, and most PCAs depend on group solidarity to enforce repayment. Recommendations for PCAs include: ensure 100% (not 75% as for some groups) repayment before lending money to previous borrowers; charge interest to avoid confusing loans with gifts; coordinate with other PCAs and donor lending programs in a particular zone; keep size of PCA groups relatively small; group solidarity should be reinforced; the members should be responsible for collecting debts from other members, and for assisting with the management of the PCA.

**Relevance:** Medium.

**Comments:** A recent, but not highly conclusive, institutional study on credit institutions operating in rural areas, carried out as part of the NPA (Nouvelle Politique Agricole). Data collection was not very rigorous, nor were the data well-presented. The appendices include some information which may be of use to researchers studying agricultural credit. May serve as a useful complement to the study in progress Manzitti and Maccherone (1989) which may generate more reliable data. Following this report, the authors developed an action plan for rural savings and credit, also annotated in this bibliography; the introductory pages to the main report include a list of acronyms and their definitions which may be useful.

**Keywords:** Credit, farmer organizations, GIEs, banking, institutions, NGOs, organizational performance, RDAs, savings.

- [12] Ba, Moussa; Ba, Mohamed (rapporteurs). (1987) *L'épargne et le crédit au niveau des associations paysannes*. Compte-rendu du séminaire de réflexions sur l'épargne et le crédit, Dakar, ENEA, les 18 et 19 juin 1987. Thiès: Fédération des organisations non gouvernementales du Sénégal (FONGS). Juin. 73 p.

**Objectives:** To summarize the major issues from two seminars. The first, held 13-15 April 1987 in Thiès, provided rural people an opportunity to discuss their needs and perceptions concerning savings and credit. The second, held 18-19 June 1987, brought together government and development organizations to discuss rural savings and credit. Proceedings of the second seminar are also presented in this document.

**Findings/Recommendations:** Farmers require credit, especially now that farm earnings are down, and other forms of support, (e.g., government subsidies) are no longer available. Agencies can help farmer groups by promoting savings as a prerequisite to borrowing; helping farmers learn how to develop and manage household budgets; and explaining concepts like interest and the importance of loan repayment. Women are often ignored by savings and credit programs. Loans need to be secured, and credit should only be used for productive activities which have minimal risk levels. Managing savings and credit is difficult, if not impossible, for people who have little or no training or education. NGOs provide credit with easy conditions (no collateral, low or no interest, accessibility to loans from NGO personnel in the village). Farmers cannot count on this easy credit always being available. CNCAS is not organized to serve farmer associations well (ceiling limit on loans). Rainy season agricultural loans are not a CNCAS priority, although they are critical for farmers. Loans are provided for 65 percent of overall need, 35 percent down, which is not easy for a farmer to mobilize. Interest rates on loans are higher than the expected returns to agriculture. CNCAS staff are not well-trained to work with farmer associations. Farmers are reluctant to place their money in banks which are not in the village. To support farmer savings and credit initiatives, organizations (GOS, NGOs, donors) can promote literacy and management training, relax certain CNCAS procedures, and provide technical support to farmer associations.

**Relevance:** Medium; the introduction/summary of the conference is good and describes specific activities, but the conference proceedings as presented are not that useful.

**Comments:** Pages 5 and 6 set forth a number of specific actions designed to help farm savings and credit associations develop.

**Keywords:** Credit, savings, cooperatives, debt, farmer organizations, institutions, literacy, NGOs.

- [13] Ba, Thierno Aliou; Crousse, Bernard. (1985) **Food-production systems in the Middle Valley of the Senegal River.** *International Social Science Journal.* Vol. XXXVII, No. 3; Food Systems 105: 389-400.

**Objectives:** An account of food production systems with differing types and levels of water supply in the Senegal River Valley; describe the consequences of these food production systems on food supply, survival of farm families, food self-sufficiency, import-exports, impact of changes in climatic conditions on farming systems and livestock management; development and consequences of land laws and land tenure problems.

**Methodology:** Descriptive analysis accompanied by diagrams and photographs.

**Data Collected:** Food production, land under cultivation, area covered by floods, rainfall, irrigated land, population figures, per capita food consumption, food inputs, etc.

**Findings/Recommendations:** Traditional pattern of land tenure remarkably well suited to the environment and to vicissitudes of flooding and rainfall. Although considerable achievements were made in irrigated agriculture, timetable set by OMVS has not been kept. Remittances from migrants to large cities or emigrants in Europe have a large impact on survival of population in the river valley. Land laws are abolishing the traditional land tenure system while respecting acquired individual rights. Some landholders may try to use the new law to justify traditional property holdings.

**Relevance:** High.

**Comments:** Translation from French.

**Keywords:** Fleuve, production, land tenure, irrigation, environment.

- [14] Ba, Thierno Aliou. (1985) **Les centres d'expansion rurale du Sénégal entre la dynamique paysanne et les structures de l'état.** *Mondes en Développement.* Vol. 13, No. 52: 621-631.

**Findings/Recommendations:** Retraces the history of rural development in Senegal since it gained independence. Institutional history of the technical agencies and their relationships with rural people are examined. Particular attention is given to the place of the Centres d'Expansion Rurale in rural society. Describes, analyzes and criticizes the roles of administrative and village structures. Describes a methodology to help regional development committees, departmental development committees, and rural communities to work towards self-directed development.

**Relevance:** Low.

**Comments:** Contained in issue with the theme "Senegal, 1985"

**Keywords:** Institutions, local government, farmer organizations.

- [15] Badiane, Ousmane. (1989) **The potential for an 'Espace Régional Céréalière (ERC)' among West African countries and its possible contribution to food security.** Paper prepared for the CILSS/Club du Sahel conference on "Regional Cereals Markets in West Africa: Ongoing Dynamics and Future Implications," Lomé, Togo, November 6-11. October 10. 23 p.

**Objectives:** To show that the creation of a protected regional space for cereals can render smallholder agriculture economically viable and contribute to increased and stabilized food consumption. To examine whether opening regional markets may lead to increased national production and stabilize national food consumption. To estimate comparative advantage in agriculture and the region's potential to expand trade within its borders.

**Methodology:** Descriptive analysis.

**Data Collected:** Secondary data is used to compute export similarity index, production similarity index, comparative export performance index, comparative production performance index, trade overlap index, trade expansion index.

**Findings/Recommendations:** There is potential for higher levels of agricultural trade within West Africa. There is a bias towards trade with other regions. Transactions costs at the regional level may be part of the bias and can be reduced by investment in transport sector. Encouraging inefficient regional trade can be very costly. Diverting trade from stable outside sources toward unstable regional suppliers can increase consumption variability. Competitive trade should be encouraged. Factors which encourage bias toward extra-regional trade need further examination. The least costly way of exploiting regional potential has to be determined.

**Relevance:** High.

**Keywords:** Trade policy, food security, comparative advantage, regional trade.

- [16] Baker, Kathleen M. (1985) **The Chinese agricultural model in West Africa: The case of market gardening in the Region du Cap Vert, Senegal.** *Pacific Viewpoint*. Vol. 26, No. 2: 401-414.

**Objectives:** To present the experience of Taiwanese and Mainland Chinese extension work in the market gardening zone of the Cap Vert region.

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** The success of the Taiwanese and Chinese approach to market gardening can be attributed to their intensive extension work and training programs. Time was allowed for gradual change by highly educated cultivators who can progress on their own. However, essential back-up services are no longer available and productivity is lower than it could be. The low-cost, small-scale projects have considerable potential and flexibility. A prerequisite for the Chinese model is an efficient extension system. The existing extension systems are severely limited, however.

**Relevance:** Medium.

**Keywords:** Vegetables, cash crops, extension, agricultural research.

- [17] Banque Centrale des Etats de l'Afrique de l'Ouest. (1989) **Notes d'information et statistiques**. No. 380. Banque Centrale des Etats de l'Afrique de l'Ouest. March.

**Findings/Recommendations:** Includes 7-page summary of the 1987 tuna season in Senegal, with details on the number and types of vessels; amount of catch; allocation of the catch among the three canneries; the types, quantities, and destination of processed tuna; and tuna exports. Annual figures on total quantity of tuna caught are given for the period 1978-1987. The 1987 catch was the smallest since 1980; the report attributes this to the reduction in the number of fishing vessels.

**Relevance:** Low.

**Keywords:** Fish, processing, industry.

- [18] Banque Centrale des Etats de l'Afrique de l'Ouest. (1988) **Notes d'information et statistiques**. No. 374. Banque Centrale des Etats de l'Afrique de l'Ouest. August-September.

**Findings/Recommendations:** The bulk of this document consists of chronologies of political and economic events and economic statistics on Burkina Faso and Côte d'Ivoire. Also included is a 5-page account of cotton production in Senegal in 1986-87, with figures on production, inputs, yields, processing, exports, and quantities of cotton, cotton products, cottonseed for seed, oil, and animal feed. The number of growers, area planted, and production dropped sharply in 1986-87 as a result of poor rainfall and changes in the input supply policy of SODEFITEX, which started supplying inputs to growers on short-term credit, instead of providing them for free. The organization of cotton marketing and processing, the role of cotton products in exports, and the various uses of cottonseed are discussed.

**Relevance:** Low.

**Keywords:** Cotton.

- [19] Banque Mondiale, Division de l'Agriculture, Département du Sahe, Région Afrique. (1989) **Rapport d'évaluation Senegal. Projet de services agricoles**. Working Draft. Washington, D.C.: World Bank. Septembre. 42 p (text) + 15 p (appendices).

**Objectives:** To describe the World Bank/GOS agricultural extension services project.

**Time Period:** Four years.

**Findings/Recommendations:** In the past, RDAs attempted to provide extension services within the context of their separate projects; this approach only reached 10-20 percent of producers. Principles of the extension approach to be used: establishment and adoption of a focused, supervised work program; regular and continuing training courses for extension service personnel at all levels; strengthening of the links between research (ISRA) and extension.

**Relevance:** Medium; good background document which considers the important issue of extension services and the link with research.

**Comments:** The copy annotated is a working draft. Consequently, many statistics are missing from the text and annexes, although space is provided for them. Mission

should try to obtain the final version of the paper. Project is the first phase of a long term program to improve extension and support services to farmers and livestock breeders. The document is an evaluation of the pre-project context to justify the project.

**Keywords:** Extension, livestock, government, organizational performance, technology, agricultural research.

- [20] Basse, Marie-Thérèse. (1984) **Women, food and nutrition in Africa: Perspective from Senegal.** *Food and Nutrition.* Vol. 10, No. 1: 65-79.

**Objectives:** Assessment of impact of women's activities on nutrition in rural and urban households in the Sahel, particularly Senegal, and prospects for improvement.

**Methodology:** Descriptive analysis.

**Data Collected:** Grain production by women.

**Findings/Recommendations:** Women play an important role in food production and food processing, and have the primary responsibility as household food providers. They have a bias towards carbohydrates and lipids for economic reasons; for cultural reasons, vulnerable groups receive smaller portions of available food. Education is the key to improving the situation of African women. Nutrition extension should be strengthened and food research should be aimed at rural African women.

**Relevance:** Medium.

**Keywords:** Nutrition, food security, women.

- [21] Baujard, Pierre; Bodian, Yankhoba; Duncan, Larry W.; Martiny, Bernard; Pariselle, Antoine; Sarr, Etienne. (1989) **Nouvelles études au champ sur les effets de deux nématocides fumigants bromés (DBCP et EDB) sur les rendements des cultures dans le bassin arachidier du Sénégal.** *Revue de Nématologie.* Vol. 12, No. 1: 85-90.

**Objectives:** To conduct on-farm tests of two bromid fumigant nematocides, dibromochloropropane (DBCP) and ethylene dibromid (EDB) on peanut, millet, and sorghum.

**Time Period:** 1985-86.

**Methodology:** Four trials reported, each with several treatments and repetitions; all trials located at Nebe, km 5, route Diourbel-Gossas.

**Findings/Recommendations:** The two chemicals have a strong nematocidal activity which is independent of the treatment date during the first month of crop cycle; DBCP gives crop yield increases for peanut and sorghum but not for millet in the year of treatment, and also for sorghum one year after the treatment (residual effect); DBCP is phytotoxic for millet when the treatment is done at germination; EDB gives crop yield increases for millet. It appears that the yield increases for peanut, millet and sorghum cannot be explained only by phytoparasitic nematode destruction; the chemicals may stimulate the plant directly or indirectly through effects on soil symbiotes.

**Relevance:** Low.

**Comments:** Cf. Dhéry et al. (1987).



**Keywords:** Peanuts, pest control, sorghum, millet.

- [22] Belloncle, Guy. (1985) **Participation paysanne et aménagements hydro-agricoles: Les leçons de cinq expériences africaines.** Paris: Karthala. 345 p.

**Objectives:** In Senegal, to evaluate a plan for training farmers to manage irrigated perimeters, and to examine accounting and management problems in the larger perimeters.

**Methodology:** Summarizes findings of five case studies of irrigated projects in Mali, Senegal, Niger, Côte d'Ivoire, and Cameroon. In Senegal, reviews experience of village-level irrigation in Matam, and of large-scale irrigation in Lampsar.

**Data Collected:** Some figures presented on SAED operations. Detailed discussion of organization and management of perimeters.

**Findings/Recommendations:** In order to strengthen extension services and village groups, SAED should develop management and accounting procedures in local languages. Concerning village-level perimeters: groups should find additional means (e.g., production taxes) to collect money for perimeter maintenance; motor-pump operators should be trained; and farmers should be trained in technical irrigation skills. Large perimeters: SAED should transfer more authority and responsibility to local level.

**Relevance:** Medium.

**Comments:** Study not concise, and objectives not clearly stated. Appears to summarize five different case studies undertaken elsewhere for various reasons. Studies are neither discussed in any integrated fashion, nor are any general conclusions offered, but the thorough discussion of organization and management of perimeters in Senegal may be useful.

**Keywords:** Irrigation, village organizations, organizational performance.

- [23] Beudot, Françoise. (1988) **Éléments de bibliographie sur les pays du Sahel, Mise à jour No. 12/Elements for a bibliography on the Sahelian countries, Updating No. 12.** Paris: OECD. October. 192 p.

**Data Collected:** 597 citations. Covers literature reviewed from July 1987 to July 1988, with some earlier references. Arranged by subject, indexed by author and geographic area. Some annotations.

**Relevance:** Medium.

**Comments:** No keywords. Earlier volumes of bibliography are available from Information - Publications service of OECD Development Center.

**Keywords:** Bibliography, Sahel.

- [24] Biarnès, Pierre. (1988) **Sénégal - 1988. Marchés Tropicaux.** [Vol./No. unknown; 15 July]: 1935-1958.

**Objectives:** Collection of articles by Pierre Biarnès on Senegal's importance, agriculture, water, industry, transportation, tourism, foreign trade, structural adjustment policy and international aid, budget, and national employers organization.

**Time Period:** 1984-1988.

**Data Collected:** Various data on production, investments, sales, transportation, tourism, trade, development assistance, government investments, foreign debt, budget.

**Findings/Recommendations:** Senegalese must make a united effort at development and the international community should continue to support this effort. Progressive desertification reduces the amount of arable land, a process which will likely be reversed by building dams. Peanuts are still the main cash crop. Fisheries has become an important sector. The provision of water as a vital need has improved markedly with some problems remaining in rural areas in particular concerning maintenance and replacement parts. Light industry is not efficient enough to compete successfully with foreign companies. The transportation system is not in balance regarding its structure and evolution of its activities. Tourism has become one of the main economic activities in Senegal. Senegal has a structural deficit in its balance of trade and has been pursuing a structural adjustment policy for 8 years. Government pays its employees, covers its operating costs, services its debt, but depends on aid to finance all government investments and payments on debt principal.

**Relevance:** Medium.

**Comments:** Good overview.

**Keywords:** Cash crops, food production, budgets, debt, transport, water management, industry, donor assistance, structural adjustment.

- [25] Biggs, Stephen D. (1989) **Resource-poor farmer participation in research: A synthesis of experiences from nine national agricultural research systems.** OFCOR Comparative Study No. 3. The Hague: ISNAR. June. 35 p.

**Objectives:** To examine the nature and degree of farmer participation in on-farm research.

**Time Period:** 1986-89.

**Methodology:** Synthesis of information from case studies of OFCOR programs in 9 countries including Senegal.

**Data Collected:** Modes of resource-poor farmer participation in on-farm research in 9 case study countries.

**Findings/Recommendations:** General findings for all 9 case studies: Activities which encourage farmer participation in research generally have low priority in research budgets. Study identifies four modes of farmer participation in agricultural research: 1) contract (scientists contract with farmers to provide land or services); 2) consultative (scientists consult farmers about problems and develop solutions for them); 3) collaborative (scientists and farmers act as partners in research process); 4) collegial (scientists strengthen farmers' capacity to do informal research and development. Most programs studied work within consultative and collaborative modes. Collegial mode might be a cost-effective approach to agricultural research

and development. Meetings and contacts with farmers are an important tool in on-farm research but need to be designed and executed with clear purpose, and taking account of local institutions and power structures. The ISRA Department of Production Systems Research and Technology Transfer has been organized into regional teams with different strategies for involving farmers.

**Relevance:** Low.

**Comments:** Only two paragraphs specifically on Senegal. For case study on Senegal, see Faye and Bingen (1989).

**Keywords:** Agricultural research, on-farm research.

- [26] Bingen, R. James; Crawford, Eric W. (1989) **La politique agricole au Sénégal**. Prepublication draft. Actes d'un séminaire organisé par l'Institut Sénégalais de Recherches Agricoles, Dakar, les 7-8 juillet 1988. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. Novembre. 453 p.

**Objectives:** Seminar intended to present to Senegalese government officials and donor representatives the results of research conducted by ISRA and MSU personnel under the Senegal Agricultural Research and Planning Project (1981-87) and the Food Security in Africa Cooperative Agreement (Senegal Applied Research Component, 1986-88).

**Findings/Recommendations:** Proceedings include 18 papers plus an introduction by Moctar Touré (Director-General of ISRA). Papers are grouped under the five session topics of the seminar: farm production and marketing, marketing and price policy, modeling, animal production and marketing, and agricultural development institutions and agencies. Recommendations proposed during each session's discussion period are included, along with a list of seminar participants.

**Relevance:** High; most papers take an explicit policy focus or summarize results of significant research programs.

**Keywords:** Production, marketing, livestock, agricultural policy, institutions, cooperatives.

- [27] Bingen, R. James; Hall, A.E.; Ndoye, Mbaye. (1988) **California cowpeas and food policy in Senegal**. *World Development*. Vol. 16, No. 7: 857-65.

**Objectives:** To describe the 1985 cowpea campaign and to assess its policy implications.

**Time Period:** 1986.

**Methodology:** Discussions with government and aid agency officials; review of project documentation and reports from the ISRA cowpea research program.

**Data Collected:** Cowpea production figures; types and amounts of assistance from donor agencies in support of the cowpea campaign.

**Findings/Recommendations:** The 1985 cowpea campaign, in which 700 tons of the CB5 variety were imported from the U.S., increased cowpea production by 3-4 times the average level. Senegalese farmers, especially in the northern Peanut Basin and along the Senegal River Valley, embraced the program enthusiastically. The use of CB5 gave many farmers food for the hungry season as well as a profitable commercial crop. However, bureaucratic pressures and technical, economic and institutional

difficulties, including inadequate supplies of sound, disease-free seed, shortages of equipment and problems with storage and marketing undermined the sustainability of expanded cowpea production. In the name of farmer responsibility ("responsabilisation"), the campaign subsidized many wealthier, larger farmers at the expense of several successful farmer groups or more needy farmers. The case study illustrates how the international transfer of technology is complex. Success is highly dependent upon a country's scientific and agricultural institutions, including farmer groups.

**Relevance:** Medium.

**Keywords:** Cash crops, food production, cowpeas, diversification, institutions, Peanut Basin.

- [28] Bingen, R. James; Crawford, Eric W. (1988) **Agricultural research and planning in Senegal: An interim report (1981 - 1987)**. East Lansing, Michigan: Michigan State University, Dept. of Agricultural Economics. August. 60 p (text) + ca. 15 p (annexes and bibliography).

**Objectives:** To present a contract completion report of the Senegal Agricultural Research and Planning Project.

**Time Period:** 1981 to 1987.

**Methodology:** Report of principal contract activities and accomplishments based on semi-annual and annual reports, consultant mission reports and other contract documents.

**Findings/Recommendations:** Reviews contract accomplishments in the areas of long- and short-term training, in-country workshops, computer support and documentation, as well as activities and accomplishments in production systems and macro-economic research. MSU managed 21 M.Sc. programs at 11 U.S. universities covering 7 academic fields; 2 certificate programs for senior technicians and in-country English language training. An applied social science library and documentation center was established in the PSR Department and a core social science collection of 100 titles provided to 4 ISRA documentation units. Help was provided to build the capacity for in-country data analysis and the timely preparation and publication of scientific reports. In addition to support for the PSR Department, MSU was the principal source of technical assistance to establish ISRA's Bureau of Macro-Economic Analysis. Recommendations made in the areas of improved project design (especially continuity between project design and implementation), long-term training (in-country screening interviews and early starts to training programs), technical assistance (with an emphasis on those with previous Francophone Africa experience and a commitment to working closely with Senegalese researchers) and the importance of an experienced on-campus support staff.

**Relevance:** High for lessons applicable to continued work with ISRA.

**Keywords:** Agricultural research, research, donor assistance, institutions, farming system, macroeconomic policy, training.

- [29] Bingen, R. James; Faye, Jacques. (1987) **Agricultural research and extension in Francophone West Africa: The Senegal experience.** MSU International Development Reprint Paper No. 13. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 23 p.

**Objectives:** To examine the relationships between ISRA and two regional development agencies as a case of institutional change.

**Time Period:** 1986.

**Methodology:** Review of documentation from ISRA and regional development agencies; discussions with relevant personnel.

**Findings/Recommendations:** Contractual research obligations often run contrary to longer term research objectives; research and extension liaison units must be funded in order to work and should not be seen as a substitute for efforts to establish more direct contact between researchers and farmers.

**Relevance:** Medium.

**Comments:** Background to relationships between ISRA and three regional development agencies. French version, "La liaison recherche-développement en Afrique de l'Ouest Francophone: L'expérience du Sénégal," Reprint Paper No. 13F, 1987.

**Keywords:** Agricultural research, extension, farmer organizations, RDAs, Fleuve, Casamance.

- [30] Bingen, R. James. (1987) **An orientation to production systems research in Senegal.** MSU International Development Reprint Paper No. 16. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 88 p.

**Objectives:** To report on the results of a workshop for introducing the principles and practices of farming systems research to ISRA researchers and field personnel from RDAs.

**Time Period:** 1984.

**Methodology:** Report of workshop planning and activities.

**Findings/Recommendations:** Specific lessons and recommendations made concerning workshop planning, organization and logistics, including the selection and use of discussion and working group themes.

**Relevance:** High.

**Comments:** Especially for planning comparable in-service workshops that involve both research and extension and that rely upon both Anglophone and Francophone scientists. French version, "Orientation de la recherche sur les systèmes de production au Sénégal," Reprint Paper No. 16F, 1987.

**Keywords:** Agricultural research, RDAs, education.

- [31] Bloch, Marianne N. (1987) **The role of women in the Bakel Small Irrigated Perimeters.** Bakel Discussion Paper Series No. 3. Madison, WI: University of Wisconsin-Madison, Land Tenure Center. July. 14 p.

**Objectives:** To obtain information about women's roles; to generate research and policy questions for later investigation.

**Time Period:** January, 1987.

**Methodology:** Visits to 14 irrigated perimeters; half-day long interviews with village representatives; 3 Soninké and 10 Toucouleur villages.

**Data Collected:** Traditional work patterns of women and men; women's involvement in agriculture versus other economic activities; women's rights and responsibilities towards the family; traditional use of and decision-making power over produce from their fields; land tenure; and perceptions of problems related to the introduction of irrigated perimeters.

**Findings/Recommendations:** In both ethnic groups, women did not have long-term secure rights to land on the irrigated perimeters. Women generally have smaller parcels of irrigated land than do men. Executive officers of the irrigated perimeter groups were men. Decisions predominantly made by males. While women are excluded from many aspects of the perimeters' functioning, they also bear fewer costs involved in keeping the perimeter functioning. Women in Soninké villages are much more involved in the irrigated perimeters than are Toucouleur women.

**Recommendation:** future research should expand interviews to include more Soninké villages.

**Relevance:** Medium.

**Keywords:** Women, Fleuve, irrigation, land tenure.

- [32] Bloch, Peter C. (1989) **Land tenure in the Bakel Small Irrigated Perimeters: Final report on a research program.** Draft for Discussion. Madison, WI: University of Wisconsin-Madison, Land Tenure Center. July. 45 p.

**Objectives:** To investigate hypotheses: 1) access to irrigated land may change over time, 2) social stratification may determine access to irrigated land, 3) women's access to land may be affected by the creation of irrigated perimeters, 4) the success of irrigation may be influenced by constraints to access.

**Time Period:** January to December, 1988.

**Methodology:** Surveys.

**Findings/Recommendations:** Principal issues discussed: 1) importance of tenure security, 2) choice of appropriate holding size, 3) care with which participant selection should be made, 4) necessity to maximize farmer participation in design and management of irrigation projects. Soninké have complex landholding arrangements largely based on traditional castes. Toucouleur have no tradition of cultivating in common and caste system is not strong: men grow basic grains; women's primary productive economic role is livestock, esp. milk production. Bakel Small Irrigated Perimeters project did not respect traditional caste distinctions and land rights patterns. SAED imposed equal access regardless of caste or gender in return for its assistance in developing the perimeter. There may be barriers to land transfers which constrain productive use of existing perimeters. Traditional elites have not been entirely successful in retaining control of irrigated land. Impact of irrigation of women's access to land has been mixed: women have lost access to land which they farmed traditionally; in some

instances, land has been set aside for women to use for irrigation. Farmers have been most interested in irrigation during the periodic droughts, and have reduced their participation to a minimum during rainy years.

**Relevance:** Low.

**Comments:** Not a rigorous summary of subject. Discussion of social organization of perimeters is of some value. Pages 14-20 summarize 14 discussion papers and Miller study on Bakel land tenure issues.

**Keywords:** Land tenure, irrigation, women, local government, Fleuve.

- [33] Bloch, Peter C. (1988) **An egalitarian development project in a stratified society: Who ends up with the land?** Bakel Discussion Paper Series No. 6. Madison, WI: University of Wisconsin-Madison, Land Tenure Center. April. 18 p.

**Objectives:** To explore the dynamics of land tenure on small-scale irrigated perimeters in eastern Senegal.

**Time Period:** January and August, 1987.

**Methodology:** Key informant interviews and parcel censuses with 15 of 19 irrigation groups in 13 Soninké villages; non random sample does not permit generalization.

**Findings/Recommendations:** Lower-caste people and women hold fewer irrigated parcels than their equitable share; it is not sufficient to provide equitable land distribution in project design because that distribution may change over time if powerful individuals or groups see interest in changing it; alternatively, powerful individuals or groups may challenge the project if their privileged socioeconomic status is called into question.

**Relevance:** Medium.

**Comments:** Relevant for Bakel area or other areas with strong caste systems intact.

First year's results of three-year research program.

**Keywords:** Land tenure, irrigation, Fleuve.

- [34] Boiral, P.; Lanteri, J.-F.; Olivier de Sardan, J.-P. (sous la direction de). (1985) **Paysans, experts et chercheurs en Afrique noire: Sciences sociales et développement rural.** Paris: CIFACE/Karthala. 224 p.

**Relevance:** Low.

**Comments:** Includes material on peanuts and fishing sectors in Senegal by Yung, Chauveau, and Diouf (cf.).

**Keywords:** Peanuts, fish, RDAs.

- [35] Bollinger, Daniel. (1987) **Les aspects marketing d'une opération de régulation céréalière au Sénégal.** Boulogne, France: IDET-CEGOS S.A.; Ministère Français de la Coopération. April. 23 p.

**Objectives:** To identify and propose methods of alleviating constraints on marketing processed local cereals in Dakar, and to describe a proposed market test for processed millet during Ramadan.

**Methodology:** Interviews with industry and parastatal representatives; marketing margin analysis.

**Data Collected:** Secondary data on marketing margins for rice and millet, monthly sales volume for processed maize, packaging costs.

**Findings/Recommendations:** Processed maize and millet need to be subsidized to regain market share from rice; consumer preferences for different forms of processed cereal are poorly understood; and promotion efforts should be focussed from March to September when supplies from extended family members in rural areas are low.

**Relevance:** Medium.

**Comments:** The issue is important but this report adds little apart from marketing margin analyses which show that processed cereals cannot compete with rice unless the raw material is subsidized.

**Keywords:** Consumption, processing, price policy, cereals imports.

- [36] Bonnefond, P.; Couty, P. (1988) *Sénégal: Passé et avenir d'une crise agricole. Revue Tiers-Monde*. Vol. XXIX, No. 114: 319-340.

**Objectives:** Description of the present agricultural situation in Senegal and account of historical developments that led to the crisis in agriculture in Senegal.

**Methodology:** Descriptive analysis on the basis of secondary statistical data and future projections.

**Data Collected:** Groundnut production, prices for groundnut products, cultivated area, revenues, cereals production, debt, interest payments.

**Findings/Recommendations:** Policies toward Senegal do not sufficiently consider problems of ecological deterioration, rapid population growth, unemployment, drastic inequities, and crushing debt. Creditors must bear the financial consequences of their mistakes. Reduction of interest rates and rescheduling would allow substantial financial transfers which are essential for improvements in production. Revenues from peanut production have gone down substantially and are insufficient to finance cereals imports. Deficit in cereals production is partly due to discrepancy between cereals produced (millet, sorghum) and cereals demanded, especially in urban areas (rice, wheat). Rice production in Senegal is not competitive and protection of rice production would not benefit producers. Agricultural production needs to be reorganized, cost-reducing technology developed, marketing improved, and producers organized.

**Relevance:** Medium.

**Comments:** Worthwhile because it gives a different viewpoint and an unorthodox interpretation of data.

**Keywords:** Peanuts, production, income, millet, cereals, rice, debt, structural adjustment.

- [37] Bonnefond, P.; Loquay A. (1985) *Aspects socio-économiques de la riziculture en basse et moyenne Casamance*. May. 12 p (conclusions only).

**Objectives:** Conclusions from study of socio-economic aspects of rice cultivation in the lower and middle Casamance region.



**Methodology:** Not indicated in the conclusions.

**Data Collected:** Various data (rainfall, rice production, prices, migration, revenues, cost of technology) are reproduced from the complete report.

**Findings/Recommendations:** Aquatic and rainfed rice production is decreasing relative to peanut production with competition between different types of rice production and cereals. There is practically no marketing of rice. Prospects for development of rice production depend on climate conditions, persistent lack of rainfall. Migratory movements are affected by drought; the agricultural labor force in rural areas is negatively affected. Farmers in the Casamance have some money income (especially from peanut production). The production unit is usually made up of individuals who eat and live together, and can include several families. Labor is an important factor of production and peanut production is preferred to rice production because of lower labor requirements. New technical recommendations only minimally useful; hybrid seed varieties might not be better suited than traditional varieties; it might not be in the farmer's interest to use direct seeding (vs. transplanting); there is a large demand for animal traction. Motorization funded by loans from development organizations is not a satisfactory solution. The high number of field staff has not produced results. Dikes are an appropriate hydro-agricultural technology.

**Relevance:** High.

**Keywords:** Water management, production, donor assistance, rural development, rural incomes, agricultural research, seed, fertilizer, equipment.

- [38] Bossard, Laurent; Gabas, Jean-Jacques (eds.). (1989) *Agricultures sahéliennes et marchés mondiaux. Etat des réflexions.* Sahel D(89)324. Paris: OECD (Club du Sahel); CILSS. Avril. 80 p.

**Objectives:** To present research and policy notes on the linkages between the world cereal markets and Sahelian agriculture.

**Methodology:** More than 40 studies/reports are analyzed/summarized. Six categories of research/policy discussion are annotated: 1) regional protection and regulation, 2) reducing food dependency, 3) national policies in regional context, 4) exchanges between West African nations, 5) food aid: a regional approach to food security, 6) locally produced cereals in the market.

**Findings/Recommendations:** The interdependence of West African economies has developed through informal trade channels. Measures to protect local agriculture are devaluation, import taxes and quotas. The challenge (for the research/policy community) is to identify a way that will permit governments to balance the negative consequences of imposing trade barriers to imports. Increased consumption of (imported) rice and wheat is a reversible trend and import substitution with local cereals is attainable. Recommendations: Food aid should be managed and coordinated regionally among the various donors; a "clearinghouse" should be established. A system of food aid loans should be developed that will be "reimbursable" through shipments of surpluses to neighboring deficit states. West African states should cooperate regionally to develop coherent food policies (especially with respect to imports).

**Relevance:** High.

**Comments:** Annotations of timely, perhaps seminal articles on food policy in West Africa. Six categories of research/policy discussion are annotated: 1) regional protection and regulation, 2) reducing food dependency, 3) national policies in regional context, 4) exchanges between West African nations, 5) food aid: a regional approach to food security, 6) locally produced cereals in the market.

**Keywords:** Agricultural policy, regulation, imports, market prospects, price policy, trade policy, taxes/tariffs, donor assistance, food aid, food security, bibliography.

- [39] Boutillier, Jean-Louis; Schmitz, Jean. (1987) **Gestion traditionnelle des terres (système de décrue/système pluvial) et transition vers l'irrigation. Le cas de la vallée du Sénégal.** *Cahiers des Sciences Humaines*. Vol. 23, No. 3-4: 533-554.

**Objectives:** To analyze the social structures of production systems and land tenure, and intraregional variations. To examine the transition from traditional rainfed and flood recession farming systems, which accommodated fishing and livestock-raising populations, to new system based on irrigation. To identify radical social changes brought about by reallocation of water and land which have accompanied irrigation.

**Time Period:** Historical background through 1975-85, the period of first phase of irrigation program.

**Methodology:** Anthropological approach: quite detailed description of traditional social groups and agricultural system and of changes in agricultural system and landholding resulting from development of irrigation.

**Data Collected:** Secondary studies and field observation, statistics on statutory groups and their landholdings.

**Findings/Recommendations:** Construction of dams and introduction of irrigated agriculture in Senegal River Valley has produced upheavals in traditional social and agricultural systems. Complex traditional system allowed three different population groups to use river valley areas at different periods for system of rainfed and flood recession cultivation, fishing, and livestock raising. Irrigated agriculture conflicts with timing and sequencing of these production activities; herdsman are particularly disadvantaged. Traditional land tenure arrangements are being radically altered by government's egalitarian apportionment of irrigated land. Traditionally lowest status groups are gaining access to irrigated land. Authors foresee increase in social dislocation and especially conflicts over land tenure and use as size of irrigated areas is enlarged.

**Relevance:** High.

**Keywords:** Land tenure, irrigation, farming system, Fleuve.

- [40] Braverman, Avishay; Hammer, Jeffrey S. (1986) **Multimarket analysis of agricultural pricing policies in Senegal.** In *Agricultural household models: Extensions, applications, and policy*, eds. Singh, Inderjit; Squire, Lyn; Strauss, John, 233-54. Baltimore, MD: Johns Hopkins.

**Objectives:** To present an approach to analyzing effects of agricultural pricing in LDCs.

**Time Period:** Simulations based on policies and prices for 1981-82; most coefficients based on data from 1976-80.

**Methodology:** Simulation of short- to medium-run effects of price policies on various outcomes. Deterministic econometric model based on theory of the agricultural household, incorporating demand for 4 goods (rice, groundnut oil, millet, maize), and supply of 5 goods (groundnuts, rice, cotton, millet, maize). Four regions are specified, of which 3 produce and consume, and 1 (Dakar) consumes only. The translog restricted profit function is used to model production, given a fixed supply of land and labor, and unlimited variable inputs (fertilizer, "other"). Demand functions are specified using the Almost Ideal Demand System. All allocation decisions are based on profit or utility maximization. Market-clearing conditions specify that world demand for groundnuts and cotton is perfectly elastic, that any shortfalls of rice are imported, and that millet and maize prices vary endogenously to equate supply and demand in local markets.

**Data Collected:** Model generates supply of the 5 crops, real incomes in the 4 zones, demand for the 4 consumer goods, net agricultural export earnings, the GOS deficit in agriculture, and rice imports.

**Findings/Recommendations:** Price policies simulated include decline in groundnut producer price, increase in cotton and rice producer prices, increase in fertilizer price, free trade at 1982 prices, devaluation, increase in rice consumer price, and various combinations of the above. Value of multimarket (vs. single market) analysis illustrated for case of 15% decline in groundnut producer price. In single market case, groundnut supply, real incomes in producing zones, net agricultural export earnings, and government deficit all decline. In contrast multimarket analysis shows that production of other crops increases (they become more profitable relative to groundnuts), real incomes in Dakar and Fleuve regions increase (increased output of millet and maize lowers price to consumers), and agricultural export earnings fall less sharply (partly because rice imports decline). A key finding is that millet production can be stimulated by raising the rice producer price, the output increase being directly related to the cross-price elasticity of demand between rice and millet. However, additional millet output comes at expense of groundnut production (the major export earner). Real incomes nationwide fall substantially, regardless of assumptions about demand structure.

**Relevance:** Medium.

**Comments:** Methodology has many strong points, but authors acknowledge significant data limitations, especially concerning demand parameters. Freud et al. (1988, 1989) contain more recent analysis using second-generation model, slightly better data, and more recent policy scenarios.

**Keywords:** Price policy, model, production, consumption.

[41] Bulteau, P. (1984) *Bilan de la recherche agronomique au Siné-Saloum*. [CIRAD]. 49 p.

**Objectives:** To assess usefulness of past agricultural research for development of Siné-Saloum, and to recommend directions for future research.

**Methodology:** Descriptive analysis of farming system and constraints.

**Data Collected:** Secondary data on population, climate, crop areas, livestock populations, past research.

**Findings/Recommendations:** General recommendations for short- and medium-term research themes relevant to identified constraints to agricultural production in Sine-Saloum.

**Relevance:** Low.

**Comments:** An interim report by an interdisciplinary team; analysis of constraints represents the conventional wisdom while recommendations for future research are neither detailed nor related to institutional capacity.

**Keywords:** Peanut Basin, agricultural research.

- [42] Caisse Centrale. (1989) *Sénégal, campagne arachide 88/89, premières estimations*. Dakar: Caisse Centrale de Coopération Economique. Janvier. 8 p.

**Objectives:** Estimates of trade and financial flows in peanut sector for 1988/89 campaign.

**Data Collected:** Variety of data for oil and confectionary peanuts: production, yields, distribution/use of output, processing and marketing volumes and costs, seed prices, and estimated losses.

**Findings/Recommendations:** Low yields (794 kg/ha) resulted from poorly distributed rain and locust attacks. Reduction of producer price to 70 F/kg did not result in large decline in area cultivated (886,147 ha vs. 946,445 ha in 1987/88). Much of the confectionary peanut harvest was downgraded in quality. SONACOS expected to satisfy 85% of domestic oil needs, exporting a surplus of ca. 100,000 t. About 40% of oil peanut production expected to remain outside official channels (30% used as seed, 70% consumed). Losses on oil peanut exports projected at 5-6 b CFAF, offset somewhat by profits on local sales (2 b CFAF). Losses on oil peanut seed projected at 274 m CFAF, using sale prices of 110 and 105 F/kg vs. cost prices of 129 and 115 F/kg (noted to be substantially different from those given in SOFRECO Phase II report).

**Relevance:** High.

**Comments:** Much up-to-date information plus useful chart of sources and uses of peanuts for 1988/89.

**Keywords:** Peanuts, processing, seed, exports, government budget.

- [43] Caisse Centrale de Coopération Economique. (1988) *Rapport d'évaluation du plan triennal semencier sénégalais: Volet arachidier*. Dakar: January. 15 p (text), ca. 30 p (tables and budgets).

**Objectives:** Describe objectives, organization, and projected costs for upcoming 3-year plan (1988-91) for peanut seed program.

**Time Period:** 1987-91.

**Data Collected:** Projected seed prices; seed stocks (for peanuts for oil and consumption); organizational chart for production of seed; detailed budget estimates for implementation of plan.

**Findings/Recommendations:** ISRA and DPCS will produce foundation seed; seed multiplication will be increasingly turned over to farmers' groups and the private sector. Objectives of the plan are to reduce extent and costs of government intervention in seed production and distribution and to promote permanent private sector mechanisms for production, supply, and financing of seed. Government will continue to provide seed multiplication and to maintain seed stocks. Roles of major organizational actors (ISRA, DPCS, SONACOS, SRDRs, CNCAS, and GIEs) are to be redefined. Seed price increases are to reduce deficit of seed program; these are to be balanced by a system for saving seed and the extension of credit to farmers. Institutional actors and their roles are described and budget estimates provided.

**Relevance:** High.

**Keywords:** Peanuts, seed, inputs, private sector, institutions.

- [44] Caisse Centrale de Coopération Economique. (1988) **Rapport d'évaluation du plan triennal semencier: Volet vivrier**. Dakar: Caisse Centrale. Janvier. 32 p (text) + ca. 40 p (annexes).

**Objectives:** To describe the objectives, organization, and projected costs for the 3-year (1988-90) food crop seed plan.

**Methodology:** Report organized into several sections: background, current situation in the seed industry, and objectives and expected results of the seed plan; actions to be carried out by the major implementing agencies; cost estimates and financing plan; plan for forage crop seed; Caisse Centrale financing plan; and annexes. Annex 4 contains a list of crop varieties recommended by ISRA. Crops covered include rice, millet, maize, sorghum, and cowpeas.

**Data Collected:** Projected area cultivated; production targets for base seed and certified seed; and investment, operating costs, and credit requirements for various agencies.

**Findings/Recommendations:** Measures outlined for implementing the seed plan: seed promotion and farmer training, creation of seed producer groups, reorganization of DPCS and RDAs to provide better technical support to seed producers (in anticipation of eventual private sector involvement), and establishment of an umbrella administrative organization to coordinate the efforts of DPCS, ISRA, RDAs, CNCAS, and GIEs. Roles for these agencies are spelled out. DPCS is the lead organization responsible for technical support to base seed ("semences de base") producers, purchase of base seed from GIEs and sale to RDAs, and seed treatment and certification. ISRA is responsible for producing the foundation seed ("semences de prébase") and for establishing a network of demonstration plots. RDAs are to provide technical support to producers of certified (multiplied) seed, furnishing them (on credit) with necessary base seed and inputs, and carrying out information and promotion activities. After 3 years, GIEs are expected to obtain credit directly from CNCAS.

**Relevance:** High.

**Keywords:** Seed, cereals, agricultural research, RDAs, GIEs, credit.

- [45] Caisse Centrale de Coopération Economique. (1987) **Synthèse des évaluations rétrospectives de trois projets de périmètres irrigués en zone Sahélienne financés avec le concours de la Caisse Centrale (Burkina Faso et Sénégal).** *Les Cahiers de la Recherche-Développement*. No. 14-15: 82-90.

**Objectives:** To evaluate the performance of irrigated perimeter projects as a way of improving rural incomes, and to specify conditions for the success of future projects.

**Methodology:** Based on assessment of three irrigated projects, two (Matam and N'Dombo-Thiago) in Senegal.

**Data Collected:** Average number of ares cultivated of various crops in perimeters; irrigated yields; importance of irrigation in local economy.

**Findings/Recommendations:** Successful irrigation projects will depend on exploring alternatives and identifying when economic and institutional as well as technical conditions favor a water development project; many irrigation projects, in retrospect, cannot be justified. Larger projects often rely on inappropriate technology, while organization of smaller ones allows for addressing problems. Projects that require more farmer initiative and demand greater managerial involvement are preferable, and extension services should seek this objective. Identifies some research needs with respect to irrigated agriculture, such as the need for a shorter cycle rice variety.

**Relevance:** Low.

**Comments:** General discussion of irrigated perimeters can be found elsewhere, except for a more detailed discussion of the evolution of SAED. Conclusions somewhat weak and not very useful.

**Keywords:** Irrigation, Fleuve.

- [46] Caisse de Péréquation et de Stabilisation des Prix. (1989) **Etude sur la physionomie actuelle du marché du riz et les perspectives d'avenir du riz entier au Sénégal.** Dakar: Ministère de l'Economie et des Finances; CPSP. Septembre. 86 p.

**Objectives:** In general, to study the possibility of establishing the consumer price of rice; taking into account rice quality; specifically, to identify the cost and sale prices and market shares of different rice grades consumed in Senegal; to evaluate the current policy of rice acquisition and distribution; to propose a system of taxation (péréquation) based on grade which would generate revenues to support protection of local rice; to examine the feasibility of developing the market for higher quality (whole-grain) rice; and to recommend the support (politique de protection) necessary to stimulate such a market.

**Time Period:** Four study phases described, but no timetable given.

**Methodology:** A study coordinator and 4 assistants supervised the collection of data from government agencies and rice importers (2 agents); survey data from rice distributors (public and private, all levels) in the regions of Dakar, Thiès, Diourbel, Kaolack, Tambacounda, Kolda, and Ziguinchor (six teams of two enquêteurs); and computer data analysis (3 persons).

**Data Collected:** Data include volume, costs, prices, and deficits in the SAED rice filière (1981-88); volume marketed by SODAGRI (1985-89); volume and cost of rice

imports by type and origin (1986-89); consumer prices and CPSP sales by region (1984-88); CPSP operating costs (1981-88); various data on operations of SONADIS and CSA (including marketing of food aid), and on the volume and prices of whole-grain rice marketed.

**Findings/Recommendations:** Five chapters: background, description of current rice acquisition and distribution policy, evaluation of current rice acquisition policy, the whole-grain rice market, and proposed system of *péréquation* by rice grade. Some findings and recommendations: CSA intervention has two negative consequences--CSA imports (exempt from duty) cost the government revenue, and CSA sales of whole rice with 35% broken (at the 100% broken price) undercuts the market for whole rice (recommendation: raise the price; have CPSP sell food aid rice received by CSA); CPSP operating costs are still high; establishing prices based on grade is difficult because the *prix de revient* of rice does not vary between importers (recommendation: establish indicative prices by grade); suppression of quotas has hurt wholesaler margins (recommendation: reintroduce quotas); an information and promotion unit for whole rice should be established within CPSP; the various elements of whole-rice import costs should be studied and reference figures published regularly; whole rice is marketed by supermarkets, SONADIS, wholesalers, local markets, and *magasins témoins* (operated by secondary school or university graduates); recommendations for promoting the whole-rice market are not clear, but seem to involve limiting sales of "good quality" broken rice, and reserving part of the market (5,000 tons) for whole rice; actions needed include definition of intermediate grades, legislation permitting unrestricted sale of intermediate grades, an import plan, better accounting at CPSP, and inclusion of PL 480 rice in the *péréquation* system; assuming a retail price of 200 F/kg, a positive *péréquation* could be obtained on whole rice if CPSP sold it to distributors at more than 164 F/kg (their estimate of *prix de revient*); similar calculations are made for intermediate grades (*prix de revient* of 118 for Vietnamese rice), and assuming elimination of the transport subsidy.

**Relevance:** High.

**Comments:** Useful study with considerable information; revised version in preparation.

**Keywords:** Rice, marketing, consumers, taxes/tariffs, subsidies, government budget.

- [47] Calamitsis, E.A.; Hill, J.R.; Franco, R.; Ugolini, P.C.; Kronenberg, R.P.; Brou, J.C. (1987) **Senegal - Recent economic developments.** Mimeo. March. 81 p (text) 43 p (annexes and statistical appendices).

**Objectives:** To provide background information to staff report on 1986 Article IV consultation discussions with Senegal.

**Time Period:** Most statistics cover period 1980-86; a few series start a few years earlier. Narrative covers developments in sectors, policies, etc., since about 1980.

**Methodology:** Compilation of economic data. Summary of developments in Senegal's economy, economic policy, and relevant institutions.

**Data Collected:** Wide variety of statistics from GOS, IMF, IBRD, and industrial organizations on income and production in major sectors, prices, wages, employment,

economic development planning, public finance, money and banking, balance of payments and external debt, exchange and payment system. Description of some important institutional arrangements; e.g., government budgeting system, tax system.

**Relevance:** Medium.

**Comments:** Strictly quantitative approach; no coverage of political or social situation.

**Keywords:** Production, prices, policy, Government budget, structural adjustment, trade.

- [48] Caputo, Vincenzo. (1988) **Savings and credit in the rural areas of the Sahel.** RC(89)02. Paper presented later at the Regional Encounter on Local Level Natural Resources Management in the Sahel, Ségou, Mali, May 22-27, 1989. December. 31 p (text) + 7 p (appendices) + 8 p (bibliography).

**Objectives:** To examine the theoretical rationale for a grass-roots approach to rural finance and self-reliance of rural populations; to criticize the practical implementation of experiments that have failed; to review ongoing initiatives; and to identify common lines for discussion and further experimentation.

**Findings/Recommendations:** Rural Financial Institutions (RFIs) are community structures which exist only in fragmentary form; National Financial Institutions (NFIs) are restricted in rural areas by legal, financial or management limitations. All successful projects are based on the collection of rural savings and rely on RFIs. Management of credit by RFIs is complex and can only be built up gradually. Essential conditions are the strictly mutual character, management capability, the freedom to fix interest rates to reflect costs, precise contracts between RFIs and national banks, and independent management. Creating Federations of RFIs at an early stage is risky; RFIs have to be promoted at the grass-roots, regional and national levels.

**Recommendations:** 1) attach greater importance to the collection of rural savings, 2) fix interest rates that reflect the opportunity cost of capital in RFMs and allow the costs and risks of using financial intermediaries to be covered, 3) use existing institutions (banks, associations, etc.) and refuse to create new structures.

**Relevance:** High; current information on an important subject.

**Comments:** Complete coverage of subject; poses many questions intended to stimulate (re)thinking of agricultural/rural credit programs; presents specific examples of use to credit program planners; bibliography appears to offer thorough review of key rural credit publications for Sahel.

**Keywords:** Credit, debt, institutions, NGOs, RDAs, organizational performance, banking.

- [49] Caswell, Nim. (1985) **Peasants, peanuts and politics: State marketing in Senegal, 1966-80.** In *Marketing Boards in Tropical Africa*, Arhin, Kwame; Hesp, Paul; and van der Laan, Laurens, 79-119. London: KPI Ltd., Routledge and Kegan Paul.

**Objectives:** To examine some of the political factors underlying the failure of ONCAD.

**Time Period:** 1982-1983.

**Methodology:** Field work in Senegal.



**Data Collected:** 1965/66-1980/81: ONCAD purchases and groundnut production; groundnut producer prices; debt repayment; value of ONCAD-marketed groundnuts; CPSP groundnut account 1973-80 and transfers 1971-79.

**Findings/Recommendations:** ONCAD failed to bring 'liberation' of the peasantry or to redirect the agricultural surplus for industrialization through controlled channels; permitted accumulation of substantial personal fortunes; perhaps less corrupt than other African marketing boards; more informed understanding of what went wrong requires more detailed examination of the role of the marabouts as an informal channel of expression for the rural (and urban) poor.

**Relevance:** Low.

**Keywords:** Peanuts, marketing, credit, debt.

- [50] Caveriviere, Monique; Debene, Marc. (1988) *Sénégal: Problématique foncière de la nouvelle politique agricole. Penant.* 98th Year, No. 798: 496-504.

**Objectives:** To examine the applicability and relevance of the 1964 Land Law to realization of objectives under the New Agricultural Policy.

**Time Period:** 1980 - 1986.

**Findings/Recommendations:** With modifications for the Senegal River Valley, the 1964 Land Law should be enforced in order to contribute to the realization of the objectives of the NPA.

**Relevance:** Medium.

**Comments:** See 1988 book by the same authors.

**Keywords:** Land tenure, local government.

- [51] Caverivière, Monique; Débène, Marc. (1988) *Le droit foncier sénégalais. Mondes en devenir--XLIV, Manuels B.-L.--12.* Paris: Berger-Levrault. 316 p.

**Objectives:** A general study in public law concerning land tenure and rights, with a special chapter devoted to land use and rights in the Senegal River Valley.

**Methodology:** Detailed examination of the government's philosophy, legislation and regulations concerning land rights and use.

**Findings/Recommendations:** A comprehensive analysis of the evolution of land law since the landmark 1964 legislation on the "domaine national" and the continuing ambiguity between public or national rights and those of individuals with respect to land ownership and use. Despite the juridical appeal of a national land law, the government should seek to play a regulatory role in adapting land legislation to specific circumstances.

**Relevance:** Medium.

**Comments:** Legalistic; not directly oriented to development questions; given complexity of the writing style would take some digging to extract relevant lessons for agricultural and rural development planning.

**Keywords:** Land tenure, regulation.

- [52] Chambas, Gérard. (1983) **Rural income distribution in Senegal: Changes and indicators.** Discussion Paper No. 106. Ann Arbor, MI: The University of Michigan, Center for Research on Economic Development. December. 48 p.

**Objectives:** To examine the degree of rural income inequality in Senegal and its determinants, and to analyze relative income concentration and factors responsible for this concentration.

**Time Period:** Early 1980s.

**Methodology:** Statistical and econometric analysis on the basis of secondary data (Center for Research on Economic Development, USAID, Ministère du Plan).

**Data Collected:** Production volume of major crops, income data broken down by income groups, share of population in each group and region, Gini index, household incomes, time series data (use of secondary data).

**Findings/Recommendations:** In years of abundant agricultural production, income disparities between regions are reduced. General impression is that rural incomes are quite evenly distributed but village data indicates major inequalities (from differences in land areas farmed and yields obtained). Producer price increases caused increase in the share of income going to the poorest and wealthiest regions at the expense of average income regions. A policy of price incentives can reduce regional inequality through its effect on production volume.

**Relevance:** Medium.

**Comments:** Some debatable hypotheses were adopted affecting the validity of estimates.

**Keywords:** Rural incomes, rural incomes, price policy, production, prices, agricultural policy, rural development.

- [53] Chantreau, J. (1983) **Sélection d'hybrides de sorgho pour le centre-nord et le nord du Sénégal.** *L'Agronomie Tropicale*. Vol. 38, No. 4: 295-302.

**Objectives:** To examine the selection of hybrid sorghum for the central-northern and northern regions of Senegal; selection is made based on analysis of heterosis, which relates to three different sterile male strains, in order to create sorghum varieties adapted to irrigated and rainfed cultivation in a Sahelian climate.

**Time Period:** Results of research conducted over a period of 25 years.

**Methodology:** Variety trials for hybrid sorghum.

**Data Collected:** Data on yields of different sorghum hybrids.

**Findings/Recommendations:** Hybrids with American female strains showed good results in irrigated cultivation. However, the genetic influence through the African sterile male strain with a local factor explains most of the progress in the development of hybrids, especially for rainfed cultivation. Some problems remain: hybrids are susceptible to lodging, and proper selection is needed under conditions which favor lodging. The use of the better F1 varieties has led to increases in yields; under conditions of low precipitation, these hybrids are more drought resistant than other varieties with fixed material.

**Relevance:** Medium.

**Keywords:** Irrigation, agricultural research, sorghum, technology.

- [54] Charlery de la Masselière, Bernard. (1984) **Culture commerciale, cultures vivrières. La transformation de l'espace de production agraire du Kayor central et septentrional (Sénégal).** In *Le développement rural en questions*, Mémoires ORSTOM No. 106, Ch. 13. ORSTOM. 29 p.

**Objectives:** Look at the transformation in the relationship between cash crops and food crops.

**Time Period:** Data from 1975-1977.

**Methodology:** Descriptive analysis on the basis of data from 1975-1977.

**Data Collected:** Underlying data not presented systematically.

**Findings/Recommendations:** Relationship between cash crops and food crops cannot be interpreted in terms of competition between cultivated areas alone. The simple pattern according to which peanut replaces millet wherever soils allow it cannot account for the various agrarian structures or the dynamics and constraints which govern cultivation of crops. The fatalistic and naturalistic pattern in farmers' lives leads to lack of appreciation of the country's systems of production, their transformation and their ability to incorporate agricultural requirements of the State. Agrarian space has to be analyzed in terms of shape, structure and function. Current production imbalances are of a functional and spatial nature. The necessary transition in the organization of production from the local to the national level prevents a regional or local solution.

**Relevance:** Medium.

**Keywords:** Peanuts, millet, cash crops, food production, regulation, land tenure, productivity.

- [55] Chauveau, J. P. (1985) **Mise en valeur coloniale et développement: Perspective historique sur deux exemples ouest-africains.** In *Paysans, experts et chercheurs en Afrique noire*, eds. Boiral et al., 143-66.

**Findings/Recommendations:** Traditional pirogue-based fishing quite efficient, given motorization; GOS should not attempt to interfere or introduce large-scale projects.

**Relevance:** Low.

**Comments:** Cf. section entitled "La pêche maritime artisanale sénégalaise: la redécouverte d'un développement 'informel'," (pp. 155-63).

**Keywords:** Fish, cooperatives.

- [56] CILSS; Institut du Sahel, RESADOC. (1989) **Bibliographie sur la recherche agricole au Sahel. No. 5: La protection des végétaux: le mil, le sorgho, le maïs et le niébé.** Bamako, Mali: CILSS, Institut du Sahel, RESADOC. Mars. 43 p.

**Objectives:** Diffusion of information on Sahelian agricultural research.

**Time Period:** Citations of works dated 1966-87.

**Data Collected:** 109 references indexed by author, institution, subject.

**Relevance:** Low.

**Keywords:** Bibliography, agricultural research, pest control, millet, sorghum, maize, cowpeas, technology.

- [57] CILSS; Institut du Sahel, RESADOC. (1988a) **Bibliographie sur la recherche agricole au Sahel. No. 1: Le mil: Amélioration variétale.** Bamako, Mali: CILSS, Institut du Sahel, RESADOC. Mai. 41 p.

**Objectives:** Diffusion of information on Sahelian agricultural research.

**Time Period:** Citations of works dated 1966-87.

**Data Collected:** 109 references, indexed by subject, author, institution.

**Relevance:** Low.

**Comments:** Not all keywords attached to references appear in subject index.

**Keywords:** Bibliography, agricultural research, millet, technology.

- [58] CILSS; Institut du Sahel. (1988b) **Bibliographie sur la recherche agricole au Sahel. No. 2: Le sorgho: amélioration variétale.** Bamako, Mali: CILSS, Institut du Sahel, RESADOC. Juillet. 47 p.

**Objectives:** Diffusion of information on Sahelian agricultural research.

**Time Period:** Citations of works dated 1971-87.

**Data Collected:** 122 references indexed by subject, author, institution, geographical area.

**Relevance:** Low.

**Comments:** Not all keywords attached to citations appear in subject index.

**Keywords:** Bibliography, agricultural research, sorghum, technology.

- [59] CILSS; Institut du Sahel, RESADOC. (1988c) **Bibliographie sur la recherche agricole au Sahel. No. 3: Le maïs: amélioration variétale.** Bamako, Mali: CILSS, Institut du Sahel, RESADOC. Juillet. 42 p.

**Objectives:** Diffusion of information on Sahelian agricultural research.

**Time Period:** Citation of works dated 1972-86.

**Data Collected:** 108 references indexed by subject, author, institution.

**Relevance:** Low.

**Comments:** Not all keywords attached to references appear in subject index.

**Keywords:** Bibliography, agricultural research, maize, technology.

- [60] CILSS; Institut du Sahel, RESADOC. (1988d) **Bibliographie sur la recherche agricole au Sahel. No. 4: Le niébé: amélioration variétale.** Bamako, Mali: CILSS, Institut du Sahel, RESADOC. Juillet. 63 p.

**Objectives:** Diffusion of information on Sahelian agricultural research.

**Time Period:** Citations of works dated 1971-87.

**Data Collected:** 154 references, indexed by subject, institution, author and geographic area.

**Relevance:** Low.

**Comments:** Not all keywords attached to citations appear in subject index.  
**Keywords:** Bibliography, agricultural research, cowpeas, technology.

- [61] Cissé, Limamoulaye. (1988) **Influence d'apports de matière organique sur la culture de mil et d'arachide sur un sol sableux du Nord Sénégal. II.--Développement des plantes et mobilisations minérales.** *Agronomie*. Vol. 8, No. 5: 411-417.

**Findings/Recommendations:** For millet, marked effects on number of tillers and growth rate were detectable from the early stage of the crop. Nutrient uptake rates were 2 to 3 times higher during the period 20-60 days after germination in the treatment with organic manure than in the control. For groundnut, similar effects were noted but at a later stage, starting from mid-cycle. Organic manure may increase the nutrient and water uptake capacity of the root system. Better understanding of the process involved may help to optimize organic manure application.

**Relevance:** Low.

**Comments:** Technical paper of some interest re: soil degradation problem.

**Keywords:** Soil quality, millet, peanuts.

- [62] Cissokho, Mamadou. (1987/1988) **Rapport annuel 1987/1988.** Thiès: Association Internationale Six "S", Coordination Nationale du Sénégal. 68 p.

**Objectives:** To describe the 3 member associations and the 7 farmer organizations which are being supported.

**Time Period:** 1987/1988.

**Methodology:** Descriptive analysis and data.

**Data Collected:** Data on households, population, financial situation of association, cultivated area, yields, investments, production. (Data provided by the associations.).

**Findings/Recommendations:** Farmer organizations face certain challenges due to government policy decisions (elimination of agricultural subsidies, liberalization of cereals markets, promotion and recognition of GIEs, facilitation of farmers' credit through CNCA's, restructuring of rural agencies). Certain actions were proposed (structuring of GIE's, savings incentives for credit, loans for product marketing, creation of a transportation program) to help associations become economically viable and autonomous.

**Relevance:** Medium.

**Keywords:** Farmer organizations, cooperatives, credit, production, rural development, organizational performance, GIEs.

- [63] Commander, Simon; Ndoye, Ousseynou; Ouédraogo, Ismaël. (1989) **Senegal 1979-1988.** In *Structural adjustment and agriculture. Theory and practice in Africa and Latin America*, ed. Commander, Simon, 145-174. London: Overseas Development Institute.

**Objectives:** To describe the development and structural adjustment process in Senegal.

**Time Period:** Study covers 1979-1988.

**Methodology:** Descriptive analysis on the basis of official statistics.

**Data Collected:** Secondary data on: per capita income 1970-1983, current account deficit and trade balance 1979-1986, financial effects of peanut production 1980-1984, determinants of peanut marketed output, producer prices for agricultural output 1971-1986, peanut producer prices as share of unit export prices and international prices 1970-1985/86, farm budget for peanuts, millet, maize, rice, cotton, per capita consumption of cereals, consumer protection coefficient for cereals, agricultural technology.

**Findings/Recommendations:** Adjustment program led to improvements in most targeted areas; fiscal deficit as a share of GNP decreased; current account deficit closed somewhat. Limitations of IMF criteria: public expenditure reduction was relatively arbitrary, sectoral distribution of expenditure remained unmodified, and revenue performance remained weak, which led to increased external borrowing. There is a net outflow of resources to IMF; debt servicing reduced through rescheduling. No improvement in tradables and overall rate of economic growth. Lack of creditworthiness in commercial markets, and access to heavily concessional credit is restricted. More program than project lending, financing consumption rather than investment. Gross inefficiencies and high budgetary costs of state or parapublic interventions in agriculture. Merely emphasizing reductions in budgetary transfers to agriculture risks ignoring development of adequate longer-term strategy. Productivity at best remained constant. Output of peanuts decreased; relative returns favor them. However, farm households place emphasis on share of cereals and self-sufficiency. Positive welfare implications from producer price increases have been exaggerated. Productivity-raising measures are important but difficult to achieve. Agricultural research directed mainly to rice and cotton. Regional research failed to reduce unit production costs for millet and sorghum, with greater potential for cowpeas, rice and maize. For this to occur, higher levels of inputs are needed but benefit-cost ratios show limited use. Emphasis on financial stabilization yielded ambiguous results.

**Relevance:** High.

**Keywords:** Peanuts, budgets, cereals, cotton, technology, prices, macroeconomic policy, credit, fertilizer, inputs, government budget, income, productivity, RDAs, structural adjustment, rural incomes, agricultural research, subsidies, price policy.

- [64] Commissariat à la Sécurité Alimentaire (CSA). (1988) **Rapport d'Activité, 1987**. Dakar: Ministère du Développement Rural, Commissariat à la Sécurité Alimentaire. April. 51 p (text) + 15 p (annexes).

**Objectives:** Review of role of CSA, major activities during the 1986/87 campaign, and major short- and long-term objectives and proposed strategies for future CSA intervention.

**Methodology:** Descriptive analysis based on compilation of official data and CSA internal data.

**Data Collected:** CSA budgets, CSA cereals transactions, cereals production and prices, food aid received by CSA, CSA storage capacity.

**Findings/Recommendations:** CSA has an important role to play in the stabilization of local cereals markets and in the establishment of an information system on prices.

Many of CSA's activities are in addition to the activities which CSA was officially mandated to undertake and should be included in an official statute. CSA's intervention in price stabilization in local markets is feasible only under certain conditions, for example after a drought year. In the case of two or three good seasons, CSA can help stabilize prices with the necessary financial means, but would be operating at an economic loss. This has implications for strategies for future intervention. Concerning the system of information on pricing, CSA's objectives are to establish a permanent and reliable system for transmitting information on cereals prices to CSA headquarters, evaluating and publishing the information in report form, and disseminating the information to interested services. This is essential data which is currently not being collected and distributed in any systematic manner. The CSA system is still in the trial stage.

**Relevance:** Medium.

**Comments:** Does not contain any consolidated data but provides a good overview of the CSA.

**Keywords:** Food security, marketing, prices, organizational performance.

- [65] Commissariat à la Sécurité Alimentaire. (1984) **Etude de factibilité pour l'équipement des magasins de stockage**. Dakar: Ministère du Développement Rural. November. 149 p.

**Objectives:** To evaluate the needs for improving and renovating the grain storage facilities managed by the CSA.

**Time Period:** 1983-84 (?).

**Methodology:** Visits to all storage facilities and discussions with relevant government officials.

**Data Collected:** Secondary data and analysis of cereal supply and demand; evaluation of storage and handling facilities.

**Findings/Recommendations:** Improvements recommended to some physical facilities, and to cereals handling and packaging; proposed project to improve storage, with financial and economic analysis of project.

**Relevance:** Medium.

**Comments:** Report financed by the Federal Republic of Germany and prepared by Agroprogress GMBH.

**Keywords:** Storage, price policy, cereals prices, processing.

- [66] Compagnie Française pour le Développement des Fibres Textiles (CFDT). (1985) **Etude des rizeries de la SAED au Sénégal et des modalités de leur transfert éventuel au secteur privé**. Paris: CFDT; Ministère des Relations Extérieures, Coopération et Développement. Octobre. 47 p (text) + ca. 60 p (appendices).

**Objectives:** To determine the minimum conditions for profitability of a private sector rice processing plant in the Fleuve; to examine the extent to which those conditions are compatible with the national development objectives for the rice subsector.

**Methodology:** Analyzed paddy production (volume and quality) and market for paddy (quantity, condition, and marketing channels).

**Findings/Recommendations:** Gross paddy production in the Fleuve has increased as hectares planted and harvested have increased and yields have improved. The capacity of Ross-Bethio processing mill is 15,000 tons of paddy per year but could be increased to 25,000 tons/paddy per year by adopting 6-day (instead of 5) work week, or by operating 11 months (instead of 10). The Richard-Toll plant can process 24,000 tons of paddy per year but could process 30,000 tons of paddy per year at maximum capacity. Hand dehulling machines help villages increase their levels of food self-sufficiency, but the margin of profit is too small, especially given current price structures. They also "waste" rice through inefficient conversion of paddy into consumable rice (a 12% loss in the production of marketable rice compared to industrial processing). Recommendations: for private sector rice processing to succeed, withdraw the SAED monopoly on purchasing rice (in effect since 1981); private operators would need to contract with producers to provide bonuses for greater volume and better quality of deliveries, and hire agents to buy rice in villages; the rice processing mills at Ross-Bethio and Richard-Toll need to be "tuned up" to operate at profitable margins, which depend on price of rice (to the producer, to the consumer).

**Relevance:** High.

**Comments:** Authors approached the study from the perspective of a private sector investor assessing rice processing in the Fleuve; appendices provide detailed and well-supported agronomic, industrial, managerial (maintenance and management), and financial analyses and recommendations for improving quality and quantity of rice production; no bibliography in copy annotated; evaluation of electricity generation by combustion of rice wastes is flawed in that it did not account for externalities.

**Keywords:** Rice, processing, marketing, private sector, price policy.

[67] Conac, Gérard (ed.). (1984) *Les grands services publics dans les états francophones d'Afrique noire*. Paris: Economica. 412 p.

**Objectives:** To provide an overview of empirical research on the administration of development, and some reflections on the functioning of African administrations in their different social, political, historical, and juridical contexts.

**Methodology:** Individual articles use various approaches; most are sociological in orientation and synthesize published studies. Some are short summaries of conditions common to the countries studied; some devote sections to individual countries. Some provide bibliographies of relevant publications.

**Findings/Recommendations:** Synthesis studies of general problems confronting African administrations, and studies of specific bureaucracies and institutions, including diplomatic service, defense, police, economic and financial services, monetary institutions, fiscal law and protection of investments, public enterprises, agricultural services, structure and organization of industry, postal and telecommunications services, public service and urbanism, public education, social services, and public transport. Specific studies highlight the central role of administrators in the implementation of development policies, and the difficulties they face in identifying with the interests and aspirations of populations which are mostly rural and resistant



to bureaucratic modes of operation. Common problems have their origins in the conditions of the formation of administrative machinery, the multiplicity and weight of tasks assigned to administrators, the nature of the political regimes, and the difficulties of communication between bureaucrats and the rest of the population.

**Relevance:** Low.

**Comments:** No index. Searching for information specifically on Senegal would be difficult in many of the articles.

**Keywords:** Government. institutions, organizational performance.

- [68] Coulibaly, Dramane; Egg, Johny; Mettetal, Gilles. (1988) **Etude inventaire des mesures de maîtrise des échanges extérieurs céréalières des pays d'Afrique de l'Ouest du Cameroun et du Tchad. Dossier No. 3: Etudes de cas: Gambie - Sénégal - Mauritanie - Mali.** Paris: Ministère Français de la Coopération; Club du Sahel; IRAM; INRA-ESR. November. 98 p.

**Objectives:** To report on a field study of trade measures; to assess the impact of government intervention on the behavior of agents in the cereals sector; and to study how realistic policies are and what factors influence foreign trade.

**Methodology:** Case study and statistical analysis.

**Data Collected:** Data from dossier No. 2.

**Findings/Recommendations:** General findings: Import policies for cereals are very different by country but interaction between countries and trade volume is increasing. Some regional integration is occurring. For policy in each country, knowledge of neighboring countries is necessary. Senegal (pp. 21-38): Senegalese trade policy is very complex and has undergone a number of changes. Conditions of imports and exports of cereals are not well known. Statistical analysis of the official data do not reflect reality. Import ceilings are probably surpassed. Differences in figures between data sources can probably be explained by illegal trade. Maintenance of elevated consumer prices for rice and wheat flour has increased illegal imports from the Gambia and Mauritania. Government intervention such as fixed producer prices and minimum prices have had some contradictory effects.

**Relevance:** High.

**Comments:** Cf. Dossier No. 1 (Vionnet and Barde, 1988); Dossier No. 2 (Harre and Mettetal, 1988).

**Keywords:** Rice, wheat, trade policy, taxes/tariffs, price policy, cereals imports, cereals exports.

- [69] Courcel, Michel. (1988) **The private sector in Senegal.** Sahel D(88)316. Orig. Fr. OECD/Club du Sahel. November. 23 p.

**Objectives:** To describe the structure and evolution of Senegal's industrial sector, and to evaluate the impact of the NPI, and to recommend remedial actions.

**Methodology:** Description of private enterprise involvement in industry, trade and services; descriptive analysis of strengths and weaknesses by national group (French, Lebanese, Senegalese).

**Data Collected:** Interviews with private sector entrepreneurs/company management; secondary data on legislation and regulations affecting business, costs of energy, minimum wages.

**Findings/Recommendations:** Secular decline in world market prices for groundnut oil largely responsible for deterioration of the economy since independence. Despite recent reversals in the fisheries subsector due to overfishing, it remains one of the most promising. Low competitiveness due to old infrastructure and overcapacity has resulted in hardly any transfer of jobs from agriculture to industry. The NPI was partially implemented with insufficient analysis, is politically and economically de-stabilizing, and should be temporarily halted and reassessed. Restructuring of the banking sector is a precondition for restructuring of the industrial sector. Given the small domestic market and the lack of any foreseeable comparative advantage in the world market, the possibility of a protected regional market should be studied.

**Relevance:** High.

**Comments:** A hard-nosed, experienced and persuasive challenge to the World Bank/IMF orthodoxy in regard to development of Senegal's industrial sector.

**Keywords:** Industry, exports, liberalization, employment.

- [70] Cournot, Claude; Ly, Hady; Ndoye, Mbaye; Janelle, Robert. (1987) **Etude sur le renforcement des capacités de formation de l'Institut national de développement rural (INDR) de Thiès.** Dakar: Ministère de l'Education Nationale. Avril. 93 p (text) + ca. 20 p (annexes).

**Objectives:** After 6 years of operation, to draw up a balance sheet of the training and management of the INDR and to examine its future prospects and ability to respond to the needs of Senegal's rural economy.

**Time Period:** March-April 1987.

**Methodology:** Discussions with government officers and review of available, relevant documentation concerning the training, administration and financial management of the INDR.

**Data Collected:** Detailed course program of INDR; equipment inventory and projected equipment and budget requirements.

**Findings/Recommendations:** Specific improvements recommended in the areas of (1) INDR organization and its administrative and financial management; (2) program of study and practical professional training; and, (3) staff, equipment, infrastructure and finances.

**Relevance:** High.

**Comments:** For anyone considering investments in higher agricultural education in Senegal.

**Keywords:** Agricultural education, extension.

- [71] Craven, Kathryn. (1982) **Peanuts and rice: Some obstacles to Senegal's drive for food self-sufficiency.** Ph.D. dissertation. Tufts University, Fletcher School of Law and Diplomacy. April. 336 p.

**Objectives:** To examine the Senegalese policy of satisfying national demand for rice through domestic production.

**Time Period:** 1980-1981 (?).

**Methodology:** Examination of different costs of rice production; analysis of self-sufficiency in light of costs of production, processing, and marketing; evaluated in terms of least-cost methods.

**Findings/Recommendations:** Limits on ability to expand handpounding of rice, and official discouragement of small rice hullers, forces increased domestic rice production into large mills. Taxes and subsidies distort the perception of economic costs of producing rice. Suggests encouraging rice production where it is economic, and reducing marketing and milling costs. Need to decide how much rice self-sufficiency is worth in terms of domestic resources.

**Relevance:** Medium; slightly outdated.

**Keywords:** Peanuts, rice, subsidies, trade policy, imports, price policy.

- [72] Crawford, Eric; Kelly, Valerie. (1987) **A field study of fertilizer distribution and use in Senegal, 1984: Summary report.** MSU International Development Reprint Paper No. 8. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 32 p.

**Relevance:** Medium.

**Comments:** Summarizes Crawford et al. (1987). Covers scope and objectives, methodology, and implementation of the study. Bulk of paper devoted to presentation of the major findings and conclusions. French version, "Enquête sur la distribution et l'utilisation de l'engrais au Sénégal, 1984: Résumé analytique," Reprint Paper No. 8F, 1988. Originally published in 1985 by ISRA/BAME; study funded by USAID.

**Keywords:** Fertilizer, fertilizer distribution, Fleuve, Casamance, Peanut Basin, agricultural policy.

- [73] Crawford, Eric; Jolly, Curtis; Kelly, Valerie; Lambrecht, Philippe; Mbaye, Makhona; Gaye, Matar. (1987) **A field study of fertilizer distribution and use in Senegal, 1984: Final report.** MSU International Development Reprint Paper No. 11. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 111 p.

**Objectives:** To describe the structure, participants, and operating procedures of the fertilizer distribution system in three regions--Casamance, Sine-Saloum, and Fleuve; to monitor the distribution of fertilizer during the 1984/85 season; to identify constraints and bottlenecks; to identify the major factors affecting farmer decisions regarding purchase and use of fertilizer, including examination of the "retenue à la source" system; and to propose alternative forms of organization and policies for fertilizer distribution.

**Time Period:** May-October 1984.

**Methodology:** Formal questionnaire survey at four levels: (1) major distribution point (perimeters in the Fleuve and Centres d'Éclatement de Produits Agricoles, CEPA, in the Sine-Saloum and Casamance); (2) local distribution point (secco, Casamance and

Sine-Saloum only); (3) village section or producers group; and (4) individual farmers. Three study zones purposively chosen in the Casamance, six in the Sine-Saloum, and four in the Fleuve. In each zone, the sample of distribution points was selected first, then a sample of farmer organizations dependent on these distribution points, then a sample of farmers belonging to those organizations. All farmers, and in some areas village sections and seccos, were randomly sampled. The overall sample was 11 CEPAs/perimeters, 38 seccos, 105 village sections, 37 producers groups, and 575 farmers.

**Data Collected:** Distribution point: characteristics of the manager, staff and facilities, quantity and timing of fertilizer delivered to and from the distribution point, distribution procedures, problems encountered, and manager's opinions regarding reform of the system. Farmer organization: membership and resources, peanut marketing (except in Fleuve), quantities and timing of inputs received in 1984/85 and distributed to members, problems encountered, and opinions on reform of the system. Farmer: characteristics of the farmer and farm, understanding of the retenue system (except in Fleuve), acquisition and use of fertilizer in 1984, factors affecting fertilizer use, and opinions on reform of the system.

**Findings/Recommendations:** Report presents survey results separately for each region. The retenue system was implemented in the Casamance and Sine-Saloum, while SAED distributed fertilizer in the Fleuve. The most significant and negative feature of fertilizer distribution in 1984 was late deliveries. In response, farmers sold or stored up to 25% of the amount received. In the Casamance and Sine-Saloum, the amount actually received by farmers varied considerably relative to what was due them under the retenue system (55 kg/ton of peanuts sold), largely a result of inadequate records on peanut sales. Amounts delivered were small. In the Casamance and Sine-Saloum, farmers used very low doses (25 and 15 kg/ha, respectively), while the rates in the Fleuve (on irrigated plots) ranged between 100 and 200 kg/ha. The major cause of late deliveries was shortage of financing and/or delayed payment at the top of the distribution system. Lack of clear implementation guidelines was also a factor. Farmers were generally happy with the SAED system, and unhappy with the retenue system. Farmers complained about the fertilizer price increase. Most were not in favor of private trader involvement in fertilizer distribution. Despite limited resources and lack of information, many village sections did a creditable job of obtaining and distributing fertilizer to their members.

**Relevance:** Medium; although retenue system no longer exists, discussion of issues and constraints, activities of farmer organizations, and operation of the SAED system still has some relevance.

**Comments:** French version, "Enquête sur la distribution et l'utilisation de l'engrais au Sénégal, 1984: Rapport final," Reprint Paper No. 11F, 1987. Originally published in 1985 by ISRA/BAME; study funded by USAID.

**Keywords:** Fertilizer, fertilizer distribution, farmer organizations, cooperatives, RDAs, Casamance, Peanut Basin, Fleuve, organizational performance, agricultural policy.

[74] Crookston, R. Kent. (1989) **Maize production in Senegal: Observations & comments.** Report of Sept. 27 to Oct. 11 consultancy to Senegal under USAID Project 685-0957,

Senegal Agricultural Research II. University of Minnesota--St. Paul, Department of Agronomy. October. 12 p.

**Objectives:** To review ISRA maize research trials near Nioro and St. Louis to evaluate progress to date and identify constraints and opportunities; to provide suggestions for new/improved ways to obtain rapid research results; to offer recommendations for achieving farmer-profitable increase in maize production while safeguarding the ecology (especially the soils) of Senegal; and to evaluate the effectiveness of ISRA'S own efforts in maize research, plus its cooperation with foreign donor/support agencies.

**Time Period:** September 27-October 11, 1989.

**Findings/Recommendations:** Focus of extension agents is on credit distribution and recovery, and/or sales of seed and fertilizer; farmers know more about farming and crop management than do the agents; agents do not have incentive to find solutions. Fertilizer trials have not been conducted to determine maximum response per input, most effective placement, or timing. More productive sites (uphill from water catchments) should be excellent sites for corn. Split application of fertilizer -- broadcast application followed three weeks later by application of nitrogen placed near the plant repeated again three weeks later -- improves fertilizer usage considerably. Weeds are a problem for corn, but herbicides are considered too expensive for farmers to use. Corn is also attacked by stem borers. Contour tillage/catchment barriers should be top priority as a technology to be extended to farmers; soil fertility status classification is essential; for at least the next 10 years, three aspects of corn management should be addressed in Senegal: 1) improved soil fertility and cost effectiveness of fertilizer, 2) improved implementation of adapted varieties, and 3) improved pest control, particularly weeds and insects. To do these three things, three corn management teams should be organized, one in St. Louis, one in Nioro, one in Casamance/Senegal Oriental (Kolda). Each team should include one applied plant breeder, one agronomist, and one soil fertility/management expert, complemented by weed scientists, entomologists, pathologists as needed. One experienced U.S. corn breeder and one U.S. soil fertility specialist should be secured as consultants to the Nioro and Kolda research teams. The importance of continuity on the part of the three members of the three teams cannot be over-emphasized.

**Relevance:** High.

**Comments:** This short paper on a key crop contains a number of well-considered ideas for cultivation techniques and potential research efforts.

**Keywords:** Maize, agricultural research, production, fertilizer distribution, pest control, soil quality.

[75] Dancette, C. (1983) **Besoins en eau du mil au Sénégal. Adaptation en zone semi-aride tropicale.** *L'Agronomie Tropicale*. Vol. 38, No. 4: 267-280.

**Objectives:** To analyze the water requirements of millet in Senegal, and to identify ways of achieving a better hydrological situation more conducive to millet production.

**Time Period:** 1970s.

**Methodology:** Field surveys and experiments, statistical and descriptive analysis.  
**Data Collected:** Rainfall, soil quality, real maximum evapo-transpiration coefficient.  
**Findings/Recommendations:** The water requirements of the major millet varieties are relatively well known for Senegal. Generalizing the findings remains a problem. Complementary measures are necessary in order to define the limits of validity of a method based on the use of cropping coefficients. It is recommended to measure the water requirements in rural settings, under less favorable conditions than those existing at experiment stations, and to know exactly how cultivation affects water requirements and yields. Factors other than water requirements are also very important. The choice of one millet variety over another can help reduce water requirements, stabilize yields, and increase efficiency of water use. There are some interesting possibilities for water conservation with shorter cycle varieties with more flexible cultivation.  
**Relevance:** Medium.  
**Keywords:** Millet, water management.

[76] de Lattre, Anne. (1988) **Observations on the private sector in Senegal, Niger and Burkina Faso: Summary. Questions submitted to the donor's advisory group.** Sahel D(88)317. Orig. Fr. OECD/Club du Sahel. November. 15 p.

**Objectives:** To provide an introduction to the individual country studies and an overview of the private sector in the Sahel, and to encourage donors to re-examine their view of privatization in the light of the country studies.  
**Methodology:** Descriptive synthesis of individual country studies.  
**Findings/Recommendations:** Main forms of private enterprise in the Sahel are modern private sector, traditional trading, and micro-enterprises. Senegal is the only Sahelian country with a "modern economic fabric." Informal sector activity cannot yet form the basis for the development of modern firms.  
**Relevance:** Low.  
**Comments:** See Senegal country study by Courcel (1988); the paper refers to a regional workshop on private enterprise planned for the third quarter of 1989.  
**Keywords:** Private sector, trade, Sahel.

[77] Delgado, Christopher L. (1989) **Cereals protection within the broader regional context of agricultural trade problems affecting the Sahel.** Paper prepared for the CILSS/Club du Sahel conference on "Regional Cereals Markets in West Africa: Ongoing Dynamics and Future Implications," Lomé, Togo, November 6-11. October. 21 p.

**Objectives:** To investigate the case for protecting Sahelian cereals markets from non-African imports; to question feasibility and desirability of policies to raise the relative price of cereals; and to give a broad diagnosis of the general trade problems facing Sahelian agriculture since the mid-1970s.  
**Time Period:** Since mid 1970s.  
**Methodology:** Descriptive and statistical analysis.

**Data Collected:** Secondary data on: imports (agricultural goods and livestock), diet patterns, sources of meat consumption, prices.

**Findings/Recommendations:** Smallholders in the Sahel have an incentive problem that is related to the trade environment. Solution to this problem should not narrowly focus on cereals. World markets for traditional exports are distorted. Exports should focus on regional level, and devaluation of CFA vis-à-vis coastal trading partners might be necessary. Growth strategies of coastal trading partners also affect Sahelian countries' potential and actual exports. Possible comparative advantage of coastal and Southern Sahelian countries in maize production offers alternative to world markets. Removing foreign exchange subsidy of the CFA gives greater weight to Sahelian and coastal zones with comparative advantage in cereals production. Protection against cereals imports from coastal countries would leave Sahelian as well as coastal countries worse off with Sahelian countries being the biggest loser.

**Relevance:** Medium.

**Keywords:** Cereals, maize, rice, livestock, cotton, prices, cereals imports, exports, trade, trade policy, price policy, subsidies.

- [78] Deloitte Haskins & Sells. (1987) **Groundnut marketing in Senegal**. Liberalization of agricultural marketing systems comparative studies. Deloitte Haskins & Sells, Agriculture and Rural Development Division. September. 21 p.

**Objectives:** To assist World Bank/EDI and policy makers in developing countries to better understand the process of liberalizing agricultural marketing systems.

**Time Period:** Not stated; data cover some or all of the 1960-86 period.

**Methodology:** Not stated; secondary data sources (mostly World Bank).

**Data Collected:** Groundnut area, production, exports (1965-84); world market prices for meal and oil (1960-85); share of peanuts legally bought by private buyers (1960-68); share of peanuts bought by GOS (1965-85).

**Findings/Recommendations:** Concludes that no liberalization of groundnut marketing has occurred; the GOS has merely dissolved certain government agencies and replaced them with others. Other conclusions: (a) deficiencies in groundnut marketing resulted from excessive government involvement, the size and "socialist" role of ONCAD (which encouraged political manipulation and corruption), and by decentralization without financial controls over local officials and cooperatives; and (b) the producer price is too low relative to the export price, and marketing costs too high, to provide groundnut producers with adequate margins and an incentive to market output through official channels (1985).

**Relevance:** Low.

**Comments:** Brief and superficial analysis. Undertaken for World Bank/EDI.

**Keywords:** Peanuts, marketing, institutions, organizational performance, cooperatives.

- [79] Dhéry, M; M'Baye, D.; Gaye, F.; Diouf, M. (1987) **Traitement contre les nématodes dans le bassin arachidier Nord du Sénégal**. *Oléagineux*. Vol. 42, No. 10: 369-77.

**Objectives:** Summarize research on use of dibromochloropropane (DBCP) to control nematodes.

**Time Period:** 1984-86.

**Methodology:** Farm-level tests of ORSTOM research results; DBCP (15 liters at 1200 g/l in 85 liters water) injected 15 cm into ground every 40 cm by pump mounted on animal-drawn seeder; fertilizer x rhizobium inoculation trials run in 1985 and 1986; pilot extension of technology on 124 farms in Thiès and 171 in Louga.

**Data Collected:** Nematode counts; peanut grain and straw yields as function of planting date, DBCP and fertilizer application; chemical content of foliage.

**Findings/Recommendations:** Clear effect of nematicide in north but not south of Peanut Basin, in terms of reducing nematode numbers, increasing peanut yields, and speeding peanut maturation; problems of availability of suitable equipment (some modifications made), traction power (two horses needed), and of input cost; results of fertilizer/rhizobium trials were variable and not conclusive.

**Relevance:** Low.

**Comments:** Nematodes considered by some to be a serious pest problem, but value of this study severely limited because (a) DBCP is expensive and now banned as a dangerous product, (b) certain results (doubling of yields, no effect in So. Peanut Basin) are doubtful and the mechanism underlying them is not currently understood, (c) move to extension stage thus seems premature.

**Keywords:** Peanuts, pest control, fertilizer, agricultural research.

- [80] Diagona, B. N. (1987) **Les organisations paraétatiques et paysannes dans le Sud-est du Sénégal.** ISRA/MSU Food Security Project Working Paper. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. December. 18 p.

**Objectives:** To characterize farmer organizations (FOs) in southeastern Senegal in the context of the New Agricultural Policy.

**Time Period:** 1986-7 production and marketing seasons.

**Methodology:** Survey of 35 heads of FOs; descriptive analyses.

**Data Collected:** Data on current and past activities of FOs, problems, constraints; and prospects for taking on a more important role.

**Findings/Recommendations:** Parastatals continue to be main actors in input distribution; not clear how the transition to a private system is to be structured--need for collaborative efforts and sharing of experience between private and public sectors. Lack of financial, human and material resources constrain effectiveness of village sections. Grass roots organizations should be encouraged through activities such as cultivating common cereals fields, constructing storage facilities, etc.

**Relevance:** Medium.

**Comments:** Of interest to researchers studying southeastern Senegal.

**Keywords:** Farmer organizations, Senegal Oriental, Casamance.

- [81] Diagona, B. N.; Goetz, S. J. (1987) **Les SRD et le système de distribution des intrants en 1985 et 1986: Participation et opinions des producteurs au Sud-Est du Sénégal.** Note



d'Information BAME 87-2. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. Décembre. 14 p.

**Objectives:** To describe participation of farmers in, and opinions of, the distribution system for chemical inputs.

**Time Period:** 1987 (for preceding production season).

**Methodology:** Field survey; descriptive analysis.

**Data Collected:** Opinion data, data on participation with parastatal programs (since when, reasons, intentions, etc.).

**Findings/Recommendations:** Parastatals remain principal suppliers of improved inputs. Farmer participation in maize production programs has increased, but there is dissatisfaction with SODEVA's program. Assured market outlets and the provision of inputs on credit are main reasons for participation with parastatals; profitability appears to be of secondary importance. Performance of the input distribution system deteriorated marginally in 1986 over 1985 according to farmers.

**Relevance:** Medium; some policy relevance for privatization.

**Comments:** Early results of longer research project.

**Keywords:** RDAs, input distribution, Senegal Oriental, Casamance.

- [82] Diagana, B.N. (1988) **La NPA du Sénégal et la responsabilisation des organisations de producteurs (OP): Problèmes et options soulevés par une enquête au sud-est du Sénégal.** ISRA/MSU Food Security Project Working Paper. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. June. 16 p.

**Objectives:** To evaluate the willingness and ability of farmer organizations (FOs) to distribute improved inputs under the New Agricultural Policy.

**Time Period:** 1987.

**Methodology:** Field surveys of chiefs of 35 FOs; descriptive analysis.

**Data Collected:** Resources, activities and constraints of select FOs in southeastern Senegal; opinions on willingness and ability to distribute improved inputs.

**Findings/Recommendations:** Existing FOs lack physical and human resources, carry out limited activities; while willing to distribute inputs, current ability is low. Without legal status FOs cannot obtain bank credit. Options for policy: a) reassess role of FOs and channel resources elsewhere (traders?); b) draw on FOs, which would require strengthening their physical, financial and human resources; c) allow FOs to utilize existing public sector resources (trucks, storage facilities). Identifies further concerns, but suggests FOs can become important actors.

**Relevance:** High; policy-oriented, with concrete recommendations.

**Comments:** Specifically oriented towards the NAP.

**Keywords:** Farmer organizations, Senegal Oriental, Casamance, input distribution.

- [83] Diaham, B.; Wade, S.; Diallo, A.; Bleiberg-Daniel, F.; Montagnon, B.; Suquet, J. P.; Lemonnier, D. (1989) **Disponibilité des denrées alimentaires et mode de consommation en milieu rural sénégalais: Cas de Khombole.** In *Les carences*

*nutritionnelles dans les pays en voie de développement*, eds. Lemonnier, D.; Inglebleek, Y., 537-542. Paris: Karthala-ACCT.

**Objectives:** To understand impact of urbanization and increased research in food technology and distribution on food consumption of rural populations.

**Methodology:** Inventory of food availability in pilot area (Khombole), field surveys, secondary data; primarily descriptive and statistical analysis.

**Data Collected:** Food consumption, agricultural production and revenues, socio-economic data.

**Findings/Recommendations:** Two ethnic groups in six villages were studied. Rice, millet and fish were purchased mostly in April; staple cereals were purchased in September. Millet and rice are the main staple foods, and eight to seventeen different recipes are used. In this rural area, though not far from a major town, the diet was found to be monotonous. In the Wolof diet, millet has been replaced to some extent by rice. In both ethnic groups, the Wolof and the Serer, children were found to suffer from protein and energy malnutrition.

**Relevance:** Medium.

**Keywords:** Consumption, nutrition, millet, rice.

- [84] Diemer, Geert; van der Laan, Ellen Ch. W. (1987) *L'irrigation au Sahel: La crise des périmètres irrigués et la voie haalpulaar*. Wageningen, Netherlands: Karthala; Centre Technique de Coopération Agricole et Rurale. 226 p.

**Objectives:** This study discusses how the Haalpulaar in the Senegal River Valley have adapted small-scale irrigation projects to their socio-economic environment. The authors use this example to model how technical assistance can be integrated within traditional social structures to achieve long-term development.

**Time Period:** Research conducted between February 1981 and September 1982.

**Methodology:** Case studies of two villages (one in Matam and one in Podor). More specific research questions were then formulated, and several adjacent villages were added to the study. A total of ten villages and five perimeters were included. Most data were collected through informal interviews.

**Data Collected:** Cereal yield data on both irrigated and non-irrigated fields, crop calendars, and some household budgets. Importance of irrigated versus non-irrigated fields in cropping strategies.

**Findings/Recommendations:** Findings not entirely supported by scope of study. Conclude that irrigation planning lacks a conceptual framework to successfully integrate technical and socio-economic factors. The State needs to begin working more closely with villages to develop more appropriate irrigation systems.

**Relevance:** Medium.

**Comments:** Detailed, farm-level descriptions of cropping strategies, labor, land-use practices, internal village structure, operation of small-scale irrigation system, and history of irrigation in some villages.

**Keywords:** Fleuve, irrigation, donor assistance, village organizations.

- [85] Diemer, Geert; van der Laan, Ellen. (1983) **Using indigenous skills and institutions in small-scale irrigation: An example from Senegal.** Network paper 8b. London: Overseas Development Institute. October. 11 p.

**Objectives:** Study of small scale irrigation projects in order to derive lessons for future planning.

**Time Period:** 1981-82.

**Methodology:** Descriptive analysis of small scale irrigation schemes supported by SAED. Presumably used village survey techniques.

**Findings/Recommendations:** Authors analyze two aspects of the irrigation schemes which have contributed to their rapid expansion: village management capabilities have been developed by existing social institutions; and the size of the schemes is compatible with the scale on which the village institutions operate.

**Relevance:** Medium.

**Comments:** An interesting "lessons learned" perspective for those planning irrigation schemes.

**Keywords:** Irrigation, village organizations, Fleuve.

- [86] Diouf, B. (1985) **Le rôle des sociétés de développement.** In *Paysans, experts et chercheurs en Afrique noire*, eds. Boiral et al., 169-84.

**Relevance:** Low.

**Comments:** Discussion covers many Senegalese RDAs, especially SODEVA.

**Keywords:** RDAs, public sector, organizational performance.

- [87] Direction de l'Agriculture. (1989) **Programme de régénération et de réhabilitation des sols.** Dakar: Ministère du Développement Rural. Mars. 42 p (text) + 26 p (appendices).

**Objectives:** To describe the technical and financial aspects of the GOS/World Bank program to rehabilitate soils.

**Time Period:** 8 years.

**Findings/Recommendations:** Program is expected to identify, develop and apply techniques to improve and conserve soil mineral content and fertility, and lower acidity on cultivated fields. This will include calcium, phosphate and organic amendments; intensive agricultural production techniques, crop rotation, tillage, and optimal use of agricultural inputs (seed, fertilizer, and pesticides). Causes of soil degradation: wind and water erosion, salt intrusion, physical and chemical impoverishment of soils.

**Relevance:** High (sections II through IV only).

**Comments:** Nationwide program is described in detail. Technical and cost data are provided. Program is an element of NPA. Appendices are not interesting from an agricultural perspective.

**Keywords:** Fertilizer distribution, soil quality, production, agroforestry.

- [88] Droy, I. (1985) **Femmes et projets de développement rural en Afrique Sub-Saharienne.** Grenoble: Université des Sciences Sociales de Grenoble. Institut de Recherche Economique et de Planification du Développement. December. 557 p.

**Objectives:** Section I: to study the impact of a large-scale project on the rural environment (l'aménagement hydroagricole du Bassin de l'Anambé) and the possible contradictions between the intervention and the farmers; Section III: La femme Toucouleur et les actions de développement dans la moyenne vallée du Sénégal: to compare several models of development within a homogeneous geographic and sociological setting; to characterize the role of Toucouleur women in different projects in the Middle Valley, and to assess the potential relevance of these projects to other areas; Section V: to illustrate the support of a cottage food industry (women's fish processing at Mbour, Senegal) by an international organization.

**Time Period:** 1981-1983.

**Methodology:** The analysis is based on several studies conducted in a number of Sub-Saharan countries between 1981-1983. Each case study is analyzed from a geographic perspective.

**Data Collected:** I: population distribution, potential yields, distribution of cultivated area, cereals production; III: ethnic distribution, property distribution by sex and type of land, distribution of type of activity by sex and cultivation activity, age distribution, family duties and contribution to expenditure by sex, revenues and consumption, division of labor by sex; V: yields, specialization by sex.

**Findings/Recommendations:** General findings: the economic role of women within the community is determined within a closely regimented matrimonial system. Women have limited access to means of production. Women engage in diverse productive activities, and have real economic autonomy. Due to studies on the role of women, their situation is better understood. Development activities in the rural setting make the farmer an object rather than an actor in the development process; they have neglected women and this has led to more male domination within the family structure. It is essential for successful rural development to include the interests and the constraints of women in development planning.

**Relevance:** Medium.

**Keywords:** Women, rural development, food production, donor assistance, ethnic groups.

- [89] Egg, Johny; Igué, John; Coste, Jérôme. (1988) **Echanges régionaux, commerce frontalier et sécurité alimentaire en Afrique de l'Ouest. Méthodologie et premiers résultats.** OECD (Club du Sahel); Ministère Français de la Coopération; CILSS; INRA-UNB-IRAM. June. 69 p.

**Objectives:** To develop ideas put forward at the CILSS - Club du Sahel colloquium at Mindelo (December 1986) with respect to grain policies in the Sahel countries: extent of trade in agricultural products in the sub-region, what factors influence trade flows, how does intra-regional trade work (mostly not in national accounts), what are pros and cons of trade for economic agents and for the region.

**Time Period:** 9 months (intermediate report June 1988).

**Methodology:** Published data combined with results of regional surveys and observations to estimate trade flows. Observations made along the borders, in important centers of regional trade, and in ports of entry for imported goods. Mainly descriptive analysis.

**Data Collected:** Exchange rates, number of merchants in main markets of study area, grain and grain product imports and exports between West African countries, trade in millet and sorghum between Niger and Mali, quantities of agricultural products traded in surveyed markets, grain imports through various ports of entry.

**Findings/Recommendations:** Border regions have special characteristics as opposed to the rest of the zone. Historical and social aspects determine trade flows. Trade is a consequence of regional complementarities. Convertibility of currencies important for inter-regional trade. Differences in economic policies and their impact on trade have to be studied further. Structural adjustment policies have adverse effect on trade in the sub-region. The world market affects West African trade through competition and relative depression of markets for tropical products, and large export subsidies for cereals in the industrialized countries. Climatic factors negatively affect supply of food products. Trade flows of cereal products, especially grains, are much larger than official figures indicate. Intermediate storage facilities are important in illegal reexports, which have increased over the years.

**Relevance:** High.

**Comments:** An intermediate report; findings are not well-specified.

**Keywords:** Trade, marketing, cereals imports, comparative advantage, producers, storage, regional trade, prices.

- [90] Egli, Peter. (1989) *L'évaluation et l'amélioration du système d'information sur les prix des céréales locales*. Berg, RFA: GTZ/Peter Egli. Août. 35 (text) + 14 appendices (ca. 80 p.).

**Objectives:** To follow up on ISRA's April 1989 recommendations to consolidate and improve the information system on local cereal prices, which covers locally produced millet, sorghum, corn and cowpeas from 40 weekly and urban markets.

**Time Period:** 04 Juillet - 05 Août 1989.

**Methodology:** Interviews, literature review, questionnaire.

**Findings/Recommendations:** Published price information is used to some extent by national services and international organizations, but information is provided without interpretation. The same organizations expressed interest in a similar information system on food supply; the system on local cereal prices should not be combined with a system on food supply, and the system on food supply should not be placed under the same oversight agency as the system on prices (CSA). Reports presented on Radio Diiso need to be improved and an annual report issued. Some markets do not need to be visited weekly which can help lower costs of collecting data.

Recommend a study to assess the impact of the price information system on target groups; an information campaign for producers, merchants and consumers to explain the potential value of price information; and consolidation of the current information

system. Before implementing an information system on food supply, donors and government services should meet to avoid duplication of similar efforts.

**Relevance:** Low, but the appendices may be of some interest.

**Comments:** Follow up to the ISRA/BAME evaluation (Ouédraogo, et al.) April, 1989.

The final report contains the conclusions and recommendations from ISRA evaluation, and a critique of the ISRA report. Appendices 7, 9, 10 and 12 provide descriptions of and examples from the the information system in question.

**Keywords:** Consumers, food security, government budget, market prospects, organizational performance, prices, producers.

- [91] Elbow, Kent; Lawry, Steven W. (1989) **Senegal reforestation project (USAID No. 685-0283). End of tour report. Forest policy and legislation.** Dakar: SECID and Louis Berger International, Inc. September. 17 p (text) + ca. 100 p (appendices).

**Objectives:** To consider the effects of existing and proposed forestry legislation on private investment in forestry and agroforestry.

**Methodology:** Summarizes prior, existing and proposed forestry legislation.

**Findings/Recommendations:** Promotion of farmer participation in tree/forest production is a new element in forest policy; regulating farmers' use/management of trees on their farms and plantations, however, can discourage farmers from planting trees and may complicate the issue of farmers' return on investment from agroforestry and forestry; 18 species of trees are restricted or regulated by current forestry laws; the proposed forestry law, if adopted, would allow farmers and collectives specific rights to plant, manage, and use forestry products for which they exercise the initiative to plant and produce; authors take issue with Article 53 of the new law and are concerned that farmers will not plant trees on their farms if use of those trees and their products is subject to administrative control by the forest service; Article 53 also would require farmers to obtain authorization from the forestry service before cutting any tree, which may waste time, create substantial transaction costs, and discourage tree planting. Recommendation: encourage GOS to adopt the proposed forestry code as early as possible; Article 53 and any other potentially restrictive condition should be framed so that producer control is not limited, forestry service authorizations would be issued to "proprietors" as a right, producers should be free to cut trees on their own farms for household and personal use; media and other training programs should be implemented to inform producers and forestry agents about the conditions of the new law after it is adopted; applied research should be conducted to identify relationships between tree use, land tenure rules, and farmer investment in forestry and agroforestry.

**Relevance:** High; an important review of forestry policy and its impact on the environment and farmers' behavior.

**Comments:** Appendix 5 is a useful bibliography of forestry and land tenure documents related to Senegal; other appendices contain text of current and proposed forestry legislation.

**Keywords:** Agroforestry, environment, land tenure, natural resources, forestry, regulation.

- [92] ENEA. (n.d.) **Les associations villageoises de développement.** ENEA Bulletin de la Recherche Appliquée, No. 3. Dakar: ENEA. 68 p.

**Objectives:** Development at the grassroots level, development of farmer organizations.

**Time Period:** Ca. 1983.

**Methodology:** Descriptive analysis of data on village associations; description of meeting at ENEA in May 1983 (with reports by various village associations and discussions).

**Data Collected:** Data collected by ENEA students and information given at ENEA meeting by representatives of village associations: structure of organizations, objectives, achievements, financial data, informational and educational training requirements.

**Findings/Recommendations:** The socio-economic context is important for development of village associations. Introduction and implementation of small self-managed local projects can lead to integrated development. Problems associated with overaging population, illiteracy, mastering of modern technology, lack of management skills and rigidities due to traditions. Recommendations: Education and training as well as informational network are needed.

**Relevance:** High.

**Keywords:** Village development, farmer organizations, literacy, rural development.

- [93] Engelhard, Philippe; Ben Abdallah, Taoufik. (1986) **Enjeux de l'après-barrage. Vallée du Sénégal.** ENDA Tiers Monde; Ministère Français de la Coopération. 632 p.

**Objectives:** To answer questions asked by the Senegalese government, the population and donor agencies concerning the future of the region along the Senegal River taking into account present and future constraints, tendencies and potential of the economic, social and ecological system.

**Time Period:** 1983 (?).

**Methodology:** Statistical and descriptive analysis based on secondary data from various sources.

**Data Collected:** Secondary data on: revenue, health, population, livestock, agriculture, debt, data on cooperatives, consumption, migration, land utilization, production costs, prices, agricultural inputs, taxes.

**Findings/Recommendations:** Cultivation on irrigated fields is the only realistic choice, but probability for Senegal Valley region to contribute markedly to self-sufficiency seems low. Efficient village and family agriculture requires coordinated management of land, activities, production and markets. Irrigation practices in agriculture pose ecological and health risks to the region.

**Relevance:** High.

**Comments:** Detailed data on the Senegal River Valley.

**Keywords:** Fleuve, environment, cereals policy, irrigation, livestock, population, food security, institutions, land tenure, water management, prices, production, migration, rice, inputs, agricultural research, credit, health.

- [94] Equipe Systèmes Djibélor. (1985) **Recherche sur les systèmes de production en Basse Casamance. Rapport annuel d'activité No. 2 (campagne agricole 1983/1984).** Dakar: ISRA, Département Systèmes. Part I: Analyse des résultats des enquêtes de terrain, 60 p (text) + ca. 30 p (bibliography + annexes); Part II: Analyse des résultats des essais agronomiques, 56 p (text) + ca. 10 p (annexes).

**Objectives:** Annual report of the Production Systems Team's research activities and results.

**Time Period:** 1983/1984 season.

**Methodology:** Field-level multidisciplinary studies in five agro-ecological zones of the Lower Casamance with attention to three cropping systems and practices, and household-level use of labor and animal traction.

**Data Collected:** Household-level labor data, sociological data, and a variety of agronomic data.

**Findings/Recommendations:** Findings and recommendations in the areas of: land productivity, food deficits, labor productivity and land use, both rainfed and inundated.

**Relevance:** Medium.

**Keywords:** Casamance, cash crops, irrigation, rice, migration, animal traction.

- [95] Ewell, Peter T. (1989) **Linkages between on-farm research and extension in nine countries.** OFCOR Comparative Study No. 4. The Hague: ISNAR. August. 31 p.

**Objectives:** To analyze experience of OFCOR programs in strengthening links between research and extension.

**Time Period:** 1986-89.

**Methodology:** Synthesis of case studies of OFCOR programs in Senegal and 8 other countries.

**Data Collected:** Types of linkage mechanisms between on-farm research and extension.

**Findings/Recommendations:** For all countries studied: On-farm research (OFR) is no substitute for extension -- institutional cooperation is crucial if new technology is to be transferred to a wide range of clients. OFR programs need to establish links with extension, especially in early stages of work. The problem of status gaps between researchers in the field and in experiment stations, and between researchers and extensionists, existed in all countries studied. In most successful cases of integration of OFR and extension, links have been established at several levels of the administrative hierarchy. There is half a page on Senegal's variously successful efforts to institutionalize links between research and extension.

**Relevance:** Low.

**Comments:** See Faye and Bingen (1989).

**Keywords:** Agricultural research, on-farm research, extension.

- [96] Ewell, Peter T. (1988) **Organization and management of field activities in on-farm research: A review of experience in nine countries.** OFCOR Comparative Study No. 2. The Hague: ISNAR. September. 55 p.



**Objectives:** To examine how field staffs of OFCOR (On-Farm Client-Oriented Research) programs in 9 case study countries have been organized internally and in relation to other parts of national agricultural research systems. To analyze management of research process and procedures used for planning, programming, and review.

**Time Period:** 1986-88.

**Methodology:** Synthesis of information from case studies of OFCOR programs in Senegal and 8 other countries.

**Data Collected:** Descriptive indicators of NARS and OFCOR programs (institutional type, organization of research program, organization and scale of OFCOR, years in operation); schematic diagram of OFCOR activities; size of field teams; relative weights of natural and social scientists and technicians in OFCOR field staffs; levels at which programs have developed explicit mechanisms for selection of research sites; fora for programming and review; number and size of field teams; distances of teams' base of operations to research areas; research activities of OFCOR programs.

**Findings/Recommendations:** General conclusions for all case studies: OFCOR programs must be designed to fit into specific institutional settings and to focus on targeted clients, e.g., through clustering of research activities in carefully selected sites. Selection of farmer collaborators is a "chronically weak area;" often large influential farmers are chosen. Social science component of interdisciplinary research teams is often weak. Feedback between OFCOR and larger national research system needs to be sustained and improved; technicians could be trained to contribute to this. Decentralized administration of field operations would help provide the flexibility necessary for successful field work. It is especially important to have strong national coordinators for OFCOR programs since OFCOR generally has lower status than experiment station research. On Senegal: OFCOR was instituted in Senegal more as a strategy to reform the research process than as a strategy to reach previously neglected groups of farmers. Institutional conflicts with earlier on-farm research projects and with scientists in regular commodity programs have been a problem. OFCOR program has been broadly interdisciplinary and has investigated a range of issues including improved varieties, marketing, and cropping and animal traction systems. Until 1986, funds were not explicitly earmarked for OFCOR activities; since 1986, "ICRA has moved to set up a more efficient system."

**Relevance:** Low.

**Comments:** Most of text generalizes for all 9 countries studied; there is half a page specifically on Senegal. Information for specific countries is in tables and appendices. For case study on Senegal, see Faye and Bingen (1989).

**Keywords:** Agricultural research, on-farm research.

[97] Experience, Inc. (1986) **Projet de transformation de mil: Rapport de fin de projet.** Minneapolis: Experience, Inc. September. 243 p.

**Objectives:** To establish the feasibility of reducing the dependence of the urban population on imported rice and wheat by 10% through substitution of millet-based products.

**Time Period:** August 1982-August 1986.

**Methodology:** Technical and financial analysis of plant for production of millet-based products; supply and demand projections for cereals; market tests of millet-based products; chemical and nutritional analysis of millet-based products.

**Data Collected:** Nutritional and chemical composition of millet-based products, historical production and consumption of cereals, market tests, investment and operational costs of industrial plant.

**Findings/Recommendations:** Availability of millet is the major constraint on reducing dependence of the urban population on imported rice and wheat. Transformation of millet into flour, couscous, semolina, baked products and drinks is technically feasible on an industrial scale, with an acceptable shelf life and reasonable prospects for consumer acceptance. Average rates of return on industrial plant range from 6% to 17% in the long run, but are sensitive to volume and are negative in the short run. Government loan guarantees should be made available to encourage investment in agro-business. Direct and indirect taxes should be eliminated to improve the competitiveness of millet based products.

**Relevance:** High.

**Comments:** Project No. 685-0250.

**Keywords:** Cereals imports, cereals, production, consumption, food policy, millet processing.

- [98] Fall, A. A. (1987) *Etude descriptive des marchés céréaliers au Sud-Est du Sénégal*. Document de Travail BAME 87-3. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. Décembre. 21 p.

**Objectives:** To describe private cereals trader and CSA activities in southeastern Senegal and to examine the cereals subsector in the context of the NPA.

**Time Period:** October-December 1986.

**Methodology:** Secondary data; trader surveys; descriptive analysis.

**Data Collected:** Activities, resources and opinions of traders.

**Findings/Recommendations:** The limited market infrastructure in southeastern Senegal discourages transactions. The CSA intervened irregularly in the markets surveyed, and prices generally were below the floor price (depending on the market). Cereals market liberalization appears to have encouraged some individuals to become cereals traders. Most traders use their own working capital, and do not have recourse to bank credit. Most traders are ill-informed about goals of the NPA and role of CSA; radio and newspaper are avenues to reach them.

**Relevance:** Medium.

**Comments:** Of interest to researchers studying southeastern Senegal.

**Keywords:** Traders, Senegal Oriental, Casamance, cereals marketing.

- [99] Fall, Amadou Abdoulaye; Kelly, Valerie; Reardon, Thomas. (1989) *Household-level survey methods used in the IFPRI/ISRA study of consumption and supply impacts of agricultural price policies in Senegal*. Report prepared under USAID Contract No. 685-0281-3-70042. [Dakar]: IFPRI/ISRA. September. 80 p.

**Objectives:** Study seeks to understand how household crop consumption and supply respond to changes in agricultural price policies. This report describes variables required to understand the full household economy, and the questionnaires used to obtain information.

**Time Period:** 1988-89.

**Methodology:** Description of questionnaires and survey methods.

**Relevance:** Medium.

**Comments:** Report discusses problems encountered with specific questionnaires, and is useful for those undertaking similar surveys.

**Keywords:** Price policy, rural incomes, consumption, research, production.

- [100] FAO. (1985) *Politiques et programme céréalières. Une analyse du secteur céréalière et un programme d'actions pour son développement. Volume 1--Rapport principal; Volume 2--Documents d'appui.* ESC/CPCL/SEN 1. Rome: FAO. Novembre. 121 p (Vol. 1), ca. 400 p (Vol. 2).

**Objectives:** To assist MDR in planning development programs, and to contribute to the discussions between the GOS and donors concerning Senegal's needs for development assistance in agriculture. Report prepared at the request of the Ministry of Rural Development.

**Time Period:** Mai-Octobre 1985.

**Methodology:** Two field missions, one on cowpeas and rainfed cereals except rice, and one on irrigated crops and rainfed rice. Review of: current GOS agricultural policies, food supply and demand balance, agro-ecological constraints, problems of profitability, prices, marketing, inputs supply, research, extension, and other institutions. Presentation of an action plan, including specific project proposals. Projected production increases are assumed to come from three sources: expansion of cultivated area (primarily for irrigated crops), intensification of production on existing area, and improvements in the efficiency of the institutional environment and marketing system. Two alternative scenarios for expansion of irrigated area are analyzed: 3,000 ha/year, and 3,800 ha/year. Also assumed are a rise in coefficient of double cropping from 1.4 to 1.8 after 6 years, and a rise in paddy yields to 6 tons/ha.

**Relevance:** Low.

**Comments:** Approach basically involved identifying the yield and area increases necessary to reach the GOS goal of 75% cereals self-sufficiency by 1995, rather than making independent projections based on realistic assumptions. Projected maize production figures considered particularly unrealistic by Senegalese researchers. Policy and institutional changes needed to bring about the assumed productivity increases are discussed, but their feasibility and means of implementation are not evaluated. Rainfed and irrigated crops are analyzed separately. The impacts of projected cereals production increases on cash crops and on the rest of the economy are not evaluated. Such methodological weaknesses and the poor empirical data base reduced the credibility of the report among other donors and GOS agencies.

Report nonetheless served as basis for the 1986 Cereals Plan (cf. MDR (1986)).

**Keywords:** Agricultural development, irrigation, cereals policy, technology.

- [101] FAO, Food Policy and Nutrition Division. (1984) **Women, food and nutrition in Africa: Economic change and the outlook for nutrition.** *Food and Nutrition.* Vol. 10, No. 1: 71-79.

**Objectives:** Given declining food production per capita, and failure of development projects to reverse this trend, article lays out approaches to strengthening women's roles in order to increase food production and overcome constraints.

**Methodology:** Descriptive analysis, secondary data.

**Data Collected:** Labor time allocated to agricultural activities.

**Findings/Recommendations:** International aid efforts should focus on women as producers of food. Activities of women directly determine nutritional status of family members. Men's and women's income-generating activities are separate and are used to meet different obligations to the household. They face different constraints as well. For women, time is the constraining factor and shortcuts can negatively affect nutrition. Appropriate technologies for women are needed with the relationship between her farming activities and nutrition in mind.

**Relevance:** Medium.

**Keywords:** Nutrition, women.

- [102] Faye, Adama. (1989) **Le rôle du cheval dans le développement rural en zone sahélo-soudanienne du Sénégal: L'exemple du sud du Bassin Arachidier.** *Les Cahiers de la Recherche Développement.* No. 21: 19-29.

**Objectives:** To show how horses and donkeys can complement or substitute for other forms of draft power; to examine the role and advantages of the horse in the city versus rural areas.

**Methodology:** In the southern Peanut Basin, studied and evaluated: the historical conditions of the development of horse draft in Senegal, its development and impact on the transformation of agricultural production systems, performance and reproduction of horses, and the need for research.

**Data Collected:** Secondary data: increase in stock of horses and donkeys, percentage of households using various or no method of draft, coefficients between horse draft and other structural characteristics of farms, distribution of various types of carts, hrs/ha for seeding peanuts with draft horses versus draft oxen.

**Findings/Recommendations:** Horses are the preferred draft animal. The role of horses as draft animals will most likely be maintained if not extended in the next few years. The use of draft horses has also spread to Middle and Lower Casamance from farmers moving south from the Peanut Basin. In spite of high mortality rates, horses are still being purchased by farmers. The clearing of vegetation together with stricter measures of disease prevention, improvement of lodging and nutrition can improve conditions for the horses. This implies improved knowledge of the characteristics of horses and donkeys. The introduction of draft horses in the south should be studied, in order to determine the implications for knowledge about horses, strategies of agricultural equipment, development of cultivation techniques and transport in the region, and animal traction.

**Relevance:** Medium.

**Keywords:** Animal traction, equipment, livestock, Peanut Basin, farming system, transport, productivity.

- [103] Faye, Jacques; Bingen, R. James. (1989) **Organisation et gestion de la recherche sur les systèmes de production au Sénégal.** The Hague: ISNAR. 176 p (text) + ca. 10 p annexes and bibliography.

**Objectives:** To describe and analyze the historical and contemporary institutional context in which the ISRA Production Systems Research Department was established, and to review the principal problems involved in its organization and management.

**Methodology:** Interviews with ISRA researchers and administrative personnel; personal experience of the authors; review of relevant documentation.

**Data Collected:** Staffing distribution and levels, 1980-86; program histories of three production systems teams; ISRA institutional relationships.

**Findings/Recommendations:** Detailed presentation of the history of agricultural research in Senegal, in-depth analysis of ISRA's and the PSR Department's human resources situation, and critical review of the organization and management of the PSR Department and its regional teams emphasizing personnel management, interdisciplinary research and relations with regional development agencies. Underlines the importance of analyzing agricultural research within an institutional context, and specifically recommends against establishing a separate research department when introducing a production systems approach into a research institute.

**Relevance:** High.

**Comments:** Especially for continued interest in supporting the improvement of ISRA's research capacity.

**Keywords:** Agricultural research, Fleuve, Casamance, Peanut Basin, donor assistance, RDAs, organizational performance.

- [104] Faye, Jacques; Bingen, James; Landais, Etienne. (1988) **The creation and establishment of production systems research in a national agricultural research institute: The Senegal experience.** MSU International Development Reprint Paper No. 22. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 25 p.

**Objectives:** To review the institutional dimensions of the establishment of the ISRA Production Systems Research and Technology Transfer Department.

**Findings/Recommendations:** Brief review of the place of the PSR Department within ISRA, and organizational changes in ISRA under the World Bank Agricultural Research Project; discussion of steps taken in establishing the first production systems team in the Casamance; discussion of personnel, budgeting and training questions; analysis of relations with commodity departments and the regional development agencies. Suggests that it is more important to find ways to incorporate a PSR approach throughout a research institute than to establish a separate department; that training activities must be planned in the context of the institute's

overall research program, and that a policy orientation should be introduced into research programs and analysis.

**Relevance:** Medium.

**Comments:** Paper presented at the first meeting of the West African Farming Systems Network in Dakar, March 1986 based on ISRA documents and personal experiences of the authors. A more detailed review and discussion found in Faye and Bingen (1989).

**Keywords:** Agricultural research, organizational performance, RDAs, Casamance.

- [105] Faye, Jacques. (1987) *L'approche systématique dans la recherche agronomique au Sénégal*. In *Recherche, vulgarisation et développement rural en Afrique noire*, ed. Belloncle, Guy, 173-183. Paris: Ministère de la Coopération.

**Objectives:** To describe the systems approach ISRA has taken towards agricultural research.

**Time Period:** Since the 1982 reorganization of ISRA.

**Findings/Recommendations:** Describes ISRA's Production Systems Research programs. Concludes that 1) farming systems literature is centered too much on crop production, which may not be appropriate in certain contexts (e.g., a community of herders), 2) social organization of farming communities should be researched as well as agricultural practices, 3) working conditions, financial constraints, researcher capabilities, and institutional context should be taken into account when planning research activities, 4) microcomputers are necessary tools for researchers, 5) researchers need to modify their approach towards maximizing production to better meet the needs of the farmers whom they are trying to serve.

**Relevance:** Medium; provides quick overview of the ISRA field research activity and the approach(es) taken.

**Keywords:** Agricultural research, institutions, Fleuve, Peanut Basin, Casamance.

- [106] Fieloux, Michèle. (1985) *Développement, émigration masculine et travail féminin. Le cas des femmes Toucouleur de la région du Damga (moyenne vallée du Sénégal)*. Paper presented at the international workshop, "Women's Role in Food Self-Sufficiency and Food Strategies," ORSTOM/CIE, Paris, 14-19 January. January. 10 p.

**Objectives:** To analyze the transformation of women's role in the organization of work in light of male emigration and agricultural development in a region which is severely afflicted by drought.

**Time Period:** Mainly 1979-1980.

**Methodology:** A survey in the village of Bow in 1977-1980. Descriptive analysis combined with conclusions drawn on the basis of the collected data.

**Data Collected:** Expenditure and revenue per production unit, consumption data, food expenditure, rice production data, hours worked in the field by women/men.

**Findings/Recommendations:** The role of the women depends on their relationship with the migrants in the family which in turn depends on the woman's age. Spouse or relative, the women engage in domestic work and work on the new "men's fields."

Apart from this homogeneity, activities depend on social origin and emigration. Whereas women whose income depends solely on their economic activity increase their activities, the women who are married to a migrant, hoping to receive more from their husbands than they actually do, often only work as much as they think is necessary. The status of the woman has gone down. Means of production are distributed unequally to the detriment of women. Men spend more time working irrigated fields than women, who spend more time than men on traditional cultivation. Women have not replaced men who migrated on the new irrigated fields.

**Relevance:** Medium.

**Comments:** Only in a footnote is there mention of a survey. It is not clear whether all of the data come from the survey. Paper lacks structure.

**Keywords:** Women, development, irrigation, migration.

- [107] Freeman, Peter H.; Resch, Tim. (1986) **Large plantations of rapidly growing exotic species: Lessons from the Bandia, Senegal.** *Rural Africana*. No. 23-24: 87-93.

**Objectives:** To examine large-scale planting of exotic species as a forestry practice (rapidly growing trees for a variety of purposes, especially for the provision of fuelwood); to discuss the costs and benefits as well as the problems with respect to the plantation in the Bandia forest.

**Time Period:** 1976-1983.

**Methodology:** Descriptive analysis with data; from USAID-funded project.

**Data Collected:** Data on yearly production, ha planted to a variety of tree species, tree growth, rainfall.

**Findings/Recommendations:** Rainfed large-scale fuelwood plantations of Eucalyptus sp. below 800 mm rainfall isohyet appear financially infeasible. Rainfall predictions, especially when extrapolated, should be carefully analyzed using statistically rigorous methods. Species, provenance and seed source selection can influence project success and failure. Research in natural forest management is recommended as a viable alternative to plantations in the Bandia.

**Relevance:** Medium.

**Keywords:** Forestry, charcoal.

- [108] Freud, Claude; MacRae, John; Schulman, Jean-Philippe; Sidibé, Karim; Yung, Jean-Michel. (1989) **Politique des prix agricoles au Sénégal.** SEDES/Ministère de Développement Rural. Janvier. 265 p.

**Objectives:** To help GOS define an agricultural price policy which takes account of possible effects on producer and consumer behavior, and on the government budget, trade and foreign exchange.

**Time Period:** GOS terms of reference approved by World Bank March 1987; WB/CCCE financing agreed by end August 1987; contract with SEDES approved May 1987; work initiated September 1987, to be completed mid-Dec. 1987; draft report submitted February 1988, reviewed by GOS March 1988; revised report submitted January 1989.

**Methodology:** Macroeconomic review--costs of production by filière, previous agricultural policies, fertilizer use, and crop prices, production, and marketing (Part 1). Analysis of producer behavior and of the cereals marketing system, and analysis of determinants of cereals consumption (Part 2). Analysis of the impact of four alternative price scenarios on production, income, GOS budget, and trade balance (1986-95), based on expert opinion and formal modelling (Part 3). Presentation of an Action Plan for agricultural price policy (Part 4).

**Data Collected:** Mostly secondary data; probably some compilation of primary data for cost calculations; data generated by model; sources rarely cited.

**Findings/Recommendations:** Part 2: peanuts are a key crop, being less risky than millet, giving greater returns to labor, and providing income for food and other purchases; cereals markets are efficient and competitive, though some sales are "forced" at low prices by debt repayment or cash needs; the CSA's capacity to support cereals prices is real but limited; there is no economic incentive to consume millet rather than rice except in years of good millet harvest, in zones of millet surplus, or (usually) for rural consumers. Part 3: production growth is sensitive to price; maximum cereals self-sufficiency is 60%; consumer price of rice plays a major role in the cereals economy; "comparative advantage" of peanuts (given superior returns to labor) is consistent across scenarios; GOS budget improves in all scenarios due to higher forecast export prices and reduction of input subsidies; trade balance varies as function of peanut exports and rice imports; the "intensification" scenario gives the most favorable results. Part 4: action plan (summarized on p. 263) focuses on price information system, and on the prices and organization of the peanut, cereals, and inputs markets.

**Relevance:** High.

**Comments:** Virtually no references given for data or assumptions used (for that, see Annexes to main report); basis for analysis in Part 2 not clear, though conclusions generally consistent with other studies; no comparison of results to similar analysis done by ISRA/BAME; millet supply seems more responsive and maize supply less responsive in SEDES model than in ISRA/BAME model; SEDES model has more satisfactory treatment of price formation and consumer demand than ISRA/BAME model, though SEDES model also incorporates minimum consumption levels by cereal.

**Keywords:** Cereals, rice, peanuts, millet, marketing, prices, price policy, production, consumption, productivity, government budget, comparative advantage, diversification, trade.

- [109] Freud, Claude; Macrae, John; Schulman, Jean-Philippe; Sidibé, Karim; Yung, Jean-Michel. (1988) *Politique des prix agricoles au Sénégal. Annexes*. Dakar: Ministère du Développement Rural; [SEDES]. Janvier. 253 p.

**Objectives:** Cf. main report.

**Data Collected:** Annex 1: value added in peanut sector, 1980-84; value added in rice, 1980-83. Annex 2: repeats text from Ch. 1 of main report; tables showing area, yield, and output by main crop, 1960/61 to 1986/87. Annex 3: repeats text from Ch.



2 of main report; producer and rural market prices of millet, including various processing costs. Annex 4: assessment of impact of the NPA under 6 price scenarios, showing producer incomes, consumer expenditures, government budget and balance of payments effects. Annex 5: similar assessment of alternative scenarios (existing trend, maize/millet self-sufficiency, comparative advantage, and intensification). Annex 6: detailed description of the model, including flow charts, algebraic formulation, some coefficients, operation of the different modules and type of results generated, detailed comparison of results for the different scenarios tested (1986-1995) based on use of model and expert analysis. Annex 7: data sources used, and tables of key assumptions about intensification possibilities by crop and region.

**Relevance:** Medium.

**Comments:** Necessary background for full understanding of the modelling analysis; includes some useful data.

**Keywords:** Agricultural policy, policy analysis, model, price policy.

- [110] Gabas, Jean-Jacques; Giri, Jacques; Mettetal, Gilles. (1987) **A protected regional cereals market: An initial exploration of a new idea.** SAHEL D(87)311. Orig. Fr. Paris: OECD (Club du Sahel); CILSS. November. 24 p.

**Objectives:** To answer following questions about a protected market: what form? What region covered? What effects? Is it desirable? Practicable?

**Methodology:** Based on data collected by missions sent to West Africa by the secretariats of CILSS and Club du Sahel; covers coastal as well as Sahelian countries; discusses past and predicted future trends in rice production and consumption.

**Data Collected:** French version contains statistical annex on Senegal, Côte d'Ivoire, and Mali.

**Findings/Recommendations:** Establishing a protected market would require strong political will, major policy changes, and some relinquishment of national sovereignty; other solutions (e.g., devaluation) appear even less feasible.

**Relevance:** Medium.

**Keywords:** Rice, trade policy, cereals imports, price policy, regional policy, consumption.

- [111] Gagnon, Gérard. (1987) **The end of utopianism: A proposal for a realistic system of stabilizing cereal farmers' income in the Sahel and of increasing food security.** Sahel D(87)303. Orig. Fr. OECD (Club du Sahel); CILSS. December. 41 p.

**Objectives:** To explain why Sahelian countries' present systems of cereal market price regulation, including official prices and benevolently intended but "confused notion of guaranteed minimum prices" cannot operate satisfactorily given limited national resources. To outline a more feasible system for support and stabilization of farmers' incomes.

**Time Period:** Discusses supply management and price policies developed since early 1970s.

**Methodology:** Descriptive and synthetic.

**Data Collected:** Refers to price data collected from various organizations including PRMC, CIDA, MTSEE. Statistics in paper presented as illustrations of main points.

**Findings/Recommendations:** Rigid pan-national and pan-seasonal official prices set before planting work against governments' objectives of stabilizing prices and managing security stocks. Costs to governments of ineffective programs are excessive. To reduce costs and to improve effectiveness, the objective of a system intended to stabilize farmers' income should no longer be to guarantee minimum prices but to stabilize prices within the limits of national resources. Government should play a smaller role in price stabilization; government loans and local organizations should facilitate storage and management of stocks by farmers and traders. Government stocks should be reduced in size, and government should buy and sell by issuing calls for tender rather than on basis of fixed official prices. Grain imports could be taxed and currencies devalued to protect domestic farmers. Cereal price policy should be flexible enough to encourage diversification of agricultural production (e.g., into root crops) rather than promoting dependence on cereals in risky rainfed agricultural systems.

**Relevance:** Low.

**Comments:** Not much attention given to issue of limiting food prices for urban consumers.

**Keywords:** Price policy, marketing, rural incomes, government.

- [112] Gastellu, Jean-Marc. (1988) *Le paysan, l'état et les sécheresses (Ngohé, Sénégal: 1972-1982)*. *Cahiers des Sciences Humaines*. Vol. 24, No. 1: 119-136.

**Time Period:** Retrospective from 1982.

**Methodology:** Qualitative observation in 1982 of changes in farming systems in villages studied intensively in 1966-82.

**Findings/Recommendations:** Major changes in farming system from 1972 to 1982 include simplification of cropping systems with reduced plant diversity but improved varieties, disappearance of fallow and extension of cropped area with concomitant reduction in ability to sustain large numbers of livestock, increased mechanization and income, changes in division of labor. Changes largely a result of droughts of 1972, 1977 and 1980, but heavily influenced also by government interventions (themselves initiated partly in response to droughts) including food aid, new administrative organization, and new civil law.

**Relevance:** Low.

**Keywords:** Farming system, drought, food aid, institutions, Peanut Basin.

- [113] Gastellu, Jean-Marc. (1985) *Petit traité de matrilinearité. L'accumulation dans deux sociétés rurales d'Afrique de l'Ouest*. *Cahiers ORSTOM. Série Sciences Humaines*. Vol. XXI, No. 4: 413-432.

**Objectives:** To show how accumulation and economic differentiation takes place in the mainly matrilineal societies of the Serer (Senegal) and the Agni (Côte d'Ivoire).

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** Ecology, economy and history have to be considered in the attempt to understand how organizations were established. There are also regional differences in organizations. Local societies have to be seen in their relations to the international economy in conjunction with influences from national policies. A local society can be in harmony with or in opposition to the international community, depending on its mode of organization. National policies can strengthen or weaken the relationship. However, it is not enough to understand the relationships and to simply substitute community projects. The whole production process of these societies is oriented towards different goals. Conscious and voluntary acts are not enough for development; the natural environment, subconscious and involuntary reactions also play a role. Development activities have to become part of a global evolutionary process of societies.

**Relevance:** High.

**Keywords:** Ethnic groups, population, village development, environment, production.

- [114] Gastellu, Jean-Marc. (1981) *L'égalitarisme économique des Serer du Sénégal*. Travaux et Documents de l'ORSTOM No. 128. Paris: ORSTOM. 808 p.

**Objectives:** Analysis of economic egalitarianism of the Serer in Senegal on the basis of an approach combining economic with anthropological tools. Traditional development economics is regarded as an inappropriate basis of understanding and analyzing the reality of the Serer. A new approach is needed: integration of social phenomena into economic analysis (economic anthropology).

**Time Period:** Data from 1967-1972.

**Methodology:** Economic and anthropological approach; descriptive analysis with data collected in a survey and interviews.

**Data Collected:** Data on: ethnic groups, family relationships, the cooperative Ngohé-Mbayar, religious groups, political groups, social status, labor force on farms, loans, capital, cultivated area and equipment used, livestock, land distribution, age distribution, work tasks, migrants, revenues, hours worked, trade, expenditure, etc.

**Findings/Recommendations:** Social organization of the Serer minimizes differences through separation of economic units and distribution of means of production. Producers are prevented from individual accumulation of goods. There is no minority of landowners. Agricultural equipment is unequally distributed due to high cost but it is only purchased where necessary. There is a relationship between equipment, labor force on the farm and area cultivated. There is no concentration of political power in the villages. Subsistence economy required production at lowest cost. Economic egalitarianism generated a collective dynamic of adaptation which goes counter to the individual dynamic being created as the Serer try to integrate into a modern national unit. Production for own consumption results from cooperative efforts but production for marketing is more individualistic. Division of labor at the farm level exists and compensates for less productive members. Even though men (especially the landowners) have higher money incomes than women, they also put the most effort into their units, resulting in more equality within the unit but not necessarily

between units. Continuity of economic egalitarianism is assured through the separation of producing-consuming unit and the unit of accumulation.

**Relevance:** Medium.

**Comments:** Detailed description and data on the Serer.

**Keywords:** Macroeconomic policy, trade, production, income, ethnic groups, religious groups, cooperatives, consumption, livestock, peanuts, millet, rice, nonagricultural activities.

- [115] Gaudio, Bernard. (1989) **Plan de marketing des semences de maïs au Sénégal.** Paris: MMC (Marketing, Management, Conseil). Juillet. 89 p.

**Objectives:** To define and devise a marketing plan for maize seed.

**Methodology:** Report contains Part I (Situation analysis) and Part II (Marketing recommendations).

**Findings/Recommendations:** Area planted to maize and yields per hectare increased since early 1970s. The national cereals plan has objective of 256,000 tons of maize produced in 2000 on 160,000 hectares, which implies an increase over 1988 of about 60 percent. At current prices, corn competes favorably with millet, but represents a very minor part of the cereals market. A favorable trend toward corn consumption is noted for urban markets. White corn (synthetic C), rich in proteins and the type most Senegalese grow, is preferred for human consumption; animal consumption of corn is not well-developed in Senegal at this time. Report identifies 4 target groups for corn seed marketing efforts: traditional farmer (who tends to not use commercial seed, fertilizer or tillage), "leader" farmers with whom extension services work, farmers who produce seed, and mechanized farms. A study shows that 64.5 percent of farmers were unfamiliar with the maize program, 51.3 percent did not use fertilizer, 72.5 percent were unacquainted with varieties disseminated by the maize project, 81.5 percent did not till their corn fields, 73 percent want to increase corn production, and 90 percent of farmers using maize project seeds are satisfied. Two hybrids developed by ISRA (QPM1 and QPM2) have high protein content relative to ordinary varieties of corn (about 40 percent higher lysine and 50 percent higher tryptophane) and seem well-suited for a consumer marketing campaign.

**Relevance:** Low; primary focus is the SODEVA/GTZ maize project.

**Comments:** Report does not go into substantive detail but presents rough outline of actions to be undertaken; instances of author's unfamiliarity with Senegal and its farmers are found throughout the paper; part 2 (sections 11-12) provides specific production and marketing objectives; copy annotated has no bibliography or list of sources; document is not well-written.

**Keywords:** Maize, production, seed, seed distribution, extension, fertilizer distribution, food security, nutrition, irrigation.

- [116] Gaviria, Juan. (1989) **Senegal's rural road transport.** Washington, D.C.: World Bank, Africa Region, Technical Department, Infrastructure Division (AFTIN). October. 26 p (text) + 6 p (appendices).

**Findings/Recommendations:** Senegal's road network is estimated at 14,000 kilometers, 30 percent of which are paved. Rural road expansion has been slow, partly due to poor performance of the economy. Since 1985, road conditions have deteriorated for both paved and unpaved roads. Grading of earthen roads should be done annually, but the average for Senegal is once each four years. Marketing costs, nearly half of which are attributable to transport, account for 20 percent of the price of groundnuts delivered to the factory (oil mills). **Recommendations:** a complete road inventory should be done for Senegal. Financing and institutional organization of the roads administration need to be reviewed. Transportation logistics need to be reviewed (by SONACOS) for peanuts.

**Relevance:** Medium.

**Comments:** Good background information for agricultural project planning.

**Keywords:** Transport, infrastructure, peanuts, marketing.

- [117] Gaye, Matar. (1989) **Contribution à l'étude de la filière engrais au Sénégal.** Kaolack: ISRA, Secteur Centre-Sud. April. 27 p.

**Objectives:** Review of current fertilizer distribution and utilization in Fatick and Kaolack regions.

**Time Period:** Not specified.

**Methodology:** Descriptive analysis of farmer perceptions, market participants, and farmer methods for acquiring and using fertilizer.

**Data Collected:** Informal survey, secondary formal survey data on cash/credit fertilizer purchases, sources of credit, use of fertilizer by crop.

**Findings/Recommendations:** At current fertilizer and crop prices, fertilizer use is a low priority for farmers; scope for reducing fertilizer prices in the short term is limited in the absence of subsidies.

**Relevance:** Medium.

**Comments:** Up-to-date assessment of fertilizer distribution and use from the perspective of farmers and suppliers; does not offer new empirical analysis or policy prescriptions.

**Keywords:** Fertilizer distribution, Peanut Basin.

- [118] Gaye, Matar. (1988a) **Les coopératives rurales au Sénégal et l'expérience de la responsabilisation.** Document préparé pour le séminaire ISRA-MSU sur la politique agricole et alimentaire au Sénégal tenu à Dakar du 7 au 8 Juin. June. 34 p.

**Objectives:** To look at cooperatives in the peanut industry, and the experiences in turning the paternalistic approach of the government into an approach allowing more responsibility by the member farmers.

**Methodology:** Formal survey in the Kaolack and Fatick regions; informal discussions with regional representatives of the cooperative movement and individual farmers.

**Data Collected:** Various data on membership, distribution of seed, composition of cooperative subgroups, and debt.

**Findings/Recommendations:** Increased responsibility in handling credit was accepted by 3/4 of the presidents of the village sections, rejected by 1/4 because of resulting social problems (social equity vs. economic efficiency). Confidence in the borrowers as the subjective basis of giving credit replaced objective criteria. This could be solved by partial self-financing through the CNCAS; power of the individual president would thereby be reduced. Status of the member is often not defined. Initiatives toward the creation of more financial autonomy should be encouraged. Through the introduction of credit management, people are more aware of cooperatives but mobilization of the farmer as a borrower does not indicate a viable system. The impact of groups such as OPS and GIE on cooperatives needs to be studied.

**Relevance:** High.

**Keywords:** Cooperatives, peanuts, credit, debt, subsidies, regulation.

- [119] Gaye, Matar. (1988b) **Le crédit informel en milieu rural sénégalais: Enquête dans les régions de Fatick et de Kaolack.** Dakar: ISRA, Direction des Recherches sur les Systèmes Agraires et l'Economie Agricole. June. 22 p.

**Objectives:** To characterize farmers' credit needs; describe farm level informal credit liabilities; and analyze the impact of recently established traders as providers of credit to the rural community.

**Time Period:** Mid-August to mid-October 1987.

**Methodology:** Survey of a sample of 240 farm household heads and complete enumeration of 39 private traders in the Kaolack and Fatick regions.

**Data Collected:** Farmer rankings of credit needs, actual credit uses, resource endowments, credit sources, interest charged.

**Findings/Recommendations:** Main policy finding is that continuing regulation of the number and location of traders is a constraint on the amount of credit provided by, and degree of competition among, traders. Other findings include: 1) only 23% of farm households reported seeking informal credit, 2) informal credit primarily used for seed and food, 3) fertilizer was the main informal credit need satisfied by traders, 4) interest rates were charged in less than 50% of transactions and were highly variable, 5) sale of groundnuts to a trader were almost universally a condition for receiving credit, 6) experienced traders preferred to provide cereals rather than cash or inputs on credit, and 7) no significant relationship between amount of credit disbursed by a trader and distance from competition.

**Relevance:** High.

**Comments:** Findings reveal a need to monitor carefully the impact of policy reforms over time on access to, and competition in the provision of, credit and inputs.

**Keywords:** Credit, private sector.

- [120] Gaye, Matar. (1988c) **Les structures coopératives face aux mutations institutionnelles.** Dakar: ISRA, Direction des Recherches sur les Systèmes Agraires et l'Economie Agricole. Décembre. 26 p.

**Objectives:** To understand the operational environment of the new cooperative organizations by studying their management and problems of agricultural input provision.

**Methodology:** Formal survey of cooperatives, village sections and individual farm households using a 1986 sample of 60 village sections and 240 farm households.

**Data Collected:** Characteristics of elected officers (e.g., age, education), conformity of management structure with regulations, financial resources, investment priorities, attitudes to reintroduction of private sector traders.

**Findings/Recommendations:** Co-operatives lack financial organization and physical infrastructure. Lack of remuneration for elected officers a point of contention. Almost total absence of female participation in management of cooperatives and SVs (much higher level of female participation in GIEs). Limited participation of SVs in CNCAS credit program due in part to strict conditions of access. Low fertilizer sales through cooperatives due to many factors including fall in groundnut price, lack of access to credit, priority use of funds for seed.

**Relevance:** High.

**Comments:** A rather unstructured but practical ground level assessment of the many constraints facing the government's policy of "responsibilisation."

**Keywords:** Cooperatives, inputs, credit.

- [121] Gentil, D.; Ledoux, G. (1988 [sic; 1989?]) **Comments on the study entitled "The competitiveness of Sahelian agriculture" by Shapiro and Berg, October 1988.** Paris: Institute for Research and Application of Development Methodology (IRAM). February. 29 p.

**Methodology:** Summarizes and critiques 8 major arguments made in the Shapiro/Berg paper, especially that higher producer prices have no effect on cereal production.

**Findings/Recommendations:** Sahelian states cannot rely exclusively on cash crops (small comparative advantage) at expense of food production. Cereals policy must include selective protection as well as production incentives. Such policies must be implemented at regional level. Many issues lack consensus (agricultural potential, price-responsiveness of production and consumption, rigidity of food habits, effectiveness and adequate level of protection).

**Relevance:** High.

**Comments:** Both sides show tendency to support their arguments by selective reference to studies in different and perhaps noncomparable zones (e.g., coastal vs. inland areas, low vs. high potential areas, etc.).

**Keywords:** Cereals, imports, trade policy, regional policy, price policy, liberalization, private sector.

- [122] Germain, Paul; Thiam, Abou. (1983) **Les pesticides au Sénégal: Une menace?** Série Etudes et Recherches No. 83-83. ENDA. Juin. 57 p.

**Objectives:** To study accidents from, abuse of, and inappropriate usage of pesticides in Senegal and to attract attention to the need for research and improved practices to protect human health and the environment from pesticide use.

**Time Period:** June 1982 to ?

**Methodology:** Investigative survey on use, application, and marketing of toxic chemicals.

**Data Collected:** Documents cases where pesticide use has led to deaths, illnesses, and environmental contamination. Reports secondary data on type and amount of pesticides used by La Compagnie Sucrière Sénégalaise (CSS); amount and percentage of total hectareage by crop treated with pesticides (1981); cost of treating different crops with pesticides (1981); types of insecticides produced in Senegal; and principal pesticide distributors in Senegal.

**Findings/Recommendations:** Numerous toxic chemicals which are banned in Senegal can still be obtained in the market. Many legal chemicals such as HCH are applied using wasteful and dangerous methods; others, such as Thimul 35, are dangerously packaged and discarded. Farmers often base their application rates on factors such as color and odor, and are frequently unable to read written instructions when they are available. Government storage of chemicals is inadequate and dangerous. Waste disposal by CSS, which pollutes the Lac de Guiers, may result in significant social costs.

**Relevance:** Medium.

**Comments:** International concern over dangers of pesticides led to the organization in 1982 of an international association, PAN-International (Le Réseau Mondial pour le Contrôle des Pesticides) in 1982. ENDA, a founding member of this association, subsequently initiated Project PRONAT (Protection Naturelle). This report represents a useful first effort by PRONAT in documenting various areas of concern in pesticide usage.

**Keywords:** Pests, environment, health, regulation.

- [123] GERSAR/CACG; Euroconsult; Sir Alexander Gibb & Partners; SONED-Afrique. (1989) **Plan directeur de développement intégré pour la rive gauche de la vallée du fleuve Sénégal. Schéma directeur de Bakel. (Tome 1. Etude du milieu et bilan socio-économique. Tome 2. Schéma directeur. Tome 3. Rapport de synthèse.)**. Version provisoire. Ministère du Plan et de la Coopération; Programme des Nations Unies pour le Développement; Banque Internationale pour la Reconstruction et le Développement. Août. 205 p (Tome 1), 206 p (Tome 2), 86 p (Rapport de synthèse).

**Objectives:** To define standards for intervening in the Upper Valley in light of regional characteristics; to propose an integrated development strategy and short-, medium-, and long-term action plans for hydro-agricultural installations and activities in complementary sectors.

**Time Period:** Short term: 1989-1994; medium term: 1995-2000; long term: 2001-2015.

**Data Collected:** Physical data: climatological and hydrological data from the Senegal and Falémé rivers, ground water, hydrogeological, soil, and environmental data.

Population data: demographic, sociological and institutional data. Economic data: characteristics of the rural economy, agricultural production systems (rainfed, flood



plain, irrigation, livestock), other economic activities (service and artisanal industries, and commerce), market studies, credit, equipment and infrastructure.

Hydroagricultural installations: current situation, analysis, cost data.

**Findings/Recommendations:** Findings: traditional agricultural practices include rainfed cereals crops, flood plain cereals, horticulture, and fruit trees, and irrigated cereals and vegetables. Constraints in the traditional system include isolation from markets and virtual absence of farm-to-market roads, low levels of equipment, agricultural inputs, and technical training, absence of agricultural credit, outmigration of labor force, and environmental health hazards. Livestock is constrained by unavailability (competing demands) of water, unfavorable economic conditions for herders, poor pasture management practices, presence of parasitic diseases. Sociological recommendations: work within social and family structures, concentrate on dominant activities within the traditional farming context, reinforce support structures for development activities (NGOs and community organizations), and improve training. Economic recommendations: priority should be given to cereals self-sufficiency, and activities should be planned which contribute to increasing farmers' revenues and improve village living conditions.

**Relevance:** High.

**Comments:** A major study despite the limited scope (9,500 square kilometres in the Bakel zone). One of the four "schemas" from which the Plan directeur de la Rive Gauche will be developed. Volume I contains the base data for the study; volume II presents development strategies and the action plans.

**Keywords:** Credit, education, employment, environment, farmer organizations, food security, GIEs, health, horticulture, infrastructure, irrigation, market prospects, migration, natural resources, NGOs, nutrition, population, RDAs, rural incomes, soil quality, transport, water management.

- [124] Gersovitz, Mark; Waterbury, John (eds.). (1987) **The political economy of risk and choice in Senegal.** London: Frank Cass & Co. Ltd. 326 p. + bibliography and index.

**Objectives:** In collaboration with the Ministry of Plan and USAID/Dakar, to examine Senegal's rural development problems in light of various aspects of risk in agricultural production, management and policy implementation at the level of cultivators, state agencies and the government.

**Time Period:** 1982-84.

**Methodology:** Informal rural financial market survey in 5 of 7 agricultural regions during the Spring 1983; interviews with government officials; secondary and historical data on agricultural production, rainfall, and secondary data on domestic and international agricultural prices, foreign aid flows, the cooperative service and land distribution. Several analyses of relationships between rainfall, crop production and land distribution.

**Data Collected:** Nine chapters by: Gersovitz on the role of climatic conditions and international prices as sources of uncertainty in the Senegalese economy; Waterbury on household-level economic behavior and the dimensions of state intervention in the Peanut Basin; Tuck on rural financial markets; Gellar and Tignor on Senegal's

historical and contemporary cooperative experience; Jammeh on the politics of agricultural price decision-making; de Macedo on the choices before Senegal concerning its foreign trade and balance of payments as a small country operating with a fixed exchange rate in the West African monetary union; and Lewis on aid, structural adjustment and Senegalese agriculture with attention to the policy dialogue between the government and donors.

**Findings/Recommendations:** Conclusions range widely and include: the Senegalese cultivator is fully integrated into the market system; the rural household represents diverse production interests; and cultivators are increasingly part-time producers. Recommendations made for revitalizing the cooperative movement and general considerations concerning the effectiveness of a rural credit program. Concerns expressed that near-term breakthroughs in farm production should not be expected and that donors and the government might focus more basically and broadly on human resources development.

**Relevance:** Medium.

**Comments:** Good background and policy-relevant historical overview, especially chapters by Gellar, Lewis, Tuck and Waterbury.

**Keywords:** Cooperatives, credit, macroeconomic policy, agricultural policy, price policy, prices, RDAs, structural adjustment, trade policy, politics.

- [125] Gersovitz, Mark. (1986) **Agro-industrial processing and agricultural pricing under uncertainty.** *Review of Economic Studies*. Vol. 53 (1), No. 172: 153-169.

**Objectives:** To present a cost/benefit analysis of processing capacity to analyze groundnut production and processing in Senegal, and to identify the optimal processing capacity and the optimal producer price.

**Time Period:** 1983.

**Methodology:** Econometric estimates of climate-yield relations.

**Data Collected:** Groundnut production and area planted from 1947 to 1980.

**Findings/Recommendations:** Shows how to choose the level of processing capacity and input pricing under particular assumptions about decision makers' preferences, sources of uncertainty, the availability of raw material and the processing technology.

**Relevance:** Medium.

**Keywords:** Peanuts, processing, price policy, model.

- [126] Giri, Jacques. (1989) **Le Sahel au XXI<sup>e</sup> siècle. Un essai de réflexion prospective sur les sociétés sahéliennes.** Paris: Karthala. 342 p.

**Objectives:** To explore future possibilities of the Sahelian countries, given the existing land, material and human capital on the basis of an understanding of the mechanisms that made the Sahelian societies what they are today. Social as well as economic aspects are taken into account. The basic hypothesis is that social and cultural factors have blocked the adoption of more efficient techniques.

**Time Period:** The book is based on previous research conducted for the Club du Sahel.

**Methodology:** Descriptive analysis using some data: retrospective, trend scenario, possible futures.

**Data Collected:** Secondary data on: debt, production, value added, public development aid, urbanization.

**Findings/Recommendations:** The trend scenario points to stagnation and a lower standard of life for the Sahelian population in the following 25 years but brighter or dimmer scenarios are also possible depending on a variety of factors and how the Sahelian people deal with them.

**Relevance:** Medium.

**Comments:** The book is based on scientific research but is intended to bring the topic of this book to the attention of a broader audience, using a less scientific approach and presenting past research in a more palatable form.

**Keywords:** Structural adjustment, debt, food aid, population, environment, government, institutions, desertification, drought, regional policy, industry, agricultural development, technology.

- [127] Glenshaw, Peter. (1988) **Senegal - Phosphate industry supervision and exploratory mission back-to-office report.** World Bank, EMTIE. September. 11 p (text) + ca. 20 p (annexes).

**Objectives:** Familiarization with phosphate industry, supervision of Credit 1360-SEN (Phosphate Industry Development Engineering), discussion of strategies for future development, and World Bank role.

**Time Period:** 1-5 August, 1988.

**Methodology:** Discussions with various individuals, and visits to Taiba (phosphate), Daou (phosphoric acid), and Mbao (fertilizer) factories.

**Findings/Recommendations:** Industry currently in poor state, but prospects are bright. Future demand for Taiba phosphate and acid threatened by high cadmium content, thought to be as damaging to health as lead. Promophos has operated effectively under IDA credit. CSPT (Taiba) shows good financial position and operating efficiency. ICS acid plant operating at 80% capacity, but Mbao fertilizer plant at less than 50%. ICS virtually bankrupt and should be restructured based on careful financial analysis. Mine at Thiès is nearly finished due to poor quality ore and aging equipment. SENCHIM has built impressive organization, with 48 sale points operated by independent Senegalese traders. Report notes the "immense" working capital needs of fertilizer distribution. Room exists for cost reduction in rail transport of exports, and in port operations. Little reason to develop reserves at Matam at present, given extensive reserves at Taiba. Phosphate exports will remain profitable if world prices hold up or CSPT cuts costs, and if the cadmium problem is solved. ICS earns good margins on its products, but considerable funds are needed for investment and payment of accumulated losses. Recommendations include future World Bank support, approval of phosphate industry access to the IDA Industrial Restructuring Credit, and strengthening of the Department of Mines and Geology.

**Relevance:** High.

**Keywords:** Fertilizer, environment, private sector, exports, donor assistance.

- [128] Goetz, S. J. (1988a) **Observations on rural self-sufficiency and prospects for expanding cereals production in Southeastern Senegal: A preliminary report.** ISRA/MSU Food Security Project Working Paper No. 6. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. June. 22 p.

**Objectives:** To identify willingness and ability of farmers in southeastern Senegal to respond to floor price incentives; constraints on expanded food production.

**Time Period:** 1986/87 production and marketing seasons.

**Methodology:** Multiple-visit surveys of ca. 200 households; descriptive analysis.

**Data Collected:** Input ownership; production and transactions data, reasons for sales and purchases; investment priorities, perceived constraints to extensification; price data; opinion data.

**Findings/Recommendations:** Diversity of households concerning buying, selling cereals, or not participating in markets at all, implies limited effectiveness of floor price policy and adverse distributional consequences in short run. Policies needed to raise productivity on and off farms: promote fertilizer for maize in southern Peanut Basin and Tambacounda, and draft equipment in Casamance. Challenge for policy is to protect cereals deficit producers while providing reasonably assured market outlets for farmers beginning to adopt improved cereals technology, and continuing to seek ways of increasing cost effectiveness of the technology.

**Relevance:** High; illustrates complexity of stimulating growth, and the need for a policy focus.

**Comments:** Early research results; further analysis in Goetz (1989). French version, "Observations sur l'Autosuffisance Alimentaire en Milieu Rural et les Perspectives d'Expansion de la Production Céréalière au Sud-Est du Sénégal: Rapport Préliminaire"

**Keywords:** Price policy, fertilizer distribution, Senegal Oriental, Casamance, cereals, production.

- [129] Goetz, S. J. (1988b) **Agricultural product prices in Southeastern Senegal: Final report for 1987.** ISRA/MSU Food Security Project Working Paper No. 7. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. April. 17 p.

**Objectives:** To report agricultural product prices observed in 6 rural and 2 urban marketplaces in southeastern Senegal.

**Time Period:** June 1986 to November 1987.

**Methodology:** Bi-weekly market surveys (BAME method); descriptive analysis.

**Data Collected:** Consumer and producer market prices (where relevant); converted from traditional units of measure to kgs.

**Findings/Recommendations:** Limited marketed cereals surpluses in the Casamance; cereals floor price policy generally not effective, or costly relative to quantities purchased. Even where successful, fixing prices across space, time and product-form causes economic problems. Observed consumer peanut prices also differ by area (higher in Tambacounda); parallel market producer price competitive with official

price. Cowpea prices well above those in the Peanut Basin; need for increased market information and better transport to increase consumption. Trading of Gambian (re-exported) rice is important--strong need for cross-border coordination of price policies.

**Relevance:** Medium; allows comparison of official/actual prices; shows regional supply and demand relationships.

**Comments:** French version, "Les Prix des Produits Agricoles au Niveau de Quelques Marchés au Sud-Est du Sénégal: Rapport Final 1986-7"

**Keywords:** Prices, consumers, producers, Senegal Oriental, Casamance, cereals.

- [130] Coetz, S. J. (1988c) **Farmer perceptions, opinions and the New Agricultural Policy: Results of a survey in Southeastern Senegal.** ISRA/MSU Food Security Project Working Paper No. 13. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. July. 48 p.

**Objectives:** To anticipate farmers' responses to USAID's Agricultural Production Support project, and to provide early feedback for future policies and programs.

**Time Period:** 1987.

**Methodology:** Household surveys; descriptive analysis.

**Data Collected:** Farmer opinions on current and future policy reforms.

**Findings/Recommendations:** Relaxing credit constraints at planting is critical, but need to broaden policy focus beyond fertilizer. "Getting prices right" is not the only issue; need to understand full set of factors and alternative options affecting farmers' willingness and ability to expand cereals production. Increased production will depress output prices, affecting profitability of fertilizer use. Privatized system bearing full cost of distribution will increase cost of input delivered to farm and curtail farm-level demand.

**Relevance:** High; specifically oriented towards the APS.

**Comments:** Early results from a longer research project; also contained in Goetz (1989).

**Keywords:** Price policy, inputs, Senegal Oriental, Casamance, private sector, credit.

- [131] Goetz, S. J.; Holtzman, J. S. (1988) **Input acquisition and crop mix changes in 1987: A farm-level report for Southeastern Senegal.** ISRA/MSU Food Security Project Working Paper No. 12. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. April. 27 p.

**Objectives:** To describe farmers' investments in inputs prior to 1987 crop season, and qualitative changes in cropping patterns.

**Time Period:** 1987 input marketing and production season.

**Methodology:** Field surveys of agricultural households; descriptive analysis.

**Data Collected:** Inputs used; investment preferences; labor supply and crop mix changes.

**Findings/Recommendations:** Parastatals (SODEFITEX) dominate input distribution (credit); virtually no fertilizer used in 1987 in southeastern Senegal in areas where SODEFITEX did not intervene. Some farmers continued to sell off equipment; lack of cash during hungry season (especially in Casamance) appears to be serious

constraint affecting productivity and output. Peanuts are perceived as more profitable among food-secure households in southern Peanut Basin and Tambacounda; nevertheless many farmers reportedly increased area cultivated to cereals in 1987, due in part to lack of peanut seed. Issues include: parastatal and private sector cooperation in distributing inputs in the short run; which farmers will eventually receive fertilizer, and the income distribution effect; assured distribution of certified, high-quality peanut seed under NPA if SONACOS withdraws entirely. More research required on linkages between rural and urban labor markets. Discusses investment priorities and implications; providing general purpose credit at planting could raise labor productivity and availability.

**Relevance:** Medium; shows that little change had taken place in the input distribution system.

**Comments:** Early results of a longer project (see Goetz, 1989). French version, "L'Acquisition des Intrants Agricoles et les Changements des Combinaisons Culturelles au Sud-Est du Sénégal en 1987: Rapport sur les Exploitations Agricoles."

**Keywords:** Input distribution, Senegal Oriental, Casamance, peanut seed, fertilizer, private sector.

- [132] Goetz, S. J.; Diagana, B. N.; with Diallo, A. K. (1987) **Le projet sécurité alimentaire ISRA/MSU/USAID: Note méthodologique.** ISRA/MSU Food Security Project Working Paper No. 8. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. Décembre. 21 p.

**Objectives:** To describe the research methods of Food Security Project.

**Time Period:** October-November, 1986.

**Methodology:** Interviews with village and weekly market chiefs, agricultural officers, parastatal agents; census administered in 27 villages.

**Data Collected:** General characteristics of villages, markets, regions.

**Findings/Recommendations:** Research methods described.

**Relevance:** Low.

**Comments:** Description of survey areas and how sample of villages and farmers was identified; useful for researchers concerned with southeastern Senegal. See also Goetz et al. (1988).

**Keywords:** Research methods, Senegal Oriental, Casamance, food security.

- [133] Goetz, S. J.; with Dieng, A. (1987) **Characteristics of agriculture and farm households in South-eastern Senegal.** ISRA/MSU Food Security Project Working Paper No. 9. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. March. 32 p.

**Objectives:** To describe selected characteristics of agriculture and farm households in southeastern Senegal.

**Time Period:** January-March 1987.

**Methodology:** Secondary data; survey data; descriptive analysis.

**Data Collected:** Regional level: rainfall, crop statistics for production, area, yields.

Household level: resources; crops; demographics; inputs; livestock.

**Findings/Recommendations:** Presents descriptive profile of farm households. Plots time series data for official regional crop production statistics, 1961-86. Analysis of rainfall data (distribution, variability, etc.) For policy-relevant results, see other documents by Goetz, et al.

**Relevance:** Low.

**Comments:** Of interest to researchers initiating studies in southeastern Senegal and seeking bibliographic references; early report from longer project.

**Keywords:** Agricultural research, Senegal Oriental, Casamance.

- [134] Goetz, S. J.; Fall, A. A.; Diagana, B. N.; Holtzman, J. S. (1987) **Private cereals traders in Southeastern Senegal and the APS: Observations on opinions, prospects and implementation issues.** ISRA/MSU Food Security Project Working Paper No. 10. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. December 8. 10 p.

**Objectives:** Outline paper prepared for seminar and discussion with USAID/Dakar.

Assess willingness and ability of traders to respond to NPA incentives.

**Time Period:** 1987 marketing season.

**Methodology:** Cereals trader surveys; descriptive analysis.

**Data Collected:** Activities, resources, and opinions of 45 cereals traders; opinions on willingness and ability to distribute improved inputs.

**Findings/Recommendations:** Limited marketed surpluses of cereals in survey areas explain limited resources and activities of cereals traders. Traders willing to distribute fertilizer but are concerned with price level and credit repayment problems; have limited knowledge of fertilizer use; and anticipate transportation problems in remote areas. Traders would prefer to work through (new) farmer organizations. With more financial resources, technical knowledge of inputs, improved management and market information, they should be able to play a more active leadership and coordinating role in cereals subsector.

**Relevance:** High; directed explicitly at the APS.

**Comments:** Results partially summarized in Holtzman et al. (June 1988).

**Keywords:** Fertilizer distribution, traders, Senegal Oriental, Casamance.

- [135] Goetz, S. J.; Holtzman, J. S.; with Dieng, A. (1987) **Crop mixes, agricultural inputs and parastatal organizations: Reports from farmers in South-eastern Senegal.** ISRA/MSU Food Security Project Working Paper No. 11. Dakar: ISRA/Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. May. 30 p.

**Objectives:** To describe the crop mixes, resources and participation of farmers with parastatal programs.

**Time Period:** 1986 production season.

**Methodology:** Field surveys of agricultural households; descriptive analyses.

**Data Collected:** Crop cultivation characteristics; use of seed, chemical inputs, draft equipment; parastatal participation and private sector credit.

**Findings/Recommendations:** Recent crop mix trends favor cereals to the detriment of cotton production. Intensification more feasible in Peanut Basin and Tambacounda, where higher population density raises economic viability of input/output marketing system. Extensification in Casamance (draft equipment is of high priority). Reduced peanut seed availability may hurt those relying on peanuts to purchase food but also increase cereals self-sufficiency. Subsidized Gambian fertilizer appears to crowd out private Senegalese fertilizer in border areas; policy coordination is required. Low net (new) investment in draft equipment is a major concern. Informal credit mostly used for consumption purposes during crop growing season (likely to raise labor productivity); limited credit linkages between producers and traders.

**Relevance:** Medium; some policy analysis.

**Comments:** Of primary interest to researchers; early results from a longer project; policy-relevant information is analyzed in Goetz (1989).

**Keywords:** Input distribution, production, Senegal Oriental, Casamance, public sector, credit, peanut seed, equipment.

- [136] Goetz, Stephan J. (1989) **Market reforms and the cash-food crop debate in southeastern Senegal.** Draft Ph.D. dissertation. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. December. ca. 250 p.

**Objectives:** To describe/analyze the existing economic system facing farm households; to explain input use and investment, production and marketing behavior of farmers; to evaluate farmers' ability to respond to NPA and to assess likely effects of NPA incentives (intended or unintended) on food security status and welfare of households; to identify points of leverage in the food system to complement current policies in stimulating growth in southeastern Senegal.

**Time Period:** October 1986 to November 1987.

**Methodology:** Surveys of 215 households (7 visits) in 15 villages; region selected based on expected high agricultural potential. Bi-weekly collection of agricultural prices in 5 rural weekly and 4 regional markets. Descriptive, statistical and econometric analyses.

**Data Collected:** Resources (labor, draft equipment and animals, fertilizer, chemical products, etc.), activities (crop production and transactions behavior, livestock, off-farm activities, etc.), perceived constraints, opinions about and expected responses to market reforms.

**Findings/Recommendations:** [Preliminary and selective]: Diversity of rural households--some are net buyers of coarse grains (CG), some net sellers, or not involved in CG market--limits scope for cereals output price policy. Fertilizer and improved seed not necessarily most limiting inputs; draft equipment especially limiting in Casamance. In addition to prices, availability of CG processing technology stimulates CG sales; more market information appears to increase CG market participation. There are technological and input-related complementarities between cash and food crops. Challenge for Senegal is to raise productivity of both food and



cash crops to maximize rural growth, while paying attention to environmental sustainability issue.

**Relevance:** High.

**Keywords:** Price policy, cereals policy, inputs, privatization, food security, Senegal Oriental, Casamance, equipment, cereals marketing.

- [137] Goetz, Stephan J.; Crawford, Eric W.; Diagana, Bocar N.; Holtzman, John S.; Weber, Michael T. (1988) **An analysis of the effects of changes in marketing institutions and policy on cereals producers and marketing agents in southeastern Senegal--Executive Summary.** Final report, Senegal Applied Research Component, Food Security in Africa Cooperative Agreement No. DAN-1190-1-00-4090-00. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. September. 47 p.

**Objectives:** To provide policy-relevant and timely information on the anticipated consequences of market reforms on rural households and marketing agents.

**Time Period:** October 1986 to November 1987.

**Methodology:** Exploratory survey of 27 villages located in southeastern Senegal; census of 400 farm households, 45 traders, 35 farmer organizations; in-depth surveys of 215 households (7 visits) in final sample of 15 villages aggregated into 5 "triads"; selection based on expected high agricultural potential; also surveys of traders and farmer organizations (6 visits each) associated with the triads (including traders from regional centers). Bi-weekly collection of agricultural prices in 5 rural weekly and 4 regional markets. Interviews with agricultural officers and parastatal agents. Descriptive analysis.

**Data Collected:** Resources, activities, constraints and opinions (observed and potential behavior). Data intended to clarify assumptions made in the NPA about food system participants' behavior, and to assist in deriving alternative policy options and anticipated effects of options.

**Findings/Recommendations:** Many households are food deficit producers, buy cereals, face higher prices (than sellers), and are unwilling and/or unable to expand cereals production in short run. Animal traction is associated with higher total and per capita output of all crops, and the ability to obtain/retain it appears critical. Promoting fertilizer alone not likely to have strong effect, especially in Casamance. Farmers buy durable inputs from traders; important to build on/strengthen these relationships under NPA. Farmer organizations are under-equipped in terms of material/human resources; current activities are limited and outlook for them under NPA is poor; could learn from/build on SODEFITEX-type model. Farmer organizations require considerable public assistance, at least in near term, to become effective actors. Lack of farm-level demand, parastatal dominance and cheap Gambian fertilizer discourage private trader involvement in fertilizer distribution; fertilizer price level remains a thorny issue, especially under initially high-cost private delivery system. Need to develop human capital of traders in conjunction with farmer organizations. Need continued monitoring of the changing food system. Need to identify and build on complementarities between private and public sectors in nurturing and coordinating input-output markets in uncertain environment.

**Relevance:** High.

**Comments:** Provides concrete program and policy options for stimulating farm productivity growth and private merchant activities in southeastern Senegal. Supplemented by analyses in Goetz (1989).

**Keywords:** Agricultural research, input distribution, price policy, privatization, food security, cereals policy, public sector, Senegal Oriental, Casamance.

- [138] Government of Senegal. (1988) **Memorandum on economic and financial policies for 1988/89.** Dakar: Government of Senegal. August. 24 p.

**Objectives:** To update and extend GOS's medium-term economic and financial policy framework; to review the progress made in the implementation of the 1987/88, adjustment program and detail the elements of the 1988/89 adjustment program.

**Time Period:** 1987/88 and 1988/89-1990/91.

**Findings/Recommendations:** Provides for a reinforcement of structural policies, further strengthening of the fiscal position, pursuit of prudent credit policy, reform of the banking system, and continued caution in external debt management policy. During 1987/88, GOS observed all benchmarks under structural adjustment, although not on a timely basis. Through end of March 1988, all performance criteria were met. Estimated real GDP growth of 4.4 percent exceeds target of 4.2 percent. Inflation fell to 2.5 percent versus target of 3.8 percent due to combination of domestic supply conditions and restrained aggregate demand. Current account deficit fell to 9.9 percent of GDP, above the target of 9.2 percent. GOS has liberalized import and marketing of agricultural inputs, reduced subsidies for fertilizers by about one-third, transferred production and marketing operations from rural development agencies to producer cooperatives and the private sector. Direct operating subsidies to the sugar company were discontinued. Seven public enterprises and two public agencies were liquidated in the second half of 1987. GOS will accelerate the pace of reform in the agricultural sector to further expand and diversify domestic production. GOS will prepare a program for the protection of soils and natural vegetation. GOS will lift all remaining price controls for goods and services by end 1988, except for minimum producer price for groundnuts, cotton and paddy.

**Relevance:** Medium; somewhat dated information but good background.

**Keywords:** Structural adjustment, macroeconomic policy, subsidies, agricultural policy, liberalization.

- [139] Griffon, M. (1988) **Cotton in West and Central Africa. Present situation and outlook. Senegal, Mali, Burkina-Faso, Niger, Côte-d'Ivoire, Benin, Togo, Cameroun, Central African Republic, Chad.** *Coton et Fibres Tropicales.* Vol. XLIII, fasc. 1: 55-58.

**Relevance:** Medium.

**Comments:** Short but somewhat useful general description and conclusions. Little specific on Senegal. French version of article also provided (pp. 51-54).

**Keywords:** Cotton, market prospects.

- [140] Guerin, H.; Sall, C.; Friot, D.; Ahokpe, B.; Ndoye, A.; with technical collaboration of Ba, T.M.; Faye, F.; Diop, M. (1986) *Ebauche d'une méthodologie de diagnostic de l'alimentation des ruminants domestiques dans un système agropastorale: L'exemple de Thyssé-Kaymor - Sonkorong au Sénégal. Cahiers de la Recherche-Développement.* No. 9-10: 60-69.

**Objectives:** To describe ruminant nutrition in two Senegalese villages, and to devise a method for diagnosing and improving production in agropastoral systems in semiarid environments.

**Time Period:** 1981-1985.

**Methodology:** Study in two villages of the Unités Expérimentales du Sine-Saloum.

Inventory of major types of vegetation. Estimates of plant production and amounts available for forage are based on equations developed in the Ferlo; these include soil type and amounts and temporal distribution of rainfall. Estimates of stocking rates and management of livestock based on surveys of herders and others in livestock management. Figures on productivity (livestock numbers and weight) obtained by measurement. Many of the figures are based on mathematical estimation or descriptive evidence rather than on actual measurement.

**Data Collected:** Land use in study area, forage production, animal weights and average daily gain by month (1984-85), comparison of mean seasonal weights in agropastoral and pastoral systems (1981-85), livestock movement in research area, grazing times in natural pastures and post-harvest fields; market value of various forages.

**Findings/Recommendations:** It is very difficult to estimate the available forage, food intake, and nutritional composition of feed in agropastoral and pastoral settings. The methods produce very approximate results; the authors are cautious about presenting conclusions or recommending changes based on these findings, but offer preliminary observations. The livestock population in the research area is too heavy for available resources, at least in difficult years; this lowers livestock productivity and degrades natural pastures. The quality of forage vegetation is deteriorating. Management which permitted regeneration of desirable plant species, including woody plants, would be helpful but would require changes in farmers' attitudes and in community grazing practices. Current levels of peanut hay production could cover a large proportion of the nutritional needs of livestock, but much of the hay is marketed to provide cash income. Management of crop residues raises complex questions of resource use and balancing of rations. Further study of animals' eating habits and needs could help to identify levels and balances of bovine and small ruminant populations which would be desirable from the points of view of productivity and ecological conservation.

**Relevance:** Low.

**Comments:** Useful introduction to the variables important in assessing livestock systems and to the methods and difficulties of measurement in pastoral systems.

**Keywords:** Livestock, farming system.

- [141] Guiro, A.T.; Sall, M.G.; Kane, O.; Ndiaye, A.M.; Diarra, D.; Sy, M.T.A. (1987) **Protein-calorie malnutrition in Senegalese children. Effects of rehabilitation with a pearl millet weaning food.** *Nutrition Reports International*. Vol. 36, No. 5: 1071-1079.
- Objectives:** To evaluate the efficiency of a pearl millet weaning food for rehabilitation of malnourished children.
- Time Period:** Duration of rehabilitation = 22 days.
- Methodology:** Statistical analysis of nutritional indicators before and after treatment with a control group of the same ethnicity.
- Data Collected:** Protein levels, alipoprotein levels, iron status, acceptability, digestive tolerance, weight gain.
- Findings/Recommendations:** Pearl millet weaning food appears to be a nutritious and efficient diet for the treatment of protein-calorie malnutrition. Iron deficiency was present in both malnourished children and the apparently healthy control group but was not corrected by the weaning food. Iron therapy should be undertaken only after the complete rehabilitation of children.
- Relevance:** Medium (in relation to the specific issue of targetting food aid to vulnerable groups).
- Comments:** Pearl millet weaning food comprised precooked pearl millet flour with skim milk powder, peanut oil, sucrose and vitamin salt. Study supported by the USAID-funded Pearl Millet Transformation project (685-02503-Senegal).
- Keywords:** Nutrition, millet.
- [142] Guissé, Nagim; Ouattara, Bakary; LeBloas, Jean. (1987) **Répertoire des travaux de cartographie, levés terrestres et couvertures aériennes du bassin du fleuve Sénégal (1ère version).** Dakar: Service Géographique National du Sénégal. Septembre. ca. 20 p.
- Objectives:** To inform users about maps and other geographic information available for the Senegal River Basin.
- Relevance:** Low.
- Comments:** Guide to various types of maps available for Senegal Mauritania and Mali, and where such maps may be found.
- Keywords:** Environment, Fleuve.
- [143] Hammer, Jeffrey S. (1986) **'Subsistence first': Farm allocation decisions in Senegal.** *Journal of Development Economics*. Vol. 23: 355-369.
- Objectives:** To develop and test a multiperiod model estimating food crop (millet) and cash crop (groundnuts) land allocation decisions, considering risk and marketing constraints.
- Time Period:** Uses 1960-1980 data.
- Methodology:** Solves multiperiod mathematical model based on maximizing expected cash income subject to subsistence constraints.

**Data Collected:** Secondary data on total production and total area planted to groundnuts and millet in six regions of Senegal, 1960-1980. Reports average millet yield in six regions.

**Findings/Recommendations:** Millet land allocations are negatively correlated with previous year's millet production, while groundnut acreage increases with millet production. Model suggests that higher yields and diversified production of staples reduces importance of millet acreage, while greater uncertainty increases its importance. Concludes marketing constraints on and risk associated with millet help explain land allocation decisions in Senegal, which do not follow profit maximization principles. This finding appears more true in the Groundnut Basin where there is a greater need for millet, than in the south where farmers behave in more standard, profit-maximizing way.

**Relevance:** Medium.

**Keywords:** Model, production, risk, marketing, Peanut Basin, cash crops, food security.

- [144] Hardy-Golan, Elise. (1989) **Land tenure reform in Senegal: An economic study from the Peanut Basin.** Madison, WI: University of Wisconsin-Madison, Land Tenure Center. September. 55 p (text) + 64 p (annexes).

**Objectives:** To determine degrees of land tenure security afforded by different tenure arrangements; to investigate effect of tenure security on land management practices and socio-economic structures.

**Time Period:** Interviewing conducted Jan-May 1987.

**Methodology:** Two village sections chosen purposively, each less than 1 hr's drive from Kaolack and within walking distance of weekly market; one in area of high population density and one in low. Random selection of 1/3 of compounds in each village from extension agents' list (48 compounds total). Enumerators lived in village. All registered titleholders (if located) were interviewed. Compound heads and individual field managers interviewed. Analysis includes social accounting matrix for each village.

**Data Collected:** Registered land holdings; compound characteristics (demography; capital stock; grain transactions; non-agricultural income); compound tenure by parcel and land improvements; field characteristics, tenure, inputs and outputs; distribution of harvest and revenue by field manager.

**Findings/Recommendations:** The 11 private titleholders were atypical, and their tenure security was not associated with mortgage credit use or efficient land use or allocation. Villages with greater tenure security did not show more use of land-improving techniques, or more efficient land allocation. Land degradation, lack of markets, and poor input distribution are more important constraints than tenure insecurity. Tenure reform proposals must recognize the compound's complex internal land tenure system.

**Relevance:** High for Peanut Basin; difficult to generalize elsewhere.

**Comments:** Tests of land tenure hypotheses are suggestive, not definitive.

**Keywords:** Land tenure, Peanut Basin, rural incomes.

- [145] Harre, Dominique; Mettetal, Gilles. (1988) **Etude inventaire des mesures de maîtrise des échanges extérieurs céréaliers des pays d'Afrique de l'Ouest du Cameroun et du Tchad. Dossier No. 2: Inventaire provisoire des flux d'importation de céréales.** Paris: Ministère Français de la Coopération; Club du Sahel; IRAM; INRA-ESR. November. 151 p.

**Objectives:** Dossier No. 2 objectives: to present the methodology used and preliminary analysis and interpretation of the results regarding the development of foreign trade of 18 African countries from 1970-1987. Only imports are considered here, exports of cereals being negligible. An inventory of available data from various sources on cereals imports for the region under investigation is to be drawn up.

**Time Period:** 1970-1987.

**Methodology:** Descriptive and statistical analysis, detailed analysis of various sources of information, comparison of identical types of data from various sources.

**Data Collected:** Data on cereals imports from various sources for various countries and cereals.

**Findings/Recommendations:** No matter which data sources are used, rice and wheat imports have gone up between 1970 and 1986. Some countries have particularly high growth rates in rice and/or wheat imports, not necessarily the largest importers. The average yearly growth rates for rice imports are higher than for wheat imports. Even though care should be taken in interpreting the results, specific domestic developmental patterns and interdependencies between countries can be observed (i.e., specialization in reexports by some countries whose import growth rates are highest).

**Relevance:** Medium.

**Comments:** Cf. Dossier No. 1 (Vionnet and Barde, 1988); Dossier No. 3 (Coulibaly, Egg, and Mettetal, 1988).

**Keywords:** Rice, wheat, maize, imports.

- [146] Havard, Michel. (1988) **Les conditions des expérimentations (1950-1985) sur les semis en culture attelée des principales espèces cultivées.** *Machinisme Agricole Tropicale*. No. 101: 11-50.

**Objectives:** Summary of results of forty years' experience with animal-drawn seeders, to contribute to reorientation of present and future research.

**Time Period:** 1950-1985.

**Methodology:** Synthesis of research on seeder use and performance.

**Data Collected:** Production of major crops 1960/61-1980/82; maps of peanut varieties planted; characteristics of peanut and other crop seeds; characteristics and performance of seeders with regard to seed weight and distribution; numbers and regional distribution of seeders, 1950-1984; seeder prices, 1978-1985; estimated planting densities; characteristics and applications of planter discs.

**Findings/Recommendations:** Outlines history of sowing practices and of cultivation of major crops. Summarizes results of research work on seeders, including the seeding method (drilling or pit sowing) and performance with regard to shape, weight and

size of different kinds of seeds. Gives results of laboratory and field tests on Super-Eco planter and details on the types and numbers of seeders available and of their use by farmers, including ranges of seed spacing patterns and effects of plate type on planting densities. Maintenance and breakdowns are also discussed. Numerous tests of animal-drawn single row seeders have led to the choice of the Super-Eco unit for use in rainfed cropping systems.

**Relevance:** Low.

**Keywords:** Technology, equipment, agricultural research, animal traction.

- [147] Havard, Michel. (1987) **Le parc de matériels de culture attelée et les possibilités de sa maintenance dans le département de Nioro: Résultats d'enquêtes.** Document de travail 87-3. Dakar: ISRA, Direction de recherches sur les systèmes agraires et l'économie agricole. Septembre. 18 p (text) + 27 p (appendices).

**Objectives:** To present the results of an inventory of different types of cultivation equipment, to estimate equipment use by households, and to study how maintenance is done.

**Time Period:** 1985.

**Methodology:** Sampled 284 households in 73 villages out of a population of 18,321 households in 543 villages; also interviewed 95 blacksmiths.

**Data Collected:** Type, origin, method and date of acquisition of equipment; type of draft used; operating condition of equipment; for blacksmiths, types of activities, training, cooperation with other artisans, materials and type of equipment used.

**Findings/Recommendations:** Equipment rates for plows (1 per 4.6 ha), for seeders (1 per 4.8 ha) and peanut lifters (1 per 3 ha of peanuts); 73 percent of farmers use horse draft; 80 percent of households are equipped with horse draft, single-blade seeder, three-blade Sine plow, and a peanut lifter; soil preparation (tilling) is practically not done; mechanical seeding is done for peanuts, millet, sorghum and corn; harvests typically are not mechanized.

**Relevance:** Low.

**Comments:** Useful statistics for studies dealing with animal traction, and mechanization. Nioro is one of the key production zones in the Peanut Basin.

**Keywords:** Animal traction, mechanization, equipment.

- [148] Hirsch, R. (1988) **Le riz et les politiques rizicoles dans les pays africains de la zone d'intervention de la CCCE.** Caisse Centrale de Coopération Economique, Département d'Appui aux Opérations, Division des Politiques Sectorielles et des Evaluations Rétrospectives (DAO/PSE). Janvier. 10 p (introduction) + 39 p (text) + ca. 45 p (appendices).

**Objectives:** To review four years of CCCE-DAO/PSE studies on the rice sectors of sub-Saharan African countries.

**Time Period:** Summer 1986-Summer 1987; production and import statistics primarily for period 1981-1984.

**Methodology:** Secondary data; statistics taken from FAO publications. Used aggregations for 33 countries divided into Sahel, Coastal West Africa, Central Africa, Southern Africa, East Africa and Indian Ocean. Analyzed progression of production, area under cultivation, imports, "apparent availability" (overall and per capita), and rates of self-sufficiency in rice from the mean for 1961-64 to the mean for 1981-84. "Apparent availability" is derived from the sum of paddy production plus imports, and paddy is converted into consumable rice by applying a coefficient of 0.55 which accounts for losses attributable to dehulling, losses and seed reserves.

**Findings/Recommendations:** Rice, formerly considered an urban food, is now generalized throughout the CCCE countries, including rural areas. Rice production is insufficient to satisfy internal demand; of the 10 top rice producers in the CCCE zone in 1981/84, 6 were among the 10 top rice importers; 22 of 33 countries in the CCCE zone import more rice than they produce. In the Sahel, per capita rice consumption increased 31% between 1961/64 and 1981/84, but imports increased 420% and rice self-sufficiency dropped from 58% to 25% during that same period. Of 8 Sahelian countries which import rice, only Niger and Chad produce more rice than they import. Annual rice consumption in Senegal is 67 kg per capita. Small irrigated perimeters in Senegal River Valley may not permit economies of scale, and may not be compatible with the objectives of Senegal's rice policies. Small perimeters may not generate surpluses, or the surpluses may be difficult to collect because of poor organization. In the 1980s, decline in world price lowered the price of rice delivered to Dakar, but the price paid by the Senegalese consumer was maintained at 2 to 2.5 times the world price. The stable price for rice serves as a disincentive to the consumer to purchase other cereals for which prices vary throughout the year according to supply and demand. Recommendations: cost estimates need to be redefined for irrigation projects in Africa. The revised estimates need to take account of actual data from Africa, to account for estimated life of pumps, type and frequency of maintenance activities, etc. Maintenance of perimeter installations is the key to reducing need for expensive rehabilitation.

**Relevance:** High.

**Comments:** Part one: a quantitative assessment of rice production worldwide, in Africa, sub-Saharan Africa, and particularly the CCCE countries. Part two: policies influencing rice production, especially producer and consumer prices as compared to world market prices. Part three: impact of and prognosis for rice projects financed by the CCCE in the past 15 years. Useful discussion across the spectrum of issues affecting rice production and consumption. Exhaustively researched and supported by extensive tables and graphs, this document provides a critical overview of the shortcomings attributable to rice policies adopted by African governments. Specifically argues for more rational price setting mechanisms. Only weakness is the lack of bibliographical source references for the richness of data presented and studies consulted.

**Keywords:** Rice, production, price policy, imports, consumption, irrigation, structural adjustment, liberalization.



- [149] Holtzman, J. S.; Goetz, S. J.; Diagana, B. N. (1988) **Strengthening private sector input distribution in South-eastern Senegal: Issues and options for agricultural policy.** ISRA/MSU Food Security Project Working Paper No. 14. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. June. 5 p.

**Objectives:** To identify policy issues and options involved in strengthening private sector participation in the food system (in southeastern Senegal).

**Time Period:** 1987 marketing season.

**Methodology:** Trader and farmer field surveys; descriptive analysis.

**Data Collected:** Activities and resources of traders; data on the cereals marketing system (farmer transactions).

**Findings/Recommendations:** Cereals markets are generally poorly developed in this zone, and traders are often by-passed in transactions between food deficit and surplus households (especially in Casamance); this explains why there are few fully specialized cereals traders; low volumes in turn entail high per unit costs of food. Nevertheless, traders capture income streams where they arise (trans-border trade). There is a critical need for public sector investments that complement private sector activities (such as in processing technologies and improved agricultural inputs).

**Relevance:** High; identifies issues, provides recommendations for policy.

**Comments:** Similar version in French by Goetz, Holtzman, Diagana, entitled "Renforcer la participation du secteur privé dans le système agro-alimentaire au sud-est du Sénégal: Problèmes et options pour la politique agricole," in Bingen and Crawford (1989).

**Keywords:** Privatization, input distribution, Senegal Oriental, Casamance, cereals marketing.

- [150] Holtzman, John S. (1989) **Coarse grain processing in Senegal: Issues, constraints, and policy and program options.** Washington, DC: Abt Associates. May. 23 p (text) + 7 p (bibliography) + 25 p (appendices).

**Objectives:** To describe the use of improved (mechanized) coarse grain processing in Senegal; to examine price, import and tax policies that affect the competitiveness of coarse grains vis-à-vis rice; to propose an action plan to promote policy dialogue to remove duties and VAT on imports and sales of processing equipment.

**Findings/Recommendations:** The NPA (Nouvelle Politique Agricole) calls for expanding production but does not address processing issues. The 30 CFAF/kg (19 percent) reduction in the price of rice [May 1988] will reduce the competitiveness of coarse grains relative to rice; both urban and rural consumption of rice are expected to increase as cheaper rice is purchased to compensate for coarse grain production deficits. Processing, preparation and marketing costs for millet and maize make them unable to compete with imported rice in urban markets. Mechanically processed local cereals sell for more than imported rice in urban areas. Urban women lack time to prepare dishes from local coarse grains. Rural households produce coarse grains and do their own processing. Import and value added taxation increase acquisition costs and are disincentives to private investment in processing machinery. Because of tax

dispensations and low/no acquisition costs, machinery operated by village organizations which receive equipment from donors prevents private investors from being competitive. Recommendations: Removal of duties and taxes which impede private sector investment is a high priority. Promote private sector grain processing. Strengthen small business management practices, and repair and maintenance services for support of processing units.

**Relevance:** High.

**Comments:** Insightful discussion on cereals price policy. Includes rigorously researched, detailed discussion on investment and capacity of mechanized technology, especially threshers, dehullers, and mills. French version, July 1989, entitled "Transformation des céréales locales au Sénégal: Problèmes, contraintes et choix de politiques et de programmes. Rapport final."

**Keywords:** Rice, processing, cereals, cereals imports, taxes/tariffs, private sector, price policy.

- [151] Holtzman, John S.; Stathacos, Charles J. D.; Wittenberg, Thomas. (1989) **Horticultural marketing and export in Senegal: Constraints, opportunities and policy issues.** Bethesda, MD: Abt Associates, Agricultural Marketing Improvement Strategies Project (AMIS). December. 134 p.

**Objectives:** To examine the organization and performance of the Senegalese horticultural sector during the 1980s, particularly export performance in the Western European market; to identify constraints to expansion, knowledge gaps and areas for further applied research, and an action plan for promoting horticultural exports.

**Time Period:** Field visits in January-February 1989 (4 weeks) and September 1989 (1 week).

**Methodology:** Literature review; analysis of secondary data; visits to production zones in Cap-Vert, Niayes, lower Senegal River valley, and Casamance; informal interviews with selected European importers, private firms, producers, government officials and donor representatives in Senegal, and USDA analysts and market agents in the U.S.

**Data Collected:** Yields, prices, production, and trade of Senegalese horticultural products; horticultural imports by selected European countries and the U.S.; marketing costs for Senegalese exports; U.S. import duties on selected horticultural products. Most data fall within 1975-88 period. Production cost estimates, more detailed trade statistics, and potential sources of market information are given in annexes.

**Findings/Recommendations:** Production and marketing of horticultural crops in Senegal are dominated by private firms, with exports concentrated in hands of a few large firms. 70% of exports go to Paris, principally green beans and melons. Advantages are proximity to European markets and good growing conditions in the Niayes region. Problems include declining quality of water supplies and soils, and difficulties experienced by Senegalese exporters in enforcing contracts with local producers. The Fleuve region has considerable potential for expanded production, but is far from the export point. Senegal's share of the off-season (December-April) market in Europe is important but declining in the face of competition from South

American and African countries (mangoes and green beans, respectively), and from Spain. Most Senegalese exporters lack the capital, know-how, and management skills to compete effectively. Foreign investment and more supportive GOS policies are needed. The overvalued CFA and the shortage of air cargo space are additional constraints. Post-harvest handling methods should be improved to raise product quality. Domestic consumption of horticultural products is projected to grow slowly. Other measures to improve Senegal's competitiveness include: (a) short-term--better intelligence on European markets, experiments with sea shipment and with alternative contractual arrangements with producers, investment in storage facilities at Yoff airport; and (b) longer-term--construction of the Cayor canal, upgrading of transport infrastructure to permit direct exports of Fleuve produce from St. Louis, and improved adaptive horticultural research and extension. The report recommends that USAID encourage the GOS to review its policies and programs for promoting private sector involvement in the horticultural sector. The report identifies knowledge gaps, and suggests an applied research agenda and an action plan for the horticultural subsector.

**Relevance:** High.

**Comments:** Thoroughly researched and well presented, with specific recommendations; contains a useful bibliography.

**Keywords:** Horticulture, exports, private sector, production, diversification, consumption, Niayes, Fleuve, infrastructure, market prospects, bibliography.

- [152] Huguenin, J. (1989) *L'élevage dans les exploitations Sereer des Terres-Neuves au Sénégal-Oriental*. Mémoire de fin d'études d'Ingénieur des Techniques Agricoles des Régions Chaudes. Montpellier: Ministère de l'Agriculture; CNEARC; Ecole d'Ingénieur des Techniques Agricoles des Régions Chaudes; ORSTOM, Département Milieux et Activité Agricole. Février. 90 p.

**Objectives:** Study conducted as part of ORSTOM program "Indépendance alimentaire," subprogram "Terrain: anciens, approche renouvelée"; study addresses following specific questions : (a) what engine of livestock development in the zone? (b) has livestock contributed to differentiation of production systems? (c) what role of animal traction in the production system? (d) might the growth of Sereer livestock conflict with indigenous livestock? (e) can the zone support a higher human and animal population? (f) are the modes of herd management similar to those of the settlers' original zone, or were they adapted to modes found in the Terres-Neuves? (g) what are the functions of livestock among the Terres-Neuves Sereer? (h) what is the structure and pattern of change of Sereer herds?

**Time Period:** Data collection June-October 1988.

**Methodology:** A systems approach with three dimensions, the livestock manager, the land resource, and the animal. Research activities were (a) literature review, (b) field data collection (survey of 55 purposively chosen households, census of human and animal population and land cultivated in two villages, livestock census, study of grazing resource use. Statistical analysis of data at ORSTOM/Montpellier.

**Data Collected:** In addition to above, number and history of 1408 cattle and 973 small ruminants, and grazing practices of 4-6 villages.

**Findings/Recommendations:** Using correspondence analysis, 5 household (HH) types were identified: (a) "bankrupt" HH, (b) marginal HH seeking an equilibrium, (c) stable HH, (d) high-income agro-pastoral HH with more than 10 ha cultivated, (e) agro-pastoral HH with high and diversified revenues. Livestock purchases used to balance out agricultural revenues and accumulate capital. Distribution of animal holdings is very concentrated. Social organization of livestock management results from methods used in Terres-Neuves, not in zone of Sereer origin (Sine). Herd productivity is low, and use of animal products is not optimal. Principal constraints: lack of dry-season watering points, degradation of grazing lands due to expansion of cultivated area, poor animal health, lack of dry-season feed, practice of lengthy animal treks which reduce cow fertility, lack of capital (for some HH) for purchase of traction animals. Programs of animal health, livestock trials, and pasture management would alleviate constraints currently faced, if implemented with collaboration between herder groups and government organizations.

**Relevance:** Medium.

**Comments:** Case study of moderate quality, well-presented, but short period of field studies, mechanistic method of identifying HH types, and unremarkable findings; would have been interesting to analyze why, out of a group of households starting from same footing in a Terres-Neuves zone, some do well and some do not.

**Keywords:** Livestock, Terres-Neuves, Senegal Oriental, animal traction, rural incomes, farming system.

- [153] Huguenin, J. (1989) **Evolution et situation actuelle du cheptel de trait dans les exploitations sereer des Terres-Neuves du Sénégal oriental.** *Les Cahiers de la Recherche Développement.* No. 21: 30-44.

**Objectives:** To assess the role and management of different herds of livestock by the Sereer of the Terres-Neuves in Eastern Senegal; to determine the contribution of each herd to the diversity of the production system.

**Time Period:** 1986-1988.

**Methodology:** Field surveys (mainly June-October 1988) and interviews to establish numbers of animals per herd in 2 villages (Keur Daouda, Diamaguene); mainly statistical analysis.

**Data Collected:** Breakdown of farms by herd size, cultivated area, etc.; animal teams per plot, prices for livestock, trends in use of teams.

**Findings/Recommendations:** The past trends in use of draft animals have shown a close relationship between animal raising and agricultural production. In 16 years the number of animal teams has doubled for Sereer farms in the Terres-Neuves. Draft animals (especially horses) have become one of the pillars of their production system. The horse has also become an excellent means of transportation. The horse has improved its position vis-à-vis oxen, even though the Sereer farmers received a pair of oxen when they first settled (early 70s). There seems to be a trend toward an

increase in the number of oxen, since they can do heavier work and thereby complement horses. Oxen also have a high speculative value and train very well.

**Relevance:** Medium.

**Keywords:** Animal traction, livestock, Terres-Neuves.

- [154] ISNAR. (1988) *Développement et gestion des ressources humaines à l'Institut sénégalais de recherches agricoles*. The Hague: ISNAR. February. 47 p, including tables and figures.

**Objectives:** To make a preliminary evaluation of the key features of the development and management of human resources in ISRA.

**Time Period:** December 1987.

**Methodology:** Interviews and discussions with ISRA management and scientists; questionnaire distributed to researchers; secondary data from ISRA personnel files.

**Data Collected:** Questionnaire responses from 60% of ISRA scientists on topics of remuneration, career prospects and their overall work situation.

**Findings/Recommendations:** Recommendations made in several areas: recruitment (define clear objectives); training (introduce a mentoring relationship); juridical status (keep institute status as an EPIC); salary structure and grades (tie clearly defined service structure and grades to a career plan); personnel evaluation (institute a formal personnel planning and evaluation system).

**Relevance:** High.

**Comments:** Especially for consideration of continued investments in building ISRA institutional capacity. Research in progress under an ISNAR-USAID contract.

**Keywords:** Agricultural research, employment, government budget, organizational performance.

- [155] ISRA. (1988) *Stratégies et programmation des recherches 1989-1993*. 10 volumes: Présentation et synthèse; 1. Sud ouest; 2. Fleuve; 3. Littoral; 4. Niayes; 5. Nord et centre du bassin arachidier; 6. Sénégal oriental et haute Casamance; 7. Centre et sud du bassin arachidier; 8. Zone sylvo-pastorale; 9. Programmes nationaux. Dakar: Ministère du Développement Rural. Mars. Présentation et synthèse, 69 p (text) + ca. 40 p (appendices); Tome 1 (ca. 50 p); Tome 2 (ca. 75 p); Tome 3 (ca. 50 p); Tome 4 (ca. 50 p); Tome 5 (ca. 40 p); Tome 6 (ca. 40 p); Tome 7 (ca. 50 p); Tome 8 (ca. 40 p); Tome 9 (ca. 100 p).

**Objectives:** To describe ISRA's short- to medium-term research program.

**Time Period:** 1989-1993.

**Findings/Recommendations:** Principal objectives of ISRA: to develop research programs in response to GOS goals and priorities; to ensure the application of research findings to development of agriculture in Senegal; to manage agricultural research stations; to promote training of Senegalese researchers; to develop international scientific cooperation. Présentation et synthèse describes ISRA's history and present role in some detail; presents areas of concentration; summarizes activities planned

for each of the geographic regions which are detailed in the other 9 volumes. Each regional volume contains details for each research activity planned.

**Relevance:** Medium; good background material.

**Keywords:** Agricultural research, institutions.

- [156] Jaeger, William K. (1987) **U.S. aid to Senegal, its impact on agricultural and rural development.** MADIA Research Report No. 9. Washington, DC: World Bank. February. 133 p + 5 p (appendices and bibliography).

**Objectives:** To assess the effectiveness of U.S. assistance programs in Senegal with specific attention to the ways in which U.S. aid contributed to agricultural and rural development. To assess underlying reasons for relative success or failure of various development activities, to understand underlying constraints and to suggest changes for improved performance.

**Time Period:** Fall, 1985; follow-up visit, October 1986.

**Methodology:** AID documents consulted in Washington, D.C., and in Senegal; extensive interviews with AID personnel and relevant officials in Senegal.

**Data Collected:** Detailed description of AID activities in Senegal from 1961 to 1984; discussion of the choice of activities, shifts in functional or sectoral emphasis and assessment of program impact.

**Findings/Recommendations:** Specific conclusions include: unrealistic project design; AID negligent in project monitoring; project aid exceeds country's absorptive capacity; USAID capacity limited by lack of staff continuity; over-reliance on funding levels at the expense of project success; biased project evaluations; USAID reluctance to commit resources to improving information about agricultural resources and productivities; institutional capacity and skills to undertake development activities essential; nonproject aid can lead to important policy reform; aid tied to policy reform will have a limited impact. Six specific recommendations are made for USAID to continue support for agricultural research, and four others concerning project and program implementation.

**Relevance:** Medium.

**Keywords:** Agricultural research, livestock, irrigation, cereals marketing, Casamance, Fleuve, Peanut Basin.

- [157] Jahnke, Hans E.; Kirschke, Dieter; Lagemann, Johannes. (1987) **The impact of agricultural research in tropical Africa. A study of the collaboration between the international and national research systems.** CGIAR Study Paper No. 21. Washington, D.C.: World Bank. 175 p.

**Objectives:** To better understand the impact of agricultural research on agricultural development in tropical Africa.

**Methodology:** Descriptive analysis on the basis of secondary data and interviews; summaries of published and informal written materials; information and data from national research system administrators and scientists and other studies.

**Data Collected:** Secondary data on: spread and impact of innovations on food production, nutrition, income distribution, structural organization of agriculture, differential impact on men and women; evolution of national research systems since 1960; major activities of non-CGIAR bilateral and multilateral agencies in supporting the national research system; linkages between national agricultural research systems (NARS) and the International Agricultural Research Centers (IARCs); potentially significant innovations currently being tested and adapted by NARS; institutional and economic environment influencing the demand for technological change; division of research effort between NARS and IARCs; interviews with professionals.

**Findings/Recommendations:** The system of IARCs performs well on the whole but has not had the expected impact in tropical Africa. The research pattern does not adequately reflect the African situation. Focussing on the regional situation might lead to a reduction in global efficiency, however. The centers have taken initiatives to meet African needs, attempting to strike a balance between their regional and global responsibilities. Institutional reforms, infrastructural developments and an increased emphasis on an economic approach towards farming have been at least as important as the introduction of new biological material. The development process has to be backed by strong political and social support, which is not found in many African governments at present. The impact of individual research projects should not be overestimated because development is a societal process and takes time. A realistic view of IAR in the overall development process is necessary.

**Relevance:** Medium.

**Keywords:** Agricultural research, food production, agricultural development, price policy, extension, donor assistance.

- [158] Jamin, J. Y.; Ndiaye, M.; Lambrecht, P.; Tourrand, J. F. (n.d.) **Rapport de synthèse 1985 du programme de recherche sur les systèmes de production du delta du fleuve Sénégal.** ISRA, CRA de Saint-Louis, Dépt. de Recherches sur les Systèmes de Production et les Transferts de Technologie en Milieu Rural, Equipe Systèmes Fleuve. 12 p.

**Objectives:** Research intended to better understand the functioning of farming systems and farmer organizations; to identify principal constraints and opportunities; to test potential farm system improvements, especially double-cropping, diversification, livestock, and use of agricultural inputs and by-products; to define and test methods of technology transfer; to propose improved forms of farmer organization; to provide "upstream" researchers with research topics; and to contribute to improved methodology for on-farm research.

**Time Period:** [1984/85].

**Methodology:** Both disciplinary and pluri-disciplinary research, including aerial photography, on-station and on-farm trials, village- and concession-level surveys, and monitoring of crop parcels, livestock, nonfarm incomes, and food situation.

**Findings/Recommendations:** 7 zones identified; selected results of trials presented; problems of research implementation and analysis discussed.

**Relevance:** Low; one year's results from early phase of the team's research.

**Keywords:** Fleuve, farming system, rice, irrigation, farmer organizations, agricultural research, livestock.

- [159] Jamin, Pierre- [Jean-] Yves. (1987) **La double culture du riz dans la vallée du fleuve Sénégal: Mythe ou réalité?** *Les Cahiers de la Recherche-Développement*. No. 12: 44-55.

**Objectives:** To examine whether double cropping of rice is feasible, and under what conditions, based on discussion of the evolution of production systems in the valley, the ecological constraints on double cropping, and cases where double cropping of rice has been or is currently practiced.

**Time Period:** Discussion covers 1965-86, with emphasis on 1982-86 period.

**Methodology:** Little data or literature cited; paper based on author's research in the area during the early to mid 1980s. Paper includes sections on traditional production systems and their evolution, natural resource constraints on double cropping (climate, hydrological regime, soils), experience with double cropping in the valley (at N'dembo-Thiago, Nianga, Guédé, village perimeters of Podor, Aéré-Lao, and Matam), and lessons for the future.

**Findings/Recommendations:** Decisions regarding production are made on both an individual basis (choice of production technique) and collective basis (irrigation and planting dates, crop mixtures and successions). Individual decisions reflect objectives such as food and cash income needs, and the desire to limit the quantity and arduousness of farm labor and the cash costs and credit required, to accumulate capital (mainly in form of animals) to maintain rights over use of traditional lands, and to maintain as much autonomy as possible from SAED. Collective decisions require a consensus and sometimes result in use of less intensive techniques. Cropping intensity coefficients rarely exceed 1.3 at present. The government's objective--to achieve coefficients of 1.5 to 1.8 within the next 10-15 years--appears unrealistic. Principal constraints are: (a) technical problems associated with cropping calendars (tight time schedule in which to harvest the first crop and prepare the second); (b) competition for labor between rice double cropping and other enterprises (vegetables, recessional and dryland cultivation, off-farm activities); and (c) household objectives, which favor a diversified and stable set of activities rather than specialization in the most profitable (e.g., rice double cropping). Measures necessary to promote double cropping include: (a) mechanization of harvest and land preparation (drawback of mechanization is high cost and organizational demands); (b) experimentation with transplanting and with crop cycles that even out labor requirements; (c) improved inputs supply and land tenure arrangements; and (d) credit for seasonal inputs and equipment. Author concludes that double cropping is feasible only if costly government support programs are maintained.

**Relevance:** High.

**Comments:** Detailed discussion of agronomic and other constraints on double cropping, on which the government's plans for irrigated agriculture depend heavily.

**Keywords:** Irrigation, rice, technology, Fleuve, farming system, farmer organizations, RDAs, mechanization.



- [160] Jammeh, Sidi C.; Lele, Uma. (1988) **Building agricultural research capacity in Senegal. Analysis of the evolution of agricultural research and the phase I Senegal agricultural research project 1982-1988.** Draft. Washington, DC: World Bank. July. 163 p (text) + ca. 25 p (annexes).

**Objectives:** To review the role of climatic and demographic pressures on Senegalese agriculture, the availability and adequacy of technology, research responses to the impact of ecology on agricultural production, and the evolution of the agricultural research system.

**Methodology:** Extensive review of World Bank project documentation, other secondary data sources and studies, discussions with government and donor agency officials.

**Findings/Recommendations:** Findings summarized in terms of the ecological context of Senegalese agriculture; research responses to the ecological constraints and the needs of rainfed agriculture and the experience in building agricultural research capacity. Specific lessons for building agricultural research capacity concern improved human resource management and strengthening administrative and financial management capacity.

**Relevance:** High.

**Comments:** Comprehensive overview of Senegalese agriculture and issues in development; implementation of the Agricultural Research Project from the World Bank's point of view.

**Keywords:** Agricultural development, agricultural research, organizational performance, donor assistance, government budget.

- [161] Jammeh, Sidi C. (1988) **State intervention in agricultural pricing and marketing in Senegal. The politics of budgetary reallocation.** Ph.D. dissertation. Johns Hopkins University. 484 p.

**Objectives:** To understand why the government intervenes in agriculture through price setting, despite evidence that such policies damage agricultural growth and long-term development.

**Time Period:** 1984/85.

**Methodology:** A reformulated extension of Bates' political economy approach to account for social and cultural factors.

**Findings/Recommendations:** It appears virtually inevitable for policymakers to deploy economic policy to advance the social agenda. Political tradition is a major determinant of the final choice of agricultural policy and strongly influences the decisionmaker's orientation. Findings argue against the use of indirect taxation of agriculture. Agricultural revitalization is possible through improved production incentives. The government should look to increased revenues from taxes on earned incomes, higher property taxes and an increase in the rural head tax.

**Relevance:** Medium.

**Comments:** See summary findings in Gersovitz and Waterbury (eds.), 1987.

**Keywords:** Price policy, government, regulation, subsidies, taxes/tariffs, prices, marketing, politics.

- [162] Jammeh, Sidi C. (1985) **State intervention in the marketing system. A case study on the politics of agricultural price decision-making in Senegal.** Washington, DC: The Johns Hopkins University, SAIS. October. 75 p (text) + 2 p (appendix).

**Objectives:** To examine the political basis of price intervention policies by looking at who decides what questions, why and on what basis.

**Time Period:** 1984.

**Methodology:** Interviews with government officials; secondary data from relevant government documents; interviews with small number of farmers around Touba Mbacké.

**Findings/Recommendations:** General description of evolution of producer and consumer prices and policies of major government and donor agencies concerning cereals pricing.

**Relevance:** Low.

**Comments:** Lack of critical analysis; superseded by BAME studies. Revised and condensed version published in Gersovitz and Waterbury (eds.), 1987.

**Keywords:** Prices, price policy, cash crops, Peanut Basin, cereals marketing.

- [163] Johnston, Bruce F.; Hoben, Allan; Dijkerman, Dirk; Jaeger, William K. (1987) **An assessment of A.I.D. activities to promote agricultural and rural development in Sub-Saharan Africa.** MADIA Research Report No. 12. Washington, DC: World Bank. February. 291 p.

**Objectives:** To improve understanding of AID's role in Sub-Saharan Africa, and to recommend changes in program content and organizational procedures to improve effectiveness of future AID efforts.

**Methodology:** Review of AID records; visits to six case study countries (Senegal, Nigeria, Cameroon, Kenya, Tanzania, Malawi).

**Findings/Recommendations:** Synopsis of Senegal study (pp. 51-3) states that USAID's 1975-83 agricultural production projects were "complex, unproven, and overly ambitious" and did not offer benefits intended, while project and nonproject activities since 1983 have had significant policy reform impact. Includes conclusions on effectiveness of AID programs in many sectors, and on AID's country missions and programming system. Overall, AID's impact has been limited by conditions in Africa, lack of domestic constituency, and organizational and procedural constraints.

**Relevance:** Medium.

**Comments:** Cf. Jaeger (1987).

**Keywords:** Donor assistance, organizational performance, agricultural development.

- [164] Josserand, H. (1985) **Eastern Senegal range and livestock project: Final monitoring and evaluation report.** USAID Contract No. 685-0202-C-00-2137-00. Ann Arbor, MI: University of Michigan, Center for Research on Economic Development. February. 454 p.

**Objectives:** Presents CRED's findings on its Eastern Senegal Range and Livestock Project monitoring and evaluation effort. Objective of project is to protect range resources, improve livestock production, and develop a model for an integrated approach to livestock development. Primary focus is introducing water catchment ponds. Covers 250,000 hectares in Bakel region.

**Time Period:** 1982-1984.

**Methodology:** Field research includes studies on range management, soils and water management, and socio-economics. Range management: collected data on soils, vegetation, water resources and agricultural land use from 36 sites over two years; interviewed individuals; observed and monitored herding practices; undertook fecal and chemical analyses; used aerial photographs. Soils and water engineering: studied hydrology of 18 ponds by collected data on rainfall, storm runoff, livestock usage, pond water levels, and sedimentation rates. Socio-economic: relied on existing baseline data; collected additional data on 20 households in 12 villages through interviews and surveys.

**Data Collected:** Household statistics in study area on household size; farm size; livestock ownership. Regional statistics on value of livestock and crop sales; economic activities of working age population; by sex; cropping patterns and labor allocation; itemized value of food purchases; migration trends and remittances. Per capita caloric and protein intake. Yield estimates for various crops. Changes in pond water volume over time; pond sedimentation rates; demand on and allocation of pond water. Monthly Bakel rainfall 1980-1984. Summary and comparison of land types and range resources, Senegal and Gambia Basins. Livestock movement and livestock diet. Production and nutritional content of milk. Nutritional analysis of vegetation. Soil analyses.

**Findings/Recommendations:** Range management: present stocking levels should be maintained until a better way is found to manage competing resource needs in the area. Need research on alternative water-harvesting techniques. Soils and water engineering: permeable subsoils result in excessive infiltration in ponds, with only small percentage of water available to livestock. Need for better hydrologic studies before proceeding with further investment in water catchment systems.

Socio-economic: Cannot separate livestock sector from agricultural sector.

Out-migration and remittances are important components of the rural economy.

Location of water catchment ponds limits their use.

**Relevance:** High.

**Comments:** Detailed statistical presentation of findings including standard deviations.

Some questionnaires also included.

**Keywords:** Livestock, water management, natural resources, agricultural research.

- [165] Josserand, Henri; Ross, Clark. (1982) **Consumption effects of agricultural policies: Cameroon and Senegal. Senegal case study.** Ann Arbor, MI: University of Michigan, Center for Research on Economic Development. August. 137-257.

**Objectives:** Study commissioned by the Office of Nutrition of USAID and the USDA in an effort to develop a workable method to trace the food consumption effects of

development interventions in rural areas. Senegal chapter focuses on trade-offs between peanut and millet production and on the role of imported rice in rural areas.

**Time Period:** May-August 1981.

**Methodology:** Tests of alternative field research techniques; field surveys in several pilot villages (cf. Josserand, 1984); secondary data; official data; mainly descriptive analysis.

**Data Collected:** Farm production, marketing, farm and nonfarm income, food consumption.

**Findings/Recommendations:** The distribution of total income is very uneven within each village surveyed and among villages, with corresponding differences in food consumption. Calorie deficiency corresponds to income distribution pattern. Productivity varied greatly among villages although climatic conditions are similar. One village produced more by emphasizing labor-extending technology. Another obtained higher yields and higher total production by using cattle manure, integrating cattle into farming activities. This highlights possibilities of increasing productivity without costly imported technologies. Study emphasizes that policy should promote cash and food crops equally, and that farmers' own perceptions of their nutritional needs place limits on the range of policy options governments can consider.

**Relevance:** Medium.

**Keywords:** Food security, consumption, Peanut Basin.

- [166] Josserand, Henri P. (1984) **Farmers' consumption of an imported cereal and the cash/foodcrop decision: An example from Senegal.** *Food Policy*. Vol. 9, No. 1: 27-34.

**Objectives:** To document food consumption patterns and nutritional status in three Peanut Basin villages, and evaluate effects of agricultural policy (input and product prices, credit, extension).

**Time Period:** May-August 1981.

**Methodology:** Random sample of 72 households from one Serer and two Wolof villages, formal survey, direct observation (consumption), anthropometric analysis, household budgets.

**Data Collected:** Primary demographic, production (field area, input and output data, marketing), consumption, anthropometric data, income.

**Findings/Recommendations:** During the soudure, rice constitutes an important source of food for low income rural families because the quantity of millet available for sale is limited. An increase in the price of rice would likely lead to a reallocation of inputs from peanuts to cereals. Almost all households showed a calorific deficiency ranging from slight to severe. No protein deficiency observed at any income level due to the importance of peanuts in the diet. No significant relationship between income and anthropometric measurements on children up to six years of age. Expenditures on food inversely related to agricultural production.

**Relevance:** Medium; first two findings important for policy but reliability of results limited by narrow scope and short time period (soudure).

**Comments:** Summarizes a case study carried out by CRED for USAID on the consumption effects of agricultural policies (see Josserand and Ross 1982).

**Keywords:** Production, consumption, Peanut Basin, price policy.

- [167] Kelly, Valerie; Reardon, Thomas. (1989) **Sampling methods used in the IFPRI/ISRA study of consumption and supply impacts of agricultural price policies.** Report prepared under USAID Contract No. 685-0281-3-70042. [Dakar]: IFPRI/ISRA. June. 75 p.

**Objectives:** Detailed discussion of sampling methods used for the study on "Consumption and Supply Impacts of Agricultural Price Policies." First of three documents.

**Time Period:** 1988-89.

**Methodology:** Description of multi-stage sampling procedure.

**Data Collected:** Socioeconomic data on zones in study.

**Relevance:** Medium.

**Comments:** Useful for those intending to undertake similar studies.

**Keywords:** Consumption, production, research, price policy.

- [168] Kelly, Valerie A. (1988) **Factors affecting the demand for fertilizer in Senegal's Peanut Basin.** Ph.D. dissertation. Michigan State University, Dept. of Agricultural Economics. 295 p.

**Objectives:** To examine causes of low fertilizer demand, and to identify policy options more responsive to farmer needs and GOS objectives.

**Time Period:** Covers 1949-87.

**Methodology:** Institutional analysis of fertilizer supply and demand, 1949-80.

Quantitative analysis of fertilizer consumption, 1961-80, using factor analysis. Review of research on economic returns to fertilizer in Senegal. Economic analysis of data from ISRA's Amélioration Foncière (AF) research, using production functions, budgets, value/cost ratios, and decision analysis. Examination of factors affecting fertilizer purchase and use in 1981-85, based on survey data collected by the author (1985) and by SODEVA (1981-84). Modelling of the fertilizer purchase decision using logit analysis and hierarchical decision models. 1983/84 SODEVA sample used as base, giving 98 farmers in Nioro and Gossas Departments in 1985; SODEVA sample stratified by farm type based on area cultivated and area cultivated per worker; SODEVA sample of farmers was representative but not randomly selected.

**Data Collected:** Author's data on farmers' perceptions of constraints, opinions about recent policy changes, input acquisition and use for 1985/86, 1980-85 changes in farm assets and liabilities, access to nonagricultural revenues, knowledge and attitudes about fertilizer use, and responses to hypothetical input investment scenarios. Other data on investment decisions and risk attitudes obtained from an informal 46-farmer sample survey in 1985/86.

**Findings/Recommendations:** Major constraints on fertilizer demand are (a) low and uncertain fertilizer response, (b) lack of financial liquidity due to low farm incomes caused by low agricultural productivity, (c) farmers' perceptions of low fertilizer

profitability relative to other investments, and (d) a poor fertilizer distribution system. Recommended policies include (a) targeting fertilizer to zones of high response and low risk, (b) use of credit to stimulate demand and private sector participation in distribution, and (c) agricultural research to identify more productive technologies for zones of low fertilizer response.

**Relevance:** High.

**Comments:** Cf. Kelly (1987).

**Keywords:** Fertilizer, fertilizer distribution, private sector, Peanut Basin, peanuts, millet, rural incomes, credit, risk, agricultural research.

- [169] Kelly, Valerie Auserehl. (1987) **Resolving Senegal's fertilizer policy dilemma: The contribution of agricultural research. A discussion of agronomic and economic research pertinent to current fertilizer policy issues.** Draft. ISRA/BAME; Michigan State University, Dept. of Agricultural Economics. December. 56 p.

**Objectives:** To provide a synthesis of current knowledge on fertilizer response, economic returns to fertilizer, and long-run consequences of farming without fertilizer; to recommend short-run policy solutions, and longer-run research needed.

**Methodology:** Evaluation of previous published research; new analysis of data from ISRA's Amélioration Foncière (AF) research (1964-82), including estimation of production functions, budgets, and value/cost ratios at both past and current (1987) prices; analysis of fertilizer use decisions for Nioro and Boulel.

**Findings/Recommendations:** Past research often showed v/c ratios greater than 2. Even at lower v/c ratios, fertilizer use often recommended to preserve soil quality. Lack of precise knowledge about long-term yield effect of cropping without fertilizer precludes economic analysis of benefits of maintaining soil quality. Analysis of AF data showed v/c ratios below 2 in zones where fertilizer was previously thought profitable. Averaging v/c ratios across sites or time masks considerable interzonal or interannual variability in fertilizer response. V/c ratios are poor indicators of farmer demand since they provide no information on profitability of fertilizer relative to other investments. Fertilizer use is more profitable in So. than in No. Sine-Saloum, and for peanuts vs. millet. Policy recommendations include that GOS should promote fertilizer only in zones of greater profitability and lower risk, and that credit be offered in these zones to stimulate fertilizer use. Research is recommended on long-run effects of farming without fertilizer, on alternative crops for zones of low fertilizer response, and on profitability of investments which compete with fertilizer.

**Relevance:** High.

**Comments:** Thorough discussion of policy implications; more details on analysis in Kelly (1988, Ph.D. dissertation).

**Keywords:** Fertilizer, peanuts, millet, Peanut Basin, agricultural research, risk.

- [170] Kelly, Valerie Auserehl. (1986a) **Acquisition and use of agricultural inputs in the context of Senegal's New Agricultural Policy. The implications of farmers' attitudes and input purchasing behavior for the design of agricultural policy and research programs.** Dakar: ISRA/Bureau d'Analyses Macroéconomiques. October 1. 31 p.

**Objectives:** Field report summarizing earlier papers on seed and fertilizer issues and presenting new information on acquisition and use of agricultural equipment.

**Time Period:** 1984-86.

**Methodology:** Cf. Kelly (Sept. 1986b; 1988).

**Findings/Recommendations:** Differs from Kelly (Sept. 1986b) by focusing more on peanut seed and agricultural equipment. Major constraints identified as lack of purchasing power, farmer attitudes, and distribution system inadequacies. Recommendations made for improving effective demand for fertilizer and improving fertilizer distribution; neither credit nor input subsidies are seen as adequate solutions, since improved production technology and input distribution systems are needed.

**Relevance:** High.

**Comments:** More detailed presentation in Kelly (1988, Ph.D. dissertation). Also available in English and French as MSU IDP Reprint Paper Nos. 18 and 18F, 1988.

**Keywords:** Peanuts, millet, seed, equipment, private sector, farmer organizations, RDAs, cooperatives, fertilizer, fertilizer distribution, rural incomes.

- [171] Kelly, Valerie Auserehl. (1986b) **Farmers' demand for fertilizer in the context of Senegal's New Agricultural Policy: A study of factors influencing farmers' fertilizer purchasing decisions.** Dakar: ISRA/Bureau d'Analyses Macroéconomiques. September 15. 46 p.

**Objectives:** Preliminary report on study of farmer decisions to purchase fertilizer.

**Time Period:** 1981-86.

**Methodology:** Analysis of farm survey data collected by author (1985-86) and by SODEVA (1981-84) in the Departments of Gossas and Niore. Hierarchical decision models of fertilizer investment for 1985/86 season. Review of previous analyses of returns to fertilizer.

**Data Collected:** 1985/86 formal survey of 98 farmers and informal survey of 46 farmers on farmers' perceptions of importance of fertilizer, of correct fertilizer use techniques, and of millet and peanut response to fertilizer. 1981-84 SODEVA survey included detailed input/output data on about 100 farmers.

**Findings/Recommendations:** Principal impediments to fertilizer purchases during 1981-85 were poor cereal harvests and lack of financial liquidity, priority given by farmers to other investments (peanut seed, livestock), and lack of availability of fertilizer in weekly markets accessible to farmers.

**Relevance:** High.

**Comments:** More detailed presentation in Kelly (1988, Ph.D. dissertation). Also available in English and French as MSU IDP Reprint Paper Nos. 19 and 19F, 1988.

**Keywords:** Fertilizer, fertilizer distribution, cereals, peanuts, millet, Peanut Basin, rural incomes, seed, livestock, equipment.

- [172] Kennes, Walter. (1989) **European Community assistance for agricultural development in Cameroon, Senegal, and Tanzania, 1960-87.** In *Aid to African agriculture: Lessons from two decades of donor experience*, ed. Lele, Uma, 131-158. World Bank/MADIA study.

**Objectives:** Reviews EC agricultural cooperation with Cameroon, Senegal and Tanzania, including strictly agricultural projects, food aid, and the system for the stabilization of export earnings (STABEX).

**Time Period:** 1960-1987.

**Methodology:** Historical description.

**Data Collected:** Overall aid commitments to the three countries, 1958/65 - 1986/90; sectoral allocation of European Development Fund (EDF) aid by country, 1958/65 - 1986/90; EDF aid for agricultural and rural development by country, 1958/65 - 1981/85; time patterns of STABEX transfers to Senegal 1978-1986; Senegal: STABEX receipts, groundnut export value and prices, 1975-1986.

**Findings/Recommendations:** The central focus of EDF projects has shifted from infrastructure development, through promotion of export crops to food crops. Four main areas of support are discussed: export crop production, irrigated crop development (mainly rice), integrated rural development, and small-scale projects. Each subsection describes the background of a representative project, summarizes its main activities, and provides assessment and includes observations on its impact and viability. Descriptions of projects in Senegal include the EC's programs to promote groundnut, cotton, and irrigated rice production, food aid, and STABEX activities. In general, export crop programs have been more successful than food crop programs. Small irrigation schemes have performed better than large, and small-scale projects have been relatively successful.

**Relevance:** Medium.

**Keywords:** donor assistance, food aid.

- [173] Klopfenstein, C.F.; Hoseney, R.C.; Leipold, H.W. (1985) **Nutritional quality of pearl millet and sorghum grain diets and a pearl millet weaning food** *Nutrition Reports International*. Vol. 31, No. 2: 287-297.

**Objectives:** To compare the nutritional value of vitamin and mineral supplemented pearl millet and sorghum grain diets, and to evaluate the nutritional quality of a pearl millet weaning food developed by the Institut de Technologie Alimentaire in Senegal.

**Time Period:** Duration of experiment = 7 weeks.

**Methodology:** Statistical analysis of controlled experiment on rats.

**Data Collected:** Nutritional analysis of diet, feces and blood samples.

**Findings/Recommendations:** Pearl millet produced higher weight gains than sorghum. Pearl millet supplemented with only calcium carbonate was equivalent to feeding a totally vitamin and mineral supplemented grain sorghum diet. The pearl millet weaning food developed by ITA is a highly nutritious, highly digestible food and should be further evaluated in human infants.

**Relevance:** Low.

**Comments:** See Guiro et al. (1987) on the evaluation of the pearl millet weaning food for rehabilitation of malnourished children; rat-feeding studies cannot be directly transposed to human nutrition.

**Keywords:** Nutrition, millet.



- [174] Kohli, D.; Ittah, J. D. (1988) **Ressources humaines pour le développement rural du Sénégal à l'horizon 2000**. T.311 Sénégal 18 & 22. Genève: Ministère d'Education Nationale and Direction de la Coopération au Développement et de l'Aide Humanitaire (Suisse). January. 162 p (text) + ca. 40 p (annexes).

**Objectives:** Given the government's policy objectives concerning cotton, peanuts, horticultural crops, cereals, livestock and natural resources, to: identify the existing human resources for agricultural and rural development; identify the human resource needs to meet the government's objectives by the year 2000; describe the rural development training facilities and their capacity; and recommend an appropriate investment strategy.

**Time Period:** 1986-88.

**Methodology:** Interviews with government officials and secondary data on education and training programs and staffing levels in several agricultural and rural development agencies and programs.

**Data Collected:** Staff patterns, qualifications and profiles in several government agencies and services; outlines of various training and rural education programs for government agents.

**Findings/Recommendations:** To institutionalize an assessment of human resource needs, training, and management in collaboration with the country's various rural development agencies (or user services).

**Relevance:** Medium.

**Comments:** Good description of many training programs, but lacks critical analysis of human resource issues such as personnel turnover and quality/relevance of training.

**Keywords:** Education, employment, extension, RDAs.

- [175] Kolster, Jacob. (1989) [CREDIT.DOC]. Untitled draft. Washington, DC: World Bank. July 14. 21 p (text) + 3 p (appendices).

**Objectives:** To describe crop credit system which finances Senegal's groundnut marketing and exports, for two reasons: 1) crop credit for groundnut marketing and export constitutes 90 percent of total crop credits granted in Senegal, and 2) the outcome of the 1987/88 marketing season left the banking system with devastating unliquidated balances concerning the groundnut industry.

**Methodology:** Four sections: 1) procedures and actors in groundnut marketing and crop credit financing; 2) overview of previous experiences, in particular the 1987/88 marketing season; 3) origin of problems and summary of important issues; 4) elements of a solution and presentation of recommendations.

**Findings/Recommendations:** SONACOS, responsible for groundnut marketing, processing and export of oil and cake, contracts with the government to determine transfer prices and mechanisms for financial support. A syndicate of banks provides SONACOS with crop credits each year based on unverified SONACOS estimates of quantities to be marketed. The system has never functioned satisfactorily, and for every crop season of the 1980s the banks have been confronted with considerable amounts of unliquidated balances at the due date. At the current level of world

market prices, SONACOS exports oil and cake at a deficit, and cannot meet its debt obligations. SONACOS has neither a clear marketing strategy nor an effective control of inputs and output. Crop credit loans are unsecured and are not subject to credit ceilings. The banking system is not willing to participate in crop financing because of unliquidated crop credits. Recommendations: 1) settlement of outstanding crop credits can be done by either permitting SONACOS to reschedule its debt or by providing for partial or total repayment through the government budget; 2) crop credit system should be changed to reduce crop financing per unit, improve control of SONACOS by the banks, improve value of GOS guarantee, and change status and rules for crop credits in the BCEAO system.

**Relevance:** High.

**Comments:** The analysis of the bank debt and the financial performance of institutions is detailed, but the recommendations may not be entirely practical; appendices provide interesting current data.

**Keywords:** Banking, credit, government budget, institutions, peanuts, exports, organizational performance, price policy.

[176] Kramer, Carol L. (1985) **Food consumption, food demand in Senegal: Summary of literature and suggestions for needed research.** [Dakar: USAID]. January. 16 p.

**Objectives:** Summary of author's assessment of current information gaps, methodologies available to supply the needed answers, and a review of some of the major literature on consumption and demand in Senegal.

**Methodology:** Review and descriptive analysis of literature.

**Data Collected:** Recent literature on food consumption and demand in Senegal.

**Findings/Recommendations:** Recent studies on food consumption and demand are few and outdated. Specifically lacking are models of income elasticities, price elasticities of demand and cross-price elasticities for major cereals. Most studies reviewed failed to systematically relate hypothesized economic determinants of consumption with observed consumption patterns, or to link policy variables and consumption. Trends among studies include: association of deficits in millet production with increased rice purchases and consumption; variation in degrees of cereals self-sufficiency within and among regions; controversy about appropriate use of price policy; doubt as to substitutability of rice and millet in consumption. Needed are studies which address: maize consumption; effect of cereals price policy on consumption of cereals; factors affecting millet consumption in urban areas; impacts of increases in price of rice. Author's recommended research priorities: food consumption and expenditures in Dakar; studies of rural households in Peanut Basin; studies of market acceptability and future demand potential for corn in Senegal.

**Relevance:** High.

**Comments:** Review is brief and somewhat subjective as to research priorities. Includes some tables which summarize literature reviewed.

**Keywords:** Food security, consumption.

- [177] Lai, Chun K. (1986) **Forestry Planning: The Senegalese experience.** *Rural Africana*. No. 23-24: 95-105.

**Objectives:** To critique the Senegal Forestry Development Master Plan (Plan Directeur de Développement Forestier).

**Time Period:** (plan developed 1980-82).

**Methodology:** Critical evaluation of methodology and consistency between diagnosis and prescription.

**Findings/Recommendations:** Program recommendations heavily biased in favor of short-term externally funded plantation projects and against management of natural reserves which will continue to supply over 90% of needs; projections for plantation establishment unrealistic; insufficient attention to interdependence of forestry and agriculture; insufficient attention to motivation for local initiatives (in particular tree tenure); and lack of participation of RDAs, rural community representatives.

**Relevance:** High.

**Comments:** Concise and thorough.

**Keywords:** Forestry, land tenure.

- [178] Landais, Etienne; Faye, Jacques. (1986) **Méthodes pour la recherche sur les systèmes d'élevage en Afrique intertropicale.** Actes de l'atelier, Mbour, Sénégal, 2-8 février 1986. Etudes et Synthèses de l'IEMVT, No. 20. Maisons Alfort, France: IEMVT/ISRA. 733 p.

**Objectives:** Conference proceedings.

**Data Collected:** Conference organized around 7 themes, each with a research methodology focus: 1) application of the systems approach to traditional livestock practices; 2) investigation of the socioeconomic aspects of livestock systems; 3) animal feeding and husbandry, and land and grazing management; 4) crop-livestock relationships; 5) veterinary and demographic aspects; 6) animal health constraints and methods of disease prevention; 7) methods for analyzing survey and experimental data.

**Findings/Recommendations:** Based on discussions at the conference, recommendations were formulated for improvements in 7 areas: motivation and support for scientific research; ISRA's research policy and planning; strengthening in areas of biometrics, epidemiology, and economics; rigor of research design and implementation, methods of economic analysis of livestock systems, and methods of analyzing human and animal health use in an ecological perspective; broadening of research focus (traditional animal medicine, macroeconomics of livestock, horse and poultry raising); synthesis and diffusion of research results; and research-extension linkages.

**Relevance:** Medium.

**Comments:** Many excellent papers, and a strong systems focus.

**Keywords:** Livestock, agricultural research, farming system.

- [179] Lawry, Steven W. (1989) **Tenure policy and natural resource management in Sahelian West Africa.** Club du Sahel, RC(89)05. Paper presented at the Regional Encounter on

**Local Level Natural Resources Management in the Sahel, Segou, Mali, 22-27 May. January. 22 p.**

**Objectives:** Look at key aspects of current tenure policies and their impacts upon resource management in the Sahel; identify opportunities for promoting tenure changes conducive to better management of natural resources.

**Time Period:** 1980's.

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** State ownership of common property meant that local and regional institutions lost legal rights to control local resource use but the State was unable to create effective management systems. Security of tenure and freedom of management are critical needs for investment in sustainable agriculture. Customary tenures are evolving to extend more rights to individuals. State reforms have not strengthened rights, and have often stymied tenure evolution. Regulating practices may be arbitrary, and with returns uncertain farmers may be disinclined to plant trees on their farms. Models for innovation: law reform, action research, participating land system planning. Goals for policy dialogue: common property management, tenure security, forest codes, reform initiatives and processes.

**Relevance:** Medium.

**Keywords:** Land tenure, institutions, natural resource, organizational performance.

[180] Le Breton, Philippe. (1989) **Les banques agricoles en Afrique de l'Ouest--Etude comparative.** Notes et Etudes No. 24. [Paris]: Caisse Central de Coopération Economique, Division des Etudes Générales. May. 55 p.

**Objectives:** To evaluate agricultural development banks in Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Sénégal and Togo with respect to their capacity to respond to the credit needs of the rural population, and their financial viability.

**Methodology:** Secondary data.

**Findings/Recommendations:** Found evidence that the agricultural banks are not adapted to the needs of the rural people they intend to serve, types of credit are not well diversified, and agricultural loans favor commercial entities, rather than peasants. Financially, the banks' institutional problems and "relaxed" management have placed most of the banks studied in bankruptcy; the banks are hardly viable. Credit offered by the agricultural banks is essentially short-term; data for Senegal for 1986-87 shows 96.8 percent of loans were short-term.

**Relevance:** Medium.

**Comments:** Methodical, thoughtful treatment of the constraints surrounding rural credit and the institutions designed to satisfy it.

**Keywords:** Credit, institutions, organizational performance.

[181] Le Roy, Etienne. (1985) **La loi sur le domaine national à vingt ans: Joyeux anniversaire?** *Mondes en Développement*. Vol. 13, No. 52: 667-685.

**Findings/Recommendations:** The purpose of agrarian reform is not simply to redistribute land rights. Twenty years after the 1964 law on national property, a clearer picture is being developed as to what is at stake. The reform has not permitted an initial accumulation of capital in agriculture nor has it stimulated the emergence of rural entrepreneurs.

**Relevance:** Low.

**Comments:** Contained in issue with the theme "Senegal, 1985"

**Keywords:** Fleuve, land tenure, agricultural policy.

- [182] LeBeau, Francis; Eriksen, John H. (1986) **OMVS Agricultural Research II Project--Senegal (685-0957)**. Washington, DC: RONCO Consulting Corp. March. 18 p.

**Objectives:** To investigate ISRA research programs and possibilities for USAID assistance through the OMVS agricultural research project.

**Findings/Recommendations:** Constraints on development of agricultural research in the Senegal River Basin: Senegalese personnel are not well-trained or have limited field experience; researchers are concentrated in Saint-Louis, and are not available at the field research stations; poor relations between researchers representing different organizations (ISRA, OMVS, WARDA); scope of research is limited, not well-suited technologically or geographically to needs of Valley farmers, and not well-implemented. Recommendations: cost reduction efforts should focus on improved techniques for water management and soil preparation; need for better cooperation between researchers in SRV; no additional long-term expatriates are needed but short-term technical assistance is essential.

**Relevance:** Low; information is probably outdated; section on research in progress may be of some interest.

**Comments:** Summarizes principal research programs carried out in SRV by organization and research topic; difficult to read because of poor editing.

**Keywords:** Agricultural research, institutions, donor assistance, organizational performance.

- [183] LeBloas, Jean. (1987) **Southern zone water management project (no. 685-0295). Bibliography of the Casamance Region**. Dakar: USAID/Senegal, Project Development Office. February. 27 p.

**Relevance:** Medium.

**Comments:** A useful bibliography specific to the Casamance.

**Keywords:** Irrigation, soil quality, water management, agricultural development, natural resources, Casamance, bibliography.

- [184] Lele, Uma; Christiansen, Robert E.; Kadiresan, Kundhavi. (n.d.[1989]) **Issues in fertilizer policy in Africa: Lessons from development programs and adjustment lending, 1970-87**. MADIA study. World Bank. 76 p.

**Objectives:** Review reform policies implemented in 1980s in MADIA countries (Kenya, Tanzania, Malawi, Cameroon, Senegal, Nigeria), and their impact on growth and diffusion of fertilizer use. Explore constraints on supply (including macroeconomic and institutional) and demand (including prices, yield responses, capital availability, risk).

**Time Period:** 1970-87.

**Methodology:** Synthesis of statistical data and secondary studies to determine national and regional levels of fertilizer use and explain complex reasons for generally low levels. Most of study applies to all 6 MADIA countries; there are short sections on each of them.

**Data Collected:** World Bank and national government statistics on crop land; food production, imports and exports; ratios of producer prices to world prices; fertilizer use and prices, including transport costs, levels and costs of subsidies; fertilizer/crop price ratios; yield responses, etc. Some data aggregated for several countries, some presented for individual countries.

**Findings/Recommendations:** For Senegal: Privatization of fertilizer distribution in Senegal will be slow because of poverty of farmers and risks in adoption of new technology. Reliance on private sector for fertilizer sales unlikely to work without comprehensive marketing strategy for inputs, credit, output purchases. Donor support of farmer cooperatives a possibility. Unstable policies and institutions are largely to blame for low level of fertilizer use. For MADIA countries generally: Donors should support long-term untied import support for fertilizers, encourage improvement of national planning and policymaking capacity. National and regional food and fertilizer stocks a good method to reduce restrictions on trade, broaden markets, and increase profitability of fertilizer use over time. Need improved knowledge base on relative roles of fertilizers and other complex resource management needs. Privatization has great potential for improving procurement and distribution of fertilizer. Public sector role is also great -- to support private sector and meet needs of farmers who are beyond reach of private sector. Desirability of fertilizer subsidies varies with national conditions.

**Relevance:** High.

**Comments:** Section on Senegal draws heavily on Kelly (1986b).

**Keywords:** Fertilizer, policy, subsidies, fertilizer distribution.

- [185] Lele, Uma; Christiansen, Robert E. (1989) **Markets, marketing boards and cooperatives: Issues in adjustment policy.** MADIA study. World Bank. June. 78 p (text) 7 p (statistical appendices).

**Objectives:** Examine appropriate roles for public, private, and cooperative sectors in agricultural marketing, and issues of export and food crop pricing in context of MADIA study countries (Cameroon, Kenya, Malawi, Nigeria, Senegal, Tanzania).

**Time Period:** Colonial period to present.

**Methodology:** Synthesis of qualitative and quantitative studies of marketing issues. Gives historical background on state marketing organizations since colonial period.

**Data Collected:** Some data on ratios of producer/international prices; marketing costs in some countries; little on Senegal specifically.

**Findings/Recommendations:** For MADIA countries in general: While state marketing organizations have been highly politicized and inefficient, there are important and legitimate roles for them, including reducing risk to small-scale farmers, ensuring input supply and markets to promote price stability, support for large-scale investment in processing facilities that the private sector cannot or will not make, and creating demand for inputs. Public sector involvement is necessary to facilitate working of private sector, by stimulating development of an entrepreneurial class, encouraging free entry into markets, building infrastructure, and promoting efficient financial markets. For Senegal: Government intervention and mismanagement and corruption were major causes of ONCAD's high marketing costs, but its 1980 dissolution devastated input and output purchase networks. Institutional instability contributes to smallholder suspicion and so aggravates instability of sources of supply for parastatals and agro-processors. Producer cooperatives operating with a lot of government intervention are unlikely to function well. Effects of variously successful efforts to privatize groundnut and cereals marketing and fertilizer distribution are discussed.

**Relevance:** High.

**Comments:** No index; references to Senegalese policies and experiences are scattered through the text (concentrated on pp. 37-41 and 62-63). Has substantial bibliography.

**Keywords:** Public sector, cereals marketing, privatization, price policy, cooperatives.

- [186] Lemestre, R; Leuchtman, E.; Sanchez, N.; Vivier, P. (1989) **Etude des prix de revient du maïs. Résultats des travaux du groupe restreint.** Sous-programme No. 8: Développement intégré de la filière maïs. Dakar: Fonds Commun de Contrepartie de l'Aide Alimentaire (FCCAA). Janvier. 6 p.

**Objectives:** To examine current maize production costs in different zones of Senegal.

**Methodology:** Structure of budgets and prices adopted from work of Martin (1988, "Budgets de culture"); 11 zones, several production techniques per zone; average cost per zone calculated weighted by estimated percentage area cultivated with each technique; mean and median cost estimates then calculated based on data obtained from different sources (Martin, RDAs, Projet Maïs).

**Data Collected:** Input/output coefficients and prices from different authors; statistics on maize area, yield, and percentage of area fertilized for 10 administrative regions.

**Findings/Recommendations:** "Weighted mean median" production costs (prix de revient) across all zones reported as 81.6 FCFA/kg for rainy season irrigation, 102.3 for off-season irrigation, and 56.5 for rainfed maize (national average of 62.6). Research-based data for such calculations is lacking, and estimates of labor requirements (a key cost element) are especially variable from author to author. Production costs can only be reduced by increasing yields. Producer price should be set above production cost; authors recommend 70 FCFA/kg.

**Relevance:** Low.

**Comments:** Data sources not fully documented; method of and rationale of calculations not clear, especially for weighted medians.

**Keywords:** Maize, irrigation, production costs, inputs.

- [187] Lericollais, André; Schmitz, Jean. (1984) "La calebasse et la boue." **Techniques et outils des cultures de décrue dans la vallée du Sénégal.** *Cahiers ORSTOM. Série Sciences Humaines.* Les instruments aratoires en Afrique Tropicale. La fonction et le signe. Vol. XX, No. 3-4: 427-452.

**Objectives:** To describe the seasonally flooded areas of the Senegal River Valley, where recessional agriculture is dominant; to analyze the tools used in recessional agriculture.

**Methodology:** Descriptive analysis; each tool used by the farmers during the operational cycle of recessional agriculture is linked to the larger systems of Sahel-Sudan agriculture.

**Findings/Recommendations:** Recessional agriculture in the Senegal Valley has not experienced any significant transformation in the last few decades. Cultivation of the Waalo lands is still done by hand and without fertilizer. In certain respects recessional agriculture is marginal. Agricultural research has neglected recessional agriculture because it is not widely practiced and serves only for food production. Attempts to substitute cash crops failed because farmers refused to substitute them for their food crops. Results of research on rainfed agriculture in the Sahel-Sudan region do not apply very well to recessional lands since a limiting factor for soil improvement is the water reserves of the soil; for fertilizer use this variable is important. Large spreads between yields and large annual variabilities indicate that edaphic and hydrological conditions combine unfavorably on large parts of the land. The full potential can only be realized on the best situated lands. It is not clear that recessional agriculture will disappear. Control over water levels will allow extension work on some innovations and allow more agricultural research in this area.

**Relevance:** High.

**Keywords:** Agricultural research, food production, irrigation, Fleuve, water management, soil quality, fertilizer, sorghum, environment.

- [188] Lewis, Jeffrey. (1989) **Natural resource management in the Sahel: An operational strategy for program development.** Draft. World Bank. June 9. 14 p.

**Findings/Recommendations:** Strategy of natural resource management programs should be to enable local communities to regain control over management of their land, improve efficiency and relevance of government support to natural resource users, improve collection and use of ecological and geographical information, and protect key wildlife populations and habitats. Problems are complex and essentially local. Program components should include development of community-level resource use plans, policies and legislation to improve security of resource use and increase community responsibility, institutional reform and training, geographical information



systems and ecological monitoring programs, and improved management of wildlife and protected areas. Risks and benefits of such programs summarized.

Recommends a World Bank role in donor coordination and developing the policy agenda, improving the policy environment re: land tenure and incentives, and contribution to national resource management funds.

**Relevance:** High.

**Keywords:** Natural resources, institutions, environment, local government, farmer organizations, donor assistance.

- [189] Lhoste, P. (1989) *Les projets de développement de la traction animale: Les contraintes liées à l'animal et les voies d'intervention prioritaires. Les Cahiers de la Recherche Développement.* No. 21: 10-18.

**Objectives:** To discuss specific constraints related to care, feeding, driving, handling, training, harnessing, finishing and selling of animals in animal traction projects.

**Time Period:** Analysis of studies conducted between 1986 and 1988.

**Methodology:** Descriptive analysis based on studies carried out in Burkina Faso, Côte d'Ivoire, Mali, and Senegal.

**Findings/Recommendations:** In order to promote the development of animal draft power, the following areas have particular priority: nutrition and care of the animals; adaptation of harness models and manufacturing techniques to suit the needs of craftspeople and users. Manure production is an important factor in the relationship between agriculture and animal husbandry. Profitability of animal draft is a function of good management practices, including replacement and marketing. Education and training is important; producer organizations or associations could also be promoted.

**Relevance:** High.

**Keywords:** Animal traction, livestock, fertilizer, credit.

- [190] Lhoste, Philippe. (1987) *L'association agriculture-élevage. Evolution du système agropastoral au Sine-Saloum (Sénégal).* Etudes et synthèses de l'IEMVT, No. 21. IEMVT/CIRAD. 284 p (text), 14 p (annexes), 15 p (bibliography).

**Objectives:** To study the relationship between agriculture and animal husbandry in West Africa on the basis of African experience (especially in Senegal) and data from the Unités Expérimentales du Sine Saloum (UESS).

**Time Period:** 1980-1982 in Senegal. 1983-1986 from Montpellier in cooperation with ISRA in Senegal.

**Methodology:** Descriptive analysis (Part I), statistical analysis mainly using livestock production data from UESS (Part II), and a general approach in Part III which includes a survey at the farm level. The focus is on the farm level.

**Data Collected:** Data on livestock (cattle, horses, mules and donkeys, small ruminants): numbers, fertility, age distribution, reproductive rates, number of offspring, herd structure. Data on pasture land: type and area of pasture, geographic and geological data on the area studied. Types of animal husbandry (data from various sources).

**Findings/Recommendations:** Animal traction seems to allow intensification of agricultural production. Integration of the animal into the production unit seems to increase productivity and value of forage resources. Extensive herding has consequently decreased in importance (especially in very dynamic agricultural areas). The herd plays an important role for the African farmers in regulation of fertility transfer, increasing the value of non-arable land and as a preferred means of accumulating wealth. Complex management problems explain in part the low productivity and slow progress in performance. Land management and social organization have to be considered in the search for solutions. Use of draft animals increases the amount of land under cultivation and labor productivity but not land productivity. The productive potential of the ecosystem is reduced and a solution has to be found before the land will no longer be able to sustain the population. Intensification and improvement of productivity of the agro-pastoral system in a global context are logical solutions.

**Relevance:** High.

**Keywords:** Animal traction, livestock, productivity, environment, nutrition, transport.

- [191] Llères, Bernard. (1986) *La pêche maritime, un moteur de l'économie sénégalaise, II (1). Afrique Contemporaine.* No. 137: 56-74.

**Objectives:** To document development of the artisanal and industrial fisheries subsectors since independence.

**Methodology:** Descriptive/historical analysis of the evolution of technology and production in the artisanal and industrial fisheries sub-sectors.

**Data Collected:** Secondary data on fish production by type (artisanal/industrial), exports, marketing channels.

**Findings/Recommendations:** Fish production is a relatively stable element in GDP. Public sector expenditure on fisheries development has historically been less than proportional to its importance. Internal distribution remains very uneven despite improvements in cold storage facilities.

**Relevance:** Low.

**Comments:** No policy recommendations presented; cf. Rieucan (1985, 1986).

**Keywords:** Fish.

- [192] Lombard, Jérôme. (1987) *Système de production et autosuffisance céréalière en pays Serer (Sénégal).* *Cahiers des Sciences Humaines.* Vol. 23, Nos. 3-4: 471-482.

**Objectives:** To examine farmer strategies for ensuring grain supply for home consumption in a period when family grain production does not meet subsistence needs.

**Time Period:** 1982-85 (?).

**Methodology:** Surveys of all 250 "chefs de cuisine" in five villages in Niakhar and Tattaguine in Serer region.

**Data Collected:** Household grain storage capacity, grain consumption, home production and purchases, millet and rice purchases, seasonal migration, food deficit households,

households with income from peanut production, household income sources. Most data cover two or three year period between 1982 and 1985.

**Findings/Recommendations:** With food production crises in West African Sahel, household grain storage capacity no longer assures large security stocks of food but is used to manage seasonal consumption of homegrown and purchased grain. Most producers purchase millet to consume during some months; degree of dependence on purchased grain varies widely. A variety of income-producing activities -- including sale of peanuts or animals, and off-farm employment -- provide cash for grain purchases.

**Relevance:** Medium.

**Keywords:** Food security, storage, production, consumption, Peanut Basin.

- [193] Louis Berger International, Inc. (1987) **Etude de la filière sucrière au Sénégal. Diagnostic technique, organisationnel et de gestion. Rapport final.** Ministère des Finances; Caisse de Péréquation et de Stabilisation des Prix. December. 163 p.

**Objectives:** To develop a basis for renegotiating an agreement between the Senegalese government and the Compagnie Sucrière Sénégalaise (CSS).

**Time Period:** 1986-1987.

**Methodology:** Descriptive and statistical analysis.

**Data Collected:** Personnel, taxes/tariffs, sugar production, producer prices, profits, costs, sales, consumption, imports, transport, prices of inputs, salaries.

**Findings/Recommendations:** Management restructuring efforts undertaken at the CSS between 1984 and 1985 were partially successful. More needs to be done with respect to organization and coordination of the whole enterprise, technical management, management of supplies and inventories, financial management and control of management. Production costs can be lowered and productivity increased. There exist some basic and formal flaws in the legal framework governing the relations between the government and the CSS. Every three years a contract should be negotiated in order to define the basis for calculating the government-controlled sugar prices, production targets, investment and diversification programs. The contract would also specify the conditions for application for the agreements, information exchange and system of control. The government-controlled sugar prices should be renegotiated yearly. A follow-up committee should be created. A permanent framework for negotiations between the government and the CSS should be defined. The external information system of the CSS is insufficient. The CSS should have only one person to deal with in the government and the number of documents to be submitted to the government should be reduced.

**Relevance:** High.

**Keywords:** Sugar, production, government, taxes/tariffs, subsidies, processing, price policy, organizational performance, marketing, imports.

- [194] Louis Berger International, Inc. (1986a) **Financial analysis for industrial processing of millet: Final report.** East Orange, NJ: Louis Berger International, Inc. February. 108 p.

**Objectives:** To provide a financial analysis and comparison of alternative investment and production plans for an industrial millet processing complex consisting of a mill and couscous and infant weaning food processing units. Study designed to assist potential investors to choose the most appropriate plan, given existing supply and market conditions.

**Time Period:** 1985 (?).

**Methodology:** Financial analysis of projected costs/revenues of operating a millet processing plant; technical analysis and sensitivity analysis. Considers five alternative investment projects.

**Data Collected:** Estimated investment and operating costs and revenues under five investment project scenarios.

**Findings/Recommendations:** Overall profitability of such a plant would be highly sensitive to millet supply conditions and demand for final products. Prospects for success are enhanced when production increases in the milling unit are carried out as quickly as possible, products of the second processing are sold at prices higher than 350 CFAF/kg for couscous and 800 CFAF/kg for weaning food, and supply purchasing for the complex can be distributed over the entire year. Profitability is highly sensitive to millet supply conditions and demand for the final product. Projects 1, 2 (both mill and processing unit) or 3 (only mill) become the best possibilities if supply can be assured and millet purchase can be distributed over the year. Which project is best depends on level of demand for products of second processing. In the extreme and probably unrealistic event of high demand, project 1 would be the most profitable (mill and processing in 1st phase, processing of twice the quantity in 2nd phase, processing of three times the quantity in 3rd phase). In the other extreme of no demand, project 3 (only mill) would be better.

**Relevance:** High.

**Comments:** Report only of interest in relation to Louis Berger International, Inc., 1986b. Cf. other Louis Berger documents listed in this bibliography. A complement to this document exists in French and includes some estimates on corn processing: "Etude des analyses financières pour les entreprises de transformation du mil: Complément maïs" (June 1986).

**Keywords:** Millet processing, production, market prospects.

[195] Louis Berger International, Inc. (1986b) **Millet supply study: Final report.** East Orange, NJ: Louis Berger International, Inc. April. 101 p.

**Objectives:** Not explicitly stated but presumably a study of the millet supply and production potential with a view towards establishing a millet processing operation to support food security goals.

**Methodology:** Statistical and descriptive analysis of official data (generally from 1970-86) collected through surveys by various organizations in Senegal (ORANA, SONED, Abt Associates, FAO, USAID, MDR). Economic analysis of proposed intervention.

**Data Collected:** Cereals consumption, production, yields, commercialization costs, and prices with particular attention to millet; fertilizer costs and requirements; cereals demand estimates; costs of intervention.

**Findings/Recommendations:** If the present trends continue, demand for millet and sorghum should increase due to demographic growth, and individual consumption will decrease (assuming stable relationship between prices and preference). Millet and sorghum production, on the other hand, will stagnate. Possibilities for increasing area cultivated are limited, although possibilities for shifting from groundnut to millet cultivation exist. Overall yields could be increased through improved technology. There is currently a deficit supply of millet and sorghum, but a balance between supply and demand could be achieved through production increases. Author suggests intervention aimed at increasing yield per hectare and perhaps also shifting surface area from groundnuts to millet/sorghum and developing urban demand. A processing plant could be supplied with surplus from two regions: Sine-Saloum in the medium term and Senegal Oriental in the long term. Limitations to increasing production are: lack of improved seed and access to chemical fertilizers, lack of effective extension services to encourage improved farming practices, and high cost of inputs to farmers. Recommendations are to reorganize the production channel for seed multiplication, set up a distribution system, grant subsidies and credit, and reinforce and support extension services. The results of intervention would be an increase in added value nationally, savings in grain imports, and a direct cost to government through loss of import duties.

**Relevance:** High.

**Comments:** See other studies by Louis Berger International, Inc.

**Keywords:** Food security, millet processing, production, Peanut Basin, Senegal Oriental.

- [196] Louis Berger International, Inc. (1986c) **Millet supply study: Additional memorandum on supply prospects for a mixed millet and corn complex.** East Orange, NJ: Louis Berger International, Inc. April. 27 p.

**Objectives:** To analyze alternative plan for supplying a processing plant with 50% millet, 50% corn.

**Methodology:** Mainly descriptive analysis of secondary data collected in Senegal.

**Data Collected:** Corn yields, production and areas under cultivation, consumption; grain production forecast for 1995. Data used from 1970-86.

**Findings/Recommendations:** Corn production development prospects are more promising than for millet. Production is increasing faster and offers less risk of deficit supply.

**Relevance:** Medium.

**Comments:** See Louis Berger International, Inc., 1986b.

**Keywords:** Food security, processing, millet processing, consumption.

- [197] Louis Berger International, Inc. (1981) **Program for the development of the Balla Marigot in Casamance. Final Report. Volume 1. Main Report.** Dakar: Ministry of Water Resources, Directorate of Rural Development; USAID. May. 140 p.

**Objectives:** Give detailed inventory of those resources in the project year available for use within a development program and definition and comparison of several

development schemes; produce technical and economic feasibility studies of the development scheme selected by the Administration.

**Time Period:** March 1979-October 1980.

**Methodology:** Chapter 1 gives the context of the project, discussing the general characteristics of agriculture in Senegal and the Casamance region (mainly statistical data); chapter 2 describes the project, presenting its various components, giving investment and operating costs and establishing a schedule for completion; chapter 3 evaluates the project, analyzing the economic benefits of the project and presenting the study's conclusions (descriptive and statistical).

**Data Collected:** Revenue, farm budget, prices, projected participation and production, foreign exchange, building and equipment needs, operating costs, construction costs, water requirements, floods, soils, agricultural production, food, inputs (most of the data is projections).

**Findings/Recommendations:** The Baila Marigot Basin Development Program is an integrated development program oriented essentially towards rice but including other areas (i.e., livestock, management of forest resources). General principles are: participation of the valley's population in the project, solving the farmer's major problems (improve mobilization and use of water resources, intensification and diversification of crops), preparation of longer term actions, for which the impact will not be limited to the region. Impact on farmers' income, agricultural production and foreign exchange is significant. Main economic interest of the project is improvement of the nonsaline lands which is economical even if yields are fair. Improvement of saline lands is costly but gives high yields and offers possibility of off-season crops. Some major technical uncertainty remains (polderization techniques, estimation of water resources and agricultural practices on the polders).

**Relevance:** High.

**Comments:** This is volume 1 of 7 volumes.

**Keywords:** Water management, production, rice, Casamance, irrigation, prices, budgets, development, agricultural research.

[198] Ly, Hady M. (1989) *Evaluation du déficit vivrier au Sénégal*. Dakar: USAID/Senegal. Mai. 42 p (text) + 24 p (appendices).

**Objectives:** To study the food deficit in Senegal.

**Time Period:** 29 mars - 12 mai 1989; field phase 1 - 15 avril 1989.

**Methodology:** Divided Senegal into 4 survey zones, excluding Cap Vert. Three departments per region were visited except the department of Kédougou; one to three arrondissements were chosen in each department, and one to three villages in each arrondissement for a total of 93 villages; five villagers chosen in each village, except one village where only three villagers were chosen for a total of 463 respondents.

**Data Collected:** Rainfall pattern; locust incidence; cereals/peanut production 1987/88 and 1988/89; estimation of household consumption (results not reported).

**Findings/Recommendations:** Results of survey not presented in detail. Women play a key role in assuring the family food supply when household cereals production is inadequate.

**Relevance:** Low.

**Comments:** The study is only for one year; the results sometimes lack coherence and are difficult to decipher.

**Keywords:** Cereals imports, consumption, food security, food aid, cereals production.

- [199] Müller, J.O. (1988) **The land laws and community reform as an example of institutional change in Senegal: Legal principles, implementation and preliminary results from the semi-arid land in the Ferlo.** *Quarterly Journal of International Agriculture*. Vol. 27, No. 1: 80-101.

**Objectives:** To evaluate implementation and degree of acceptance of land laws and administrative procedures in the Ferlo region.

**Methodology:** Not discussed - appears to be interviews with household heads and key informants in five villages.

**Data Collected:** Secondary data on the content and instruments of land laws (e.g., registre foncier); primary data on administrative procedures of the communautés rurales; understanding of and attitudes to land laws.

**Findings/Recommendations:** Implementation in this sparsely populated semi-arid area is taking place according to the law and appears to have fewer problems and deviations than in more highly populated areas (Fleuve, Casamance, Sine-Saloum). Land laws were generally understood by household heads, all of whom had their use rights recognized. The difference in effective land use now and prior to the reform is limited as population pressure on the land is low. Where unequal access to land resources persists it is linked to traditional castes and privileges of the Islamic leadership which are respected by both government and rural people. The reform of community administration has resulted in a significant increase in local autonomy.

**Relevance:** Low

**Comments:** Difficult to follow due to poor translation.

**Keywords:** Land tenure, local government, Ferlo.

- [200] Magnuson, Axel; Block, Steven; Damon, Jacqueline; Eriksen, John; Gellar, Sheldon; Kane, Francine; Ross, Clark; Schwarz, Ronald; Steedman, Charles. (1985) **Senegal agricultural policy analysis.** Agricultural policy analysis project. Cambridge, MA: Abt Associates, Inc. April. 275 p.

**Objectives:** Study commissioned by USAID/ADO as support for policy dialogue between USAID/Senegal and GOS. Terms of reference called for (a) description of agricultural potential and constraints, (b) description of major policy instruments used by GOS, (c) discussion of major policies that constrain agricultural development, (d) assessment of policy alternatives, (e) recommendations for USAID assistance programs and participation in the policy dialogue with GOS.

**Time Period:** February 1984 to January 1985. Announcement of GOS New Agricultural Policy in March 1984 led to revision of study workplan. Preliminary draft presented to USAID in June 1984; second draft submitted September 1984.

**Methodology:** Three visits to Senegal by the assessment team during 1984, including two weeks of field interviews covering all regions.

**Data Collected:** Secondary data and informal interview results.

**Findings/Recommendations:** Chapters cover (1) importance of agriculture in Senegal, (2) evolution of present situation, (3) analysis of major constraints on agricultural development, (4) regional potential, (5) conclusions and recommendations. Estimated foodgrain supply and demand are projected for 1985-2000 under two alternative scenarios. Major conclusion: Senegal will continue to face a major structural deficit in domestic food grains, caused by population growth exceeding agricultural production growth, by the allocation of 50% of cultivated area to cash crops, and by poor millet/sorghum yields. The report argues that significant progress will require improvements in rainfed agriculture combined with development of efficient irrigation systems, and that increasing rainfed crop productivity is the most likely means of achieving significant medium-term gains in food security. Major issues/recommendations cited include (a) food security (not food self-sufficiency), (b) crop mix (poor long-term prospects for peanuts) and need for changes in price policy and farmer support services to encourage more intensive production, (c) fiscal issues (GOS must not forego investment in rainfed agriculture in favor of irrigated systems), (d) research priorities (environment, land tenure, maize, diffusion of results to policy-makers), (e) input supply (private sector input distribution, RDA role in foundation seed production), and (f) institutional issues (policies and regulations are needed to encourage private sector involvement in input and product marketing).

**Relevance:** High.

**Comments:** Generally solid analysis given data and time constraints; assessment of issues still relevant.

**Keywords:** Agricultural policy, agricultural development, environment, technology, inputs, marketing, institutions, agricultural research.

- [201] Manzitti, Virginia; Maccheroni, Carlo. (1989) **Différentes formes d'épargne et de crédit en milieu rural. Présentation des premiers résultats d'une enquête au Sénégal.** Paper presented at the seminar sponsored by Université Laval/CILSS/Université de Ouagadougou, "Les stratégies et les politiques alimentaires," Ouagadougou, 12-15 juin 1989. June. 24 p.

**Objectives:** To study financial transactions in rural areas and the socio-economic relationships which influence them.

**Time Period:** Décembre 1988-Septembre 1989.

**Methodology:** Study sample: two rural areas (Boukiling, Casamance and Passy, Saloum), 32 villages, five interviews over the period of the study; sampled 400 individuals in 320 compounds (demand for financial services, supply of loans); 80 institutional and non-institutional suppliers of financial services (banks, projects, businesses,



individuals). This preliminary paper covers only Bounkiling: 160 compounds, and only one of the five planned interviews, conducted in February 1989.

**Data Collected:** Financial needs of rural people: amounts, uses, seasonal distribution of demand for credit; different forms of credit offered and by whom; costs of credit, repayment mechanisms, institutional and social controls, risk levels for different loan types; savings practices: types, amounts, yields, savings period; correlation between financial costs and resource allocations.

**Findings/Recommendations:** Hypothesis 1: an informal financial market is well-established and credit and savings play an important role in the peasant economy. Hypothesis 2: high financial costs constrain the rural economy, contribute to technological underdevelopment and keep agricultural sector from becoming competitive. Hypothesis 3: existing financial network provides base for setting up improved types of credit and savings as a means to reduce investment costs for food system activities. Preliminary findings in one area for one interview: a) most loans are for food purchases; b) 60 percent of compounds report difficulty accumulating savings (attributable to production shortages - traced back to limited use of production inputs); c) 36 percent of savings reserved for dry season food needs; d) savings represent deferred consumption (80 percent saved for less than one year); e) 92 percent keep savings in compound; only 8 percent maintain deposits in formal/informal savings institutions; f) 62 percent took loans: 36 percent of loans in form of farm products (mostly rice and millet), 44 percent in money; g) 78 percent of loans are for less than 9 months; h) 30 percent of loans from businesses, 18 percent from organizations, 17 percent from relatives.

**Relevance:** Medium.

**Comments:** Completed study likely to be of high relevance. Study is one of three parts of a CILSS study on the structure of the food system: a) farmer strategies based on market price and food security in Burkina Faso; b) impact of urbanization on food consumption models in Niger; c) types of credit and savings in rural Senegal (the present study).

**Keywords:** Credit, institutions, savings, consumption, food security.

- [202] Martin, Frederic. (1988a) **Food security and comparative advantage in Senegal: A micro-macro approach.** Ph.D. dissertation. East Lansing, MI: Michigan State University. 294 p.

**Objectives:** To develop a conceptual framework for analyzing food security and comparative advantage at the farm and national levels; to conduct an empirical analysis of Senegal's current and projected comparative advantage, the costs associated with higher levels of cereals self-sufficiency, and the key variables which stimulate or constrain cereals production.

**Time Period:** Field research conducted in 1984-86, with cost and price information updated in 1987.

**Methodology:** Method designed to incorporate both farmer and GOS food security objectives. Method included review of literature on food security and comparative advantage; analysis of national food supply/demand situation (1974-85, and projected

1985-2000); preparation of 181 crop budgets for eleven production zones, including current and improved production technology; construction of typical farm models for eleven production zones, using linear programming; estimation of regional (zone) cereals supply curves, assuming 20%-100% increases in cereals producer prices; and incorporation of these supply curves into an agricultural sector model which used separable programming techniques to estimate the production and trade pattern which minimized the economic cost of achieving various levels of cereals self-sufficiency.

**Data Collected:** For 1970-84, world prices and domestic yields for selected crops; for 1974-85, trade in agricultural inputs and products, supply of cereals by product and origin, rainfall and gross cereals production; for 1983-85, regional distribution of cereals supply and estimated consumption; for 1985-2000, projected grain production and consumption (author's calculations plus citation of projections from 3 other sources); calculation of import and export parity prices for 1986/87; farm income, crop area, output, input use, agricultural trade, and government budget deficit under different price scenarios.

**Findings/Recommendations:** Results showed limited cereals supply response to price increases. Land for rice production is limited, and millet/sorghum remains less profitable than peanuts. Maize output increases substantially, creating likely surplus given small demand for maize. Aggregate output increases more significantly when expansion of irrigated area is assumed, but irrigation development and higher prices are costly to government and consumers. Raising the rice price alone (e.g., by establishing a protected regional market) has negligible effects on production, but imposes substantial costs on consumers. Aligning producer prices with economic prices would produce benefits from Senegal's comparative advantage in peanuts, but may not be a viable long-term strategy.

**Relevance:** High.

**Comments:** Cf. Freud et al. (1989) for description of related econometric modelling study which, relative to Martin's study, has stronger treatment of demand and price determination but weaker treatment of production. Cf. Martin (1988b) regarding crop budgets; Martin and Crawford (1989) for more recent discussion of price policy issues.

**Keywords:** Comparative advantage, rice, peanuts, millet/sorghum, maize, irrigation, food security, cereals policy, price policy, technology, trade.

- [203] Martin, Frederic. (1988b) *Budgets de culture au Sénégal*. MSU International Development Reprint Paper No. 28F. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 55 p.

**Objectives:** To present the methodology used to construct a set of crop budgets for each major agricultural zone of Senegal, and to discuss the results of a comparative analysis of crop profitability by zone and type of technology.

**Time Period:** Budget preparation during 1985-87; budgets incorporate 1986/87 costs and prices, with some reference to the 1988 reduction in producer price of peanuts.

**Methodology:** Review of published data on crop budgets; in-depth interviews with researchers from ISRA and WARDA, and with personnel of regional development agencies; budgets computerized using Lotus 1-2-3; a total of 181 budgets constructed for 11 production zones, covering 2-6 crops per zone (11 crops in all) and 5 possible types of technology (8 for large irrigated perimeters in the Fleuve); yields and returns estimated for poor, average, and good rainfall situations; gross and net margins (using financial prices) analyzed to determine the most profitable crop/technology combination within and across zones; individual budgets presented in annexes.

**Data Collected:** Inputs and technology used, including calendar of human and animal labor use by crop operation; costs and prices; yields.

**Findings/Recommendations:** Peanut production is the most profitable rainfed crop. Cotton is less profitable than most other crops. Maize is nearly as profitable as peanuts in the southeastern Peanut Basin. Millet/sorghum is significantly less profitable than peanuts, even with the 1988 reduction in peanut producer price. Irrigated rice is the most profitable enterprise in the Fleuve, and for the country as a whole, given prevailing prices. Under current prices, intensification of crop production is profitable in southeastern Senegal, but not in zones north of the southern Peanut Basin.

**Relevance:** High.

**Comments:** All budgets incorporate actual 1986/87 financial prices.

**Keywords:** Budgets, production costs.

- [204] Martin, Frederic. (1988c) **Budgets de culture au Sénégal: Annexe 1--Budgets de culture et analyse des marges dans le Bassin Arachidier.** MSU International Development Reprint Paper No. 28F/1. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 134 p.

**Objectives:** To present the detailed crop budgets and gross/net margin analysis tables for the Peanut Basin (Zone 1--Center, Zone 2--North, Zone 10--Southwest, Zone 11--Southeast).

**Methodology:** Cf. Martin (1988b). Budgets and margin analyses are grouped by zone. Crops covered are millet/sorghum, peanuts, cowpeas, and maize. Notes on the budgets are included for each crop and zone. Margin analyses cover gross and net margins with and without labor costs, and are presented for 5 different rainfall scenarios. For each of the four types of margin, the crops are ranked in order of profitability within each technology category (module). A ranking of the crops across all modules is also given.

**Findings/Recommendations:** Cf. Martin (1988b) for summary of margin analysis results.

**Relevance:** High.

**Keywords:** Budgets, production costs.

- [205] Martin, Frederic. (1988d) **Budgets de culture au Sénégal: Annexe 2--Budgets de culture et analyse des marges au Sénégal Oriental et en Casamance.** MSU International

Development Reprint Paper No. 28F/2. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 204 p.

**Objectives:** Cf. Martin (1988c).

**Methodology:** Cf. Martin (1988c). Presents individual crop budgets and margin analysis tables for Senegal Oriental (Zone 6), Upper Casamance (Zone 7), Middle Casamance (Zone 8), and Lower Casamance (Zone 9). Crops covered are millet/sorghum, maize, peanuts, cotton, upland rice, mid-slope rice (riz de nappe), and transplanted rice.

**Findings/Recommendations:** Cf. Martin (1988b) for summary of margin analysis results.

**Relevance:** High.

**Keywords:** Budgets, production costs.

- [206] Martin, Frederic. (1988c) **Budgets de culture au Sénégal: Annexe 3--Budgets de culture et analyse des marges dans la Vallée du Fleuve Sénégal.** MSU International Development Reprint Paper No. 28F/3. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 214 p.

**Objectives:** Cf. Martin (1988c).

**Methodology:** Cf. Martin (1988c). Presents individual budgets and margin analysis tables for large irrigated perimeters in the Delta and Middle Valley (Zone 3), for small irrigated perimeters and recessional agriculture in the Middle Valley (Zone 4), and for small irrigated perimeters and rainfed crops in the Upper Valley (Zone 5). Crops covered include rice, sorghum, maize, tomato, millet/sorghum, cowpeas, and peanuts. Various double-cropping enterprises are included (e.g., rice-rice, rice-tomato, etc.).

**Findings/Recommendations:** Cf. Martin (1988b) for summary of margin analysis results.

**Relevance:** High.

**Keywords:** Budgets, production costs.

- [207] Martin, Frederic; Dieng, Alioune. (1988) **Foreign trade of agricultural products and inputs in Senegal from 1975-84.** MSU International Development Reprint Paper No. 23. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 45 p.

**Objectives:** To describe the primary characteristics of the foreign trade of agricultural products and inputs in Senegal, and to trace its evolution from 1975 to 1984.

**Time Period:** Prepared during 1985-86.

**Methodology:** Analysis of primary data compiled from computer records of imports and exports jointly maintained by the Statistics Directorate and the Customs Directorate.

**Data Collected:** Volume of foreign trade of agricultural products and inputs in relation to overall foreign trade, and to national income; trends in trade; principal products traded; and Senegal's chief trading partners. Appendix summarizes duties, taxes, and other trade restrictions.

**Findings/Recommendations:** Trade in agricultural products and inputs is important in the Senegalese economy. Senegal is dependent on a small number of products (peanuts, fertilizer, fish, imported rice) and trading partners (France), both for imports and exports. Long-term trend suggests a weakening agricultural trade balance.

**Relevance:** Medium.

**Keywords:** Trade, imports, exports, inputs.

- [208] Martin, Frederic. (1985) **La réforme de la politique céréalière dans le Sahel: Le Sénégal.** Alexandria, VA: Elliot Berg Associates. Octobre. 127 p.

**Objectives:** Case study of Senegal's experience with cereals policy reforms, and recommendations for future action.

**Time Period:** 1984-85.

**Methodology:** Descriptive analysis of cereals policy reforms based on official data.

**Data Collected:** Cereals prices.

**Findings/Recommendations:** Cereals policy reforms have been slow to occur in Senegal. The reforms were motivated by a national financial crisis and pressure by donors, and were apparently designed as a short-term fix rather than as long-term strategies. A long-term strategy could be developed with the help of donors. Cereals policy is complex; there is a lack of appropriate data and certain interest groups are likely to create conflict. It is important to determine respective roles of the State and the private sector in developing a strategy which will have a positive long-term effect on the political economy.

**Relevance:** Medium.

**Keywords:** Food security, cereals policy.

- [209] Martin, Frederic P. (1989) **Consultation report, mission to Senegal.** Michigan State University, Dept. of Agricultural Economics, Senegal Agricultural Research II Project. April 23. 18 p (text) + 8 p (annexes).

**Objectives:** To summarize mission to support M. Sidibé, ISRA/BAME.

**Time Period:** March 29 to April 13, 1989.

**Methodology:** Review of research and field trip to St. Louis.

**Findings/Recommendations:** Evaluation of Sidibé's modelling of risk and farmer strategies in lower Senegal River Valley. Recommends improvements in the model. Includes guides to updating the ISRA/BAME crop budgets, to analyzing price, technology, and institutional policies with the ISRA/BAME farm models, and to running the national model.

**Relevance:** Medium, for those interested in use of the crop budgets and models.

**Keywords:** Fleuve, production costs, model, price policy, technology, risk, rice.

- [210] Martin, Frederic P.; Crawford, Eric W. (1989) **The role of price incentives in developing Sahelian agriculture: The case of Senegal.** Staff Paper No. 89-10. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. January. 32 p.

**Objectives:** Using Senegal as a case study, to contribute to: the disciplinary debate about role of price policy in developing Sahelian agriculture; the empirical debate about aggregate supply response; and the technical and political debate about desirable agricultural policies in Sahelian states.

**Methodology:** Based on Martin (1988a) and additional literature review. Discusses the roles of technology, institutions, and prices in stimulating agriculture. Describes the farm and national models used in Martin (1988a) to evaluate alternative price policies, summarizes results, and presents policy implications. Alternative price policies are evaluated in terms of impact on production, economic costs, government budget, and agricultural trade balance. Price policies analyzed include 20%-100% increase in all cereals prices at producer level; 50% increase in rice price alone; and pricing based on economic import and export parity prices.

**Findings/Recommendations:** Major conclusion is that price policy alone is not enough to increase output and improve food security. Other necessary ingredients include agronomic research to improve millet/sorghum yields to make that crop more competitive with peanuts; credit to farmers, since capital is a major constraint on intensification of production; irrigation development to relieve land constraint, if increased rice production is desired; and processing and marketing improvements to increase demand for maize. Cf. annotation of Martin (1988a) for additional results.

**Relevance:** High.

**Comments:** Cf. comments to Martin (1988a).

**Keywords:** Price policy, agricultural development, technology, institutions, food security, trade, government budget, maize, peanuts, rice, millet/sorghum.

- [211] Martin, Frederic P.; Crawford, Eric W. (1987) **Analysis of the food situation in Senegal: Evolution from 1974 to 1985 and projections.** Paper presented at Senegal Country Day, SAIS/Johns Hopkins University, April 10-11. 19 p (text) + 45 p (maps, figures, tables).

**Objectives:** To analyze key food policy issues faced by Senegal, using a food security perspective, and to evaluate whether the government's stated goal of 80% cereals self-sufficiency by 2000 is realistic and desirable.

**Methodology:** Examines the trend in the national cereals balance from 1974-85, the regional cereals balance for 1983/85, and the farm-level cereals balance. Descriptive analysis of the desirability of the self-sufficiency goal in terms of comparative advantage, food security, food habits, budget implications, and foreign exchange implications.

**Data Collected:** Compilation of actual and forecast production data from secondary sources; calculation of actual and forecast total national cereals supply; compilation and analysis of unpublished data on food aid, and estimation of food aid distribution by region.

**Findings/Recommendations:** The 80% self-sufficiency goal will be difficult to achieve and economically costly.

**Relevance:** Medium; more recent and thorough analysis in Martin's 1988 Ph.D. dissertation and subsequent papers.

**Keywords:** Cereals, cereals policy, food security, food aid, comparative advantage, trade.

- [212] Mathieu, Paul. (1985) *L'aménagement de la vallée du fleuve Sénégal: Transformations institutionnelles et objectifs coûteux de l'autosuffisance alimentaire. Mondes en Développement.* Vol. 13, No. 52: 649-665.

**Objectives:** To identify key factors and the underlying logic of three changes to the social and economic organization of the Senegal River Valley: hydroagricultural improvements, land reform, and the new agricultural policy.

**Findings/Recommendations:** Article sets forth GOS's objectives and achievements in irrigated agriculture in the SRV. Analyzes three recent transformations: diversification/extension of irrigated perimeters, land reform, the new agricultural policy. Questions logic and assumptions underlying these changes. Suggests that peasant agriculture will retain only a marginal role in the new technical and economic structures being established.

**Relevance:** Low.

**Comments:** Contained in issue with the theme "Senegal, 1985"

**Keywords:** Farmer organizations, institutions, irrigation, land tenure, agricultural policy, Fleuve.

- [213] Matlon, Peter J. (1989) *Prospects for improving productivity in sorghum and pearl millet systems in West Africa.* Club du Sahel, RC(89)01. Paper presented at the Rencontre régionale pour un meilleur équilibre socio-écologique en milieu Sahélien, Mali, Mai. March. 40 p.

**Objectives:** To consider the prospects for improving the productivity of sorghum and pearl millet systems in the semi-arid zones of West Africa.

**Methodology:** Descriptive analysis of historical production trends, trends in factor costs, natural and human factors affecting production potential; agro-economic analysis of technology options for increasing coarse grain production.

**Data Collected:** Secondary data on area, yield and production of coarse grains, land and population characteristics, population and carrying capacity projections.

**Findings/Recommendations:** Continuing environmental degradation (particularly in the 300-600mm rainfall belt) associated with population growth will cause upward pressure on unit costs of production for the foreseeable future. For the Sahel zone (less than 300mm), extensive livestock raising may be more rational and ecologically sustainable than attempts at intensification. For the Sahelo-Sudanian zone (300-600mm), arresting degradation of the land base is the immediate challenge, through the use of available low cost and farmer-adapted anti-erosion and run-off management techniques. For the Sudanian zone (600-800mm), run-off management combined with low input intensification packages in the short run and closer integration of crops and livestock in the longer term.

**Relevance:** High; analytical framework highly relevant although much of the discussion is not specific to Senegal.

**Keywords:** Millet, productivity, sorghum, agricultural research, environment, population.

- [214] Maxwell, Simon. (1986) **Food aid to Senegal: Disincentive effects and commercial displacement.** Discussion Paper 225. Brighton, U.K.: University of Sussex, Institute of Development Studies. December. 43 p.

**Objectives:** To assemble secondary data relating to food aid distribution, and to analyze the disincentive effects and commercial market displacement caused by food aid.

**Methodology:** Secondary data collection from GOS and donor community, informal field visits, discussions with officials and donor representatives, descriptive analysis.

**Data Collected:** Secondary data on balance of payments, external debt, production of major crops, terms of trade, cereal supply and demand estimates, cereal imports, food aid estimates.

**Findings/Recommendations:** Cereal food aid not responsible for major disincentive effects, can be used productively, and should be expanded. Food aid receipts should be used to fund targeted nutrition interventions to mitigate effects of declining real incomes of the poorest. A major deficiency of the food management system is lack of monitoring of policy effectiveness.

**Relevance:** High; relevant to assessing role of food aid in agricultural sector development, useful summary of key policy issues.

**Keywords:** Food aid, nutrition, rural incomes, food policy.

- [215] Mbengue, H. M. (1989) **Etude d'un décortiqueur adapté aux besoins de transformation artisanale des mils, maïs et sorgho au Sénégal.** *Céréales en Régions Chaudes*. [Vol. unknown]: 255-263.

**Objectives:** To test several models of mechanical dehullers.

**Findings/Recommendations:** In spite of past research efforts to mechanize local cereals processing, no successful solution has been found for home/farm-level dehulling. ISRA and SISMAR studied the PRL dehusser to improve and adapt it to local conditions. The result is the ISRA/SISMAR mill which cleans dehulled grain and works with small quantities of grain. Nine pilot units were installed in 8 villages and 1 rural town. Technical and economic results over a period of 7 months were satisfactory, and there is opportunity to extend this type of dehusser to other areas of Senegal.

**Relevance:** Medium.

**Keywords:** Mechanization, cereals, processing, technology.

- [216] Mbengue, Hyacinthe Modou. (1987) **Synthèse des travaux de recherches en technologie post-récolte du mil au Sénégal.** Paper presented at the ICRISAT millet workshop, Bambey, Sénégal, 21-24 September. 17 p.

**Objectives:** To analyze and assess the application of harvest and postharvest techniques and alternatives that are available to Senegalese farmers.

**Findings/Recommendations:** Mechanical harvesting of millet is prohibitively expensive and would destroy the stalks which farmers use for fencing and other construction purposes. Techniques identified by ISRA for drying and threshing millet are not



well-developed or adapted for use by individual farmers. Storage of millet in heads protects the seed from insect destruction and rot. Several techniques are mentioned which can improve millet seed storage, but these may be too expensive for the typical farmer. Women currently pound millet into flour, a daily task that takes about one hour for 2 kg of flour. Mechanical millet grinders may not be adapted to village purposes and means. Millet flour which is produced under maximum mechanization (transport, drying, threshing, storage, grinding) costs between 175 and 250 FCFA/kg, which is substantially higher than the 160 FCFA/kg price of imported rice. These costs do not take into account the opportunity savings attributable to reducing women's labor.

**Relevance:** Medium.

**Comments:** One of the only documents identified on postharvest technology; an attempt to apply research findings at the farm level.

**Keywords:** Processing, millet, women, technology.

- [217] Mbengue, Hyacinthe Modou; Diouf, Mamadou. (1987) **La technologie du maïs au Sénégal. Situation actuelle et perspectives.** Document de travail 87-9. Bambey: ISRA, Centre de recherches agricoles de Bambey, Programme technologie post-récolte. 17 p.

**Objectives:** To summarize corn technology work done in Senegal and describe various research efforts which have been completed (postharvest techniques, primary and secondary processing techniques).

**Findings/Recommendations:** Corn harvesting is still done manually; 60-120 hours per hectare required to harvest (collect, transport and store) yields of 1000 to 3500 kgs/ha. Mechanical corn-picking requires 4 hours/hectare, and is technically feasible for Senegal's rural areas; it may not be economically feasible. Grain traditionally is dried and stored on the cob. Improved drying cribs begin to show positive returns on investment when losses are reduced by 15 percent or more. More difficult than pounding millet into flour, it takes women an average of 2 hours/kilogram to pound corn to flour using mortar and pestle.

**Relevance:** Medium.

**Comments:** All corn subsector operations currently done manually; mechanization would be especially important in postharvest activities for corn.

**Keywords:** Mechanization, maize, processing, technology.

- [218] McLindon, Michael P. (1989) **Privatization and the development of the private sector in the Senegal River Valley.** Dakar: USAID; Louis Berger International, Inc. June. 18 p (text) + 8 p (appendices).

**Objectives:** To identify and analyze key institutional constraints on private sector participation in agricultural enterprises in the Senegal River Valley (SRV); to draft proposed GOS action plan.

**Methodology:** Literature review, and interviews with public and private sector individuals in Dakar and towns along the SRV.

**Data Collected:** Short review of Senegal's agricultural and economic policies affecting the SRV and rice production.

**Findings/Recommendations:** Four principal institutional constraints: finance, land tenure, continued presence of SAED, and uncertainty about future rice policies of GOS. Private sector, privatization and rice policy are the critical factors in SRV development in the 1990s. Privatization must be accompanied by national rice policy adjustment so private sector better understands future course of government rice policy. With low volume and high unit cost, SRV rice production cannot compete with imports in Dakar; liberalization of rice is impractical in the near term.

**Relevance:** High.

**Keywords:** Structural adjustment, rice, Fleuve, private sector, policy.

- [219] Michel, Pierre; Sall, Mamadou. (1984) **Dynamique des paysages et aménagement de la vallée alluviale du Sénégal.** In *Le développement rural en questions*, Mémoires ORSTOM No. 106, Ch. 6. Paris: ORSTOM. 20 p.

**Objectives:** Describe the environmental processes and the management of the alluvial valley of the Senegal River.

**Methodology:** Descriptive analysis using secondary data and literature.

**Data Collected:** No new data seems to have been collected for this article.

**Findings/Recommendations:** Recent geomorphological developments, characterized by important climatic changes and variations in the sea level, led to an alluvial model which requires flooding of the main river bed by annual high waters; pedogenesis and vegetation cover depend directly on these factors. Meander bends have increased and there is increased sedimentation of clay deposits in the lower basins of the main river bed; in the dry season aeolian deflation in the salty basins of the Delta (sebkhas) and on the fluviodeltaic banks can be observed. Early management efforts have changed the dynamic of the natural processes. The dams at Diama and Manantali should lead to lower efficiency in transport in the secondary river bed and increased local sedimentation which the river will not be able to wash away. Sedimentation in the main river bed will probably be reduced because of controlled flooding of fields for irrigation purposes. There is a risk of progressive oversedimentation through retained material at Diama. This effect will be exacerbated by erosion in the upper basin.

**Relevance:** Medium.

**Keywords:** Fleuve, irrigation, desertification, drought, water management, soil quality, environment.

- [220] Miller, David J.; Crookston, R. Kent; Brandstetter, Robert H.; Tout, Edwin A.; Ray, Howard E.; McClure, Gail D. (1988) **Identification and assessment of stage of readiness for diffusion to farmers of agricultural technologies and technology systems in Senegal.** Second draft report, Communication for Technology Transfer in Agriculture project (AID/S&T 936-5826). January. 43 p.

**Objectives:** To identify agricultural technologies which are appropriate for rainfed cereal production in farmer-managed systems in Senegal but which are currently underutilized or not adopted. To outline role of communication in transfer of agricultural technology in Senegal.

**Time Period:** 1988.

**Methodology:** Eleven-day survey of scientific researchers and administrators at ISRA, SODEVA, CIRAD, DPCS, USAID, and visits to research centers and farmers in Kaolack, Kaymor, and Bambey.

**Data Collected:** Impressionistic description of agricultural technologies and constraints on adoption. Organizational chart of ISRA.

**Findings/Recommendations:** Technologies examined include: improved varieties and quality of seeds; increasing soil fertility; soil management and tillage; seed placement and row spacing; pest control. Technologies classed as "ready," "almost ready," and "promising" for diffusion. Agricultural, institutional, and socioeconomic constraints to adoption considered. Findings: National agricultural research system does not yet have necessary communication linkages for transferring technologies to farmers. Strengthening UNIVAL and improving interface between research and extension systems would improve information flow from researchers to extension and to farmers. Provisional recommendations made for improving communication flow between ISRA and USAID APS project.

**Relevance:** High.

**Comments:** Evaluation of appropriateness of technologies covers a lot of ground but is fairly superficial.

**Keywords:** Technology, extension, agricultural research.

- [221] Miller, Richard Paul. (1984) **Peasant autonomy and irrigation: Innovation in the Senegal River basin.** Ph.D. dissertation. Northwestern University. 261 p (text) + ca. 35 p (methodology annex and bibliography).

**Objectives:** To assess the relationship between irrigation development projects and community control through water users' associations and local leadership.

**Time Period:** 1980-81.

**Methodology:** Demographic survey of water user association members (453) in three villages (Bakel, Sebou and Diawara); socioeconomic survey of 160 families in same villages; participation survey of sample of 100 water user association members; a Senegal River basin survey of 24 irrigation schemes and villages without schemes.

**Data Collected:** Demographic survey: socioeconomic status, leadership, use of non-family labor, herding practices, migration, parcel allocation. Socioeconomic survey: socioeconomic status, age and gender of household members; education, migration, participation in irrigation, agricultural production. Participation survey: socioeconomic status, bureaucratic linkages, communication with other associations, decision-making structure, management practices, information dissemination, performance, dispute settlement; Senegal River basin survey: forms of social organization, land tenure, participation of emigrants in irrigated agriculture, agricultural adaptation.

**Findings/Recommendations:** Despite government controls, peasants maintain an active role in irrigated agriculture schemes, especially where recently returned emigrants are found; government water users' associations are presumably participatory, but highly centralized at the local level with unequal access to, and control over, irrigation.

**Relevance:** Medium.

**Comments:** Helpful to get questionnaires from USAID/IWME for those continuing work in the Fleuve.

**Keywords:** Fleuve, irrigation, farmer organizations, rice, land tenure, RDAs.

- [222] Ministère du Développement Rural, SODEFITEX. (n.d. [1988]) **Troisième lettre de mission entre le Gouvernement du Sénégal et la Société de développement des fibres textiles.** Dakar: Ministère du Développement Rural. 52 p.

**Objectives:** To formalize the agreement between GOS and SODEFITEX, and to confirm SODEFITEX as a regional agency for integrated rural development, based on cotton.

**Time Period:** Four campaigns: 1988/89 to 1991/92.

**Methodology:** Sets forth general background, targets, intervention and financing principles, obligations of GOS and SODEFITEX, and supervision of implementation.

**Data Collected:** Includes data on SODEFITEX personnel numbers and costs, income statement and balance sheet, estimated costs and returns of cotton production, and prix de revient of maize and rice.

**Findings/Recommendations:** Indicates total outstanding debts of 2.2 b CFAF owed to SODEFITEX by GOS and CPSP. Contains a 4-year financing plan, which shows a negative péréquation for cotton in each year, and a 4-year total of nearly 7 b CFAF needed from GOS and donor sources (excluding CPSP), including initial working capital of 1.0 b CFAF.

**Relevance:** High.

**Comments:** Clear issue of cost involved in asking SODEFITEX to provide general (non-cotton) rural development services.

**Keywords:** Cotton, maize, rice, RDAs, government budget, Peanut Basin, farmer organizations, Senegal Oriental.

- [223] Ministère du Développement Rural. (1989a) **Programme national de vulgarisation agricole: document de projet.** Dakar: Ministère du Développement Rural. Mars. 32 p (text) + 56 p (appendices).

**Objectives:** To describe the agricultural extension program being proposed as part of the NPA.

**Time Period:** Five years (1989-1993).

**Findings/Recommendations:** Program is based on principles of T & V system. Program activities are: 1) develop Ministries' capabilities to provide farmers with support and services consistent with the NPA; 2) organize teams of extension agents and assign them to short-term field activities; 3) develop extension services' abilities to program and manage extension activities; 4) design and implement systematic training

programs for extension personnel at every level; 5) improve the link between research, extension, and the farmers through a process of needs identification, programming, development and evaluation of technologies and through on-farm experiments; 6) strengthen the links and improve coordination between extension and other services which have a role in implementing the NPA; and 7) at the Directorate level, implement effective systems for information management, follow-up and evaluation. Under proposed program, extension agents would make regularly scheduled visits to villages and work with "contact groups" (10-15 farmers); 2 agents would be assigned to each rural community for a total of 608 for crop extension and 78 for livestock extension. Technical specialists would ensure the link between research and extension.

**Relevance:** High.

**Comments:** The plan is ostensibly for five years beginning in 1989, but this draft program description was not released until March of 1989; the implementation schedule obviously will need to be reformulated; appendices 1 and 2 provide detailed proposals (budgets) for personnel, salaries, materials, etc.; missing are justifications for the numbers provided and, for vehicles, provision for a stock of spare parts; appendix 3 describes the plan for livestock and veterinary extension; appendices 4 and 5 provide qualifications and job descriptions for personnel.

**Keywords:** Extension, agricultural research, producers, institutions, government budget.

- [224] Ministère du Développement Rural. (1989b) **Organisation des appuis aux producteurs. Répartition des fonctions entre les différents partenaires du développement dans le milieu rural sénégalais. Rapport de synthèse.** Dakar: Ministère du Développement Rural. Juillet. 59 p.

**Objectives:** To contribute to reflection on reorganization of field services of MDR by (a) analyzing farmer needs, and functions to be fulfilled by the administration, and (b) suggesting how these functions should best be shared among the administration, RDAs, NGOs, professional organizations, village councils, and the private sector.

**Time Period:** Mission in-country 16 May to 10 June 1989.

**Methodology:** Field visits by 10-person expatriate/Senegalese team to 15 Departments in the Peanut Basin, Lower and Middle Casamance, Senegal Oriental, and Fleuve (Lower and Middle Valley); 2-hour meetings with representatives of above-listed groups.

**Data Collected:** Report divided into 4 parts: diagnosis; guiding principles; proposals; implementation.

**Findings/Recommendations:** Part 1: diversity of localities recognized but most policies and programs are applied uniformly nation-wide; in some cases farmer organizations are weak (e.g., Peanut Basin), or RDA still has a useful role it should play long-term (e.g., SAED, SODEFITEX); main problems cited by farmers concern input availability and credit, and need for information and training; agriculture, rural incomes, and the environment are in serious decline, and farmers are disillusioned with GOS development programs; farmer organizations autonomous from the state are now emerging; presence at regional and local level of 4 state structures--ISRA,

administration, projects, and RDAs--and 100 private agencies or firms; administrative staff are often competent but handicapped by lack of resources and poor interagency coordination. Part 2: any new division of functions between farmers and the state must be negotiated with farmers to be accepted. Part 3: specific proposals made for strengthening farmer organizations, improving key services of state agencies, altering the division of functions (cf. table p. 37 bis), establishing regional farmer support implementation committees to focus on specific tasks (p. 49), and initiating facilitative policies at national level. Part 4: proposes a 14-component Farmer Support Project under MDR, to be part of the Structural Adjustment Program.

**Relevance:** High.

**Comments:** A recent and frank analysis of a key institutional issue, with some interesting insights. Discussion somewhat superficial, based on rapid reconnaissance and short interviews. Funded by Min. Français de la Coopération and Caisse Centrale. Team coordinator, D. Gentil. Cf. Ministère du Développement Rural (1989c) for complementary material.

**Keywords:** Farmer organizations, government, organizational performance, RDAs, NGOs, institutions, cooperatives, rural incomes.

- [225] Ministère du Développement Rural. (1989c) **Organisation des appuis aux producteurs. Documents complémentaires. Tome II.** Dakar: Ministère du Développement Rural. Juillet. 166 p.

**Data Collected:** Contains 14 documents on: terms of reference and mission schedule, regional analyses, farmer organizations, cooperatives, development and diffusion of innovations, seed management, information and training for farmers, and planning, coordination, and monitoring.

**Relevance:** Medium; annex to main report.

**Keywords:** Farmer organizations, organizational performance, government, RDAs, NGOs, cooperatives, rural incomes, technology.

- [226] Ministère du Développement Rural. (1989d) **Communication en conseil interministériel sur: le bilan de la campagne de production agricole 1988-1989; l'état d'avancement de la campagne de commercialisation 1988-1989; la préparation de la campagne agricole 1989-1990.** Presented by Cheikh A. Khadre Cissokho. Dakar: Ministère du Développement Rural. Mai. 112 p (text) + 21 p (appendices).

**Objectives:** To present the results of the 1988-1989 agricultural campaign, the status of the 1988-1989 marketing campaign, and preparations for the 1989-1990 agricultural campaign.

**Time Period:** 1988-1989.

**Findings/Recommendations:** Factors constraining use of fertilizer by farmers: limited purchasing power, relatively high cost for fertilizer, difficult access to credit, inadequate distribution channel. Poor production statistics for the year are explained by: erratic and late rainfall, poor cultivation practices of the farmers (especially weeding), extremely low soil fertility, insect and other parasitic infestations during

peak growing periods. Paddy rice was the only crop with a protected price (85 FCFA); other crop prices were set by the market. Floor prices are set to trigger CSA intervention to protect grain prices. After purchase and collection by the RDAs (statistics are provided for each), grain self-sufficiency was estimated at 51 percent, a 10 percent drop by comparison to 1987/88.

**Relevance:** Medium.

**Comments:** Many agricultural and agro-industrial statistics are presented in this report and its annexes. These are potentially useful even though they cover only one season. Tables comparing target against performance for MDR programs are also interesting.

**Keywords:** Agricultural research, credit, fertilizer distribution, extension, horticulture, irrigation, production, organizational performance, pest control.

- [227] Ministère du Développement Rural. (1988) **Programme d'amélioration des services d'appui aux agriculteurs. Alternatives de stratégies pour un programme national de vulgarisation agricole.** October. 20 p.

**Objectives:** To review selected options for the organization of agricultural extension under the training and visit system in Senegal.

**Findings/Recommendations:** Reviews pros and cons of three options: continue with regional development agencies; return to the earlier system run by the agriculture service and using the CERs; and establish a national agricultural extension institution.

**Relevance:** Medium.

**Keywords:** Extension, RDAs, agricultural research.

- [228] Ministère du Développement Rural. (1986) **Etude du secteur agricole: Rapport de synthèse.** Ministère du Développement Rural. May. 165 p.

**Objectives:** Summary report in GOS's 13-volume agricultural sector study.

**Time Period:** Current; figures mostly from 1980s.

**Methodology:** Synthesis of findings from a series of agricultural subsector studies.

**Data Collected:** Summary statistics on wide range of socioeconomic, agroecological, and production subjects.

**Findings/Recommendations:** Major headings: 1. Place of agriculture in Senegal's economy (basic description, size, topography, water sources, climate, population); structure of economy (sectoral breakdown of economic activity); characteristics of agriculture (problems: climate and land degradation, structural, financial); agricultural development efforts to date; agriculture and satisfaction of food requirements (cereals, sugar, fruits and vegetables, animal protein, oils); agriculture as "tool" of decentralization and land management (population distribution and growth, potential of different zones for population absorption). 2. Regional presentation of agriculture and rural problems. Peanut Basin, Fleuve, Casamance, Sylvo-pastoral zone, Senegal Oriental, Dakar and Niayes (subzones, determinants of occupation and land use, rural and agricultural development problems). 3. New Agricultural Policy:

objectives and strategies. Main orientations; redefinition and reorganization of RDAs; agricultural input supply; pest control and postharvest storage. Objectives and strategies by subsector, including environmental protection. Integrated approach to agricultural and rural development. 4. Translation of objectives and strategies into plans for action (includes projected programs for 5-year plans through Tenth Plan 1997-2001). Context of structural adjustment policies; outline of plans for agricultural subsectors; outline of plans for cross-sectoral activities including price system, agricultural credit, education, agricultural inputs.

**Relevance:** High.

**Keywords:** Development, policy, agricultural policy.

- [229] Ministère du Développement Rural. (1986) **Etude du secteur agricole: Intrants Agricoles**. Dakar: Ministère du Développement Rural. Mai. 98 p.

**Objectives:** Part of an overall study of the agricultural sector conducted by the Ministry of Rural Development with FAO assistance, this document covers the marketing, distribution, demand for, and government strategy with respect to agricultural inputs. Seeds, fertilizers, chemical inputs, agricultural tools and equipment by crops, and livestock medicine and feed are covered.

**Methodology:** Appears to use FAO and government data.

**Data Collected:** Present and future estimates of various amounts of inputs used by crop and by region. Price data on fertilizers, magnitude of state subsidies to purchases of agricultural equipment, number of livestock vaccination doses given in 1985.

**Findings/Recommendations:** Finds that inadequate supply of seed is due to insufficient research. Recommends action in each of the input areas covered, including estimated costs for these actions. Prioritizes development of seed program, and recommends fertilizer price and subsidy levels, progressive disengagement of public sector from pesticide distribution, encouragement of animal traction, intensification of animal production systems.

**Relevance:** High.

**Comments:** Historical discussion of government role with respect to inputs. Also includes estimates of credit needs by crop. Discusses key constraints in seed distribution. Summarizes projects and donor assistance both planned and underway.

**Keywords:** Fertilizer distribution, marketing, public sector, seed distribution, productivity.

- [230] Ministère du Développement Rural. (1986) **Cereals plan**. Dakar: Ministère du Développement Rural. April. 55 p.

**Objectives:** To explain the plan for promotion of cereals production within the context of the New Agricultural Policy and the Seventh Economic and Social Development Plan (1985-89). Prepared for presentation to international donors at June 1986 sectoral meeting on agriculture.

**Time Period:** Discusses developments in agriculture and agricultural policy since about 1980; estimates production increases and costs of program to the year 2000.



**Methodology:** Description of objectives of cereals policy and outline of programs proposed to achieve them. Calculation of benefits under scenarios involving no new intensification of production, slight intensification, and moderate intensification.

**Data Collected:** Growth in population and food production, food imports 1970-1984; consumption of cereals; average production of cereals during Sixth Plan (1981-1984); projections of production increases resulting from intensification of rainfed cropping and extension of irrigated cropland (1984 figures and estimates for the year 2000); projected population and cereals requirements to 2000; estimates of levels of cereal self-sufficiency with and without cereals plan, 1985-2000; estimated costs and benefits of implementation of plan; projected needs for plant health products, seed, equipment, storage and processing facilities; estimated costs of support and ancillary programs; estimated technical assistance requirements.

**Findings/Recommendations:** The basic goals of the plan are to intensify production of food crops (with the goal of achieving 80% self-sufficiency in food by the year 2000) while minimizing government subsidies and provision of services, and raising the incomes of cereal growers. Report is in 4 sections: 1) the agricultural sector in the Senegalese economy; 2) issues in cereals development; 3) action plan for development of cereals production; 4) costs of the cereals plan. The action plan includes intensification of production in rainfed areas and extension and intensification of irrigated agriculture. Cropping systems should be modified to improve productivity according to regional differences in environment. General proposals are made for improvements in agricultural research, research and development projects, seed policy, improvement of design and availability of mechanized equipment, improving the availability of fertilizer (especially through development of private sector supply), and for improved plant protection. Needs for agricultural credit are described. The plans for management of supplies and of producer and consumer prices, and plans to improve grain storage and processing facilities are designed to reduce dependence on imported cereals.

**Relevance:** High.

**Comments:** Recommendations are not very specific; the plan is long on objectives and short on specific strategies for implementation. Also in French as "Etude du secteur agricole: Plan céréalière," dated May 1986.

**Keywords:** Cereals, cereals policy, production, food security, liberalization, marketing, inputs, price policy, rural incomes, subsidies, taxes/tariffs.

[231] Ministère du Développement Rural. (1984) *Nouvelle politique agricole*. Dakar: Ministère du Développement Rural. Mars-Avril. 106 p (text) + 26 p (annexes).

**Objectives:** To summarize the current situation of the agricultural sector, and to present the principal goals and specific objectives of the new agricultural policy (NPA).

**Methodology:** Based on a policy review begun during GOS-donor meetings held in October and December, 1983; policies formally announced at Interministerial Council meetings on 25 March and 16 April 1984.

**Data Collected:** Annexes include data series on rainfall, government expenditures on agricultural programs, input distribution, area cultivated, and production by crop and region.

**Findings/Recommendations:** Document contains four parts: current situation in the agricultural economy, orientations of the NPA, specific objectives and strategies, and policy implementation. Major themes of the NPA include cooperative reform based on multipurpose village sections and producer groups, downsizing and reorganization of regional development agencies, and reintroduction of programs for crop protection, credit, and distribution of fertilizer, seed, and equipment. Emphasis is given to expansion of local cereals production to achieve the goal of 75% self-sufficiency by the year 2000, by focusing on expanded irrigation and production in areas of relatively good rainfall. Improved processing and promotion of local cereals products is proposed. For peanuts, the goal is to stabilize area cultivated at 1.2 m ha, and production at 1.0-1.2 m tonnes. Plans are announced for a national agricultural credit bank (CNCAS) to finance farmer acquisition of equipment and inputs. Brief mention is given to conservation of natural resources, to be achieved in part by better integration of crop, livestock, and forestry activities. Implementation of the NPA is to rely on: giving greater responsibility and broader functions to cooperatives and farmer groups, developing plans for staff reduction in regional development agencies, reducing the cost of fertilizer (more efficient production, elimination of taxes), establishment of a national peanut seed stock by the oil processing firms, production of improved peanut seed supervised by MDR and ISRA, other actions to improve the supply of equipment and crop protection products, and improved marketing and processing of local cereals.

**Relevance:** Medium.

**Comments:** Superseded by more recent policy statements, but a key historical document.

**Keywords:** Agricultural policy, cereals policy, irrigation, farmer organizations, cooperatives, peanuts, inputs, credit, processing, seed.

- [232] Ministère du Plan et de la Coopération. (1989) **Projet de plan d'orientation pour le développement économique et social. 1989-1995 (VIIIe plan)**. Dakar: Ministère du Plan et de la Coopération. Octobre. 250 p.

**Objectives:** To present strategies and criteria for selecting policies and programs to help Senegal achieve long-term objectives.

**Time Period:** Six-year time span (1989-1995) to be revised/reviewed in three years.

**Findings/Recommendations:** Part I: an historical analysis of Senegal's demographic, physical, social, political, and economic characteristics. Specific agricultural problems and constraints identified include: production systems are characterized by low levels of productivity, degradation of the environment and agro-ecosystem, low utilization of inputs (fertilizer, improved seed varieties, insecticides, fungicides, medicines and improved feed for livestock), virtual absence of agricultural extension, and limited access to financing. Part II: analysis of current economic status of each sector and each production or service activity within sectors; population breakdowns/statistics (pp. 80-81). Part III: the "big picture"--overall proposed strategies and activities for

the VIIIe plan: for the rural sector, institute a management policy that is flexible and provides incentives to work towards food self-sufficiency and improve the quality of life in rural areas, apply a multisectoral approach to raise agricultural and agro-forestry production, and to encourage rural initiatives organized by people living in rural areas. Chapter 8 sets forth strategies and specific activities for each subsector of the agricultural economy, including the agro-industrial subsector.

Chapter 9 develops the macroeconomic and financial implications of the VIIIe plan.

**Relevance:** High; a current planning document, and essential background for policy dialogue with GOS.

**Comments:** The national plan has three components: a long term study which attempts to predict what Senegal may be like in the year 2015 (cf. Ministère du Plan et de la Coopération, Avril, 1989), a medium-term economic and social plan (reviewed here), and a shorter-term triennial plan for public sector investment and activities; this document is a synthesis of several other reports (included in the annotations) which were done for the preparation of the VIIIe plan; some of the statements made in this document are questionable, e.g., the section early in the paper that decries the lack of effort and labor which Senegalese are willing to put forth, claiming that Senegalese lack initiative and enterprising attitudes.

**Keywords:** Rural development, diversification, employment, environment, food security, government budget, institutions, macroeconomic policy, natural resources, agricultural policy, structural adjustment, technology, trade policy.

- [233] Ministère du Plan et de la Coopération. (1989) **Etude prospective "Sénégal 2015"**. Dakar: Ministère du Plan et de la Coopération. Avril. 91 p (text) + ca. 50 p (appendices).

**Objectives:** To forecast what Senegal may be like one generation into the future.

**Methodology:** Begins with a retrospective study of Senegal's progress to date which attempts to identify major tendencies and "seeds of change"; this is followed by a factorial analysis of 74 variables: 49 endogenous variables include factors such as policies, demographic and social characteristics; 25 exogenous variables include the natural and international environments. Chapter 2 and appendix 3 describe the methodology in detail.

**Findings/Recommendations:** Findings are presented in 9 chapters (chapters 3-11): the effect of the international environment, Nature's effects on Senegal, the population's characteristics and changes which are foreseen, the rural system, the urban system, probable changes for the Senegalese economy, changes in values and outlook, the educational system, and changes in the powers of the state and civil authorities.

**Relevance:** High; the chapters in this document on Nature, population (very useful statistics), the rural system, and the economy contain information useful for an agricultural sector assessment.

**Comments:** The national plan has three components: the long-term "Etude prospective," the medium-term economic and social plan, and the shorter-term triennial plan for public sector investment and activities.

**Keywords:** Development, education, employment, environment, institutions, local government, macroeconomic policy, natural resources, population, technology.

- [234] Ministère du Plan et de la Coopération. (1989) **Evaluation du programme triennal d'investissement public (PTIP) 1988/89-1990/91. Projet de lutte contre les nématodes dans le bassin arachidier nord du Sénégal; Rapport d'évaluation.** Dakar: Ministère du Plan et de la Coopération. February. 42 p.

**Objectives:** To describe the second phase of ongoing program to fight nematodes in the Peanut Basin.

**Time Period:** Describes development of technology and extent of its dissemination since beginning of project in 1984. Describes plan for program through 1991.

**Data Collected:** Areas fumigated for nematodes 1987-89, budgets for programs, estimated returns, calculations of financial and economic returns.

**Findings/Recommendations:** The current phase of the war against nematodes includes on-going scientific research on nematocides and nitrogen fixation under diverse conditions, and expansion of the currently operating and highly successful soil fumigation service in regions of Diourbel, Thiès, Louga, and Kaolack. Financial and economic analysis show the project to be highly desirable.

**Relevance:** Medium.

**Keywords:** Pests, Peanut Basin, agricultural research, peanuts, pest control.

- [235] Ministère Français de la Coopération. (1987) **Le coton en Afrique de l'ouest et du centre. Situation et perspectives.** Paris: Ministère Français de la Coopération. August. 223 p including ca. 100 p of annexes in chapters.

**Objectives:** To review over the medium- to long-term the conditions for maintaining the competitiveness of African cotton in the world market.

**Methodology:** Studies jointly undertaken by Ministère de la Coopération, CCCE, CIRAD, CFDT and SEDES in the nine West and Central African cotton-producing countries (including Senegal) with specific attention to an analysis of the current situation concerning African cotton, the perspectives for cotton in the medium to long term, future strategies and possibilities for diversification.

**Data Collected:** For the countries of Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, Mali, Senegal, Chad and Togo: evolution of cotton production from 1960s to 1980s; marketing organization; economic importance in the countries; world market situation; specific country analyses.

**Findings/Recommendations:** Principal recommendations include: actions to improve productivity (intensification; varietal improvement; improved fertilizer use; revising the cultivation calendar); agricultural diversification; improve the filière for cotton by-products; improve cotton marketing within Africa; continue detailed marketing and production analysis of cotton.

**Relevance:** Medium.

**Comments:** One short section directed specifically to Senegal.

**Keywords:** Cotton, cash crops, productivity, prices, marketing, diversification.

- [236] Minvielle, Jean-Paul. (1985) **Paysans migrants du Fouta Toro (Vallée du Sénégal)**. Travaux et Documents de l'ORSTOM, No. 191. Paris: ORSTOM. 282 p.

**Objectives:** Part of a large integrated research effort in the Middle Senegal River Valley to guide policy-makers on agricultural development in the Valley, this research focused on characterizing agricultural production and food consumption patterns by ethnic group, and examining the role of migrant populations in these patterns.

**Methodology:** Collected quantitative and qualitative data in four Peul and Toucouleur villages in Matam. Used interviews, surveys, and topographical surveys. Supplemented research with historical documents and oral histories. Reports some government statistics for background.

**Data Collected:** Data on rice and tomato area and production. Yield estimates for land owners versus sharecroppers; transference of two families' land over several generations; family size and active membership by ethnic group; access of different groups to land types and area; agricultural calendar and cropping strategy for different land types; cultivation expenses as percentage of harvest value by land type; and agricultural gender roles by ethnic group, land type, and activity. Migration data include age structure of populations who live in village, and those who return or do not return to cultivate; place of immigration and source of work; and use of migrant farm labor. Consumption data includes detailed structure of expenses and revenue by ethnic group.

**Findings/Recommendations:** The Middle Valley, no longer self-sufficient in agricultural production, has a dual and interdependent economy of agricultural production and labor exportation. Especially among the Soninké, inelastic migration will hinder agricultural development in the region. Among other groups, development may slow and migration trends may reverse.

**Relevance:** High.

**Comments:** Discussion of family and social structure, traditional economy, history of agricultural and irrigation development in the region. Thorough review of origin and history of land-tenure relationships in the region, and of the existing land-tenure structure in Matam.

**Keywords:** Migration, Fleuve, irrigation, land tenure, rural incomes, production, consumption.

- [237] Modou Mbengue, Hyacinthe; Havard, Michel. (1986) **La technologie post-récolte du mil au Sénégal**. *Machinisme Agricole Tropical*. No. 93: 21-46.

**Objectives:** To describe available technology for each level of millet processing, and to study the impact of processing techniques on the nutritional value of the final product.

**Methodology:** Descriptive analysis.

**Data Collected:** Secondary data on various tools and machinery used in harvesting and processing of millet; costs.

**Findings/Recommendations:** Increased agricultural production can only have beneficial effects at the regional and national level if adequate post-harvest technology is

introduced at the national level. Technical solutions are possible and efficient but costs are prohibitive for the Senegalese farmer. Hulling and milling is only profitable in urban and semi-urban areas where the quantity processed is large. Mechanization only has potential if grain is produced as a cash crop. Mills and threshers are well-developed in some cases. Quoted figures for losses due to storage seem to refer to total post-harvest losses. A higher rate of hulling leads to a reduction in nutritional value of the flour and increased producer prices due to milling losses. Traditional techniques for hulling leach nutritional elements. Research should be conducted: to evaluate the losses in the traditional and intermediate processing stages, and the influence of storage techniques and processing on the nutritional value of the final product; and to compile data on the post-harvesting equipment used in Senegal; to develop new threshing and processing techniques which are geared towards rural and economic needs.

**Relevance:** High.

**Keywords:** Technology, millet, processing, equipment, cereals imports.

- [238] Monimart, Marie. (1989a) **Summary of the study: "Women in the fight against desertification"**. Sahel D(89)326. Orig. Fr. OECD (Club du Sahel; CILSS. February. 30 p.

**Objectives:** To analyze the role of women in desertification control; to identify the factors contributing to the economic, social and political advancement of women in the Sahel, from the standpoint of development and desertification control; to analyze the different approaches and projects involving women in working groups and sometimes in the decision-making and leadership groups involved in anti-desertification programs and policies.

**Methodology:** Descriptive analysis on the basis of 43 village studies carried out in six different countries in the Sahel.

**Findings/Recommendations:** The fight against desertification cannot be won unless women are recognized as the prime protagonists and their social and economic advancement is addressed. The current tendency, of only using their labor power, runs a huge risk of dislocating and demobilizing them in the long term. Decision-makers and donors must reorient their policies and anti-desertification projects to foster the advancement of women. The fight to gain control of population growth will be won in cooperation with the women.

**Relevance:** Medium.

**Comments:** Cf. Monimart (1989b).

**Keywords:** Women, rural development, soil quality, environment, desertification.

- [239] Monimart, Marie. (1989b) **Femmes du Sabel: La désertification au quotidien**. Paris: Karthala. 263 p.

**Objectives:** To examine Sahelian women's role in fight against desertification, to look at positive contributions they have made, and to identify strategies to support these contributions.

**Methodology:** Case studies. Informal interviews with women's groups in 43 villages in Burkina Faso, Cape Verde, Mali, Mauritania, Niger, and Senegal.

**Data Collected:** Divided into three zones: Sahara-Sahel, North Sahel, and Sahel/South Sahel. Estimates of fuelwood collection time. Respondants' perceptions of changing environmental conditions and subsequent socio-economic destabilization.

**Findings/Recommendations:** Recommendations: improve women's role in preserving and restoring the environment by educating women on environmental issues and directly involving them in environmental action plans; train foresters to collaborate with women; develop and disseminate multi-media literature; organize wood collection to minimize collection time; encourage alternative income-generating activities for women to reduce their need to sell wood; encourage use of improved stoves; introduce agro-forestry; protect trees used for traditional goods such as medicine. Findings: Desertification cannot be successfully addressed unless it results in socio-economic improvement for women. Population growth must be curtailed in the long run, and this can be achieved through working with women.

**Relevance:** Medium.

**Comments:** No country-specific data or discussion. General discussion of how women have coped with changing environmental resources, and how these changes have altered social and economic patterns. Some discussion of on-going desertification projects, such as a reforestation project in Gandiolais, Senegal. Limited discussion of population growth, and government action in this domain.

**Keywords:** Women, natural resources, environment, population.

- [240] Monnier, J. (1984) **Pour un nouveau développement de la culture attelée en régions tropicales.** *Machinisme Agricole Tropical*. No. 88: 3-17.

**Objectives:** To describe experiences with and lessons learned from animal traction projects in Senegal, Madagascar and Côte d'Ivoire; to look at the roles played by research and extension.

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** Animal traction in Senegal is more developed than in Madagascar and Côte d'Ivoire, but Senegal's agricultural potential is weak. Light draft animals (horses and donkeys) are prevalent in Senegal but the introduction of oxen traction has been more successful since the second attempt at introducing it in the 1960's. Animal traction has been successful due to exceptionally favorable conditions (the reserve of draft animals, openness of farmers to technical progress, the complementary activities of the private sector and agricultural research by the State). Unfavorable conditions (short seasons, low rainfall, poor soils) persist, however.

**Relevance:** Medium.

**Keywords:** Animal traction, agricultural research.

- [241] Montagne, P. (1988) **Foresterie rurale au Sénégal. Le projet d'aménagement et de reboisement des forêts du centre-est, PARCE.** *Bois et Forêts des Tropiques*. No. 215: 5-26.

**Objectives:** To address the problem of deforestation in Sahelian areas (Central East Senegal) by inciting the farmers to develop the forest in the rural environment on their own. 3,000 ha of family and community plantations were to be created to be managed by the farmers.

**Time Period:** 1982-1995.

**Methodology:** Official data (on population, rainfall, etc.) and descriptive analysis of the project.

**Data Collected:** Producer prices, costs, population, rainfall, production volume, plantation size.

**Findings/Recommendations:** Farmers have been planting and protecting trees for a long time because they were aware of the benefits. Rural forestry projects were created by the forest services and specialized internal agencies in order to cope with the deterioration of the environment. Demographic developments and the reduction in rainfall have caught people unprepared. Inherited traditions and customs are not enough to deal with this problem. Assistance is needed for the people to organize themselves, to find solutions, and to receive the necessary technical assistance. The goals set by PARCE have not yet been achieved but it is on the right track.

**Relevance:** Medium.

**Keywords:** Desertification, forestry, farmer organizations, environment, agroforestry.

- [242] Morize, J; Sergi, P. (1989) **Diagnostic et perspectives de la vulgarisation au Sénégal. Rapport de mission.** Rome: FAO. Avril. 8 p (summary) + 31 p (text) + ca. 100 p (appendices).

**Objectives:** To provide the GOS with essential information for establishing a national extension program.

**Time Period:** 25 January to 6 April 1989.

**Methodology:** Literature review and interviews with key extension personnel in Senegal's 6 ecological zones: 1) Fleuve (irrigated rice), 2) cotton zone (Senegal Oriental, Upper Casamance, part of the Peanut Basin), 3) Peanut Basin, 4) Upper and Middle Casamance, 5) Niayes (horticulture), 6) agro-sylvo-pastoral zone (extensive livestock). Examined extension objectives, nature and content of extension messages, extension methods, public reached by extension, extension agents, and extension infrastructure.

**Findings/Recommendations:** Observations: Intensification can increase yields for all crops. Research has not been directed to the farm level and the link between research and extension is not well-developed. The focus of research needs to be on developing packages that are economically feasible for farmers. Extension agents need to be provided with more complete documentation. Farmers are reluctant to invest in improving their land because they do not have usufructary rights, so they tend to practice extensive farming techniques, and are reluctant to invest in wells, irrigation systems, soil improvements, wind breaks, etc. Herders also have no interest in conserving the land because of the threat of losing grazing rights. Agricultural credit institutions should have a closer link with the extension network to ensure that credit is given to support viable activities. Use of improved inputs (fertilizer, seeds, land improvements) limited by lack of access to credit, ineffective



distribution channels, need for farm-level demonstrations. Extension agents have reasonable technical skills but are not well-trained in teaching and counseling others, or in adapting those skills to the particular needs of farmers. **Recommendations:** Organize extension efforts by ecological zone, linked to appropriate research and coordinated with projects taking place within each zone. Agents should be hired on contractual basis (with fixed employment periods) to give regional inspectors leverage in determining how/where to use extension agents. Agents need to be trained, then motivated. Research needs to be oriented towards finding solutions to specific farmer problems.

**Relevance:** High.

**Comments:** Analysis is extensive, provides detailed description of different extension agencies active in Senegal, and their integration into the administrative structures and rural societies with which they work; annexes provide valuable information on extension efforts for each of the six zones; annex 7 has statistics for fertilizer use (88/89), seed production (87/88), agricultural credit (86/87, 87/88), production under "supervision" of extension personnel, administrative statistics for extension efforts; more direct recommendations would have made this paper more worthwhile.

**Keywords:** Agricultural research, extension, institutions, farmer organizations, seed distribution, fertilizer distribution, credit, horticulture, organizational performance, risk, Fleuve, Peanut Basin, Casamance, Niayes, Senegal Oriental.

- [243] Morris, Michael. (1988) **Etude sur la commercialisation des céréales dans la région du Fleuve Sénégal: Méthodologie.** MSU International Development Reprint Paper No. 25F. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 48 p.

**Objectives:** To describe the ISRA cereals marketing research program in the Fleuve.

**Time Period:** 1983-84.

**Methodology:** Discussion of the design of the research program, recruitment of field-level interviewers, questionnaire construction and field methods, data analysis and means for diffusing research findings.

**Data Collected:** Data collected include: (1) survey of government-licensed cereals traders; (2) inventory of local, private rice hullers; (3) costs-and-returns survey of sample of private rice millers; and, (4) informal survey of principal actors in the parallel cereals market.

**Relevance:** Medium.

**Comments:** Includes questionnaires initially published by ISRA/BAME in 1986. Later summary of methodology contained in Morris (1987b).

**Keywords:** Cereals marketing, rice, Fleuve, price policy, processing.

- [244] Morris, Michael L. (1987a) **Rice marketing in the Senegal River Valley: Research findings and policy reform options.** MSU International Development Paper No. 8. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 89 p.

**Objectives:** To describe the organization of cereals markets in the Senegal River valley; assess the performance of current marketing policies; analyze selected policy reform

options and their performance consequences; and identify barriers to reform and discuss possible changes.

**Time Period:** 1984-85.

**Methodology:** Field-level studies of cereals marketing and private rice milling in the Senegal River Valley and review of records of government marketing organizations and other official statistics; supply and demand projections to generate forecasts of long-term evolution of regional cereals balances; sensitivity analysis to test likely effects of changes in population growth rates; irrigated area expansion; increased cropping intensity and yield improvements.

**Data Collected:** Multi-visit survey of 122 licenced grain distributors; census of parallel channel rice hullers; a costs-and-returns survey of a sample of 26 rice hullers; and an informal survey of parallel channel marketing agents.

**Findings/Recommendations:** Cannot overlook the demand side in the food balance equation; total cereals production will be more influenced by rates of expansion of irrigated area and increased cropping intensity than by yield improvements; small changes in key demand and supply side parameters could lead to quite different degrees of regional self-sufficiency in cereals production. Specific proposals for reform call for expanded role for private firms and individuals. They focus on: market organization and licencing requirements; pricing mechanisms and price levels; role of government marketing organizations; and choice of technique in rice processing.

**Relevance:** High.

**Comments:** See other publications by Morris.

**Keywords:** Fleuve, irrigation, cereals marketing, rice, price policy, cereals prices, food security.

- [245] Morris, Michael L. (1987b) **Cereals marketing in the Senegal River Valley (1985)**. MSU International Development Reprint Paper No. 4. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 126 p.

**Objectives:** To describe the ISRA Fleuve Cereals Marketing Study, summarize findings from previously published ISRA papers analyzing the official and parallel marketing channels, and present the study methodology.

**Time Period:** 1984-85.

**Methodology:** Field-level data collection with cereals traders and rice hullers, plus secondary data from government sources.

**Data Collected:** Organization and performance data from traders; costs-and-returns data from hullers.

**Findings/Recommendations:** Policy recommendations cast in terms of public sector and private sector considerations and future research priorities.

**Relevance:** Medium.

**Comments:** Cf. Morris (1987a) for additional details.

**Keywords:** Fleuve, rice, processing, cereals marketing, price policy.

- [246] Morris, Michael Lewis. (1986) **The cereals sub-sector in the Senegal River Valley: A marketing policy analysis.** Ph.D. dissertation. Michigan State University. 351 p.

**Objectives:** To examine the cereals subsector in Senegal using elements of industrial organization theory, with particular attention to rice assembly, processing, wholesaling, and retailing activities.

**Time Period:** 1984-1985.

**Methodology:** Field surveys along the Senegal River Valley.

**Data Collected:** Official cereals marketing operations from records of public and parastatal organizations; multi-visit survey of 122 licenced distributors; census of rice hullers; informal interviews with market participants.

**Findings/Recommendations:** Government rice marketing organizations found to be inflexible, sluggish and generally inefficient in assembly and processing; official marketing regulations and policies hamper private-sector distribution activities and create opportunities for corruption; private hullers operate profitably at a wide range of capacity utilization rates; parallel market channel is not exploitative. Marketing policy alternatives range from increased state participation to extreme privatization; special attention should be given to altering public-sector marketing institutions to enhance their complementarity with private-sector capabilities.

**Relevance:** High.

**Keywords:** Fleuve, rice, processing, marketing, private sector, price policy.

- [247] Nascimento, J.-C.; Raffinot, M. (1985) **Politique de prix agricoles et comportement des producteurs: Le cas de l'arachide au Sénégal.** *Revue Economique*. Vol. 36, No. 4: 779-98.

**Objectives:** To study the determinants of peanut production in Senegal, and to present a formal model of peanut producer behavior induced by changes in relative prices, thus allowing evaluation of price policies.

**Methodology:** Econometric analysis.

**Findings/Recommendations:** Senegalese development policies favored industrialization over promoting agricultural production which led to very low producer prices in agriculture. Peanut production has become relatively less important. The producer price of peanuts should rise to 100 to 200 FCFA/kg in the next few years.

**Relevance:** Medium.

**Keywords:** Peanuts, price policy, model, production.

- [248] Ndiaye, Cheikh; Diouf, Niokhor; Diop, Mouhamadou. (1985) **The food industry in Senegal, with particular reference to the processing of grains, fisheries products and milk products.** Geneva: UNCTAD. November. 83 p.

**Objectives:** To identify linkages between the subsectors studied and the national economy (in particular agriculture and the local industry), and to identify the major problems in each of the subsectors.

**Methodology:** Descriptive analysis of the structure, policies and programs for grain processing, dairy products and fisheries.

**Data Collected:** Secondary data on production, value added, employment, imports, prices.

**Findings/Recommendations:** The grain processing industry suffers from underutilization of capacity. An experiment with bread made from wheat and millet flour failed in part due to short supply and poor quality of millet available to millers. In regard to fisheries, the development of internal markets and provision of maintenance facilities are needed. Satisfying urban demand for milk products through local production is not feasible in the near future.

**Relevance:** Low.

**Comments:** Heavily influenced by dependency theory, the study is more detailed but less up-to-date and less pragmatic than the one by Courcel (1988).

**Keywords:** Processing, fish, millet, wheat, industry.

- [249] NDoye, Mbaye; Gahukar, Ruparao. (1987) **Insect pests of pearl millet in West Africa and their control.** Pages 195-205 in Proceedings of the International Pearl Millet Workshop, 7-11 April 1986, ICRISAT Center, India. India: ICRISAT.

**Findings/Recommendations:** Several orders of insects infest millet. They occur throughout Sahelian zone, but incidence varies yearly. Stem borers (*Acigona ignefusalis*, *Sesamia* spp.) and the spike worm (*Raghuva albipunctella*) are apparently major pests under present cropping conditions. The ecology of the pests has been studied in some countries. Cultural techniques, insecticides, resistant varieties, and natural enemies have been tested to reduce pest damage. The application of integrated pest management strategies in subsistence agriculture requires further data on economic thresholds and socioeconomic problems.

**Relevance:** Low.

**Comments:** Some Senegal-specific studies reported.

**Keywords:** Pests, pest control, millet.

- [250] Ndoye, Ousseynou; Ouédraogo, Ismaël; Goetz, Stephan J. (1989) **The significance and causes of Senegambian rice trade.** Paper presented at the CILSS/Club du Sahel conference on regional grain trade in West Africa, Lomé, 6-10 November. 14 p.

**Objectives:** To quantify unofficial imports of Gambian rice into rural Senegalese markets, to discern factors motivating this trade, and to determine the savings realized by Senegalese households from low-cost Gambian rice.

**Time Period:** Data given for the 1983-87 period.

**Methodology:** Presentation of secondary and anecdotal information, and results of surveys of rural households, traders, and markets.

**Data Collected:** Prices of rice at various points in the Gambia-Senegal marketing chain; rice production and imports for Senegal and the Gambia (1985-87); CPSP sales of rice to southern Peanut Basin wholesalers (1983-87); consumer prices for Gambian and Senegalese rice in border markets (1985-88); household rice purchases and consumption by zone (1986/87); household cereals preferences (1986/87).

**Findings/Recommendations:** Unofficial imports of Gambian rice were significant prior to the May 1988 reduction in Senegal's consumer price of rice from 160 to 130 FCFA/kg. Availability of cheap Gambian rice contributed to the food security of households in border zones. With Gambian rice selling for 60 F/kg less than Senegalese rice, households saved an average 7,000 FCFA on their rice purchases. The Thai (Siam) rice imported by Gambia is preferred by Senegalese consumers. Gambian rice prices observed since May 1988 are still slightly lower than Senegalese rice prices, but data are not yet available on the impact of the smaller price gap on unofficial imports of Gambian rice. While it would be difficult to cut off imports entirely, imports could be reduced by stimulating coarse grain production and increasing availability of mechanical processing in Senegal to make local cereals more competitive with rice.

**Relevance:** Medium.

**Keywords:** Rice, imports, consumption, cereals.

- [251] Ndoye, Ousseynou; Ouédraogo, Ismaël. (1988) **Commercialisation des produits agricoles dans le bassin arachidier. Situation actuelle et implications pour la politique agricole.** Paper presented at the ISRA/MSU Conference on Food and Agriculture Policy, Dakar, 7-8 July. 14 p.

**Objectives:** To estimate the magnitude of farm incomes in the Peanut Basin; to examine the pattern of household purchases, and the importance of nonagricultural revenues; to discuss issues concerning the proposed substitution of cowpeas for peanuts; and to discuss policy implications.

**Time Period:** October 1986 to September 1987.

**Methodology:** Field surveys in 4 groups of 3 villages in northern and southern Peanut Basin; sample of 113 household heads, 50 in the north and 63 in the south. Descriptive and statistical analysis.

**Data Collected:** Quantity and value of cereals produced by household heads in northern and southern zones (1986/87); purchases of cereals by type, reason for purchase, and zone; percentage importance of different sources of revenue for purchase of millet, sorghum, maize and rice, by zone.

**Findings/Recommendations:** Farm incomes (primarily from peanuts) are higher in southern than in northern Peanut Basin; cereals purchases are proportionally greater in the north; rice purchases and nonfarm revenues are important in both zones; the latter come mainly from remittances, petty trade, borrowing, and livestock sales; producers in northern Peanut Basin seem uninterested in switching completely from peanuts to cowpeas, in part because the cowpea price is not guaranteed.

**Recommendations:** relative profitability of cowpeas and peanuts should be further examined, and market outlets for cowpeas improved; research is needed to generate more productive cereal varieties; donors should assist the GOS to reintroduce short-term credit for seeds and fertilizer, and medium-term credit for equipment.

**Relevance:** Low.

**Comments:** Based on survey of household heads only; fewer findings of broad program relevance than in Ndoye and Ouédraogo (1987); more recent and complete information on cereals transactions in Ndoye, Ouédraogo and Goetz (1989).

**Keywords:** Peanuts, cowpeas, cereals marketing, agricultural policy.

- [252] Ndoye, Ousseynou. (1987) **Government regulations and cereal marketing in Senegal.** Paper presented at the IFPRI/ISRA Conference on the Dynamics of Cereals Consumption and Production Patterns, Dakar, 15-17 July. 39 p.

**Objectives:** To discuss government regulations in agricultural markets, and how they affect sales and purchases of local cereals in the Peanut Basin.

**Time Period:** 1984/85 and 1985/86 marketing seasons.

**Methodology:** Field surveys (stratified random sample of 170 producers in 8 villages in October 1984 to February 1985, and 166 producers in October 1985 to March 1986; stratified random sample of 63 wholesale traders in 34 markets in 1984/85 for period of 6 months after harvest, and 70 wholesale traders in 1985/86); compilation of official records; descriptive, statistical, and econometric analysis.

**Data Collected:** Farmer cereals transactions before and after liberalization of cereals marketing, traders' cereal stocks and volumes marketed, market prices of cereals.

**Findings/Recommendations:** Proportion of millet sold out of own production by women increased after liberalization, perhaps due to shortage of peanut seed and increased millet acreage, and to deregulation of cereals marketing which reduced uncertainty for market participants. Wholesalers handled more millet and less imported rice after liberalization. Rural markets in the Peanut Basin are well-integrated; price spreads are stable among markets in a given season, despite considerable price variation. Private traders are playing an effective role in cereals marketing, and should be encouraged by the government. Processing of local cereals must be developed for them to compete better with imported rice. More research is needed on inter- and intra-year patterns of household marketing behavior; on the role of women in cereal marketing and their contribution to food security; and on marketing costs.

**Relevance:** Medium.

**Comments:** Author notes that available data did not allow a conclusive assessment of the impact of market liberalization on observed cereals marketing behavior.

**Keywords:** Cereals marketing, traders, women, liberalization.

- [253] Ndoye, Ousseynou; Ouédraogo, Ismaël. (1987) **Le commerce des céréales dans le bassin arachidier et la Nouvelle Politique Agricole au Sénégal.** Paper presented at the APDAA/USAID/FAO Workshop on Pricing Policies and Market Intervention in Africa, Dakar, 30 March to 3 April. 20 p.

**Objectives:** To assess the impact of two objectives of the New Agricultural Policy: (a) assured market outlets and guaranteed prices for producers, (b) greater private sector involvement in the agricultural sector.

**Time Period:** 1984/85 and 1985/86 marketing seasons.

**Methodology:** Census of 200 weekly and permanent markets in the Peanut Basin (1984); identification of the 40 most important markets, including some on Gambian border; identification of various actors in rural cereals markets; collection of millet prices in rural markets; survey of volumes traded and margins earned by rural wholesalers and retailers handling cereals; descriptive and statistical analysis.

**Data Collected:** Official and informal producer prices of millet for September 1985 through June 1986; Trader and public sector (CSA) cereal stocks and volumes handled; marketing margins for rural grain assemblers for October 1985 to June 1986.

**Findings/Recommendations:** Food aid distribution imposes the risk of financial loss on traders who store cereals after harvest. Use of millet threshers is increasing, enabling producers to store millet in grain form. Producers sell millet in order to purchase seed and fertilizer, which are no longer available on credit. Private traders bought more cereals from farmers than the CSA did in both the 1984/85 and 1985/86 seasons. Traders' margins are on the same order of magnitude as those of the CSA. The CSA should not try to intervene in all parts of the Peanut Basin in order to guarantee the minimum support price; its financial resources are too limited, and prices in some regions are already above the minimum price. The CSA should intervene only in years of bumper production, during the post-harvest period (September-November) and after official peanut marketing (February). The CSA could reduce its costs by contracting with private traders to collect millet, as SONACOS does for peanuts.

**Relevance:** Medium.

**Comments:** Cf. CSA (1988). Issues and some recommendations still very relevant, but empirical findings should be complemented by analysis of more recent data. Similar paper entitled "Cereal marketing in Senegal: Implications for the New Agricultural Policy," presented at Johns Hopkins/SAIS Senegal Country Day, 10-11 April 1987.

**Keywords:** Cereals marketing, traders, public sector.

[254] Ndoye, Ousseynou; Ouédraogo, Ismaël. (1987) **Les politiques d'ajustement structurel et leur impact sur la performance du système agricole au Sénégal.** Paper prepared for the joint ISRA-ODI project. 22 p.

**Objectives:** To review the effects of structural adjustment policies on the agricultural sector in Senegal.

**Time Period:** 1982-1988.

**Methodology:** Studies undertaken by the ISRA Bureau of Macro-Economic Analysis.

**Findings/Recommendations:** Marketing and price liberalization has accomplished its principal objectives; producers are very responsive to government price and credit policy in planting either peanuts or cereals; government needs to review its agricultural subsidy policies.

**Relevance:** High.

**Keywords:** Cereals marketing, millet, peanuts, structural adjustment.

- [255] Ndoye, Ousseynou; Ouédraogo, Ismaël; with Fay: Tabacar; Ndiaye, Amadou; Fall, Mor; Mall, Iba; and Sène, Emile. (1986) **Prix au producteur dans les marchés du bassin arachidier: L'arachide graine. Juillet 1984-Décembre 1985.** Note d'Information BAME 86-1. Dakar: ISRA, Bureau d'Analyses Macro-Economiques. Mars. 5 p (text) + 2 p (charts) + 4 p (appendices).

**Objectives:** To describe prices paid to producers for shelled peanuts at local markets in the Peanut Basin; to analyze whether producers selling shelled peanuts in the local markets, rather than selling unshelled peanuts at the official price, had made profits.

**Time Period:** Juillet 1984 à Octobre 1984 (phase 1); Novembre 1984 à Avril 1985 (phase 2); Mai 1985 à Août 1985 (phase 3); Septembre 1985 à Mars 1986 (phase 4).

**Methodology:** Two enumerators in 13 markets in phase 1; enumerators in 40 (later 34) markets in phase 2; 4 enumerators in 10 markets in phase 3; 4 enumerators in 16 markets. Data collected once monthly (phase 1), then twice monthly (phases 2-4).

**Data Collected:** Price per kilogram for shelled peanuts (with some broken shells) where available; otherwise, prices were collected for first quality (seed quality) shelled peanuts.

**Findings/Recommendations:** Shelled peanuts represent 50 to 60 percent of the weight of unshelled; shelling costs 10 to 13 FCFA per kilogram, at the official price for unshelled peanuts of 50 to 60 FCFA per kilogram, producers always increased their returns by selling shelled peanuts; at official price of 90 FCFA during last two months of study period, producers selling shelled peanuts lost money by comparison to selling unshelled peanuts at official prices. Additional research is recommended to assess price responses.

**Relevance:** Low.

**Comments:** Markets located in Kébémér, Bambey, Touba, Kaffrine, Niore, Kaolack and Fatick; official prices are not set for shelled peanuts.

**Keywords:** Peanut Basin, peanuts, prices, production costs, marketing.

- [256] Newman, Mark; Sow, P. Alassane; Ndoye, Ousseynou. (1985) **L'incertitude réglementaire et les objectifs gouvernementaux sur l'organisation et la performance des marchés céréaliers: Le cas du Sénégal.** In *Etats, développement, paysans. Actes du colloque CIRAD-MESRU*, 118-129. CIRAD. September.

**Objectives:** To examine the relations between government regulations and private sector activities, sales costs and margins in cereals marketing.

**Time Period:** 1983-1985.

**Methodology:** Market surveys in the Peanut Basin.

**Data Collected:** Cereals market prices, trader and official cereal stocks, interest rates and marketing costs.

**Findings/Recommendations:** Private sector plays an important role, more often despite government regulations than because of them, in the achievement of governmental objectives for cereals marketing. Roles for the public and para-public sectors and for cooperatives and private agents in the grain market are discussed.

**Relevance:** High.



**Comments:** Cf. Newman, Sow, and Ndoye (1988).

**Keywords:** Cereals marketing, price policy, Peanut Basin, subsidies, transport.

- [257] Newman, Mark D. (1987) **Grain marketing in Senegal's Peanut Basin: 1984/85 situation and issues.** MSU International Development Reprint Paper No. 14. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 16 p.

**Objectives:** To describe the 1984/85 grain marketing situation in the Peanut Basin, and to discuss several immediate policy questions relative to the roles of private traders and the public sector with respect to the NPA.

**Time Period:** 1984.

**Methodology:** ISRA/BAME cereals marketing studies in the Peanut Basin.

**Data Collected:** Prices and volume of marketed cereals.

**Findings/Recommendations:** In order to achieve objectives of the NPA, government must clarify the "rules of the game" in cereals marketing.

**Relevance:** Medium.

**Comments:** Originally appeared as ISRA/BAME Working Paper 84-5.

**Keywords:** Cereals marketing, Peanut Basin, food security, prices.

- [258] Newman, Mark D.; Sow, P. Alassane; Ndoye, Ousseynou. (1988) **Regulatory uncertainty and government objectives for the organization and performance of cereal markets: The case of Senegal.** MSU International Development Reprint Paper No. 24. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 24 p.

**Objectives:** To present results of surveys on the organization and performance of cereals markets in the Peanut Basin; to discuss policies related to the roles of the private and public sectors in accomplishing the objectives of the NPA; and to examine the impact of regulatory uncertainty on market performance and development of the private sector.

**Time Period:** 1984-85.

**Methodology:** Field surveys of private traders in the Peanut Basin; cf. Newman, Ndoye, and Sow (1987). This paper discusses private and public marketing channels, volumes marketed and marketing margins, "rules of the game," and the effect of regulation on traders and on market performance.

**Findings/Recommendations:** Frequent changes in regulation lead to uncertainty in cereals markets. For wholesalers, adherence to regulations imposes substantial costs in terms of fines and bribes, and time needed to understand regulations and obtain authorizations. The average total value of fines paid by wholesalers interviewed was 460,000 CFAF, or about 5,000 per fine or "arrangement," representing 0.03 CFAF per kg of cereals marketed. Net margins earned by wholesalers amount to 5 to 8% of the sales price, given storage time, transportation, and deduction for the wholesaler's labor and management. Deducting a further 7.2% per month cost of capital, the average rate for loans in the unofficial sector, would make net margins negative. Overall, actual trader margins are higher than officially authorized markups, but not excessive considering the cost of capital, the costs of dealing with

regulation and monitoring by official agents, and the high risks faced by traders. The private sector carries out functions which are important in achieving government food policy objectives, but the contribution of the private sector is often hindered rather than supported by government regulation.

**Relevance:** High.

**Comments:** One of the few sources of research-based information on marketing margins of private traders and the impact of regulation on trader costs and operating procedures. French version, "Incertitude réglementaire, objectifs gouvernementaux, organisation et performance des marchés céréaliers: Le cas du Sénégal," Reprint Paper No. 24F, 1988. Cf. also Newman, Sow, Ndoye (1985).

**Keywords:** Regulation, cereals marketing, Peanut Basin, private sector, public sector, organizational performance, risk.

- [259] Newman, Mark D.; Ndoye, Ousseynou; Sow, P. Alassane. (1987) **Tradeoffs between domestic and imported cereals in Senegal: A marketing system perspective.** MSU International Development Reprint Paper No. 15. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 41 p.

**Objectives:** To examine the rules and reality of grain marketing in Senegal.

**Time Period:** 1983-1985.

**Methodology:** ISRA/BAME surveys since 1983 of market intermediaries primarily in the central Peanut Basin.

**Data Collected:** Stratified random sample of wholesalers and assemblers in 34 markets for intermediary transactions: products handled, purchase and sales volumes, transportation, storage, financing and information links. Also for producer transactions on grain sales and purchases, choice of market outlets, sources of market information. Detailed data on wholesaler marketing activities, costs, margins, sales volumes and seasonal variations with sample of 63 wholesalers. Product price data. Role of cooperatives in grain and peanut assembly from sample of 60 official assembly points.

**Findings/Recommendations:** Active parallel market in grain moves considerable quantities between producers and consumers. Market is internally financed and marketing costs and margins do not seem extremely large. An unnecessary degree of uncertainty may lead to underinvestment in the system and necessitate larger margins than otherwise needed. Recommends clear statements of the "rules of the game," using "carrots instead of sticks" to provide incentives, and evaluating policy options by taking a systems approach to research and analysis.

**Relevance:** Medium.

**Comments:** French version, "Céréales locales et céréales importées au Sénégal: La politique alimentaire à partir des systèmes de commercialisation," Reprint Paper No. 15F, 1988.

**Keywords:** Cereals marketing, cash crops, Peanut Basin, cooperatives, regulation, liberalization.

- [260] Newman, Mark D.; Sow, P. Alassane; Ndoye, Ousseynou. (1987) **Private and public sectors in developing country grain markets: Organization, issues and options in Senegal.** MSU International Development Reprint Paper No. 12. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 14 p.
- Objectives:** To draw insights from Senegal's experience with the development of a private sector system of assembly, wholesaling and distribution for locally produced and imported grain.
- Time Period:** 1983-1985.
- Methodology:** ISRA-BAME cereals marketing surveys.
- Data Collected:** Sample of 40 primary assembly and distribution markets and stratified random sample of 312 intermediaries; also follow-up survey of wholesaler marketing functions; costs and margins; producer marketing behavior and marketing information; producer price data.
- Findings/Recommendations:** Despite regulatory uncertainty, traders move grain between areas of temporary surplus and deficit; private traders handle storage and transport, and they are largely self-financing; government regulatory environment is uncertain and price policy objectives need to be defined.
- Relevance:** Medium.
- Comments:** Originally appeared as ISRA/BAME Document de Travail No. 85-1.
- Keywords:** Cereals marketing, private sector, regulation.
- [261] Niamer, Maryam. (1985) **Degradation, its control and prevention in the Sahel: A case study from Eastern Senegal.** In *Human and Cultural Understanding--Key to Improving Benefits from Rangelands. Proceedings of the International Rangelands Resources Development Symposium*, (eds.) White, Larry D.; Tiedeman, James A. 106-114. February 13-14, 1985, Salt Lake City, Utah. Pullman, Washington: Washington State University, Department of Forestry and Range Management.
- Objectives:** To propose a general development strategy applicable to Sahelian agro-pastoral communities on the basis of a review of the Livestock Development Project in Eastern Senegal.
- Time Period:** 1982-1984.
- Methodology:** Fieldwork in Senegal with the Center for Research on Economic Development (CRED), University of Michigan.
- Data Collected:** Baseline data on the vegetation-water-livestock-man interaction in the zone of the Eastern Senegal Livestock Development Project.
- Findings/Recommendations:** Proposes a development strategy aimed at three different existing organizational levels: the pastoral unit, the village and the owner/herder.
- Relevance:** Low.
- Keywords:** Senegal Oriental, livestock, environment.
- [262] Niase, Madiodio; Vincke, Pierre-Pol. (1985) **Perception de l'environnement et réactions des agriculteurs et des éleveurs du Galodjina face aux modifications récentes de leurs espaces traditionnels.** *Mondes en Développement*. Vol. 13, No. 52: 633-647.

**Objectives:** To obtain perceptions of farmers and herders to changes in their environment.

**Findings/Recommendations:** A case study of Galodjina in northwestern Senegal (arrondissement Mbane) shows how the modern economic sector, from colonial to present times, has transformed traditional agriculture. Economic goals and modern structures have not been affected by recent land tenure reforms.

**Relevance:** Low.

**Comments:** Contained in issue with the theme "Senegal, 1985"

**Keywords:** Livestock, village organizations, land tenure.

- [263] OECD; CILSS, Club du Sahel. (1989) **Bibliographie: Documents diffusés par le CILSS et le Club du Sahel.** Sahel D(89)333. Paris: OECD (Club du Sahel); CILSS. July. 111 p.

**Time Period:** 1976-89.

**Data Collected:** Includes all documents (approximately 375) edited and distributed by Club du Sahel since its creation in 1976. Arranged by subject; no index.

**Relevance:** Medium.

**Comments:** Gives addresses where documents may be obtained.

**Keywords:** Bibliography, Sahel.

- [264] OECD (Club du Sahel); CILSS. (1989) **Regional cereals markets in West Africa. Compilation of studies on Sahelian agriculture, regional trade and world markets.** Sahel D(89)332. Paris: April. 154 p.

**Objectives:** Includes 4 papers: Part I--The regional cereals market: Myth or tomorrow's reality? by Jacques Giri (12 p); Part II--The competitiveness of Sahelian agriculture, by Elliot Berg (59 p); Part III--Food security policy and the competitiveness of agriculture in the Sahel: A summary of the "Beyond Mindelo" Seminar, by Thomas S. Jayne and Nicholas Minot (45 p); and Part IV--Provisional results of the IRAM-INRA-UNB effort, by Gilles Mettetal, Johny Egg, Jean-Jacques Gabas, Jean-Pierre Lemelle, and Jean Coussy (30 p).

**Relevance:** Medium; Senegal figures prominently as an example in these papers.

**Keywords:** Cereals marketing, trade policy, cereals imports, production, consumption, macroeconomic policy.

- [265] Olufowote, J. O. (1989) **Technical and economic potential and major constraints to developing a second season rice crop for the Sahel irrigated environment.** Paper presented at the Annual Rice Review Meeting of WARDA, Bouaké, Côte d'Ivoire, April 24-26. 18 p.

**Objectives:** To discuss physical, biological, water availability and policy constraints to making dry-season rice more competitive with tomato, and to describe WARDA's strategy for overcoming these constraints.

**Time Period:** Various data reported for the period 1981-88.

**Methodology:** WARDA research and compilation of secondary data.

**Data Collected:** 1985 rice statistics for five Sahelian countries (including Senegal); 1988 meteorological data for Fayaye; 1981-88 production of dry-season rice, tomatoes, maize, and sorghum (Senegal River); estimated costs, yields, and net returns for dry-season rice and tomato; results of 1988 variety tests at Fanaye.

**Findings/Recommendations:** Profitability of rice (as percent investment) higher than for tomato, and rice easier to transport; major dry-season constraints are heat, cold, salinity, spider mites and white flies, availability and cost of water, limited window for wet-season harvest and dry-season preparation; exotic cultivars are sources of heat and cold tolerance, high yield, and early maturity; indigenous African cultivars are sources of pest tolerance. Policies to improve competitiveness of rice include giving rice priority for dry-season water use, subsidizing fuel for pumps, and increasing the paddy price.

**Relevance:** Medium.

**Comments:** Relevant topic, interesting technical information, but relatively weak economic and policy analysis.

**Keywords:** Rice, irrigation, tomatoes, maize, sorghum, agricultural research, Fleuve, technology.

- [266] OMVS; Haut-Commissariat, Direction du développement et de la coordination. (1985) *Note sur les perspectives de la recherche sous-régionale dans le bassin du fleuve Sénégal*. Dakar: Septembre. 41 p.

**Objectives:** To support preparation of "après-barrage" actions; to identify high-yielding crop and livestock enterprises for the Fleuve; and to identify socioeconomic constraints on diffusion of research results.

**Methodology:** Studies conducted at three research centers established in 1972: a) Samé, Mali (Haut Bassin, céréales pluviales); b) Kaédi, Mauritania (Moyenne vallée, riziculture intensive); c) Guédé, Senegal (Basse vallée et Delta, autres céréales irriguées).

**Findings/Recommendations:** Four phases of research financing identified, along with major research agencies operating in the region. Results summarized for rice, wheat, maize, sorghum, forage crops, tomato, sugar cane, and "diversification crops" (soybeans, potato, beans, peppers, sweet potato); for double cropping systems and weed control; and for cattle fattening. Problems faced by research summarized (center management, research coordination, diffusion of results). Solutions proposed.

**Relevance:** Medium.

**Comments:** Relatively optimistic picture of technological possibilities; little discussion of socioeconomic factors.

**Keywords:** Fleuve, agricultural research, irrigation, technology, rice, sorghum, maize, tomatoes.

- [267] Orsini, J.P.G.; Lhoste, P.; Bouchier, A.; Faye, A.; Niang, L. (1985) *Une typologie d'exploitations agropastorales au Siné-Saloum, Sénégal*. *Rev. Elev. Méd. Vét. Pays Trop.* Vol. 38, No. 2: 200-210.

**Objectives:** To develop a typology of mixed agriculture-livestock production systems in the Sine Saloum.

**Time Period:** 1968-1981.

**Methodology:** Household level data collected among 245 households in the Unités Expérimentales in June 1983.

**Data Collected:** Household livestock holdings, area cultivated (1982) and household size.

**Findings/Recommendations:** Identifies four principal types of production units on the basis of size of unit, type of animal traction used and the level of capitalization represented by the number of animals held. Recommends that efforts to promote animal traction must be adapted to the type of production unit.

**Relevance:** Medium.

**Keywords:** Peanut Basin, animal traction.

- [268] Ouédraogo, Ismaël; Sidibé, Mamadou; Diédhiou, Lamine; Faye, Babacar. (1989) **Evaluation du système d'information sur les prix agricoles du Commissariat à la Sécurité Alimentaire: rapport final.** Dakar: ISRA/DRSAEA. Avril. 7 p (introduction) + 35 p (text) + 12 p (appendices).

**Objectives:** To evaluate, at the request of CSA, the CSA's information system on market prices of cereals and cowpeas.

**Time Period:** Avril, 1987 - Décembre, 1988.

**Methodology:** Sample of 904 people from three markets in Dakar, one market in each regional capital except Fatick, and seven weekly markets in the Peanut Basin; 4 questionnaires on opinions of people using the price information broadcast on the radio, characteristics of merchants and markets surveyed, a check to determine the validity of prices in the information system, and estimated quantities of cereals in the markets.

**Findings/Recommendations:** Consumers are the group least influenced by the broadcast price information; producers were more pleased with the system than were merchants and consumers; merchants in Dakar were better informed than their rural counterparts.

**Relevance:** Low.

**Comments:** Provided the stimulus for the Egli (1989) report (also annotated); potential users for the information system include producers, processors, merchants, haulers, consumers, researchers and political decision makers.

**Keywords:** Consumers, producers, marketing, prices, organizational performance.

- [269] Ouédraogo, Ismaël; Ndoye, Ousseynou. (1988) **Les marges et coûts de commercialisation des céréales dans le bassin arachidier.** Paper presented at the seminar on Food and Agricultural Policy in Senegal, Dakar, 7-8 July 1988. 21 p.

**Objectives:** To describe the data collection methods for cereals marketing research, and to discuss factors influencing marketing costs for wholesalers and assemblers.

**Time Period:** 1987-1988.

**Methodology:** Marketing surveys; statistical and econometric analyses.

**Data Collected:** Marketing costs, market prices, trader cereal stocks.

**Findings/Recommendations:** Stresses the importance of understanding cereals marketing costs and price movements as a basis for identifying measures for achieving the objectives of the NPA. Traders operate with fairly straightforward calculations of costs, and turn over stocks rapidly in order to minimize carrying costs.

**Relevance:** Medium.

**Keywords:** Cereals marketing, regulation, price policy.

- [270] Ouédraogo, Ismaël; Ndoye, Ousseynou. (1987) **La diffusion de la nouvelle politique agricole au Sénégal: Note d'information à l'attention des décideurs.** Paper presented at the APDAA/USAID/FAO Seminar on Price Policy and Market Intervention in Africa, Dakar, 30 March-3 April. 17 p.

**Objectives:** To investigate the dissemination of information concerning the NPA among cereals producers and traders, and to examine their responses to this information.

**Time Period:** 1986.

**Methodology:** Surveys of 151 producers and 70 cereals wholesalers.

**Data Collected:** Reactions of producers and traders to NPA information.

**Findings/Recommendations:** Traders better informed than producers, and male heads of households best informed within the household. Official sources of information less frequent, but more accurate; few written informational sources used. Recommend increasing official means for information diffusion and in local languages.

**Relevance:** Medium.

**Keywords:** Agricultural policy, cereals marketing, cereals prices, producers.

- [271] Ouédraogo, Ismaël S.; Ndoye, Ousseynou. (1988) **Guidelines for the collection of agricultural prices in Sub-Saharan rural markets: Lessons from Senegal.** Document de Travail. Dakar: ISRA/BAME. 16 p (text) + 8 figures and maps.

**Objectives:** To clarify the role of research institutions in collection of market price information; to recommend guidelines for collection of agricultural product prices in rural markets; to illustrate the policy issues that such data can be used to address.

**Time Period:** 1984-88.

**Methodology:** Describes and evaluates methodology used in the ISRA/BAME cereals marketing research program for conducting field surveys of cereals prices in rural markets.

**Data Collected:** Six graphs showing official and rural market cereals prices; producer prices of local cereals; traders' marketing margins; data generally given for October 1985 to September 1987 period.

**Findings/Recommendations:** Lack of market information in sub-Saharan Africa has led researchers to collect their own price information; this is sometimes too specific or not reported quickly enough to be of use to policy makers. The ISRA Bureau d'Analyses Macroéconomiques established a cereals marketing research program in 1984 which has collected and disseminated a range of price data. Price collection guidelines discussed include: select a subset of market places; distinguish product

forms and grades; understand the roles of market participants; determine the relevant market prices to collect (rural producer, retail, and wholesale); determine adequate frequency of price collection (fortnightly); select appropriate methods of collecting prices (4 methods evaluated); observe relevant market conditions (parastatal intervention occurring or not); design questionnaires to facilitate data entry and analysis; and analyze and report results quickly. Cereals price information of the following types is relevant to policy formulation: seasonal patterns of millet producer prices, prices by product and grade, regional differences in producer prices, impact of price support interventions, and millet assembly and retail margins.

**Relevance:** High.

**Comments:** Methodology guidelines relevant to design of future research programs; discussion of price data and policy questions is of substantive interest. French version presented at the ISRA/MSU Conference on Food and Agricultural Policy, Dakar, 7-8 July (cf. Bingen and Crawford, 1989).

**Keywords:** Agricultural research, cereals marketing, prices, millet, price policy, traders.

- [272] Patterson, William M. (1984) **Village irrigation systems along the Senegal River: A comparative analysis.** Ph.D. dissertation. Cornell University. January. 110 p.

**Objectives:** To evaluate the appropriateness of the village irrigation systems (PIV) for development, and to discern which sociological factors were related to productivity within these systems.

**Time Period:** July 1979-May 1981 (field survey from Aug. to Dec. 1980).

**Methodology:** Qualitative analysis of village irrigation systems within the socio-cultural and historical context of the SRV; informant survey (PIV as unit of analysis with representative of the water user's association as respondent); regression analysis.

**Data Collected:** Primary data on association size and member characteristics (ethnicity, languages, migration, experience with cooperatives), presence of an extension agent/supervisor in the village, attributes of the association president, remuneration of pump operators, rules and regulations; secondary data on perimeter yield estimates (SAED).

**Findings/Recommendations:** Peul ethnic group, presence of an extension agent living in the village, and geographical location of the system were positively and significantly related to productivity. Age of the president of the water user's association was negatively and significantly related to productivity. PIVs represent a "major impetus towards development" but (with growth in numbers) careful monitoring is necessary to retain positive features.

**Relevance:** Medium.

**Keywords:** Fleuve, irrigation, productivity, farmer organizations, land tenure, water management.

- [273] Phélinas, Pascale. (1986) **La politique des prix du riz, incitation à la production et effet sur la répartition des revenus dans six pays africaines.** Thesis, Faculty of Economics. University of Clermont I: 373 p.



**Objectives:** To provide an overview of rice production, consumption, food self-sufficiency, and the role of the State in six African countries. To do a comparative analysis of rice price policies with specific attention to the sensitivity of supply to price variations.

**Methodology:** Review of available documentation from Cameroon, Côte d'Ivoire, Liberia, Madagascar, Senegal and Sierra Leone.

**Findings/Recommendations:** Not sufficient to look at international prices as a sole determinant of the supply; more depends on prices in each country. The rice supply in all countries is sensitive to variations in real prices and the prices of competing cereals; other factors besides prices are also significant. Can only partially measure the effect of public price controls on rice production. It is easier to understand the distribution effect of price policy in terms of social classes instead of the traditional rural-urban dichotomy.

**Relevance:** Medium.

**Comments:** Only available on microfiche.

**Keywords:** Rice, price policy, subsidies, regulation, exports, trade policy, market prospects, comparative advantage.

- [274] Phillips, W. A.; Von Tungeln, D. L. (1985) **The effect of yeast culture on the poststress performance of feeder calves.** *Nutrition Reports International*. Vol. 32, No. 2: 287-294.

**Objectives:** To simulate the sequence of events found in marketing channels which move feeder calves from the farm of origin to the next production point; to determine the effect of adding yeast culture to the poststress diet of feeder calves on feed intake and performance.

**Time Period:** Twelve months.

**Methodology:** Three trials using 144 freshly weaned calves.

**Data Collected:** Calf weights and diets during experimental period.

**Findings/Recommendations:** Simulation of conditions in marketing channels resulted in changes in body weight and poststress dry matter intake was depressed by about 50% of maximum intake. Dry matter intake increased over time in all trials and peaked at three weeks poststress. Yeast culture was added to the poststress diet, which tended to increase the dry matter intake, but the addition of yeast culture did not consistently increase poststress performance.

**Relevance:** Low.

**Keywords:** Livestock, marketing.

- [275] Pieri, Christian. (1989) **Fertilité des terres de savanes. Bilan de trente ans de recherche et de développement agricoles au sud du Sahara.** Paris: Ministère de la Coopération; CIRAD-IRAT. 433 p (text) + 10 p (bibliography).

**Objectives:** To consolidate findings of soil fertility research done in the sudano-sahelian zone by Francophone agricultural research and development organizations; to assess the impact of development projects and farmers' practices on soil fertility; to identify

solutions and minimal technical recommendations based on scientifically confirmed observations which can help limit the risk of further soil degradation.

**Time Period:** Uses information dating from the mid-1950's and after.

**Methodology:** Analysis of studies and information amassed during 30 years of experience by agencies operating in Francophone Africa.

**Findings/Recommendations:** Part I: Fertility and agricultural development. Chapters 1 (Fertility defined), 2 (Agro-ecological characteristics of the zone), 3 (Population dynamics) and 4 (Agricultural policies and soil fertility). Part II: Status of soil fertility. Section A: Agricultural yields in recent decades. Chapters 1 (National tendencies), 2 (Yield tendencies in intervention zones), and 3 (Summary: balanced increase in yields, implications for the future). Section B: Agricultural situation and land use. Chapters 1 (Land use in traditional agricultural systems), 2 (Rural demographic growth and land use), and 3 (Intensive agriculture and its consequences for the management of soil fertility: The case of cotton). Part III: Experimental basis for safeguarding and maintaining the fertility of soils under cultivation. Section A: Planting and land use: an ecological approach. Chapters 1 (Planting and physical depletion of soils), and 2 (Cropping patterns and biological imbalances in soils). Section B: Land use and yields in stationary rainfed agriculture: long-range experiments. Chapters 1 (Introduction to the interpretation of long-term trials), 2 (Year-to-year variability of yields: the rainfall effect), 3 (Manual farming under low intensity), 4 (Manual, intensive farming systems), and 5 (Farming with animal traction). Part IV: Major processes in fertility development. Section A: Developmental aspects of the organic composition of soils under cultivation. Chapters 1 (Conditions of the organic composition of soils under cultivation), 2 (Tilling and the organic composition of soils under cultivation), 3 (Fertilizer amendments and the organic composition of soils under cultivation), and 4 (Quantitative evaluation of the organic composition of soils under cultivation). Section B: Developmental aspects of the mineral composition of soils under cultivation. Chapters 1 (Type and distribution of soil minerals) and 2 (Quantitative evaluation of the mineral composition of soils under cultivation).

**Relevance:** Medium.

**Comments:** A definitive reference. Limited to the sudano-sahelian, sudanese and sudano-guinean zones which are characterized by bushy vegetation and monomodal (1 single rainy season) rainfall between 500 and 1100/1200 millimeters.

**Keywords:** Soil quality, environment, natural resources.

- [276] Posner, J. L. (1988) **A contribution to agronomic knowledge of the Lower Casamance (bibliographical synthesis)**. MSU International Development Reprint Paper No. 17. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 47 p.

**Objectives:** To enable the Lower Casamance production systems research team, established in 1982, to base its research program on the agronomic research results obtained to date, and to better appreciate the constraints faced by local producers.

**Time Period:** Review prepared in late 1982.

**Methodology:** Review and evaluation of published research on the Lower Casamance; bibliography lists 72 references.

**Data Collected:** Sections cover climate, hydrology, upland soils, soils lying between the plateau and the alluvial plain, and the seasonally inundated soils.

**Relevance:** Medium; a useful synthesis. Cf. Posner, Kamuanga, and Lô (1989).

**Comments:** French version, "Contribution à la connaissance agronomique de la Basse Casamance (synthèse bibliographique)," Reprint Paper No. 17F, 1988.

**Keywords:** Casamance, bibliography, agricultural research, rice, technology.

- [277] Posner, J. L.; Kamuanga, M.; Lô, M. (1989) **Lowland cropping systems in the Lower Casamance (Senegal): Results of four years of agronomic research.** Draft MSU International Development Reprint Paper (forthcoming). East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. ca. 135 p.

**Objectives:** Based on agronomic surveys and field trials, to describe and explain the production techniques used by farmers in the lowlands of the Lower Casamance, and to identify the implications of these results for future agronomic and farming systems research and for PIDAC, the regional rural development agency.

**Time Period:** 1982-85.

**Methodology:** Review of secondary data and previous agronomic research; classification of the region into five agroecological zones, based on the criteria of social organization of labor, use of animal traction, and importance of transplanted rice relative to other crops; informal surveys and village census; purposive selection of 10 villages; random selection of 10-15 farm households within each village, resulting in a sample of 125 households in 1982-84, reduced to 35 households in 1985; detailed agronomic survey of all parcels cultivated by each household (1982-85); 1985 survey obtained data at subparcel level; 10 types of agricultural experiments (5 for aquatic zone, 5 for the "riz de nappe" or mid-slope zone); 75% of individual trials conducted on farm, 25% on station, with 3-5 farmers being involved in each type of on-farm trial.

**Data Collected:** Historical data on rainfall and rice area and production; survey data on area, production, and yield of rice, soil characteristics, and production techniques and inputs used by farmers; results of agricultural experiments on improved varieties and production practices.

**Findings/Recommendations:** Part I covers the background and results of the agronomic surveys; Part II presents results of the agricultural experiments; Part III presents conclusions and recommendations. Lowlands cover 41% of land area in Ziguinchor Region. They remain a preferred area for rice production, although the 30% reduction in annual rainfall over last 20-year period has led to abandonment of 50% of the rice fields due to salinization and lack of water. In fields still used, farmers face problems of water stress, salinity, and iron toxicity. Transplanted rice remains the dominant technique in lower-level fields, while direct-seeded rice is increasingly found in higher fields. Cropping systems differ by zone, but within zones farmers choose their cultivation techniques and input levels as a function of each season's rainfall pattern. A major problem is competition for labor between lowland and

upland crops (which in some areas represent female- vs. male-grown crops) at the beginning of the season. Zonal and other differences in cropping systems mean that no single improved technology is generally relevant. The best-performing varieties and production techniques identified in this research program are summarized, and implications for research and extension programs are suggested. Short-cycle rice varieties and a 50%-of-recommended fertilizer dose are proposed, along with other recommendations for methods of planting, weed control, and diversification. A classification scheme for rice fields is proposed.

**Relevance:** Medium.

**Comments:** Synthesis of major recent research program incorporating a farming systems research perspective. This research program was instrumental in demonstrating the importance of upland crops given the increasing riskiness of lowland cultivation. French version, "La culture du riz dans les terres basses de la région de Ziguinchor: Bilan du suivi pluriannuel et des essais agronomiques (1982-1985)," Reprint Paper (forthcoming); published by ISRA/Djibélor, October, 1986.

**Keywords:** Rice, agricultural research, farming system, fertilizer, Casamance, production.

- [278] Posner, J. L.; Kamuanga, M.; Sall, S. (1988) **Production systems in the Lower Casamance and farmer strategies in response to rainfall deficits.** MSU International Development Reprint Paper No. 20. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 30 p.

**Objectives:** To analyze farmer strategies of adapting to drought.

**Time Period:** 1982-1985.

**Methodology:** Production systems research (farm-level agronomic research; household-level economic surveys) in the Lower Casamance.

**Data Collected:** Household-level agronomic and economic (production) data.

**Findings/Recommendations:** North of the Casamance River, upland areas are plentiful; availability of animal traction has enabled farmers to adapt to drought by giving them a means to increase the production of groundnuts, millet and maize; south of the river farmer strategies are based on intensive rice cultivation and off-farm activities; research and development agencies must account for these variations and for differences among production systems; there is no single solution to the agricultural problems in the Lower Casamance.

**Relevance:** Medium.

**Comments:** French version, "Les systèmes de production en Basse Casamance et les stratégies paysannes face au déficit pluviométrique," Reprint Paper No. 20F, 1988.

**Keywords:** Casamance, irrigation, rice, peanuts, employment, nonagricultural activities.

- [279] Posner, J.; Landais, E. (eds.). (1985) **Actes de l'atelier: La recherche agronomique pour le milieu paysan.** Proceedings of workshop held at Nianing, Senegal, May 5-11, 1985. Dakar: ISRA. May. 309 p.

**Objectives:** Conference organized by ISRA, supported by USAID, focused on how to improve research to meet needs of rural population and promote economic and

social development. 29 papers were given on 4 major topics: 1) Identification of constraints--special attention to diagnostic methods; 2) methods of scientific control in agronomic trials; 3) statistical analysis of surveys, and statistical and economic analysis of agronomic trials; 4) peasant participation in agronomic trials, and technology transfer.

**Findings/Recommendations:** 16 specific recommendations in the following categories: Improve communication among scientific researchers within the country and abroad. Improve quality of research work--especially focus on identification of specific problems limiting agricultural production. Priority should be given to analysis of diverse physical environments, and to understanding peasant farming practices. Reporting of research methods and results should be more standardized and complete.

**Relevance:** Medium.

**Keywords:** Agricultural research, on-farm research.

- [280] Posner, Joshua L.; Crawford, Eric W. (1989) **Agro-economic analysis of field trials from a farming systems research perspective: Fertilizer trials with lowland rice, maize, and peanuts, Ziguinchor, Senegal.** Staff Paper No. 89-80. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. August. 27 p.

**Objectives:** To examine the yield and profitability effects of on-farm fertilizer trials, and to answer the question, "Where does fertilizer work, and why?"

**Time Period:** Based on research conducted during 1982-85.

**Methodology:** On-farm trials; estimated fertilizer response curves, and other statistical and economic analyses.

**Data Collected:** Trials results on crop yield at different fertilizer levels; soil characteristics at different sites.

**Findings/Recommendations:** Simple trial design (zero, one-half, and full-rate doses) was an efficient way to evaluate fertilizer recommendations. Data on slope and soil characteristics of each site were useful in interpreting results. Sandy or strongly acid lowland rice fields do not respond well to NPK, nor do maize fields with high acidity and low organic matter, or peanut fields with high acidity. The highest returns to investment are obtained with the half-rate fertilizer dose on rice and maize, and the full dose on peanuts. Expanding maize production beyond well-manured inner fields depends on finding economical ways of increasing soil organic matter, raising soil pH, and managing fields in blocks to mitigate problems of damage from animals.

**Relevance:** Medium.

**Keywords:** Fertilizer, agricultural research, Casamance, rice, peanuts, maize, technology, farming system.

- [281] Posner, Joshua L.; Crawford, Eric W. (1988) **Agro-economic analysis of field trials from a farming systems research perspective: Weed control in rainfed lowland rice, Ziguinchor, Senegal.** Staff Paper No. 88-91. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. October. 24 p.

**Objectives:** To discuss results of research on weed control in rainfed lowland rice in the Lower Casamance (now Ziguinchor) region.

**Time Period:** Based on research conducted in 1982-86.

**Methodology:** On-farm and on-station trials; statistical and economic analysis.

**Findings/Recommendations:** Three types of trials discussed: herbicide use, mechanized row seeding, and mode of planting (transplanting vs. direct seeding). Herbicide use was profitable; it had little effect on yield, but reduced labor time for weeding by two-thirds. Use of the seeder reduced labor for sowing and weeding. Under recent low-rainfall conditions, transplanting may yield less and be more risky than direct seeding, but requires less labor, involves little weeding, and has a labor profile that fits better with upland crop cultivation.

**Relevance:** Medium; indicates ways to improve farm productivity in the region with modest increases in inputs.

**Comments:** Revised in June 1989.

**Keywords:** Casamance, rice, agricultural research, farming system, technology.

- [282] Prod'homme, Jean-Pierre; Sahuc, Philippe; Snrech, Serge; Primaux, Anne-Sophie. (1987) *Des conditions d'émergence, de fonctionnement et de pérennité des groupements villageois au Sénégal*. Ministère de la Coopération; Institut National Agronomique, Paris-Grignon, Chaire de Sociologie Rurale. May. 103 p.

**Objectives:** To study the role of farmer organizations and local associations in agricultural and rural development; to analyze the conditions (social and economic) for the creation and functioning of different forms of village organizations; to assess the threat of instability and the conditions for continued existence of these groups; to support the necessary development of exchanges among the numerous organizations.

**Methodology:** Chapter I: descriptive analysis of village organizations and cooperatives. Chapter II: descriptive analysis of 3 different types of village organizations: 1) with involvement from NGO's in Senegal Oriental, 2) with ties to Senegalese organizations, 3) update of the study of l'Association Ufulal in Casamance (1984). Bibliographic study, field study (sociological approach), which led to a basic outline that was followed by the individual researchers. Chapter III: descriptive analysis of geographic and administrative factors in rural communities, typology of rural organizations and horizontal and vertical relationships, societal impact of actions taken.

**Data Collected:** Rainfall, importance of high water, involvement of different organizations in the Fleuve region.

**Findings/Recommendations:** Village organizations are recognized as a driving force in rural areas with a possibility of a farmers' union movement. Question of organization remains a problem; the limited scope of village or quartier does not allow for economies of scale, and raises questions about profitability. Expansion into larger, wider organizations (unions, federations) bears the risk of a loss of decision-making power. Main obstacles to farmer organization are the same as 25 years ago: illiteracy, lack of resources, insufficient competence at the lower decision-making level, which leads to communications problems between farmers and officials. Preconceived ideas

exist within the rural group and their partners. New structures and ideas often clash with traditions. Internal problems exist within group due to composition of group and traditional vs. modern ideas.

**Relevance:** High.

**Keywords:** Casamance, Senegal Oriental, village development, cooperatives, farmer organizations, NGOs, RDAs.

- [283] Prod'homme, Jean-Pierre. (1986) **Etude sur les groupements villageois. Séminaire de restitution des travaux menés au Sénégal. Compte-rendu - résumé.** Paris: Institut National Agronomique Paris-Grignon, Chaire de Sociologie Rurale. July. 16 p, including 3 p (annexes and map).

**Objectives:** To discuss and review preliminary results of case studies on the role of farmer and village organizations in agricultural development.

**Time Period:** 1985-86.

**Methodology:** Participant observation with selected village organizations in the Lower Casamance, Senegal Oriental, the Peanut Basin and the Fleuve.

**Data Collected:** For each organization: conditions of establishment and continuation, group characteristics, mode of operation, external support, relations with other groups, group influence on agricultural development.

**Findings/Recommendations:** Reports of working groups on the economic and social conditions for group success, the role of government vis-à-vis village organizations, relations with other farmer groups and the support role of NGOs.

**Relevance:** Low.

**Keywords:** Farmer organizations, NGOs.

- [284] Rabès, Jean. (1989) **Privatisation des activités de transformation du riz dans la Vallée du Fleuve. Conditions et définition d'un plan d'action.** Dakar: Secrétariat Général de la Présidence de la République; Délégation à la Réforme du Secteur Parapublic; USAID/Sénégal. 30 Septembre. 122 p.

**Objectives:** To analyze the conditions of privatization of rice processing in the Fleuve, and to propose an action plan which would satisfy government objectives.

**Time Period:** 22 August to 16 September 1989.

**Methodology:** Not stated; presumably interviews and review of documents; visits in Dakar and St. Louis. Report includes: short introductory summary, section 1 (current situation), section 2 (privatization: options and action plan), and 3 annexes.

**Data Collected:** Irrigated area, rice production, and official marketing; volume of unofficial paddy processing and sales; SAED processing costs; supply of high-quality rice. Calculations: hypothetical estimation of production/consumption balance and sales, by Department; summary of marketing and processing costs; projected prix de revient of milled white rice, based on 3 levels of official paddy purchases; and comparison of SAED and private factory processing costs.

**Findings/Recommendations:** Section 1 describes the pricing system and role of CPSP, rice area, production, official sales, producer behavior, the parallel market, and

activities and costs of SAED (for grain collection and processing). Section 2 notes that privatizing rice processing has been planned since 1984, but that some studies (e.g., CFDT, October 1985) have questioned its feasibility. The annex on costs concludes that the collection and processing function no longer is profitable for SAED, and that the subcontract with Delta 2000 has not reduced SAED's costs. Two deliberately "extreme" privatization options are discussed: (a) state-controlled (either SAED retains ownership of mills, operated by a private firm under a management contract, with firm buying and selling the grain, or SAED buys and sells the rice but the private firm owns the mills and is paid to do milling under an annual subcontract); (b) liberalized (either elimination of CPSP's guaranteed purchase price, so that local rice competes with imports, or that plus liberalization of imports and elimination of fixed consumer prices). The author argues that the objectives in privatizing rice processing should be to reduce the state's financial and direct management burden, to ensure that the private sector becomes committed to improving the productivity of the local rice industry, and to liberate SAED staff to concentrate on other development activities. The author presents evidence that state-controlled privatization does not work and is costly, but also cautions against sudden, complete liberalization on the grounds that the resulting lower producer price (50-60 F/kg) would lead farmers to abandon commercial rice production. Two major issues to resolve are the pricing policy and the sale of SAED mills. Candidates for private millers include regional or national level firms, producer groups, or current SAED staff. Most candidates feel that some support of the mill-to-CPSP sale price is necessary, but not a monopoly over rice purchases, and that financing of paddy purchases would be needed if they were no longer handled by SAED. Candidates' interest in carrying out milling is greater than in owning the SAED factories (equipment too old and costly). Author argues that selling the factories should be considered separately from privatization of processing, and that the factory at Richard Toll should not be renovated. The Action Plan for privatization covers institutions to be involved (including a new Commission "Privatisation Riz" with a permanent secretariat), rules and regulations (including a rice grading system and the rules for private marketing and processing of rice), actions concerning the maintenance and eventual sale SAED factories, and a timetable beginning in 1990.

**Relevance:** High.

**Comments:** Report is well-documented, and contains much useful information and a good discussion of issues.

**Keywords:** Privatization, rice, processing, Fleuve.

[285] Reardon, Thomas. (1989) **Cereal demand in West Africa: Implications for Sahelian regional protection.** Paper prepared for CILSS/Club du Sahel seminar on "Regional Cereals Markets in West Africa", Lomé, Togo, November 6-11. November. 14 p.

**Objectives:** To summarize key features of changing demand patterns in Sahelian and coastal countries in West Africa, and to analyze the impacts of these patterns on West African imports from the rest of the world and on imports to Sahelian



countries from the coast and vice versa. Outlines the probable impacts of cereals protection schemes on food security.

**Methodology:** Household surveys in the Sahel, reviews of secondary data.

**Data Collected:** Consumption data.

**Findings/Recommendations:** Consumption of imported rice and wheat has increased; consumption of coarse grains has decreased. In urban areas, the consumption of rice is not limited to the poor. There is no significant correlation over the last few decades between shortfalls in coarse grain production and rice or wheat imports, and there is no evidence that rice consumption is driven by price factors. The lower processing and preparation costs of rice are an incentive for women street vendors to purchase rice. Increasing urbanization is behind this trend. The effects of increased rice and wheat imports are not clear. In rural areas, purchases are an important source of food, contrary to conventional wisdom; consumer prices affect real incomes and are thus important to rural people. Engaging in noncropping and off-farm activities is a strategy for improving food security. Coarse grain is generally produced to feed the family, not to generate income.

**Relevance:** Medium.

**Keywords:** Consumption, cereals prices, rice, wheat, nonagricultural activities.

- [286] Reh, Ingeborg; Horst, Peter. (1985) **Beef production from draft cows in small scale farming.** *Quarterly Journal of International Agriculture.* Vol. 24, No. 1: 38-47.

**Objectives:** To evaluate the effect of work on beef production from cows.

**Time Period:** September 1979-October 1980.

**Methodology:** Regression analysis (weight gain, slaughter yields and prices as dependent variables).

**Data Collected:** Weight, mortality, calving rate, slaughter yields, slaughter prices.

**Findings/Recommendations:** 26% of all draft cattle in Sine Saloum were female. Draft cows gained 9 kg on average over the period whereas herd cows lost 9 kg. Draft cows had a significantly lower mortality rate than herd cows for all age groups. No significant effect of work on calving rate. Carcass weight and prices paid by butchers significantly higher for draft cows relative to herd cows.

**Relevance:** Medium.

**Comments:** There is no evidence that the spread of animal traction in Senegal is constrained by a lack of male animals; the study attempted no comparison of the relative appreciation of male and female draft animals.

**Keywords:** Animal traction, livestock, Peanut Basin.

- [287] Reij, Chris. (1989) **Trends in drought and desertification control strategies of major donor agencies in the West African Sahel.** Sahel D(89)328. Paris: OECD (Club du Sahel); CILSS. January. 31 p.

**Objectives:** To describe and analyze changes in drought and desertification control strategies in the West African Sahel since 1975; to describe and analyze the strategies proposed by the Club du Sahel and CILSS; to identify differences in

emphasis and approaches within the donor community with regard to drought and desertification control. Emphasis is on policies and strategies, less on practice.

**Time Period:** Strategies and policies beginning with 1975 are reviewed.

**Methodology:** Descriptive analysis of anti-desertification policies and strategies by various donor agencies.

**Data Collected:** No new data collected. Paper mainly based on data from donor agencies.

**Findings/Recommendations:** People are given greater responsibility for individual and collective programs of desertification control. The role of the state is to assist population groups and their organizations to carry out operations that exceed the competence and capabilities of local population groups. A multisectoral approach, which simultaneously aims at production and the environment, is now considered more appropriate than a sectoral approach to development. A consensus has emerged among donor agencies on the need to improve the management of renewable natural resources in the Sahel and the need to transfer responsibility to groups of resource users. Although urgency of desertification control activities is recognized, funds allocated to ecology/forestry and to the development of rainfed agriculture are low and decreasing.

**Relevance:** Medium.

**Keywords:** Drought, desertification, environment, donor assistance, irrigation, livestock, agroforestry.

[288] Reij, Chris. (1989) **The present state of soil and water conservation in the Sahel.** Sahel D(89)329. Paris: OECD; Club du Sahel; CILSS. March. 39 p.

**Objectives:** To outline the present state of soil and water conservation in the Sahel; to describe and analyze the major modern soil and water conservation (SWC) systems used in the Sahel; to describe indigenous SWC techniques; to indicate trends in Sahelian SWC; to present a strategy to reinforce SWC in the Sahel; to make recommendations to governments, donor agencies and rural organizations.

**Methodology:** Descriptive analysis with secondary data.

**Findings/Recommendations:** With few exceptions, SWC techniques have been introduced without consideration of the potential applicability of these techniques by the local population. Farmers seldom apply the new techniques on their fields. A substantial part of the rural population has to be voluntarily engaged in SWC for degradation to be reduced. Whether people are able to engage in SWC depends on the technical complexity of the techniques and the labor requirements for construction and maintenance. People are only willing to engage in SWC when they expect to gain benefits from it. **Recommendations:** only one government agency should be responsible for SWC. A national SWC policy should be developed. Coordination should be strengthened and exchange of information promoted. SWC activities should be better monitored by projects. Grants rather than loans should be given for SWC. Donor agencies should increase their funding for SWC which can lead to increases in cereal yields and food self-sufficiency at the family level. Appropriate SWC techniques should be identified in partnership with farmers. Priority should be

given to low-cost, replicable conservation packages. Rural organizations should play a role in identification and expression of farmers' priorities and preferences. Material support should be given to farmers.

**Relevance:** Medium.

**Keywords:** Environment, technology, rural development, soil quality, water management.

- [289] Republic of Senegal. (1986) **Statement of agricultural policy**. Presented at the meeting of donors on agriculture, Dakar, June 17-18. 40 p (text) + ca. 15 p (annexes).

**Objectives:** To serve as guidance for discussions during donor meetings.

**Findings/Recommendations:** Focuses on economic policy questions, actions undertaken or planned, sector studies required to support future measures, and investment and technical assistance programs needed to accompany policies.

**Relevance:** Medium; outdated though important document.

**Keywords:** Government, agricultural policy, donor assistance.

- [290] Reveyrand, Odile. (1987) **Les associations féminines en Afrique noire: L'exemple de la Casamance. Deuxième partie**. *Le Mois en Afrique*. No. 251-252: 97-120.

**Relevance:** High.

**Comments:** Cf. Reveyrand (1986). English summary, p. 120.

**Keywords:** Casamance, women, ethnic groups.

- [291] Reveyrand, Odile. (1986) **Les associations féminines en Afrique noire: L'exemple de la Casamance. Première partie**. *Le Mois en Afrique*. No. 249-250: 119-139.

**Objectives:** To describe women's associations in Africa, using Casamance associations as an example; to describe the different ethnic groups which organize themselves into women's organizations and exercise not only different economic functions but also play different social and cultural roles.

**Methodology:** Descriptive analysis.

**Data Collected:** Some secondary data on distribution of ethnic groups in the Casamance.

**Findings/Recommendations:** The women's associations have an economic base with respect to land allocation and food production, but their main purpose is the preservation of cultural cohesion among the women. Each woman belongs to sub-groups based on marital and religious criteria. Membership in the group is determined by the relationship with the men of the tribe. The associations have their own laws and spheres of activity (work and ceremonial festivities). Willing participation of women in the groups provides a strong work force and allows the women to confront contemporary economic and political problems. The women's associations operate within the traditional male-dominated society, however.

**Relevance:** High.

**Comments:** English summary, pp. 138-39. cf. Reveyrand (1987).

**Keywords:** Casamance, women, ethnic groups.

- [292] République du Sénégal. (1989) **Déclaration de politique de développement agricole.** Dakar: Juillet. 71 p.

**Objectives:** To define a plan of action in the short and medium term to reinforce and extend reforms already underway in the agricultural sector; to work towards long-term goals: 1) growth of the agricultural sector (improve rural income, slow rural outmigration, balance regional development, food security, effective natural resource management especially soils, increase agricultural productivity); 2) financial reform in the agricultural sector; 3) improve balance of payments; 4) permit producers to develop as they see fit ("responsabilisation"); 5) progressive disengagement of the State in production and marketing activities; 6) diversify agricultural production.

**Findings/Recommendations:** 1) encourage growth of cooperative organizations and GIEs; 2) cereals plan: intensify rainy season cropping and expand irrigation by 5000 ha/yr to goal of 10% of cereals area and 30% of production by year 2000; rice production will be increased, millet decreased; 4) 80% food self-sufficiency is goal by year 2000.

**Relevance:** High.

**Comments:** Definitive although very optimistic action plan for each subsector of the agricultural sector; timely information. Defines specific production, processing, and marketing characteristics, policies and plans for the following subsectors: cereals (millet, sorghum, corn), rice, peanuts, horticulture, and livestock; also discusses policies for agricultural credit, agricultural inputs, research, extension, land use and natural resources management.

**Keywords:** Diversification, food security, liberalization, agricultural policy, producers.

- [293] Ribot, Jesse. (1988) **Market structure and environmental policy in Senegal's charcoal industry. Report to ENDA-TM -- Energy program.** Draft. Berkeley, CA: University of California at Berkeley, Energy and Resources Group. June. 48 p (text) + 9 p (appendices) + 11 p (bibliography).

**Objectives:** To examine the organization and state regulation of Senegal's charcoal market, variables that influence ability of Forestry Department to regulate charcoal production, political and economic constraints on charcoal supply and demand.

**Time Period:** 18 months of research in 1986 and 1987.

**Methodology:** Surveys and interviews with charcoal producers, merchants, wholesalers, vendors, transporters, GOS officials, and NGOs. Hypothesis 1: agents of the Forestry Department, workers, and merchants in the market function under contradictory pressures to conserve and to produce woodfuels. Hypothesis 2: mechanisms for coping with these contradictions are based in the social structure of the market.

**Data Collected:** Detailed study of the charcoal industry from production through distribution.

**Findings/Recommendations:** In Senegal, 25 percent of population is urban but urban areas consume 50 percent of national production of woodfuels (charcoal). For most African countries, over 80 percent of total national energy supply is woodfuels.

Urban woodfuel demand contributes to decline in forest cover and rural firewood supply. Substitute fuels not generally adopted by Senegalese. Shortages of woodfuel rarely occur, a result of systematic circumvention of and exceeding of national charcoal production quota. Entry barriers result in reduced competition and rigid marketing channels. Merchants have influence with GOS officials. Recommendations and policy considerations: cooperative system should be restructured to include producer cooperatives; quotas should be based on strict, environmentally conservative criteria; revenue structure for forestry service needs to be revamped.

**Relevance:** High; description of relationships within the industry may be applicable to other subsectors of agriculture.

**Comments:** Preliminary paper based on partial analysis of data.

**Keywords:** Natural resources, environment, marketing, forestry.

- [294] Rieucou, Jean. (1986) *Le Sénégal et la coopération internationale: L'exemple des ressources vivantes de la mer, II(2)*. *Afrique Contemporaine*. No. 138: 34-43.

**Objectives:** To analyze the role of international assistance in the development of Senegal's fisheries resources.

**Methodology:** Descriptive/comparative analysis of Canadian, Japanese, South Korean, EEC and PVO assistance for fisheries development and protection.

**Data Collected:** Secondary data on legal instruments and project agreements between Senegal and donors.

**Findings/Recommendations:** Senegal has been at the forefront in fisheries development and protection in Africa (e.g., all fishing rights granted by Senegal are linked to technical and financial assistance and the most recent agreement with the EEC requires all catches to be unloaded at Senegalese ports). High maintenance costs and limited capacity of marketing infrastructure (cold chain and refrigerated trucks) can only satisfy needs of high income consumers for fresh fish.

**Relevance:** Low.

**Comments:** No specific policy recommendations; cf. Rieucou (1985) and Llères (1986).

**Keywords:** Fish, donor assistance.

- [295] Rieucou, Jean. (1985) *De la pêche comme activité nouvelle, de la mer comme nouvelle frontière dans les pays du Tiers monde: L'exemple du Sénégal, pays pêcheur sur un continent terrien, I*. *Afrique Contemporaine*. No. 136: 3-23.

**Objectives:** Geo-political overview of third world fisheries exploitation.

**Methodology:** Descriptive analysis of third world fishery resources and their role in regional and national economies.

**Data Collected:** Secondary data from UN sources.

**Findings/Recommendations:** Fisheries development is lagging in Africa and current agreements largely profit industrialized countries.

**Relevance:** Low.

**Comments:** Journalistic style; see parts II(1) and (2) by Llères (1986) and Rieucou (1986), respectively.

**Keywords:** Fish.

- [296] Riss, Marie-Denise. (1984) **La place de la femme dans les mutations internes de l'économie rurale à partir d'un exemple sénégalais.** In *Le développement rural en questions*, Mémoires ORSTOM No. 106, Ch. 21. ORSTOM. 15 p.

**Objectives:** Describe the woman's place in African rural economy.

**Methodology:** Descriptive analysis.

**Data Collected:** Peanut production, distribution of agricultural equipment; data sources not clear.

**Findings/Recommendations:** Present transformation of the rural environment favors men, who own the agricultural equipment. Women have to work more in order to make a profit from their crops. Changes in the women's lives have not always benefitted them.

**Relevance:** Medium.

**Keywords:** Women, production, millet, peanuts, rice, trade.

- [297] Romero, Carlos; Rehman, Tahir ur. (1983) **Goal programming via multidimensional scaling applied to Senegalese subsistence farming: Comment.** *Amer. J. of Ag. Econ.* Vol. 65, No. 4: 829-833.

**Objectives:** To discuss the application of linear goal programming to farm planning with respect to clearly establishing conceptual and technical differences among objectives, goals and constraints, and the possible effects of setting pessimistic levels of aspiration in a goal-programming problem. Comment on the AJAE article by Barnett, Blake and McCarl (1982), Vol. 62: 720-727.

**Findings/Recommendations:** Use an auxiliary multiobjective programming model to assess the solution found with goal programming.

**Relevance:** Low.

**Comments:** Reply by McCarl and Blake, pp. 832-833.

**Keywords:** Model.

- [298] Rosetta, L. (1986) **Sex differences in seasonal variations of the nutritional status of Serere adults in Senegal.** *Ecology of Food and Nutrition.* Vol. 18: 231-244.

**Objectives:** To determine if seasonal variations in the nutritional status of adults can be quantified in a chronically poor population, and to compare the responses of men and women to seasonal changes.

**Time Period:** July 1980 to October 1982.

**Methodology:** Stratified random sample of 40 family groups, statistical analysis of anthropometric data by sex and age/physiological state.

**Data Collected:** Weight, height, anthropometric data, consumption data.

**Findings/Recommendations:** The population subsists at the lower limit of its nutritional balance. Men have very low energy reserves and mobilize protein (muscle) during the hungry season. Adverse effects of the hungry season are more acute with

increasing age in men. In the case of women, relatively low energy reserves were adequate to cope regardless of age and physiological status.

**Relevance:** Medium.

**Comments:** Emphasis on methodology; no discussion of policy implications.

**Keywords:** Nutrition, women.

- [299] Ross, Clark G. (1980) **Grain demand and consumer preference in Senegal.** *Food Policy*. Vol. 5, No. 4: 273-281.

**Objectives:** In relation to the policy goal of increasing foodgrain self-sufficiency to assess whether domestically produced rice possesses characteristics acceptable to the urban population, and whether the urban population will shift its grain diet towards increased millet and maize consumption.

**Time Period:** Survey conducted June 1977 to March 1978.

**Methodology:** Sample of 75 Dakar households from all major neighborhoods, ethnic and income groups; descriptive analysis of consumption patterns and statistical analysis of demand parameters for millet and rice.

**Data Collected:** Detailed data on purchasing and consumption patterns and preferences for rice, millet and maize.

**Findings/Recommendations:** Current (1977/78) Dakar consumption patterns present a serious obstacle to policy goal of substituting imported rice with domestically produced rice, millet and maize because of: 1) limited substitutability of millet for rice in the mid-day meal when most rice consumed, 2) strong preferences for imported rice due to volume after cooking and oil absorption qualities, 3) high price elasticity of demand for millet (due to availability of substitutes) indicates possibility for increasing millet consumption through lower prices but not necessarily resulting in decreased rice consumption, and 4) limited possibility for increasing millet consumption through processed products at current price differentials.

**Relevance:** Medium.

**Comments:** Although collected ten years ago, the data are an important baseline for further studies.

**Keywords:** Consumption, cereals, food security.

- [300] SAED - CAB. (1989) **Journées de concertation avec le secteur privé: La rentabilité des aménagements hydro-agricoles.** Dakar: Ministère du Plan et de la Coopération; Ministère du Développement Rural. Mai 1989. 4 p (text) + 24 p (tables).

**Objectives:** To present results on production costs and returns to irrigation in the Senegal River Valley.

**Methodology:** Used Lotus 1-2-3 spreadsheet models.

**Data Collected:** Established irrigated production costs for various crops by irrigation type, geographic location, and cropping season under different assumptions: with and without the amortization of perimeter development costs; intensity of cropping expected in 1990, 1995, 2000.

**Findings/Recommendations:** Costs of irrigation are often more than 50 percent of total costs of production. Estimated irrigation costs calculated per hectare: water use (OMVS) - 4,000 CFAF without amortization; 34,000 CFAF with amortization; perimeter preparation - fixed costs per hectare 40,000 CFAF; variable costs per 1000 m<sup>3</sup> of water used 2,700 CFAF for irrigation plus 500 CFAF for pumping. Tables show detailed cost estimates by crop for rice, tomatoes, corn, sweet potatoes, potatoes, beans, and onions for two levels of intensity (privé and paysannal) for different seasons.

**Relevance:** Medium.

**Comments:** Detailed results presented but scanty analysis. May be useful for planning irrigation projects in other areas.

**Keywords:** Irrigation, production costs, Fleuve.

- [301] Sahel Antenna, OECD Development Center; Club du Sahel. (1989) *Bibliographie de documents et rapports sur les pays du Sahel (1977-1985)/Bibliography of documents and reports on the Sahelian countries (1977-1985)*. Paris: OECD. 198 p.

**Objectives:** Facilitate access to information on Sahelian countries.

**Time Period:** Inventory of documents assembled 1977-85.

**Methodology:** Club du Sahel collection incorporated into collection of Sahel Antenna of OECD Development Center.

**Data Collected:** 379 references to reports and documents, mostly unpublished, which can be consulted at Sahel Antenna of OECD Development Center. Contents divided into 19 subject areas (International cooperation, economic policy, economic conditions, culture, education-training, agriculture, industry, trade, transport, public finance, management, labor, demography-population, food-health, environment, earth sciences, science, information). Indexed by author, corporate author, geographic area, keywords.

**Relevance:** Medium.

**Keywords:** Bibliography, Sahel.

- [302] Sall, Babacar. (1987) *Relations interethniques, coopératives et enjeux politico-économiques en milieu maraîcher sénégalais*. Genève-Afrique. Vol. XXV, No. 1: 25-42.

**Objectives:** To analyze interethnic relations in the vegetable production zone of Senegal within the framework of a study of the rural community; to examine "modern" institutions--State, cooperatives and political parties--through which these relations turn into conflict, get out of control and force ethnic groups to abandon their traditional ways of interacting.

**Time Period:** 1983.

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** Cooperatives have not been very successful in rural areas because the rural community has had to adapt to these institutions instead of the opposite. The integration of modern state-initiated development structures into



agrarian societies leads to destruction, rejection, readjustment of societal structures, and conflict. The new structures have led to new alliances which go beyond ethnic borders at the political level, but at the economic level ethnic origin is still the binding factor between individuals.

**Relevance:** Medium.

**Keywords:** Vegetables, ethnic groups, cooperatives, farmer organizations.

- [303] Santoir, Christian. (1983) **Raison pastorale et politique de développement (les Peul sénégalais face aux aménagements)**. Travaux et Documents de l'ORSTOM, No. 166. Paris: ORSTOM. 185 p.

**Objectives:** To identify policies which will promote and improve the livestock sector, while maintaining integrity of pastoral people.

**Methodology:** Extensive review of two examples of efforts to develop the livestock sector in Senegal: attempts to settle pastoral population in the Diolof by digging boreholes, and similar attempts in Senegal Valley to establish the Peul in irrigation schemes. Relies on secondary data.

**Data Collected:** Changes in livestock population in Linguere region (1945-1975).

Regional maps on changes in Peul settlements over time, and locations of boreholes; movements of animals during dry season in the Diolof, before and after 1950; and population density in south Diolof (1953-1980). Differences in rice yields between Wolof and Peul. Expenses and value of sales in irrigated perimeters.

**Findings/Recommendations:** Past policy in Senegal concerning pastoral populations (Peul) have been unsuccessful because technical aspects have not met Peul interests, and have been too market oriented in approach. Future policy should be based on assessment of traditional agro-pastoral systems. Two examples are recognizing the role of livestock in the Peul socio-economy, and addressing the territorial needs of the Peul.

**Relevance:** Medium.

**Comments:** Historical discussion of traditional agro-pastoral system of Peul. Reviews history of irrigation development in the Lower Senegal Valley, and the Peul's participation in this development.

**Keywords:** Livestock, Fleuve, irrigation, Ferlo.

- [304] Sarr, Désiré; Diouf, D.; Diouf, O. (1987) **Allocation de semences crédit par les sections villageoises: Etude de cas dans la Communauté rurale de Kaymor**. Note d'Information 87-5. Dakar: ISRA, Direction de Recherches sur les Systèmes Agraires et l'Economie Agricole. November. 19 p.

**Objectives:** To assess the validity of accusations of villagers that seed credit distribution was not handled according to criteria stated by the presidents of village sections; to reflect on impact that such an attitude could have on future functioning of village sections, and to suggest improvements.

**Time Period:** July-August 1985.

**Methodology:** Case study of 5 out of 9 village sections in the rural community of Kaymor; questionnaire was distributed as part of a field survey; interviews were also carried out.

**Data Collected:** Total quantities of seed received by the sections in 1985/86 and 1986/87; number of beneficiaries as opposed to total number of registered persons per section; quantity of seed received according to family status, social, political or economic position in the village, section and/or rural community, or family relationship with a member of the section committee; quantities received by members of the committee.

**Findings/Recommendations:** The objective of ensuring repayment of seed credit justifies selection of solvent farmers. The criteria for eligibility should not, however, be based on family relationship or social status because it has a detrimental effect on cooperatives and impairs the functioning of village sections mainly due to reserved attitude of farmers towards cooperatives. Criticism of seed distribution has to be considered; the section should not be a monopoly and serve only specific interest groups; decisions should be characterized by moral responsibility and serve the largest number of members possible.

**Relevance:** Medium.

**Keywords:** Farmer organizations, credit, organizational performance, cooperatives, seed distribution.

- [305] Sarr, Désiré Y. (1988) *Les sections villageoises et l'approvisionnement des exploitations agricoles en facteurs de production*. Dakar: ISRA, Direction des Recherches sur les Systèmes Agraires et L'Economie Agricole. June. 12 p.

**Objectives:** To study the mode of input distribution to producers through the sections villageoises (SV), and to identify potential improvements.

**Time Period:** Study implemented July-August 1986 but covered both the 1985/6 and 1986/7 agricultural campaigns.

**Methodology:** Formal survey in 5 SVs in the Kaymor Communauté Rurale covering 400 recipients of seed credit.

**Data Collected:** Personal characteristics of recipients (e.g., family status, social status, relationship to committee member), quantities of seed obtained, opinions of farmers on the method of distributing inputs.

**Findings/Recommendations:** SV committees were unable to prepare lists of eligible farmers or to determine the allocation of seed and/or fertilizer without recourse to SONACOS agents due to lack of literacy and functional training. None of the SV committees held meetings to explain and discuss eligibility criteria and distribution methods to members. Predominance of lineage and socio-political status among criteria for allocating credit. SVs have neither the resources nor the degree of participation to fulfill their intended role.

**Relevance:** High.

**Comments:** Succinct and clear exposition of current state of management of SVs in Kaymor.

**Keywords:** Cooperatives, inputs, credit.

- [306] Sautier, Denis; O'Deyé, Michèle. (1989) **Mil, maïs, sorgho: Techniques et alimentation au Sahel**. Paris: Editions L'Harmattan. 171 p.

**Objectives:** Consideration of cereals research and experience from technological, cultural and economic perspectives, analyzing successes and failures of cereals promotion in an attempt to draw significant conclusions and make recommendations for future action.

**Methodology:** Descriptive analysis of data from three sources: recent research; field missions and observation in Senegal, Burkina Faso and Mali; interviews with representatives of organizations involved in cereals research.

**Findings/Recommendations:** Authors reject notion that in Africa there are no entrepreneurs. There exist thousands of small enterprises which if supported could prosper. National cereals policies do not take into consideration all of these actors. Also, each country and each institute or organization involved should exchange information, results and experiences with others. It is necessary to re-orient cereals policy toward the internal dynamics of the country, for example to orient research toward traditional production and marketing methods and food crops; to orient development of technologies toward small entrepreneurs; and to realize the importance of individual rural households and small artisans in the overall economy.

**Relevance:** Medium.

**Keywords:** Cereals policy, food security, marketing, private sector.

- [307] Savanne, Marie Angélique. (1985) **Femmes, production et crise alimentaire en Afrique au sud du Sahara**. Paper presented at the international workshop on Women's Role in Food Self-Sufficiency and Food Strategies, ORSTOM/CIE. 10 p.

**Objectives:** To identify the role and importance of women in food production and in the achievement of food self-sufficiency in sub-Saharan Africa.

**Findings/Recommendations:** Given the contribution of women to household agricultural production, especially with small garden plots, and in cultivation, food preparation and marketing, women should be recognized as full-time producers and given access to land, credit and technology.

**Relevance:** Medium.

**Keywords:** Women, processing, production.

- [308] Schneider, Hartmut. (1988) **Groupements paysans et productivité agricole. Expériences africaines**. Paris: OECD. 96 p.

**Objectives:** To review the relevance of different modes of village-level organization to agricultural production.

**Time Period:** 1986-1987.

**Methodology:** Village-level studies.

**Data Collected:** Information on the structure, organization and operation of village organizations.

**Findings/Recommendations:** Difficult to assess the relationship between the structure of village-level organizations and agricultural production; success of a local organization linked to the degree to which it is part of local village culture and traditions; water and land are greatest constraints; contribution of foreign and outside NGOs to long-term success of village organizations is not clear.

**Relevance:** Low.

**Comments:** See Chapter 7, Structures locales dans deux villages du Sénégal.

**Keywords:** Village organizations, land tenure, NGOs.

- [309] Schwartz, Lisa A.; Sterns, James A.; Oehmke, James F.; Freed, Russell D. (1989) **Impact study of the Bean/Cowpea CRSP for Senegal.** USAID Contract No. DAN-1310-G-SS-6008-00. East Lansing, MI: Michigan State University, Bean/Cowpea CRSP Management Office. December 11. 43 p.

**Objectives:** To quantify the impact of the Bean/Cowpea CRSP on Senegalese farmers, on Senegalese agriculture, and the international research community; to review research on Senegalese cowpea farming practices and production in the 1980's; to examine the benefits of the CRSP training program.

**Time Period:** 1981-1988.

**Methodology:** Review of secondary data.

**Findings/Recommendations:** The CRSP has combined the work of Senegalese and U.S. scientists to yield the following benefits for Senegalese farmers: decreased risk and increased yields due to the introduction of improved short and medium cycle varieties of cowpeas; decreased swings in income and food supplies by introducing a crop which can be harvested early during the hungry season; adaptation of improved varieties to fit specific local conditions; and decreased post-harvest losses with improved on-farm storage. Food security in the semi-arid Louga region has improved in drought years when peanuts cannot be planted, and in normal rainfall years when cowpeas are a nutritional complement to other foods. The training of Senegalese research scientists and the establishment of international research linkages has improved the national agricultural research system's capacity to generate, borrow and adapt new technologies of cowpeas and other crops.

**Relevance:** High.

**Comments:** Recent and thorough example of evaluating research impact, applied to a key food crop.

**Keywords:** Agricultural research, cowpeas, food production, training, drought.

- [310] Seck, S. M.; Lericollais, A. (1986) **Aménagements hydro-agricoles et systèmes de production dans la Vallée du Sénégal.** *Les Cahiers de la Recherche-Développement.* No. 12: 3-11.

**Objectives:** To summarize the results of session 4 of the DSA-CIRAD workshop on "Aménagements hydro-agricoles et systèmes de production" held at Montpellier, 16-19 décembre 1986.

**Findings/Recommendations:** Historically dominant production systems are described (rainfed and recessional agriculture, livestock, fishing). Estimated area of recessional agriculture is 100,000 to 120,000 ha, with production of 50,000 t/yr of sorghum. Annual fish production estimated at 15,000 to 30,000 t. SAED's mission since its creation in 1965 has been to reduce Senegal's food deficit and increase the well-being of farmers in the Delta. Irrigation schemes have transformed the social organization of production. Irrigated cultivation is now found everywhere, and is the dominant but rarely the only activity. Livestock serve to capitalize the revenues earned from irrigated agriculture. Intensification via double cropping is constrained by many factors (cf. Jamin, 1986). Costs of rice produced in the valley are very high compared to the import parity price. Rice production is subsidized, but has benefits in terms of employment and redistribution of purchasing power. Since 1980, SAED has undertaken to improve its efficiency and to reduce the number of functions it controls. In the "après-barrage" era following construction of the Diama and Manatali dams, the area potentially irrigable on the Senegalese side of the river is estimated at 240,000 ha. An artificial flood is planned to permit some continued recessional agriculture. Various constraints will slow the pace of irrigation development. Land tenure conflicts and potential environmental damage must be addressed.

**Relevance:** High.

**Comments:** This issue of the journal contains 7 articles which treat: the summary (described above), water management and social reorganization induced by irrigation (cf. annotation of Seck, 1986), agriculture and livestock in the large perimeters of the Delta, large vs. intermediate perimeters, rice double cropping (cf. annotation of Jamin, 1986), macro-economic aspects, and recessional agriculture.

**Keywords:** Irrigation, Fleuve, farming system, livestock, rice, RDAs, subsidies.

- [311] Seck, Sidy Mohamed. (1986) *La maîtrise de l'eau et la restructuration sociale induite par l'organisation de la production irriguée dans le bassin du fleuve Sénégal. Les Cahiers de la Recherche Développement.* No. 12: 13-19.

**Objectives:** To look at the development of irrigated agriculture and its effects on farmer organizations, farm systems, and management of the fields.

**Methodology:** Descriptive analysis.

**Findings/Recommendations:** Irrigated agriculture has become the dominant method of cultivation in the Senegal River Basin only in the last 15 years. Integration of irrigated agriculture into the general system of agriculture is far from complete. Coexistence of different systems is marked by conflicts and constraints. The absence of hydro-agricultural traditions in the Basin influences the institutional, judicial and organizational changes which have occurred, reflected in the different types of irrigated fields and types of farm organization. Irrigated fields at the village level have made an important contribution and show the ability of the population to adapt. Human and social dimensions in hydro-agricultural development strategies are important. The political slogan of "more responsibility for the people" has to be dealt with cautiously, since the people are not sufficiently prepared to take this

responsibility, and the necessary structures at the government level are not in place. The current transition phase should lead to rapid and substantial improvement in development methodology and institutions.

**Relevance:** High.

**Keywords:** Village organizations, irrigation, production, cooperatives, farmer organizations, Fleuve.

- [312] Second, Chantal; Benoit Cattin, Michel. (1986) **Systèmes agraires, systèmes de production en Afrique de l'ouest (et Madagascar). Bibliographie.** Collection Documents Systèmes Agraires, No. 2. Montpellier: Département Systèmes Agraires du CIRAD. Not paginated.

**Objectives:** Annotated bibliography of production systems research in West Africa and Madagascar based on the holdings listed in the CIRAD-Montpellier computerized database ("Texto").

**Methodology:** Bibliography organized as follows: General (concepts, methods, techniques); Burkina-Faso, Cameroon, Côte d'Ivoire, Madagascar, Mali, Niger, Sénégal, Chad, Togo, and Other Bibliographies. Keyword and author indexes.

**Data Collected:** Each annotation includes: author, title, date, pages, keywords, subject and location of document; 40 documents from 1962 through 1985 listed for Senegal.

**Relevance:** Medium.

**Keywords:** Agricultural research, bibliography.

- [313] Seka, Pierre. (1989) **Macroeconomic indicators - a statistical record.** MADIA study. World Bank. June. 104 p.

**Time Period:** Many data series cover period 1960-87; some start in 1960s.

**Methodology:** Quantitative data, no text. Compilation of World Bank data on Kenya, Malawi, Tanzania, Cameroon, Nigeria, Senegal.

**Data Collected:** Structure and performance (growth of GDP, growth by sectors, income per capita, structure of output, saving, and investment, agricultural sector, social indicators). Foreign trade and external imbalances (export/import ratios, agriculture in foreign trade, food imports, trade account, current account). External shocks and policy controllable factors (terms of trade, foreign demand, interest payments, export promotion, import compression, new debt). Policy indicators (debt structure and burden, public and publicly guaranteed debt disbursed and outstanding, official development assistance, macroeconomic policy indicators, money, inflation, interest rates, exchange rates, public consumption, sectoral policy indicators).

**Relevance:** High.

**Comments:** Data are presented separately for six countries; tables and graphs are generally laid out to facilitate international comparisons.

**Keywords:** Macroeconomic indicators, production, trade.

- [314] SENAGROSOL. (1989) **Etude de la filière engrais au Sénégal. Vol. 1: Rapport de synthèse. Vol. 2: Fertilisation des cultures--Bilan et perspectives. Vol. 3: Evaluation**

**socio-économique.** Dakar: SENAGROSOL; Ministère de Développement Rural/Direction de l'Agriculture. Avril. 83 p (Vol. 1), 128 p (Vol. 2), 97 p (text) + ca. 40 p (annexes) (Vol. 3).

**Objectives:** To propose a plan for promoting fertilizer use, based on analysis of farmer motivations, financial and economic impact of fertilizer, potential effective demand, and synthesis of fertilizer research results and evaluation of their adequacy for extension.

**Time Period:** Dec. '88 through April '89; 40 days of surveys, 40 days of analysis.

**Methodology:** Formal and informal surveys at various levels of the filière; bibliographic review. Sampling: 10 agroecological zones (excluding Kédougou and Dakar); equiprobable random sample of 280 villages, simple random sample of 6 farmers (exploitation) per village (final total=1668 farmers), sample of all farmer groups per village (total=297). Statistical analysis including multiple regression analysis of cash purchase behavior.

**Data Collected:** Vol. 2 contains bibliography, only 12 of 77 references 1983 or later.

Survey data: socioeconomic characteristics of farmers and farmer groups, area cultivated by crop, traction animal and equipment inventory, fertilizer acquisition by farmers, and farmer opinions on fertilizer amounts needed, input priorities, production problems, price policy and distribution mechanisms.

**Findings/Recommendations:** Findings: much agronomic research done, but little research on how to overcome constraints on adoption of fertilizer recommendations, especially for intensive cropping. Recommendations: initiate program to preserve and improve soil fertility (natural phosphates, research on organic matter and phosphogypse, mapping of acid soils); improve crop productivity (initiate long-term research on crop response to mineral fertilizer, farm-level soil fertility tests); reduce fertilizer prices (establish compacting factory, liberalize fertilizer imports, initiate 3-year subsidy program); improve fertilizer credit (improve access by farmer groups, initiate a 2-year repayment schedule, improve coordination between CNCAS, RDAs, and farmer groups); improve distribution (maintain RDA involvement or subsidize private traders to ensure supply in zones of degraded soils; improve information on fertilizer availability; and support dry-season activities as source of income for fertilizer purchase.

**Relevance:** Medium; key topic, but quality of study is mixed (Vol. 2 much better than Vol. 3).

**Comments:** Method and results of modelling analysis of frequency of cash purchases (pp. 5-7, Vol. 3) are suspect.

**Keywords:** Fertilizer, fertilizer distribution, private sector, farmer organizations, agricultural research, soil quality, credit, subsidies, nonagricultural activities.

- [315] Sène, Djibril. (1987) **Recherche agronomique et vulgarisation agricole: l'expérience du Sénégal.** In *Recherche, vulgarisation et développement rural en Afrique noire*, ed. Belloncle, Guy, 65-74. Paris: Ministère de la Coopération.

**Objectives:** Historical overview of the role and impact of extension in rural development and the link between extension and agricultural research.

**Relevance:** Medium.

**Comments:** Short but useful background article; informative treatment of progression of extension and research institutions in Senegal from the colonial period to 1985.

**Keywords:** Institutions, agricultural research, extension.

- [316] Sène, Djibril. (1987) **Aperçu sur les technologies disponibles en matière agricole au Sénégal.** Unpublished draft. January. 211 p + unnumbered bibliography, maps, graphs.

**Objectives:** Survey and description of evolution of available technologies relevant to production of livestock, peanuts, millet, sorghum, rice, and cowpeas in four agro-ecological target zones represented by departments of Dagana - Podor, Linguère, Niore, Sédhiou - Kolda. Examine socioeconomic factors relevant to diffusion of technologies.

**Time Period:** 1951-present.

**Methodology:** Data on 1951/52 conditions from 1952 Porteres report on condition of Senegalese agriculture. Sources of data on later periods mostly not specified in text or tables; bibliography cites wide range of research reports and Senegalese government reports.

**Findings/Recommendations:** Agricultural research has produced useful technologies but agricultural production has stagnated or dropped. Reduction of subsidies for agricultural inputs slowed diffusion of modern agricultural technologies in general, and decreases in annual rainfall have discouraged use of fertilizers. Appropriate technologies exist for agricultural development and achievement of food self-sufficiency, but work is needed to improve fertilizer formulations to make fertilizer use more economic since discontinuation of fertilizer subsidies. Better-adapted varieties of millet and sorghum are needed. Success in increasing agricultural production will be contingent upon policies establishing adequate producer prices and improving performance of cereal markets, and making agricultural credit available.

**Relevance:** Medium.

**Comments:** Rather long on lists (e.g., fertilizer formulations recommended at various dates), short on interpretation or synthesis. Information on dissemination of technology seems to rely heavily on aggregate figures (e.g., tons of fertilizer distributed) with little examination of patterns of adoption within regions.

**Keywords:** Agricultural research, technology, peanuts, millet, sorghum, rice, cowpeas, livestock.

- [317] Sène, Djibril. (1985) **Etude de l'impact de la recherche agronomique sur le développement agricole au Sénégal.** Dakar: CGIAR/CIRAD. Mars-Avril. 89 p.

**Objectives:** To examine the link between agricultural research and development, and to evaluate the type, quality, and number of finished agricultural research products ready to transmit to farmers, and proposed to national extension agencies.



**Time Period:** Document covers 1959-1984; field visits conducted from 4 March to 15 April 1985.

**Methodology:** Field visits to research and development personnel; questionnaire administered to same.

**Data Collected:** General, climate, and agricultural production statistics on Senegal, 1959-84; various data on research programs and research recommendations during this period.

**Findings/Recommendations:** Senegal clearly has an agricultural research capacity, but its capacity has diminished substantially in the last 15 years (research results, publications). Causes include unfavorable climatic trends which rendered obsolete existing varieties and fertilizer recommendations, and financial, administrative, and personnel management problems. Research results have shown the relatively high potential of tropical soils. Research recommendations have been proposed for all zones and crops, but concentrating historically on the Peanut Basin and varying considerably by crop and zone. Successful research results include technologies for recessional agriculture (sorghum, Fleuve), rice under partial water control (Fleuve, Casamance), cotton (Casamance, Senegal Oriental), peanuts (Peanut Basin, though no progress in last 15 years), horticulture, animal nutrition, and mechanized row seeding and peanut harvesting. Cases of research failure or stagnation include rice under full water control, irrigated maize and sorghum, rainfed cereals (except early millet), fertilizer use (since reduction of subsidies and credit), plowing, oxen traction, and animal disease control. International research organizations have contributed to Senegal's research, especially in rice, millet, and training. Agronomic researchers pay too little attention to socioeconomic factors or to problems faced by extension, though this is improving.

**Relevance:** High: authoritative (if slightly outdated) review by a respected senior Senegalese agronomist; cf. also Sène (1987).

**Comments:** Done for CGIAR, through Min. Français de la Recherche et de la Technologie and CIRAD.

**Keywords:** Agricultural research, technology, RDAs, extension.

- [318] Shaikh, Asif; Arnould, Eric; Christophersen, Kjell; Hagen, Roy; Tabor, Joseph; Warshall, Peter. (1989) **Opportunities for sustained development. Successful natural resources management in the Sahel. Summary.** Club du Sahel, RC(89)03; paper presented at the Club du Sahel conference, Regional Encounter, Local Level Natural Resources Management in the Sahel, Segou/Mali, 22-27 mai. 15 p.

**Objectives:** The plan for Supporting Natural Resources Management in Sub-Saharan Africa (PNRM) aims at achieving sustainable increases in agriculture and rural income. The Sahel Sub-Regional Natural Resources Management Assessment Report (SSRA) is an important element of PNRM. SSRA teams examine farmer-based initiatives that were having enduring impacts and describe the conditions under which the impacts were occurring.

**Time Period:** Study began in 1987.

**Methodology:** Field surveys and descriptive analysis. The report focusses on on-farm production practices that show promise for sustainable agricultural growth.

**Data Collected:** Unknown; paper is only a summary.

**Findings/Recommendations:** Agriculture, economics, environment, national institutions and their policies and the socio-cultural milieu under which small producers conduct business need to be understood since they are all part of sustainable development. A sound analytical understanding of the relationships among the elements of a production system is also necessary in order to assess the system's resilience and ability to withstand shock and stress, both externally and internally imposed. Intensive efforts have regenerated degraded land and created productive microenvironments. Successful "farmer-innovators" have provided powerful role models. Public policy changes have increased incentives for more rational natural resource management by small farmers. Successful resource management initiatives have improved the climate for subsequent efforts; they involve both technical interventions and socioeconomic incentives. Sustainable initiatives which provide immediate benefits have brought about smallholder participation. It will take 20 years or more before impacts from successful programs become visible on a large scale. Increased economic opportunities to local populations are needed for success in maintaining biological diversity. Local trainers and intermediaries are more efficient and cheaper than outside agents; "model farmers" and resource managers provide strong and positive demonstration effects. **Recommendations:** Provide clear, consistent policy signals, focus on incentives for local participation, assure a stable long-term commitment to the natural resource sector.

**Relevance:** Medium.

**Keywords:** Sustainability, natural resources, production, policy, rural incomes, agroforestry, environment, employment, soil quality, donor assistance.

- [319] Shapiro, Kenneth; Berg, Elliot. (1988) **The competitiveness of Sahelian agriculture.** Paper presented at the Donors' Advisory Group meeting, Tucson, Arizona, December. 59 p.

**Objectives:** To examine the competitiveness of Sahelian agriculture, and to review possible approaches to increasing its competitiveness; to assess the merits of protecting domestic cereals markets in Sahelian countries.

**Methodology:** Literature review and descriptive analysis; countries covered include Senegal, Burkina Faso, Mali, Niger, Mauritania, The Gambia, Chad, and Guinea Bissau.

**Data Collected:** Cereals imports (1970-86); commercial imports and exports (1983, 1985); government budget revenues and expenditures; millet/sorghum production (1962-85); world prices for cotton, groundnut oil, rice, wheat (1962-86); real effective exchange rates (1978-87); selected nominal protection coefficients (1977-87); nominal and real effective protection coefficients (1970-87).

**Findings/Recommendations:** Desire to increase competitiveness of Sahelian agriculture raises "obvious" issues (cost of production, exchange rates, fiscal and monetary policy, structure of world markets) and "less obvious" issues (research capabilities, efficiency

and effectiveness of rural transport, marketing, credit, and inputs supply). Constraints to increased cereals production even with higher producer prices include production side constraints (lack of improved technology, land constraints and high cost of expanding rice production) which limit the expected aggregate supply response; consumer demand constraints (importance of urbanization and other nonprice factors underlying the preference for rice); negative macroeconomic effects (reduced foreign exchange earnings, likely negative effect on government revenues); and negative food security effects (higher prices impose costs on net buyers of cereals). Competitive disadvantage of Sahelian cereals producers is exacerbated by both external and internal factors. Major world cereals producers (especially of rice) use efficient low-cost production technology, based on thorough water control. Their countries subsidize cereals production and exports. By contrast, exchange rate and other policies in Sahelian countries discourage local production and encourage imports. Protection of domestic cereals will have few benefits and high costs. Authors argue that, despite the gloomy prognosis of many studies, private individuals and firms will discover new opportunities if governments create an institutional and legal environment which encourages and sustains innovations.

**Relevance:** High.

**Comments:** Senegal receives considerable attention in the discussion. Cf. comments on this paper by Gentil and Ledoux (1988 [1989]).

**Keywords:** Cereals policy, price policy, cereals imports, institutions, regulation, macroeconomic policy, comparative advantage, subsidies.

- [320] Société de Développement et de Vulgarisation Agricole (SODEVA). (1984) *Le magasin semencier villageois: Etude de cas*. Kaolack: SODEVA. Janvier. 65 p.

**Objectives:** Case study of ACOPAM (Appui Coopératif aux Activités de Développement Assistées par le Programme Alimentaire Mondial en zone soudano-sahélienne) in Senegal. Discusses region of intervention, pilot groups, description of project results. Directed at those undertaking similar projects.

**Time Period:** 1981-83.

**Methodology:** Case study of SODEVA/ACOPAM in Senegal; descriptive; compilation of official and project-specific data.

**Data Collected:** Rainfall, cereal yields, seed stock, socioeconomic data on participating villages, program costs.

**Findings/Recommendations:** In 1981, the World Food Program supported the ACOPAM project managed in Senegal by SODEVA to provide technical assistance for the organization of village cooperatives, aiming primarily at the village grain stores, with an objective of making improved quality grain available at the village level. The effects of the program were generally positive but costs per village of constructing grain stores need to be reduced in the long run, and SODEVA agents need to be more involved.

**Relevance:** Medium.

**Comments:** An excellent "lessons learned" report.

**Keywords:** Food security, storage, cereals, cooperatives, Peanut Basin.

- [321] SOFRECO. (1989) *Etude sur la filière arachide au Sénégal. Rapport de troisième phase. Le plan d'action à court-moyen termes*. Paris: SOFRECO; Ministère du Développement Rural. Juillet. 193 p (text) + 37 p (appendices).

**Objectives:** To define short- and medium-term action plans for production, processing, and local and export marketing; to develop economic and financial analyses for the proposed plans; to implement the SONACOS and SOFRECO-13 options recommended by steering committee and described in phase 2 report.

**Time Period:** 1990-1995 for short term, and 1990-2004 for longer term plans.

**Methodology:** (See annotation for SOFRECO (1988), Phase 2 report.) Third phase considers transportation costs for peanuts, possibility of obtaining concessional loan rates to support subsector activities in the short term, strengthening of SONACOS' marketing capabilities, privatizing of peanut and peanut product marketing.

**Findings/Recommendations:** Current and planned peanut areas, production characteristics, and use of inputs are presented for five principal peanut planting zones: north and central Peanut Basin, central (Sine and Saloum), south Peanut Basin, Casamance, Senegal Oriental. Over the next 15 years, area planted to peanuts will be reduced by 80,000 ha in the north, and in the south will be increased by 30,000 ha, to level production at 830,000 tons. Four factors need to be satisfied to permit the peanut subsector to return to profitability in the next two to three years: elimination of sectoral debt, especially oil mill rents; stabilizing of world edible oil prices; reorganizing of the peanut subsector, especially the oil milling operations (SONACOS); and the granting of short-term loans to facilitate timely purchase of peanuts. Assuming a producer price of 70 CFAF/kg, with the SOFRECO option the subsector will return to profitability beginning in the third year of the proposed program and will develop a surplus of 2.5 billion CFAF by the end of the fifth year; with the SONACOS option profitability is achieved in the fourth year and a surplus of 200 million CFAF is projected at the end of year five. Recommendation: the SOFRECO option should be adopted because the consolidation of oil processing in one site (Dakar) results in savings of 700-750 million CFAF per year. A 15-year agricultural action plan should be implemented to intensify production techniques and improve crop yields. The oil industry should be rehabilitated: redundant facilities closed, equipment modernized and production streamlined. A technical and economic audit is recommended.

**Relevance:** High.

**Comments:** The assumptions made in deriving the analyses are not always clear, nor is the methodology well explained; the industrial analysis is thorough and provides some useful statistics. Follows the first two phases of the study and the short-term action plan by the same consultants. Part I presents an action plan (1990-1994) for production (chapter 1), processing (chapter 2) and marketing (chapter 3). Part II sets forth proposals for restructuring the peanut subsector. Part III presents projected costs and benefits for the recommended activities.

**Keywords:** Peanuts, processing, production, marketing, transport.

- [322] SOFRECO (Société Française de Réalisation, d'Etudes et de Conseil). (1988) *Etude sur la filière arachide au Sénégal. Rapport de deuxième phase. Les scénarios de redimensionnement de l'activité arachidière*. Paris: SOFRECO; Ministère du Développement Rural. Novembre. 222 p (text) + 12 p (appendices).

**Objectives:** For the study, to analyze the peanut subsector and to set forth a series of actions designed to reduce the (present) deficit; for the second phase, to describe the consequences of three scenarios for the redesign of subsector activities, and to estimate the financial, macroeconomic and microeconomic impact for each scenario. A specific aim is to determine realistic marketing objectives compatible with constraints and potential of agricultural production and to redesign the processing of peanuts as a function of these objectives.

**Time Period:** First phase (diagnostic review of subsector) completed June 27, 1988; second phase, presented here, (comparative analysis of three scenarios identified in phase 1).

**Methodology:** Three scenarios contain assumptions about export and domestic market conditions, and describe the situation in 1992. All scenarios assume 250,000 tons of peanuts are handled in the "non-controlled" market, including peanuts consumed by producers as food or seed, or sold at local markets. Break-even point for each of the three scenarios is 1992. Scenario 1: fixed production of 830,000 tons of peanuts; export market--SONACOS will develop an aggressive commercial strategy towards the EEC and towards other African countries; Groupe LESIEUR, leading purchaser of SONACOS peanut oil, will permit Senegal's share of the European market to increase from 50% to 60%; 10,000 tons/year to African markets; domestic market--SONACOS currently supplies 60,000 tons/year of oil, expected to increase 4% per year to provide 72,000 tons/year in 1992; situation in 1992--202,000 tons/year of peanut oil corresponds to the purchase of 580,000 tons/year of peanuts; this implies production of 830,000 tons/year. Scenario 2: fixed production of 600,000 tons of peanuts; more pessimistic than Scenario 1; export market: assumes LESIEUR changes strategy and European demand for peanut oil loses 20% over 4 years (falls to 160,000 tons/year in 1992); European oil producers receive subsidies from the EEC which encourages production of other vegetable oils; SONACOS is able to capture only 50% of the European market (80,000 tons/year), no demand from African countries; domestic market--SONACOS can only provide 50% of domestic demand (43,000 tons/year in 1992); situation in 1992--123,000 tons/year of oil in 1992 (350,000 tons of peanuts must be purchased); Scenario 3: maximize production (1,060,000 tons of peanuts after 15 years); phase 1 showed that underutilized processing plants increase production costs; under these conditions, market constraints are not binding; export market--African oil sales of 10,000 tons/year; after extracting domestic and other export needs from total production, amount available to the European oil market will be 201,000 tons/year; domestic market--72,000 tons/year in 1992; situation in 1992-- 810,000 tons of peanuts sold to SONACOS. Six ecological zones were chosen to evaluate each of the three scenarios.

**Findings/Recommendations:** SONACOS processing plant overcapacity contributes substantially to the deficit of the subsector. The principal cause of the deficit is the

difference between world price and producer prices. Scenario 3 would be "dangerous" to Senegal's agricultural security; it would also increase the subsector deficit. Scenario 2 is "best positioned" in terms of the subsector's financial balance (deficit), but it risks depressing the country economically, especially the farmers. Scenario 1 still incurs deficits within the subsector, but positive overall economic effects would largely offset these deficits. The analysis shows that substantial economies can be realized in the subsector even if, given current financial difficulties, deficits are unavoidable. Farm yields can be increased through improved farming techniques, and new methods for (donor-supplied) financing of the marketing campaign. Oil plants should be refitted as a function of their expected levels of production. Preferential quotas/prices for peanut oils should be negotiated with the EEC.

**Relevance:** High; substantive and detailed analysis of problems associated with cultivating, marketing and processing peanuts.

**Comments:** Appendix 1 and table (p.13) missing from copy annotated. See SOFRECO (1989) for third phase report.

**Keywords:** Inputs, peanuts, environment, seed, processing, marketing, storage.

- [323] SONED. (1985a) *Etude de la commercialisation des céréales au Sénégal. Rapport de synthèse et recommandations*. Dakar: Société Nouvelle des Etudes de Développement en Afrique (SONED); ISRA. Février. 32 p.

**Objectives:** To synthesize findings from a national cereals marketing survey (1983), and recommendations for addressing problems and constraints concerning the organization and operation of markets, storage, processing and exports.

**Time Period:** 1983.

**Methodology:** Not specified.

**Data Collected:** Studies undertaken include: millet and rice marketing; official markets for rice, millet and maize; evolution of foreign trade in cereals; cereals marketing credit; cereals processing; cereals storage needs; periodic household and cereals distributor surveys between March 1982 and May 1983.

**Findings/Recommendations:** Findings include: cereals demand exceeds availability; area cultivated in cereals is stagnant with production primarily for home consumption; official markets handle about 90% of total quantity of cereals marketed; storage facilities adequate, credit for marketing essentially non-existent; cereals transformation efforts resulted in expected outcomes. Recommendations cover: role of government, price reference system, price fixing, security stocks, transport and handling, imports and the establishment of a "fonds de prime."

**Relevance:** Medium.

**Keywords:** Cereals marketing, maize, millet, rice, sorghum, wheat, storage, cereals imports.

- [324] SONED. (1985b) *Etude de la commercialisation des céréales au Sénégal. Rapports annexes. Autres études sectorielles*. Dakar: Société Nouvelle des Etudes de Développement en Afrique (SONED); ISRA. Février. 88 p.

**Objectives:** Presentation of the complete reports and findings concerning the official cereals marketing system, storage and investment needs, and the analysis of cereals processing, foreign marketing and marketing credit.

**Time Period:** 1982-1983.

**Findings/Recommendations:** See annotation of SONED (1985a).

**Relevance:** Medium.

**Keywords:** Cereals marketing, credit, processing, cereals imports.

- [325] SONED. (1985c) **Etude de la commercialisation du riz et du maïs au Sénégal (production locale). Rapport sur les résultats de l'enquête.** Dakar: Société Nouvelle des Etudes de Développement en Afrique (SONED); ISRA. Février. 42 p + 3 p (tables) and 10 p (questionnaires).

**Objectives:** To present the findings and recommendations from the surveys of rice marketing and from maize producers.

**Time Period:** 1982-1983.

**Methodology:** Rice producer and marketing surveys in the Fleuve, Casamance and Eastern Senegal and a maize producer survey in the same regions, plus the Sine-Saloum.

**Data Collected:** Marketing information at the producer and dealer levels.

**Findings/Recommendations:** For rice: local marketing is marginal, dealers are not specialized, but storage is adequate. For maize: a secondary crop throughout most of the country; producers in the Fleuve tend to have surplus production.

**Relevance:** Medium.

**Comments:** See annotations for SONED (1985a,b).

**Keywords:** Cereals marketing, storage, rice, maize.

- [326] Sous-Commission Agriculture-Elevage-Protection de la Nature-Hydraulique Rurale; Sous-Groupe Agriculture. (1989) **Bilan diagnostique du sous-secteur agricole.** Dakar: Commission Nationale de Planification: Secteur de la Production (VIII Plan). Février. 90 p.

**Objectives:** To assess effectiveness of the NPA to date, and to identify major constraints facing individual subsectors (groundnuts, cereals, cowpeas, cotton, horticulture, seed, prices, fertilizer, equipment, credit, support services, cooperatives).

**Methodology:** Descriptive analysis.

**Data Collected:** Secondary data compilation (e.g., production of major crops, price series 1959-89).

**Findings/Recommendations:** Major constraints facing each subsector identified in general terms (e.g., for cereals: climate, soils, input supply, ineffectiveness of floor price), but no specific recommendations.

**Relevance:** Medium; historical assessment of the NPA; analysis lacks depth.

**Comments:** Draft working document.

**Keywords:** Agricultural policy.

- [327] Sous-commission du sous-secteur "pêche" (1989) **Résumé du bilan diagnostic socio-économique de la pêche (VIIIe plan)**. Dakar: Commission nationale de planification du secteur productif. Juin. 31 p.

**Objectives:** To describe the state of industrial and traditional coastal, ocean and inland fisheries.

**Findings/Recommendations:** The production from fisheries in Senegal has declined in recent years, partially because the physical capital has fallen into disrepair or disuse; fish in one form or another is an important part of the Senegalese diet, but the domestic market is not fully exploited.

**Relevance:** Medium.

**Comments:** This report is filled with statistics, but no sources are documented; it provides a thoroughly informative overview of the state of Senegal's fisheries over the past twenty years through 1989, including coastal and inland aquaculture.

**Keywords:** Fish, food security, processing.

- [328] Sous-commission productions agricoles. (n.d. [1989]) **Préparation du VIIIème plan de développement économique et social. 1989-1995. Sous-secteur protection de la nature. Bilan diagnostic**. Dakar: Commission nationale de planification. 25 p.

**Objectives:** To describe activities for inclusion in the VIIIe plan.

**Findings/Recommendations:** Topics mentioned include: anti-desertification campaign; reforestation; control of brush/forest fires; soil reclamation (anti-erosion barriers, dune stabilization, other agroforestry measures); energy-saving activities (substitution of other fuels for wood/charcoal, use of improved woodstoves, more efficient burning of charcoal); encouragement of farmers to place land in fallow; control of grazing; improved use of forest products; improved wildlife management; pollution control.

**Relevance:** Medium; covers GOS priorities for environmental protection.

**Comments:** Specific actions are proposed in part IV of the paper.

**Keywords:** Agroforestry, environment, natural resources.

- [329] Sous-commission: agriculture, élevage, protection de la nature, hydraulique. (1989) **VIIIème plan national de développement économique et social. Rapport de synthèse de la phase 0: bilan diagnostic**. Dakar: Commission nationale de planification du secteur productif. Mai. 42 p.

**Objectives:** To evaluate the impact of policies and programs on productivity in agriculture, livestock, ecological protection and water resources.

**Relevance:** Medium; an overview of production policies, both past and planned.

**Comments:** Chapter III gives specific production targets for the year 2000 and contains production statistics which may be useful; chapter V states specific principles of the New Agricultural Policy (NPA) and problems that have hindered development efforts in the past; adopts the approach of the NPA which treats production across several subsectors as integrated elements within a system; the agricultural production section incorporates ideas which originally were set forth in the March 1989



"Rapport de synthèse du bilan diagnostic du secteur" written by the Groupe du travail de l'agriculture.

**Keywords:** Agroforestry, animal traction, consumption, credit, debt, development, diversification, donor assistance, environment, exports, extension, food security, GIEs, horticulture, imports, irrigation, land tenure, liberalization, natural resources, agricultural policy, production, research, soil quality, water management.

- [330] Sous-commission: agriculture, élevage, protection de la nature, hydraulique agricole et rurale. Groupe de travail sur l'agriculture. (1989) **VIIIème plan national de développement économique et social; Rapport de synthèse du bilan diagnostic du secteur.** Dakar: Commission nationale de planification du secteur productif. Mars. 22 p.

**Time Period:** 1960-1989.

**Findings/Recommendations:** A brief historical review of the major agricultural events/characteristics of the Senegalese economy from 1960 to 1989; crops covered include oilseed peanuts, cotton, confectionary peanuts, millet and sorghum, corn, paddy rice, sugar cane, industrial tomatoes, and horticultural production; includes sections on producer prices, use and distribution of agricultural inputs and equipment, research and extension, irrigation, cooperatives, and agricultural credit.

**Relevance:** Medium; good background document.

**Keywords:** Production, prices, inputs, cooperatives, credit.

- [331] Sow, Fatou. (1986) **Femmes africaines, emploi et division internationale du travail: Le cas du Sénégal.** *Labour, Capital and Society. A Journal on the Third World/Travail, Capital et Société. Une revue sur le tiers monde.* Vol. 19, No. 2: 201-217.

**Objectives:** To study employment of women in Senegal, and how the position of women in society has changed over time; to look at the role of women in various sectors of the economy, access of women to education and a professional status, and women as wage laborers.

**Methodology:** Descriptive analysis with some secondary data from the University of Dakar and Statistical Services and possibly other sources.

**Data Collected:** Secondary data on salaries, number of women students at the University of Dakar, employment figures.

**Findings/Recommendations:** Oversimplification should be avoided when studying women's employment. The role of women in production, reproduction, and the cultural and social environment has many facets with respect to concept and theory. Because the position of women varies throughout Africa, a different strategy for liberating women is needed. The dominance of a worldwide male culture, supported by the political and economic systems, is the basis for control over women.

**Relevance:** High.

**Comments:** Extract of study with the same title published in December 1983 (Dakar: IFAN).

**Keywords:** Employment, education, income, women.

- [332] Sow, P. Alassane; Newman, Mark D. (1988) **The regulation and organization of cereal markets in Senegal: Report on the marketing campaigns of 1983/84 and 1984/85.** MSU International Development Reprint Paper No. 26. East Lansing, MI: Michigan State University, Dept. of Agricultural Economics. 29 p.

**Objectives:** To describe cereals marketing regulations, and to analyze and discuss the effects of regulation on market participants, and the contribution of these regulations to the achievement of the government's objectives outlined in the NPA.

**Time Period:** 1983-1985.

**Methodology:** ISRA-BAME cereals marketing surveys.

**Findings/Recommendations:** Recommends looking at the market as an institutional mechanism for achieving regulated (coordinated) trade, rather than as the object of regulation; reviews the possibilities of floor and ceiling prices as providing a framework to facilitate the implementation of a policy to promote local cereal production and marketing.

**Relevance:** Medium.

**Comments:** French version, "La réglementation et l'organisation des marchés céréaliers au Sénégal: Situation des campagnes de commercialisation 1983/84 et 1984/85," Reprint Paper No. 26F, 1988.

**Keywords:** Cereals marketing, regulation, price policy.

- [333] Sow, Pape Alassane. (1986) **Réflexions sur l'organisation de la commercialisation des mils/sorgho et du maïs au Sénégal.** Dakar: World Bank. May. 7 p.

**Objectives:** Discussion of GOS intervention, through the CSA, in local cereals markets in order to ensure that official floor prices are respected.

**Methodology:** Observation, description.

**Data Collected:** None cited.

**Findings/Recommendations:** A floor price for millet or other cereals may induce farmers to grow more millet rather than peanuts, for which they have a guaranteed price at harvest. This will reduce risk to farmer of expanding cultivation of cereals. However, establishing and administering a floor price is complicated and could be costly to the government especially if the floor price exceeds the free market price. Author recommends viewing the market as a tool of regulation rather than the object of regulation. It would be less costly to the government to support a large number of economic agents, such as cooperatives or individuals, to operate in the market rather than by-passing them and imposing a floor price for cereals.

**Relevance:** Medium.

**Keywords:** Food security, cereals policy, private sector, public sector.

- [334] Sow, Pape Alassane. (1985) **L'évolution historique de la réglementation gouvernementale sur la commercialisation des céréales (mil/sorgho, riz).** Dakar: World Bank. Novembre. 7 p.

**Objectives:** Historical look at GOS cereals policy and intervention in the cereals market.

**Methodology:** Description, commentary, secondary data.

**Data Collected:** Official millet and peanut prices, 1966-80.

**Findings/Recommendations:** Cereals production maintained at subsistence level due to inadequate policies over the past 20 years. Public organizations monopolized and controlled commercialization of cereals. These organizations were unsuccessful due to lack of a cereals policy which created incentives to producers, and lack of participation by the private sector.

**Relevance:** Low.

**Comments:** Cf. Sow (1986).

**Keywords:** Food security, cereals policy, public sector, private sector.

- [335] Stomal-Wiegel, Bozena. (1988) *L'évolution récente et comparée des systèmes de production serer et wolof dans deux villages du vieux Bassin Arachidier (Sénégal)*. *Cahiers des Sciences Humaines*. Vol. 24, No. 1: 17-33.

**Objectives:** To discuss effects of agricultural modernization - especially extension of commercial peanut production - on Serer and Wolof farming systems in regions environmentally homogeneous but heterogeneous ethnically and in terms of population pressure; to determine whether agricultural modernization has led to increased uniformization or differentiation.

**Time Period:** Study of changes since initiation of agricultural modernization policy in 1965.

**Methodology:** Descriptive case studies of one Serer and one Wolof village. Quantitative data drawn from official surveys, personal observation, and secondary sources.

**Data Collected:** Farm size, input levels, cropping patterns, labor productivity.

**Findings/Recommendations:** Commercialization of agriculture, with use of purchased inputs and non-traditional technology, has thoroughly penetrated both densely populated Serer area and lightly populated Wolof area and has brought increased consumption of purchased goods. Intensive pattern of Serer farming system associated with low labor productivity contrasts with higher labor productivity of more extensive Wolof farming system. Differences attributed partly to different levels of population pressure, partly to differences in agricultural and cultural traditions.

**Relevance:** Low.

**Comments:** Interesting observations on differences in cultural orientation and agronomic traditions of Wolof and Serer farmers.

**Keywords:** Farming system, productivity, Peanut Basin.

- [336] Timmons, Robert J.; Drake, William D. (1984) *Food aid in Senegal: Can targeting provide increased benefits to children in need?* Report under USAID contract number 1 QC-PDC-0262-I-12-3079-00. Ann Arbor, MI: Community Systems Foundation. November. 41 p.

**Objectives:** To determine the most effective strategy for targeting supplementary food programs for the prevention or cure of malnourishment in preschool age children.

Effectiveness defined largely by ability of targeting to avoid including children not at risk of malnutrition (inclusion errors) and excluding children at risk (exclusion errors). To assess whether targeting strategies should be varied by region or whether uniform national target population should be selected.

**Time Period:** Data analyzed for the period Jan. 1980 to Dec. 1982.

**Methodology:** Compilation and statistical analysis of children's weight, age, and sex records, assessment of incidence, seasonality, and changes in rates of incidence of malnutrition.

**Data Collected:** Weight and age records for children participating in supplementary feeding and weighing programs in 16 of Senegal's 434 feeding centers administering PL 480-supported feeding programs.

**Findings/Recommendations:** Regional and local differences in nutritional status are so great that different targeting strategies for feeding programs in different regions may be more efficient in fighting malnutrition than a uniform national targeting strategy. Anthropometric screening to identify malnourished children, where this is feasible, is more efficient than screening by age or regional selection alone.

**Relevance:** High.

**Comments:** One of a series of similar studies conducted in 6 countries.

**Keywords:** Nutrition, food aid, health.

- [337] Touré, Oussouby. (1988a) **The pastoral environment of northern Senegal.** *Review of African Political Economy.* No. 42: 32-39.

**Objectives:** To describe the transformation of Peul agriculture from farming and herding in a system of long distance transhumance into permanently settled cattle ranches; to examine class differentiation and changes in women's responsibilities, consequences of new boreholes, and especially of larger herds.

**Methodology:** Descriptive analysis.

**Data Collected:** Biomass production.

**Findings/Recommendations:** Disastrous environmental and human consequences.

Installation of boreholes is the central strategy in controlling the nomads. Pastoralists settled around permanent water sites without giving up their potential mobility.

Environmental degradation around water sites complicates maintenance of herds and makes boreholes an obstacle to permanent settlement. This is due to increasing herd size and relative anarchy in the use of grazing. Sooner or later, pastoralism in the Ferlo will collapse.

**Relevance:** Medium.

**Comments:** Translation from French.

**Keywords:** Ferlo, environment, water management, livestock.

- [338] Touré, Oussouby. (1988b) **Structure et fonctionnement des exploitations agricoles de Diawar (Delta du Fleuve Sénégal).** CRA Saint-Louis: ISRA, Département de Recherches sur les Systèmes Agraires et l'Economie Agricole. December. 34 p.

**Objectives:** To describe and understand farmer behavior with a view to improving the relevance of technical innovations.

**Methodology:** Formal and informal surveys for a sample of 43 farm households, and descriptive/comparative analysis.

**Data Collected:** Formal survey variables include demographic structure, land holding, equipment inventory, production activities; informal survey topics include management of resources, production methods, nonfarm income.

**Findings/Recommendations:** Development of irrigated agriculture has permitted majority of households studied to achieve food security and generate a surplus for productive investment (e.g., equipment, horticulture, commerce). Household structure is variable and dynamic. Poor paddy yields on some parcels attributed to poor water control and annual redistribution of parcels by SAED.

**Relevance:** Medium.

**Comments:** Part of a larger ongoing study of farming systems in the Delta area.

**Keywords:** Farming system, Fleuve.

- [339] Touré, Oussouby. (1987) **Une société pastorale en mutation sous l'effet des politiques de développement: Les Peul du Ferlo du début du siècle à nos jours.** Etudes et Travaux de l'USED, No. 8. Dakar: Institut du Sahel, USED (l'Unité Socio-économique et de Démographie); ISRA. June. 107 p.

**Objectives:** To analyze changing characteristics of constraints on pastoral production systems of the Ferlo, and to contribute to identification of ways to improve living conditions of populations while preserving the environment.

**Time Period:** History from pre-colonial period to 1984.

**Methodology:** Review of secondary literature on social and economic history of Ferlo. 1984 (drought year) surveys in four borehole areas (Mbiddi, Nammarel, Teskere, et Wiidu Cingoli) and among transhumant herdsmen.

**Data Collected:** Rainfall patterns 1961-80; social and power structure of Peul; traditional transhumance systems; annual maps of declining quantities of biomass/hectare, 1981-84 (FAO data); history of water projects; illustrative figures on herd growth since 1950.

**Findings/Recommendations:** Anthropological descriptions of social and political systems of Peul and of production systems including herding, gathering, hunting, and agriculture. Development policies for pastoral societies of the Sahel have aimed since the colonial period at settlement of nomadic populations. Herd sizes and income have increased dramatically as result of opening of boreholes, improved veterinary care, and improved terms of trade between livestock and grains. Current evolution toward intensified animal production without foresightful management and protection of environment is dangerous. Technical solutions to rational and conservative exploitation of pasture are needed, and also organization, training, and "responsabilisation" of livestock producers. Difficulty of organizing socially responsible behavior aggravated by deterioration of social ties resulting from increased herd size and prosperity. Complete sedentarization of nomadic populations

not possible without diversification of economic activity and abandonment of purely pastoral model.

**Relevance:** Medium.

**Comments:** Good account of mechanisms of change in herding society and production which have led to heavy animal population pressure on pasture resources, but no concrete recommendations for solutions to environmental degradation problem.

**Keywords:** Environment, livestock, Ferlo.

- [340] Tourrand, J.F.; Ndiaye, M. (1988) **Innovations techniques en milieu paysan dans le delta du fleuve sénégal pour l'alimentation du cheptel.** *Les Cahiers de la Recherche-Développement.* No. 17: 47-53.

**Objectives:** To analyze different methods of livestock feeding among farm households in the Senegal River Delta.

**Time Period:** 1984-1986.

**Methodology:** ISRA Production Systems Research Program in the Delta.

**Data Collected:** Farm-level census of livestock and livestock production practices.

**Findings/Recommendations:** Two proposed methods for increasing farm-level fodder resources (use of agricultural by-products and the introduction of fodder crops in rotation with rice or combined with market garden crops) are advantageous for farmers only during drought when the amount of natural fodder and other products does not cover feed requirements. More intensive livestock farming techniques may make it possible to introduce new methods.

**Relevance:** Medium.

**Keywords:** Fleuve, livestock.

- [341] USAID, Bureau for Science and Technology, Office of Nutrition. (1983) **Food consumption and nutrition effects of international development projects and programs: An annotated bibliography.** Washington, D.C.: USAID. 91 p (annotations) + 6 p (indexes).

**Objectives:** Bibliography intended for multidisciplinary audience.

**Data Collected:** Section one: articles which describe overall relation between malnutrition and its causes; section two: country specific articles link agricultural projects or policies to impact on nutrition; section three: globally focussed articles to assess impact of agricultural projects or policies on nutrition. Three indexes: author, geographic, and linkages between agricultural development and nutrition.

**Relevance:** Low; annotations deal only with subject matter, not quality, of articles.

**Comments:** Somewhat outdated; may serve as useful reference for some studies.

**Keywords:** Consumption, nutrition.

- [342] USAID/Senegal, River Basin Development Office. (1984) **Sectorial bibliography of the Senegal River Basin.** Dakar: USAID/Senegal. May. 65 p.

**Objectives:** Specific application to the Senegal River Basin (Senegal, Mauritania and Mali).

**Relevance:** Medium.

**Comments:** A useful though somewhat dated bibliography. Chapters III (soil studies), VI (hydro-agriculture and rural development), VII (agronomy) and IX (livestock) would be of particular interest for an agricultural sector assessment.

**Keywords:** Irrigation, soil quality, water management, agroforestry, agricultural development, livestock, transport, natural resources, bibliography, Fleuve.

- [343] van der Laan, Ellen. (1984) **Factors contributing to the rapid development of small-scale irrigation schemes along the Senegal river.** *Agricultural Administration*. Vol. 17: 203-213.

**Objectives:** To identify factors responsible for the rapid spread of irrigated village perimeters among a population having no previous experience with irrigated agriculture or rice cultivation.

**Time Period:** 1981/82.

**Methodology:** Anthropological fieldwork among the Toucouleur.

**Findings/Recommendations:** The most important factors accounting for the rapid increase in subsistence irrigation along the Senegal river are: convergence of interest between farmers and authorities; the availability of land and labor; money income from family migrants; and village institutions which play a role in the operation of the irrigation scheme.

**Relevance:** Medium.

**Keywords:** Fleuve, irrigation, village organizations, migration, land tenure.

- [344] Vengroff, Richard; Johnston, Alan. (1985) **Senegal's rural councils: Decentralization and the implementation of rural development.** Prepared under USAID Project 685-0256 Senegal ENEA Rural Management. Lubbock, Texas: Texas Tech University, Center for Applied International Development Studies (CAIDS). November 11. 120 p (text) + 11 p (survey instrument) + 5 p (bibliography).

**Objectives:** To assess the impact of the decentralization currently being implemented in Senegal, and to examine the viability of "autonomous financial responsibility" through rural communities' budgets and budgetary powers.

**Methodology:** Fourteen rural communities chosen for sample, from all regions except Kaolack. Six characteristics examined for all 319 rural communities in Senegal: number of wells, schools, cooperatives, health posts and villages. Multi-stage cluster sampling design: for each rural community, interviewed president and vice-president, 6 elected councillors, 3 council representatives of cooperatives. Interviewed 144 of a sample of 154 councillors representing universe of 231. Survey instrument consists of 45 questions translated from French into Wolof, Mandingue and Pulaar.

**Data Collected:** Demographic (ethnic, education, age, profession, religious sect), incumbency of councillors, communication patterns between councillors and government officials, decision-making patterns, councillor attitudes towards authority,

villagers, community needs. Includes an assessment of 1972 Territorial and Administrative Reform, and of the GOS attempt to decentralize local administration (pp. 2-19).

**Findings/Recommendations:** The budgetary process of the rural councils is dominated by the sous-prefets. **Recommendations:** sous-prefets should adopt role of auditor, not policy maker; rural communities must allocate 25 percent of rural tax to central solidarity fund which is not redistributed to rural communities; this policy should be changed because revenues are already inadequate to meet needs of rural communities; managerial experience and capacity of councillors is limited; literacy and management training is important for council members; electoral reform to allow multiparty representation is needed; representation of cooperatives on rural councils (33 percent) needs to be evaluated.

**Relevance:** Medium.

**Comments:** As a study of decision making/influence in rural communities; may be helpful for targeting activities. ENEA Rural Management Project intended to expand knowledge of management problems associated with rural development in Senegal. Because of uncertainties surrounding the sample, inferences drawn should be treated as indicative rather than definitive.

**Keywords:** Local government, organizational performance, village organizations, politics.

- [345] Vionnet, Patricia; Barde, François-Xavier. (1988) **Etude inventaire des mesures de maîtrise des échanges extérieurs céréaliers des pays d'Afrique de l'Ouest du Cameroun et du Tchad. Dossier No. 1: Inventaire provisoire des mesures prises par les états.** Paris: Ministère Français de la Coopération; Club du Sahel; IRAM; INRA-ESR. November. 150 p (text), 35 p (annexes).

**Objectives:** General objectives: to study how Senegal and neighboring countries can protect domestic production and further inter-country trade. Dossier No. 1 objectives: to look into the methodology to be used for setting up a database on "trade measures"; to list preliminary findings and conclusions from the preliminary inventory.

**Methodology:** Descriptive analysis.

**Data Collected:** Some data on taxes/tariffs, prices, exchange rates, cereals imports and exports.

**Findings/Recommendations:** Three headings in the initial nomenclature deal directly with cereals trade (tariffs, taxes, quotas) and three are of a general nature (trade agreements, fiscal and monetary policy, domestic policies). There is great heterogeneity between the countries with respect to tariffs, taxes and quotas and since the countries are "normally" coherent in their trade policies, the case for progressive harmonization in the medium run seems weakened. A dynamic framework that allows necessary adjustments is needed. Quotas seem to be the most effective tool, given they are applied effectively and at the right time. CIF prices are important. Fiscal and monetary policies must be integrated into the inventory since they have as important an effect on trade as quotas do.

**Relevance:** High.



**Comments:** Cf. Dossier No. 2 (Harre and Mettetal, 1988); Dossier No. 3 (Coulibaly, Egg, and Mettetal, 1988).

**Keywords:** Trade, cereals prices, trade policy, taxes/tariffs, macroeconomic policy, cereals imports, cereals exports.

- [346] Waldstein, Alfred S. (1984) **A hydro-agricultural zone in the global economic system: Adaptation to the constraints on development in the Senegal River delta.** Ph.D. dissertation. Columbia University. 291 p.

**Objectives:** To analyze the adaptation of local populations in the Senegal River Valley to the establishment of a government-sponsored irrigated agriculture scheme.

**Time Period:** 1975-1977.

**Methodology:** Structured interviews with 70 households with cultivation rights in Kassak Nord, 50 similar households in Kassak Sud, and 38 households with membership in Kassak Sud Peulh A.I.R.

**Data Collected:** Household-level demographic data, livestock ownership; household members' migration and production data permitting the derivation of the net cash return per day's labor for several years of rice and tomato cultivation.

**Findings/Recommendations:** Irrigated agriculture is a secondary economic activity throughout the study area; the returns to rice and tomato cultivation are low primarily because of constraints that SAED places on producers; to qualify for funding, but also because of the ecology of the Delta, imperfections in irrigation works, and instability within cooperatives. Recommends the use of small-scale irrigation technology; capital-intensive technology makes farmers vulnerable to world economic conditions and dependent on central institutions which finance and administer the projects.

**Relevance:** Medium.

**Keywords:** Fleuve, irrigation, rice, vegetables, RDAs, village organizations.

- [347] Waterbury, John. (1989) **Agricultural policy making and stagnation in Senegal.** Revised draft; MADIA study paper. Washington, DC: World Bank. May. 103 p.

**Objectives:** To examine the extent to which Senegal's agricultural crisis results from misguided policies, and the impact of political factors on policy-making.

**Time Period:** Generally 1960-89.

**Data Collected:** Chapters on: rural development strategies since 1960, the Senegalese state, the marabouts, the peasants, the donors, actions and policies, and conclusions.

**Findings/Recommendations:** Senghor and Diouf have maintained Senegal's political stability by balancing the interests of four main actors (the state (including the Parti Socialiste), marabouts, peasants, donors). Economic cost of this stability has been high and largely borne by donors. Major policy issues are prices, agricultural cooperatives, rural credit, and national peanut seed stock. Malaise paysan in late 1960's produced by twin shocks of rainfall decline and loss of preferential French peanut prices. Second (and continuing) crisis occurred following 1979 oil price shock, fall in world phosphate prices, renewed drought, and post-1981 fall in world

peanut prices. Doubtful whether Senegal could have avoided these crises under any policies. Benign neglect of drought-stricken northcentral Peanut Basin would be politically dangerous, since it contains half of the rural population and is of economic importance to the marabouts. Policy-making highly centralized, largely in hands of the President and a few Ministers and advisors. Little lobbying done by local interest groups; except for donors, groups try to influence policy ex post. Operation of state characterized by patronage and bias toward urban groups and parastatals, with no systematic rural or maraboutic bias but a need to maintain rural political support. Urban sector now generates more revenues for marabouts than peanut sector, increasing the importance of urban patronage and consumer subsidies. Peasants are not a homogeneous group, though asset distribution is fairly egalitarian, and markets have penetrated everywhere. Peasants skilled in gamesmanship, manipulating rather than avoiding state programs, thus developing "bad habits," especially unwillingness to repay credit. Donors have been neither consistent nor unified, with priorities "gyrating spectacularly", especially regarding degree of state intervention. At one level, donors pursue economic efficiency, yet at higher level aid is highly political. Donor reforms threaten both urban and rural political alliances, yet offer only tenuous hope for long-run economic improvement. Price policy has many determinants; most important institutional actor is CPSP. Efforts to create new cooperatives controlled by peasants have not succeeded. Marabouts have favored national peanut seed stock, but village-run stocks are a promising alternative. Major strategic issues are (a) priority to development of well-watered vs. drought-prone regions, (b) what to do in the northcentral Peanut Basin, and (c) how to increase productivity of rainfed areas.

**Relevance:** High.

**Comments:** Informative and knowledgeable analysis of political factors, and of historical context of recent agricultural strategies and policy issues.

**Keywords:** Institutions, government, politics, donor assistance, structural adjustment, policy, public sector, Peanut Basin.

- [348] World Bank. (1989a) **Managing agricultural development in Africa.** World Bank/MADIA study. World Bank. Unpaginated.

**Objectives:** To provide summaries of a number of the MADIA reports.

**Findings/Recommendations:** Contains list of participants in the MADIA symposium, (June 25-28, 1989), participants in the MADIA study (1984-1989), and two- to four-page summaries of some of the MADIA reports.

**Relevance:** Medium.

**Keywords:** Research, agricultural development, donor assistance.

- [349] World Bank. (1989b) **Senegal. Fourth Structural Adjustment Credit (SAL IV) Initiating Memorandum.** Washington, DC: World Bank, Africa Region, Sahel Department, Country Operations Division. June 20. 30 p (text) + ca. 5 p (annexes).

**Objectives:** To seek authorization to appraise a Fourth Structural Adjustment Credit (SAL IV) to Senegal, intended to support GOS strategy of promoting private investment and exports, improving public sector resource mobilization and allocation, and alleviating poverty.

**Time Period:** 1st tranche Nov. '89, 2nd tranche July '90, 3rd tranche July '91.

**Data Collected:** Contents include: economic performance and macroeconomic management; macroeconomic and structural objectives and policies; Bank experience with structural adjustment lending; the proposed SAL IV; features of the proposed credit; annexes (policy matrix and selected economic and financial indicators).

**Findings/Recommendations:** SAL IV focuses on macroeconomic and fiscal management, reform of civil service and parapublic sector, incentives for private sector development, and measures to minimize adverse socioeconomic effects.

**Relevance:** High.

**Keywords:** Structural adjustment, donor assistance, public sector, private sector, macroeconomic policy.

- [350] World Bank. (1989c) *Senegal country strategy paper*. Washington, DC: World Bank, Africa Region, Sahel Department, Country Operations Division. June 21. 26 p (text) + ca. 10 p (annexes).

**Objectives:** Assistance program intended to establish financial stability as precondition for future growth, improve public sector efficiency, revive sustainable growth based on domestic endowments and promotion of dynamic export-oriented private sector, and reduce interregional and urban/rural disparities in production and living conditions.

**Time Period:** FY90-94.

**Data Collected:** Annexes contain key economic indicators and national accounts data (1980-87), social indicators (1988), and projected indicators for 1988-97 under moderate adjustment scenario.

**Findings/Recommendations:** Performance of Senegalese economy poor since 1960, despite high per capita ODA. Reasons are poor policies (promotion of large public sector, excessive regulation of private sector), poor natural resource base, energy price shocks of 1970's, and falling terms of trade. Reform program pursued since 1985, but limited by historical, institutional and socio-political factors. Unilateral devaluation not feasible, so issue is pace of other reforms (3 scenarios are examined). World Bank strategy assumes GOS will make following reforms: improving private sector incentives, public sector revenue mobilization and expenditure reduction, rehabilitation of banking system and deregulation of financial sector, and sound environmental management and population growth and distribution policies. Urban labor force and infrastructure give Senegal comparative advantage on light manufacturing and services. Development strategy should also focus on improving support services and incentives for agriculture, which could satisfy much higher proportion of domestic food demand over next 15-20 years. World Bank role should be to provide financial and intellectual support so that appropriate reforms are made and donor assistance goes where most needed. Social services should be

protected by reallocating funds within existing budget. Annual lending under IDA-8 and IDA-9 is proposed at US\$78 m in FY88-90, and US\$81 m in FY90-94 (if policy reform is sustained). Under a slow adjustment scenario, core program would consist of investments in human resources, transport, and urban infrastructure sectors, and operations in agricultural research and environmental management.

**Relevance:** High.

**Keywords:** Donor assistance, structural adjustment, macroeconomic policy, public sector, private sector, exports, human resources, environment.

- [351] World Bank. (1989d) **The World Bank and Senegal, 1960-87.** Report No. 8041. Washington, D.C.: World Bank, Operations Evaluation Department. August 31. 137 p (text) + 36 p (appendices).

**Objectives:** To examine the interaction between the World Bank and Senegal over an extended period of time, and to identify strengths and weaknesses of the interaction which can contribute to making the relationship more effective.

**Time Period:** 1960-87.

**Methodology:** Review of World Bank files and documents, and discussions with World Bank staff members and field missions.

**Findings/Recommendations:** Senegal shows high positive correlation between agricultural output and per capita GDP. Since 1966, World Bank commitments to Senegal concentrated on agriculture and transport (21 percent of total for each sector), education and health (9 percent), energy and telecommunications (7 percent), urban and water (5 percent) and industry and tourism (4 percent). Since 1984, proportion of project lending to agricultural and transport sectors has declined. Real producer prices for cotton, groundnuts, maize and millet declined from 1970 to 1986. GO3 reduced consumer rice prices from 160 FCFA to 130 FCFA, which appears inconsistent with goal of encouraging substitution of local cereals (i.e., millet) for rice (which in turn would increase food self-sufficiency). Inadequate agricultural research effort and lack of yield-enhancing technical packages ready to be adopted by farmers. Strong correlation between agricultural production and the amount/distribution of rainfall; price and fertilizer application have only a limited effect on output. Production affected by declining rainfall trend (around 60 percent of yield variation can be attributed to rainfall) and desertification (attributable to overgrazing, lack of effective crop rotation, deforestation and erosion). The regeneration of soil fertility is a critical issue. Share of GDP from agriculture is currently below 10 percent although 70 percent of the labor force is in agriculture. Agricultural exports represent over 40 percent of merchandise exports, enough to offset food imports (40 percent) but not food aid (8 percent). Rice and wheat imports amounted to about 90 percent of export revenues from groundnuts. Key issues in Senegalese agriculture: diversification away from groundnut dependency into cereals production (especially irrigated rice); need to develop and implement appropriate technological packages (research, extension, use of technical inputs, and pricing policy); effects of discriminatory or disincentive producer price levels, especially for groundnuts and rice; poor institutional performance, especially by

parastatal agencies. World Bank failed to: map out a long-term strategy for the agricultural sector; develop a consistent approach to support irrigation subsector and its parastatals; improve the quality and management of information on Senegalese agriculture; consider effects of pricing policy and agricultural taxation rates. Under structural adjustment, pricing policy has been adjusted to stimulate marketing of domestic produce, shift income in favor of rural producers; however, price policies may not be effective at bringing about an increase in supply because of other constraints, viz., climatic trends, soil degradation, weak research and extension. High relative input prices, non-existent formal credit system, low savings levels and non-functioning extension service contribute to depressed demand for modern inputs, especially fertilizer.

**Relevance:** High.

**Comments:** Description of policy miscalculations and failures since independence; characteristics of Senegal's economic performance since independence, and issues and constraints to development of the agricultural sector is important (especially chapter 3, section A); many useful tables and statistics. Summary at the beginning provides overview of World Bank activities, and some useful statistics; first chapter reviews economic developments in Senegal since 1960, second chapter presents detailed review of GOS' and World Bank's approach and effectiveness in structural adjustment process since 1980, third chapter presents detailed analysis of changes over time and reviews constraints and World Bank involvement in major sectors of the economy (section A - agriculture, section B - industry, section C - transportation, section D - education, section E - foreign aid coordination; appendix 1 provides details of three Structural Adjustment Loans; appendices 2-4 show objectives, performance indicators and production statistics for the agricultural sector (appendix 3 is of special interest); appendix 5 lists World Bank credits and loans to Senegal; appendix 6 lists net revenues of Senegal.

**Keywords:** Donor assistance, structural adjustment, organizational performance, agricultural research, cereals imports, cereals production, price policy, credit, fertilizer distribution, extension, food security, irrigation, macroeconomic policy, natural resources, RDAs, rural incomes, taxes/tariffs, technology.

[352] World Bank. (1987a) *Senegal: An economy under adjustment*. Washington, DC: World Bank, Western Africa Region. November. 69 p.

**Objectives:** To review economic progress under the structural adjustment program.

**Methodology:** Descriptive macroeconomic analysis.

**Data Collected:** Secondary data.

**Findings/Recommendations:** Endorsement of the NPA (in particular the rationalization of rural development agencies, liberalization of cereals marketing, and reorganization of the groundnut sector), the Cereals Plan and strengthening of agricultural research (in particular diversifying agricultural exports).

**Relevance:** Low.

**Comments:** Dated, though a record of World Bank position at the time.

**Keywords:** Macroeconomic policy, structural adjustment.

- [353] World Bank. (1987b) **Western Africa agricultural research review: World Bank 1985-86.** Washington, DC: World Bank, Western Africa Projects Department. February. 413 p.

**Objectives:** To appraise current agricultural research efforts in West Africa, to lay basis for collaborative action to strengthen and intensify research over the coming 20-25 years.

**Time Period:** 1984(?)-1986.

**Methodology:** Review of published reports, visits to most countries in region, discussions with national officials and donor agencies; the preliminary report was reviewed at a December 1986 workshop of directors of West African national research programs, representatives of IARCs, bilateral and international agencies and consultants.

**Data Collected:** Most data are presented for each of the 24 countries studied. Area and production figures for major crops; diet, growth rates for agricultural commodities, commodity prices; expenditures for agricultural research; numbers of domestic and expatriate researchers; lists of regional and international research institutions; status of agricultural research and technology for annual crops, tree crops, forestry, livestock; current numbers and estimated necessary numbers of required research personnel; annual production of scientists; estimated training costs; summary of national agricultural research systems by country.

**Findings/Recommendations:** Design of strategies for generating and applying modern scientific technology to agriculture should be among the top priorities of African leadership and the international community, since large increases in West African agricultural production are necessary. Final chapter is a draft proposal of a strategy for strengthening agricultural research to develop scientific manpower. It includes recommendations for various types and degrees of support to national programs and suggestions for arranging cooperation and consultation in agricultural research, and it stresses the need for regional centers for commodity and resource management research, for basic research for the development of new technology, and for applied and adaptive studies to disseminate it.

**Relevance:** Medium.

**Comments:** There is no section on Senegal and no index to facilitate search for references to Senegal, but most tables show data by country.

**Keywords:** Agricultural research, technology.

- [354] World Bank. (1984) **Senegal country economic memorandum.** Report No. 5243-SE. Washington, DC: World Bank, Western Africa Regional Office. November 5. 114 p (text), 60 p (tables), map.

**Objectives:** To serve as base for donor/GOS dialogue on Senegal's medium-term economic prospects.

**Time Period:** Bank mission, May-June, 1983.

**Methodology:** Coverage of sectoral programs and issues selective; less emphasis on energy, transport, education. Uses macroeconomic model (SEN/CAM) to examine two adjustment scenarios, each under 3 assumptions of GDP growth.

**Findings/Recommendations:** Much of analysis in World Bank's 1979 assessment, "The Economic Trends and Prospects of Senegal," remains valid. Major policy issues: investment and savings performance, public finance, reforming public enterprises, industrial prospects and policy incentives, agricultural strategy. "Base case" (no adjustment) projections financially unsustainable. Exports and investment must rise and imports and consumption must fall in order to reduce the resource and current account balances. Action plan proposed to improve fiscal performance and public sector management, increase investment, and develop growth sectors.

**Relevance:** Medium; more recent and rigorous analysis exists (World Bank, 1989b; cf. also Freud et al., 1989; Martin, 1988).

**Keywords:** Structural adjustment, macroeconomic policy, donor assistance, market prospects, organizational performance, private sector, public sector.

- [355] Wright, Peter L.; Broekhuysen, Jan; Weber, Fred R.; Lund, Soren. (1988) **Ecology and rural development in Sub-Saharan Africa: Selected case studies.** Sahel D(89)327. OECD (Club du Sahel); CILSS. August. 44 p.

**Objectives:** To study projects, activities, and organizations that were felt to have made a significant contribution towards the achievement of a sustainable system of resource use in several of the member states of the CILSS.

**Methodology:** Case studies by a team of consultants commissioned by Club du Sahel. The study deals with the development of sustainable rural production systems as a process that involves the social structures and production systems knitted together into a cultural system.

**Findings/Recommendations:** Changes in the production system which responded to the complexity of resource use through better management of the natural resources made the greatest contribution to sustainable resource use. Non-management technologies provided a response to individual production constraints, but were unable to make significant improvement in the overall production system. Management approaches appeared to be cost effective over a wide range of ecological conditions. Technological responses to production constraints were more easily and quickly implemented than resource management approaches. Management responses to complex resource use patterns required parallel changes in the social structures to be feasible. Rural organizations have been able to initiate development activities through mastery of their human and financial resources. They displayed the skills and self-confidence necessary to promote innovative approaches to sustainable resource use. There remain political and institutional constraints, however. Policy changes are necessary for sustainable development.

**Relevance:** Medium.

**Comments:** Annexes (will be) published separately.

**Keywords:** Natural resources, production, technology, land tenure, government, sustainability.

- [356] Yung, Jean-Michel. (1985) **Evaluation de la filière arachide au Sénégal.** In *Paysans, experts et chercheurs en Afrique noire*, eds. Boiral et al., 82-101.

**Objectives:** Evaluation of "the peanut development project."

**Time Period:** 1964-79.

**Methodology:** Based on 1982 evaluation mission by Thenevin and Yung.

**Findings/Recommendations:** Four phases: 1964-68 (SATEC, mass extension of thèmes légers [TL]); 1968-71 (SODEVA, introduction of thèmes lourds [TB]); 1971-75 (emphasis on elite farmers and TB); 1975-79 (SODEVA responsibilities broadened). TL adopted by farmers, but used for extensification. TB rejected, though animal fattening component accepted. Farmers adopted only elements of proposed technology which contributed to their goals of security vs. maximization of production, and returns to labor vs. returns to land. Adoption differed for household heads vs. women and dependents. Extent of adoption varied each year as function of rainfall, prices, and previous year's output. Farmers generally applied fertilizer late and in smaller than recommended quantities, to reduce risk of crop damage or financial loss. Risk factors were important to all farmer adoption decisions. Significant effects of the project included extension of land cultivated, increase in labor productivity, changes in division of labor within the household, and greater differentiation between rich and poor farmers.

**Relevance:** Medium; outdated but useful historical background.

**Keywords:** Peanut Basin, peanuts, RDAs, animal traction, fertilizer, technology, risk.



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- Senegal agricultural policy analysis. [200]
- Senegal country strategy paper. [350]
- Senegal reforestation project (USAID No. 685-0283). End of tour report. Forest policy and legislation. [91]
- Senegal. Fourth Structural Adjustment Credit (SAL IV) Initiating Memorandum. [349]
- Sénégal, campagne arachide 88/89, premières estimations. [42]
- Strengthening private sector input distribution in South-eastern Senegal: Issues and options for agricultural policy. [149]
- The cereals sub-sector in the Senegal River Valley: A marketing policy analysis. [246]
- The competitiveness of Sahelian agriculture. [319]



- The potential for an 'Espace Régional Céréalière (ERC)' among West African countries and its possible contribution to food security. [15]
- The private sector in Senegal. [69]
- The role of price incentives in developing Sahelian agriculture: The case of Senegal. [210]
- The World Bank and Senegal, 1960-87. [351]
- Troisième lettre de mission entre le Gouvernement du Sénégal et la Société de développement des fibres textiles. [222]

### Medium Relevance

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- A field study of fertilizer distribution and use in Senegal, 1984: Summary report. [72]
- A field study of fertilizer distribution and use in Senegal, 1984: Final report. [73]
- A hydro-agricultural zone in the global economic system: Adaptation to the constraints on development in the Senegal River delta. [346]
- A protected regional cereals market: An initial exploration of a new idea. [110]
- Actes de l'atelier: La recherche agronomique pour le milieu paysan. [279]
- Agricultural product prices in Southeastern Senegal: Final report for 1987. [129]
- Agricultural research and extension in Francophone West Africa: The Senegal experience. [29]
- Agro-economic analysis of field trials from a farming systems research perspective: Fertilizer trials with lowland rice, maize, and peanuts, Ziguinchor, Senegal. [280]
- Agro-economic analysis of field trials from a farming systems research perspective: Weed control in rainfed lowland rice, Ziguinchor, Senegal. [281]
- Agro-industrial processing and agricultural pricing under uncertainty. [125]
- Allocation de semences crédit par les sections villageoises: Etude de cas dans la Communauté rurale de Kaymor. [304]
- An assessment of A.I.D. activities to promote agricultural and rural development in Sub-Saharan Africa. [163]
- An egalitarian development project in a stratified society: Who ends up with the land? [33]
- Analysis of the food situation in Senegal: Evolution from 1974 to 1985 and projections. [211]
- Aperçu sur les technologies disponibles en matière agricole au Sénégal. [316]
- Beef production from draft cows in small scale farming. [286]
- Besoins en eau du mil au Sénégal. Adaptation en zone semi-aride tropicale. [75]
- Bibliographie de documents et rapports sur les pays du Sahel (1977-1985)/Bibliography of documents and reports on the Sahelian countries (1977-1985). [301]
- Bibliographie: Documents diffusés par le CILSS et le Club du Sahel. [263]
- Bilan diagnostic du sous-secteur agricole. [326]
- California cowpeas and food policy in Senegal. [27]
- Cereal demand in West Africa: Implications for Sahelian regional protection. [285]
- Cereals marketing in the Senegal River Valley (1985). [245]
- Cereals protection within the broader regional context of agricultural trade problems affecting the Sahel. [77]
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- préparation de la campagne agricole 1989-1990. Presented by Cheikh A. Khadre Cissokho. [226]
- Consultation report, mission to Senegal. [209]
- Consumption effects of agricultural policies: Cameroon and Senegal. Senegal case study. [165]
- Contribution à l'étude de la filière engrais au Sénégal. [117]
- Cotton in West and Central Africa. Present situation and outlook. Senegal, Mali, Burkina-Faso, Niger, Côte-d'Ivoire, Benin, Togo, Cameroun, Central African Republic, Chad. [139]
- Crop mixes, agricultural inputs and parastatal organizations: Reports from farmers in South-eastern Senegal. [135]
- Culture commerciale, cultures vivrières. La transformation de l'espace de production agricole du Kayor central et septentrional (Sénégal). [54]
- Développement, émigration masculine et travail féminin. Le cas des femmes Toucouleur de la région du Damga (moyenne vallée du Sénégal). [106]
- Différentes formes d'épargne et de crédit en milieu rural. Présentation des premiers résultats d'une enquête au Sénégal. [201]
- Disponibilité des denrées alimentaires et mode de consommation en milieu rural sénégalais: Cas de Khombole. [83]
- Dynamique des paysages et aménagement de la vallée alluviale du Sénégal. [219]
- Ecology and rural development in Sub-Saharan Africa: Selected case studies. [355]
- Eléments de bibliographie sur les pays du Sahel, Mise à jour No. 12/Elements for a bibliography on the Sahelian countries, Updating No. 12. [23]
- Etude comparative des programmes de crédit agricole (P.C.A.): Rapport principal et rapport annexe. [11]
- Etude d'un décortiqueur adapté aux besoins de transformation artisanale des mils, maïs et sorgho au Sénégal. [215]
- Etude de factibilité pour l'équipement des magasins de stockage. [65]
- Etude de la commercialisation des céréales au Sénégal. Rapport de synthèse et recommandations. [323]
- Etude de la commercialisation des céréales au Sénégal. Rapports annexes. Autres études sectorielles. [324]
- Etude de la commercialisation du riz et du maïs au Sénégal (production locale). Rapport sur les résultats de l'enquête. [325]
- Etude de la filière engrais au Sénégal. Vol. 1: Rapport de synthèse. Vol. 2: Fertilisation des cultures--Bilan et perspectives. Vol. 3: Evaluation socio-économique. [314]
- Etude descriptive des marchés céréaliers au Sud-Est du Sénégal. [98]
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- European Community assistance for agricultural development in Cameroon, Senegal, and Tanzania, 1960-87. [172]
- Evaluation de la filière arachide au Sénégal. [356]

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- Evolution et situation actuelle du cheptel de trait dans les exploitations sereer des Terres-Neuves du Sénégal oriental. [153]
- Factors contributing to the rapid development of small-scale irrigation schemes along the Senegal river. [343]
- Farmers' consumption of an imported cereal and the cash/foodcrop decision: An example from Senegal. [166]
- Femmes du Sahel: La désertification au quotidien. [239]
- Femmes et projets de développement rural en Afrique Sub-Saharienne. [88]
- Femmes, production et crise alimentaire en Afrique au sud du Sahara. [307]
- Fertilité des terres de savanes. Bilan de trente ans de recherche et de développement agricoles au sud du Sahara. [275]
- Foreign trade of agricultural products and inputs in Senegal from 1975-84. [207]
- Foresterie rurale au Sénégal. Le projet d'aménagement et de reboisement des forêts du centre-est, PARCE. [241]
- Government regulations and cereal marketing in Senegal. [252]
- Grain demand and consumer preference in Senegal. [299]
- Grain marketing in Senegal's Peanut Basin: 1984/85 situation and issues. [257]
- Household-level survey methods used in the IFPRI/ISRA study of consumption and supply impacts of agricultural price policies in Senegal. [99]
- Innovations techniques en milieu paysan dans le delta du fleuve sénégal pour l'alimentation du cheptel. [340]
- Input acquisition and crop mix changes in 1987: A farm-level report for Southeastern Senegal. [131]
- Journées de concertation avec le secteur privé: La rentabilité des aménagements hydro-agricoles. [300]
- L'approche systématique dans la recherche agronomique au Sénégal. [105]
- L'égalitarisme économique des Serer du Sénégal. [114]
- L'élevage dans les exploitations Sereer des Terres-Neuves au Sénégal-Oriental. [152]
- L'épargne et le crédit au niveau des associations paysannes. [12]
- L'irrigation au Sahel: La crise des périmètres irrigués et la voie haalpulaar. [84]
- La diffusion de la nouvelle politique agricole au Sénégal: Note d'information à l'attention des décideurs. [270]
- La filière maïs au Sénégal. [3]
- La place de la femme dans les mutations internes de l'économie rurale à partir d'un exemple sénégalais. [296]
- La politique des prix du riz, incitation à la production et effet sur la repartition des revenus dans six pays africaines. [273]
- La réforme de la politique céréalière dans le Sahel: Le Sénégal. [208]
- La technologie du maïs au Sénégal. Situation actuelle et perspectives. [217]
- Large plantations of rapidly growing exotic species: Lessons from the Bandia, Senegal. [107]
- Le commerce des céréales dans le bassin arachidier et la Nouvelle Politique Agricole au Sénégal. [253]

- Le coton en Afrique de l'ouest et du centre. Situation et perspectives. [235]
- Le droit foncier sénégalais. [51]
- Le magasin semencier villageois: Etude de cas. [320]
- Le rôle du cheval dans le développement rural en zone sahélo-soudanienne du Sénégal:  
L'exemple du sud du Bassin Arachidier. [102]
- Le Sahel au XXI<sup>e</sup> siècle. Un essai de réflexion prospective sur les sociétés sahéliennes. [126]
- Les aspects marketing d'une opération de régulation céréalière au Sénégal. [35]
- Les banques agricoles en Afrique de l'Ouest--Etude comparative. [180]
- Les marges et coûts de commercialisation des céréales dans le bassin arachidier. [269]
- Les organisations paraétatiques et paysannes dans le Sud-est du Sénégal. [80]
- Les pesticides au Sénégal: Une menace? [122]
- Les SRD et le système de distribution des intrants en 1985 et 1986: Participation et opinions  
des producteurs au Sud-Est du Sénégal. [81]
- Lowland cropping systems in the Lower Casamance (Senegal): Results of four years of  
agronomic research. [277]
- Managing agricultural development in Africa. [348]
- Memorandum on economic and financial policies for 1988/89. [138]
- Méthodes pour la recherche sur les systèmes d'élevage en Afrique intertropicale. Actes de  
l'atelier, Mbour, Sénégal, 2-8 février 1986. [178]
- Mil, maïs, sorgho: Techniques et alimentation au Sahel. [306]
- Millet supply study: Additional memorandum on supply prospects for a mixed millet and corn  
complex. [196]
- Multimarket analysis of agricultural pricing policies in Senegal. [40]
- Note sur les perspectives de la recherche sous-régionale dans le bassin du fleuve Sénégal. [266]
- Nouvelle politique agricole. [231]
- Opportunities for sustained development. Successful natural resources management in the Sahel.  
Summary. [318]
- Organisation des appuis aux producteurs. Documents complémentaires. Tome II. [225]
- Participation paysanne et aménagements hydro-agricoles: Les leçons de cinq expériences  
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- Peanuts and rice: Some obstacles to Senegal's drive for food self-sufficiency. [71]
- Peasant autonomy and irrigation: Innovation in the Senegal River basin. [221]
- Politique de prix agricoles et comportement des producteurs: Le cas de l'arachide au Sénégal.  
[247]
- Politique des prix agricoles au Sénégal. Annexes. [109]
- Pour un nouveau développement de la culture attelée en régions tropicales. [240]
- Préparation du VIII<sup>ème</sup> plan de développement économique et social. 1989-1995. Sous-secteur  
protection de la nature. Bilan diagnostic. [328]
- Private and public sectors in developing country grain markets: Organization, issues and options  
in Senegal. [260]
- Production systems in the Lower Casamance and farmer strategies in response to rainfall  
deficits. [278]
- Programme d'amélioration des services d'appui aux agriculteurs. Alternatives de stratégies pour  
un programme national de vulgarisation agricole. [227]

- Protein-calorie malnutrition in Senegalese children. Effects of rehabilitation with a pearl millet weaning food. [141]
- Raison pastorale et politique de développement (les Peul sénégalais face aux aménagements). [303]
- Rapport annuel 1987/1988. [62]
- Rapport d'Activité, 1987. [64]
- Rapport d'évaluation Senegal. Projet de services agricoles. [19]
- Recherche agronomique et vulgarisation agricole: l'expérience du Sénégal. [315]
- Recherche sur les systèmes de production en Basse Casamance. Rapport annuel d'activité No. 2 (campagne agricole 1983/1984). [94]
- Regional cereals markets in West Africa. Compilation of studies on Sahelian agriculture, regional trade and world markets. [264]
- Relations interethniques, coopératives et enjeux politico-économiques en milieu maraîcher sénégalais. [302]
- Ressources humaines pour le développement rural du Sénégal à l'horizon 2000. [174]
- Réflexions sur l'organisation de la commercialisation des mils/sorgho et du maïs au Sénégal. [333]
- Résumé du bilan diagnostic socio-économique de la pêche (VIIIe plan). [327]
- Rural income distribution in Senegal: Changes and indicators. [52]
- Sampling methods used in the IFPRI/ISRA study of consumption and supply impacts of agricultural price policies. [167]
- Sectorial bibliography of the Senegal River Basin. [342]
- Senegal - Recent economic developments. [47]
- Senegal country economic memorandum. [354]
- Senegal's rural councils: Decentralization and the implementation of rural development. [344]
- Senegal's rural road transport. [116]
- Sex differences in seasonal variations of the nutritional status of Serere adults in Senegal. [298]
- Sélection d'hybrides de sorgho pour le centre-nord et le nord du Sénégal. [53]
- Sénégal - 1988. [24]
- Sénégal: Passé et avenir d'une crise agricole. [36]
- Sénégal: Problématique foncière de la nouvelle politique agricole. [50]
- SONACOS-SEIB: Examen des divers aspects particuliers. Rapport. [9]
- Southern zone water management project (no. 685-0295). Bibliography of the Casamance Region. [183]
- State intervention in agricultural pricing and marketing in Senegal. The politics of budgetary reallocation. [161]
- Statement of agricultural policy. [289]
- Stratégies et programmation des recherches 1989-1993. [155]
- Structure et fonctionnement des exploitations agricoles de Diawar (Delta du Fleuve Sénégal). [338]
- 'Subsistence first': Farm allocation decisions in Senegal. [143]
- Summary of the study: "Women in the fight against desertification" [238]
- Synthèse des travaux de recherches en technologie post-récolte du mil au Sénégal. [216]
- Système de production et autosuffisance céréalière en pays Serer (Sénégal). [192]

- Systèmes agraires, systèmes de production en Afrique de l'ouest (et Madagascar). Bibliographie. [312]
- Technical and economic potential and major constraints to developing a second season rice crop for the Sahel irrigated environment. [265]
- Tenure policy and natural resource management in Sahelian West Africa. [179]
- The Chinese agricultural model in West Africa: The case of market gardening in the Region du Cap Vert, Senegal. [16]
- The creation and establishment of production systems research in a national agricultural research institute: The Senegal experience. [104]
- The impact of agricultural research in tropical Africa. A study of the collaboration between the international and national research systems. [157]
- The pastoral environment of northern Senegal. [337]
- The political economy of risk and choice in Senegal. [124]
- The present state of soil and water conservation in the Sahel. [288]
- The regulation and organization of cereal markets in Senegal: Report on the marketing campaigns of 1983/84 and 1984/85. [332]
- The role of women in the Bakel Small Irrigated Perimeters. [31]
- The significance and causes of Senegambian rice trade. [250]
- Tradeoffs between domestic and imported cereals in Senegal: A marketing system perspective. [259]
- Trends in drought and desertification control strategies of major donor agencies in the West African Sahel. [287]
- U.S. aid to Senegal, its impact on agricultural and rural development. [156]
- Une société pastorale en mutation sous l'effet des politiques de développement: Les Peul du Ferlo du début du siècle à nos jours. [339]
- Une typologie d'exploitations agropastorales au Siné-Saloum, Sénégal. [267]
- Using indigenous skills and institutions in small-scale irrigation: An example from Senegal. [85]
- VIIIème plan national de développement économique et social. Rapport de synthèse de la phase 0: bilan diagnostic. [329]
- VIIIème plan national de développement économique et social; Rapport de synthèse du bilan diagnostic du secteur. [330]
- Village irrigation systems along the Senegal River: A comparative analysis. [272]
- Western Africa agricultural research review: World Bank 1985-86. [353]
- Women, food and nutrition in Africa: Perspective from Senegal. [20]
- Women, food and nutrition in Africa: Economic change and the outlook for nutrition. [101]

### Low Relevance

- Bibliographie sur la recherche agricole au Sahel. No. 5: La protection des végétaux: le mil, le sorgho, le maïs et le niébé. [56]
- Bibliographie sur la recherche agricole au Sahel. No. 1: Le mil: Amélioration variétale. [57]
- Bibliographie sur la recherche agricole au Sahel. No. 2: Le sorgho: amélioration variétale. [58]
- Bibliographie sur la recherche agricole au Sahel. No. 3: Le maïs: amélioration variétale. [59]
- Bibliographie sur la recherche agricole au Sahel. No. 4: Le niébé: amélioration variétale. [60]

- Bilan de la recherche agronomique au Siné-Saloum. [41]
- Characteristics of agriculture and farm households in South-eastern Senegal. [133]
- Commercialisation des produits agricoles dans le bassin arachidier. Situation actuelle et implications pour la politique agricole. [251]
- De la pêche comme activité nouvelle, de la mer comme nouvelle frontière dans les pays du Tiers monde: L'exemple du Sénégal, pays pêcheur sur un continent terrien, I. [295]
- Degradation, its control and prevention in the Sahel: A case study from Eastern Senegal. [261]
- Ebauche d'une méthodologie de diagnostic de l'alimentation des ruminants domestiques dans un système agropastorale: L'exemple de Thyssé-Kaymor - Sonkorong au Sénégal. [140]
- Etude de marché sur l'utilisation du maïs au Sénégal: Rapport final. [1]
- Etude des prix de revient du maïs. Résultats des travaux du groupe restreint. [186]
- Etude sur les groupements villageois. Séminaire de restitution des travaux menés au Sénégal. Compte-rendu - résumé. [283]
- Evaluation du déficit vivrier au Sénégal. [198]
- Evaluation du système d'information sur les prix agricoles du Commissariat à la Sécurité Alimentaire: rapport final. [268]
- Food consumption and nutrition effects of international development projects and programs: An annotated bibliography. [341]
- Goal programming via multidimensional scaling applied to Senegalese subsistence farming: Comment. [297]
- Groundnut marketing in Senegal. [78]
- Groupements paysans et productivité agricole. Expériences africaines. [308]
- Improving family welfare through women's work in farming systems in Senegal. [5]
- Influence d'apports de matière organique sur la culture de mil et d'arachide sur un sol sableux du Nord Sénégal. II.--Développement des plantes et mobilisations minérales. [61]
- Insect pests of pearl millet in West Africa and their control. [249]
- L'aménagement de la vallée du fleuve Sénégal: Transformations institutionnelles et objectifs coûteux de l'autosuffisance alimentaire. [212]
- L'évaluation et l'amélioration du système d'information sur les prix des céréales locales. [90]
- L'évolution historique de la réglementation gouvernementale sur la commercialisation des céréales (mil/sorgho, riz). [334]
- L'évolution récente et comparée des systèmes de production serer et wolof dans deux villages du vieux Bassin Arachidier (Sénégal). [335]
- La loi sur le domaine national à vingt ans: Joyeux anniversaire? [181]
- La pêche maritime, un moteur de l'économie sénégalaise, II (1). [191]
- Land tenure in the Bakel Small Irrigated Perimeters: Final report on a research program. [32]
- Le parc de matériels de culture attelée et les possibilités de sa maintenance dans le département de Nioro: Résultats d'enquêtes. [147]
- Le paysan, l'état et les sécheresses (Ngohé, Sénégal: 1972-1982). [112]
- Le projet sécurité alimentaire ISRA/MSU/USAID: Note méthodologique. [132]
- Le rôle des sociétés de développement. [86]
- Le Sénégal et la coopération internationale: L'exemple des ressources vivantes de la mer, II(2). [294]

- Les centres d'expansion rurale du Sénégal entre la dynamique paysanne et les structures de l'état. [14]
- Les conditions des expérimentations (1950-1985) sur les semis en culture attelée des principales espèces cultivées. [146]
- Les effets des politiques agricoles sur la consommation alimentaire: Cameroun et Sénégal. Partie I. Rapports de pays. [6]
- Les effets des politiques agricoles sur la consommation alimentaire: Cameroun et Sénégal. Partie II. Méthodologies d'analyse et modalités d'enquête. [7]
- Les grands services publics dans les états francophones d'Afrique noire. [67]
- Linkages between on-farm research and extension in nine countries. [95]
- Mise en valeur coloniale et développement: Perspective historique sur deux exemples ouest-africains. [55]
- Modèle d'évaluation micro-économique d'une méthode de conservation post-récolte de légumes tropicaux par saumurage. [2]
- Notes d'information et statistiques. [17]
- Notes d'information et statistiques. [18]
- Nouvelles études au champ sur les effets de deux nématicides fumigants bromés (DBCP et EDB) sur les rendements des cultures dans le bassin arachidier du Sénégal. [21]
- Nutritional quality of pearl millet and sorghum grain diets and a pearl millet weaning food. [173]
- Observations on the private sector in Senegal, Niger and Burkina Faso: Summary. Questions submitted to the donor's advisory group. [76]
- OMVS Agricultural Research II Project--Senegal (685-0957). [182]
- Organization and management of field activities in on-farm research: A review of experience in nine countries. [96]
- Paysans, experts et chercheurs en Afrique noire: Sciences sociales et développement rural. [34]
- Peasants, peanuts and politics: State marketing in Senegal, 1966-80. [49]
- Perception de l'environnement et réactions des agriculteurs et des éleveurs du Galodjina face aux modifications récentes de leurs espaces traditionnels. [262]
- Plan de marketing des semences de maïs au Sénégal. [115]
- Politiques et programme céréalières. Une analyse du secteur céréalière et un programme d'actions pour son développement. Volume 1--Rapport principal; Volume 2--Documents d'appui. [100]
- Prix au producteur dans les marchés du bassin arachidier: L'arachide graine. Juillet 1984-Décembre 1985. [255]
- PROSUMER FARMER--A linear model of peasant farming in Casamance, Senegal. [8]
- Rapport de synthèse 1985 du programme de recherche sur les systèmes de production du delta du fleuve Sénégal. [158]
- Resource-poor farmer participation in research: A synthesis of experiences from nine national agricultural research systems. [25]
- Répertoire des travaux de cartographie, levés terrestres et couvertures aériennes du bassin du fleuve Sénégal (1ère version). [142]
- Senegal: An economy under adjustment. [352]



- State intervention in the marketing system. A case study on the politics of agricultural price decision-making in Senegal. [162]
- Synthèse des évaluations rétrospectives de trois projets de périmètres irrigués en zone Sahélienne financés avec le concours de la Caisse Centrale (Burkina Faso et Sénégal). [45]
- The effect of yeast culture on the poststress performance of feeder calves. [274]
- The end of utopianism: A proposal for a realistic system of stabilizing cereal farmers' income in the Sahel and of increasing food security. [111]
- The food industry in Senegal, with particular reference to the processing of grains, fisheries products and milk products. [248]
- The land laws and community reform as an example of institutional change in Senegal: Legal principles, implementation and preliminary results from the semi-arid land in the Ferlo. [199]
- Traitement contre les nématodes dans le bassin arachidier Nord du Sénégal. [79]

## APPENDIX 1

### Document Sources and Search Procedures

#### Michigan State University

A search was made at the main library for all documents pertaining to Senegal published since 1980. Materials catalogued separately in the Africana Library (formerly the Sahel Documentation Center) were consulted, along with bibliographies of Africa-related materials. Documents were obtained from faculty and students with Africa interests. Senegal-specific papers published in the MSU International Development Paper series (including Working Papers and Reprint Papers) were identified. This included 20+ documents prepared under the ISRA/MSU/USAID Senegal Agricultural Research and Planning Project. The Food Security in Africa Cooperative Agreement document collection was searched, and working papers published under the FSA/Senegal project were obtained. A few Ph.D. dissertations were ordered from University Microfilms.

#### Washington, D.C.

Eric Crawford made visits during 4-6 October to the World Bank (David Jones, David Steeds, Pape Sow, Uma Lele), USAID (Patricia O'Brien-Place), Abt Associates (John Holtzman), Louis Berger International (Bob Fishbein), and IFPRI (Chris Delgado, Ousmane Badiane, Tom Reardon). David Jones of the World Bank provided access to his collection of Senegal-related documents.

#### On-Line Database Searches

Patricia Wetmore (USDA/OICD) conducted searches of two on-line databases:

- CAB Abstracts: the ECON file, which includes the World Agricultural Economics and Rural Sociology Abstracts, and selected abstracts on technical agriculture subjects; and
- AGRICOLA, the holdings of the National Agricultural Library

These databases were searched using Senegal and 1983-89 as the search criteria. The citations were downloaded and sent to MSU and to USAID/Dakar. The CAB citations include abstracts; the AGRICOLA citations do not. Patricia Wetmore also provided copies of certain documents which were unavailable in the MSU library system. Documents included in the CAB listing but not available for copying were not included in the bibliography.

While in Washington, D.C., Eric Crawford visited the World Bank Agricultural Sector Library where he made a search of the World Bank/IMF JOLIS database file which includes periodical articles. References on Senegal since 1983 were downloaded. Time did not permit a search of the JOLIS file which includes books.

**Senegal**

Materials were acquired in Dakar by Eric Crawford during his 12-25 October visit, and by Malcolm Versel (18 October to 10 December). Documents were first obtained from ADO staff. The USAID documentalist, Mrs. Fatou Kader, provided listings of the computerized reference files available in the Documentation Center, including the files of ADO, Program Office, and Documentation Center holdings. Subsequent contacts were made with other units in the Mission. Contacts were made with organizations outside USAID (GOS agencies, CIRAD, ISRA, ORSTOM, ENDA, etc.), and a variety of materials were purchased in local bookstores.

**Paris**

Eric Crawford spent 26-28 October in Paris. Documents were obtained at the Club du Sahel, OECD Centre de Développement/Antenne Sahel, ORSTOM, IEMVT, and local bookstores (Editions Karthala, Editions l'Harmattan). With the assistance of Henri Jossierand (Club du Sahel), arrangements were made with Mme. Beudot, the documentalist at the OECD Centre de Développement/Antenne Sahel, for Crawford to use the Centre de Développement documentation center outside of the normal hours. Mme. Beudot prepared a list of recent Senegal-related materials from the Centre's computerized documentation file. Some items were photocopied, and some duplicates were donated by Mme. Beudot.

**Number of Documents**

Clearly, this bibliography covers only part of the universe of relevant documents. Over 500 items were acquired from various sources, of which about half were initially assigned a top annotation priority. Pat Wetmore prepared a list of 242 items (including abstracts) from the CAB database, and another 312 references (not including abstracts) from the AGRICOLA database. Despite considerable overlap between our inventory and the CAB and AGRICOLA listings, the total number of unique references identified must be well over 600. No doubt there are many other items which might be included, including documents by ISRA researchers.

## **APPENDIX 2**

### **Bibliography Preparation and Printing**

#### **Computer Software**

The Notebook II program was used (Pro/Tem Software). Notebook II is a database management program for text, for DOS/PC compatible computers. It is especially designed for bibliographical reference information. The program handles up to 50 fields of variable length, ten pages of text per record, and as many records as the computer disk will hold. A keyboard macro program was used to facilitate the entry of accented French characters.

#### **Structure of Recent Studies Database**

This database included 22 fields: first author, other authors, year, month, title, series/number, journal, place published, publisher, pages, document copy from, annotator, annotation priority, annotated (Y/N), objectives, time period, methodology, data collected, findings/recommendations, relevance, comments, and keywords. The large number of fields was intended to serve three purposes: (1) to ensure that the annotators all addressed the same topics; (2) to allow flexibility in format of the printed output; and (3) to manage the flow of documents.

#### **Structure of Current Research Database**

This database included 12 fields: title of study, executing agency, funding agency, investigator(s), start date, expected completion date, objectives, scope, methodology, data to collect, potential contribution, and keywords.

#### **Staffing**

Aside from the Project Director (Crawford), on-campus staff included one faculty member (Bingen), an administrative assistant, a student assistant, and 1.5 person-months of graduate assistant time split among 4-6 students, for a total of 7 person-months. A significant number of annotations were done by another 4 students who were not paid under the project. In-country staff consisted of Malcolm Versel. The large number of annotators made it possible to accomplish a lot in a short time, but complicated the task of maintaining a consistent bibliographic format and editorial style.

#### **Document Inventory**

All documents obtained were entered into a master inventory database. The inventory contained basic bibliographic information, plus the annotator, annotation priority, date signed out by annotator, date signed in, and comments. The inventory was used to establish annotation assignments, and to minimize the number of duplicate documents and annotations. This was essential, given the number of annotators involved and the division of staff between MSU and Dakar. Maintaining the inventory turned out to be a more time-consuming task than anticipated, however.

### **Screening/Prioritizing Documents for Annotation**

Crawford and Bingen checked the lists of references to assign priorities for obtaining the document from the library or other sources. Once obtained, the documents were given a priority for annotation. Documents were then assigned to annotators, or sorted into high, medium, and low priority groups and left for annotators to select.

### **Guidelines for Preparing Annotations**

Guidelines were prepared for the annotators to ensure completeness and accuracy of annotation, and standardization of reference format. The major task for the annotators was deciding what degree of detail to include. Several meetings were held with the annotators to discuss this with them and clarify the type of annotation desired. Another difficult task was identifying and correctly entering the bibliographic reference information. Many government and French-language documents, for example, make it difficult to determine the author and date of publication.

### **Editing and Printing Procedures**

The following notes summarize the procedures developed for working with Notebook II and WordPerfect 5.0 to edit and print the bibliography. Important issues in doing this are printing from Notebook in the "Notebook Import" format using appropriate disk file options, retrieving this text file into WordPerfect using the CTRL-F5, 1, 2 option, saving the edited text file from WordPerfect using the CTRL-F5, 3 option, and Importing the file into a blank Notebook database with the Import procedure options set as shown below.

1. For illustration, assume the Notebook database containing the annotations is called SEN1, and that you have an empty database called SEN0 (same format but no data). Other filenames given below are also illustrative, based on a trial run done with the EWCTEST database.
2. Print SEN1 to a disk file called SEN1%.TXT, using the report format SEN1%. (Options on this report format should include a Custom Left Margin of 1, a Custom Right Margin of 0, Lines on Page of 0, and the 4 top/bottom header/footer margins set to 0.) This will produce an ASCII file in Notebook "Import" format (each record beginning with %START;, etc.)
3. Retrieve SEN1%.TXT into WordPerfect using the CTRL-F5, 1, 2 option (converts CR/LF to HRt).
4. Edit the text of this file as needed (except the field headers that begin with %). \*\* Do not insert any hard returns, hard page breaks, headers, font codes, etc.
5. Save this file in generic word processor format as SEN1%.IMP, using the CTRL-F5, 3 option.

6. Create a SEN2 database by copying and renaming the SEN0 database. Import SEN1%.IMP into the SEN2 database, using the Utilities/Import feature. Option settings here should be Newlines=Keep, Control Characters=Remove, and Extended Characters=Keep (\*\* these are not the default settings).
7. Print SEN2 to a disk file called SEN2.TXT, using the report format SEN2PR. (Options should be the same as those for SEN1%.) This will produce an ASCII file of citations and annotations, ready for final formatting in WordPerfect.
8. Retrieve SEN2.TXT into WordPerfect using the CTRL-F5, 1, 2 option.
9. Run the ALT-B macro to insert the hanging indents, boldface, and italics.
10. Do any other necessary editing, and print.

### Notes on Preparing Indexes

1. Reorder the database on author (assumes the main annotations list is by first author). Compact the database to eliminate "deleted" records (which would otherwise be included in the record numbering).
2. Keyword index
  - a) Use Utilities, Key, Create (having selected the Keywords field). Set the Spaces as Delimiters? option to No.
  - b) {Optional} To examine the keywords used in the annotations, use Utilities, Key, KeyWrite to print a list of keywords to a file, which will automatically be named KEYS.K--. This ASCII file could be read into WordPerfect for editing and printing.
  - c) To create the keyword index, execute Utilities, Key, IndexWrite to a file, automatically named INDEX.K--. This ASCII file will need to be read into WordPerfect for editing, since only the first 19 characters of the keywords are printed by Notebook.
3. Title index
  - a) Reorder the database on Title, creating a view for that.
  - b) Print that view to a disk file using a report format which prints, for example, Title, FirstAuthor, date, and record number in brackets. Options should be those for printing a disk file, with Record Number set to Actual.
  - c) Edit that ASCII file in WordPerfect to insert hanging indents.

**4. Relevance/title index**

- a) Select on Relevance, beginning with High; sort the view by title.
- b) Print the sorted view to a file.
- c) Select on Relevance, beginning with Medium ; sort by title.
- d) Print sorted view to file.
- e) Ditto for Low.
- f) Check to ensure that all records have been included, i.e., that no Relevance field was inadvertently left blank or coded something other than high, medium, or low.
- g) Retrieve the 3 files successively into WordPerfect 5.0 to edit.