

A.I.D. RESEARCH AND DEVELOPMENT ABSTRACTS

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INTRODUCTION

PURPOSE

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The original mailing list was assembled by listing addresses of institutions and organizations known to have a professional interest in development. Titles and positions within institutions are used rather than names of individuals because positions tend to remain in place while incumbents move from one organization to another. If we used individual names the mailings would soon become undeliverable because such mail is usually not forwarded.

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AGRICULTURE

CEREAL CROPS

SORGHUM, MILLET, PEAS — A BIBLIOGRAPHY OF THE INDIAN LITERATURE — 1969-1973

P.S. Jadhav, T.C. Jain, and S. Prasannalakshmi
1975, 121p. (IN-016.63317-J21)

International Crops Research
Institute for the Semi-Arid Tropics
Hyderabad - 500016 (A.P.) India

The literature specialization in ICRISAT Library primarily would be on all aspects of Sorghum, Millets, Chickpea, Pigeonpea, Farming Systems, Water Utilization, Soil Water Management and on problems relating to economic aspects of crop production in the Semi-Arid Tropics of the World. The ICRISAT Library plans to update the bibliographies of the world literature on these areas of research. The bibliographies of the world literature published up to 1969 on Sorghum, Millets and other Minor Cereals have already been prepared by Mr. Kenneth O. Rachie and published during 1969-1973 excluding theses. A separate bibliography of theses submitted to various Indian universities is under compilation. The development of the ICRISAT Library started only in December 1973, and as such the resources of the library are yet very limited and incomplete. The literature search, therefore, was also carried in the libraries of Andhra Pradesh Agricultural University, National Institute of Community Development, Central Plant Protection Training Institute, Co-ordinated Research Project for Dryland Agriculture, All Indian Sorghum Improvement Project (all at Hyderabad), Indian Council of Agricultural Research, and Indian Agricultural Research Institute (both at New Delhi).
PN-AAB-073 \$8.95

DEVELOPMENTAL STUDIES ON THE PANICLE INITIATION IN SORGHUM

Kit-wah Lee, Robert C. Lommasson, and J.D. Eastin
February 1974, 5p. (633.174-L478)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in Crop Science, Vol. 14, February 1974

A study of the morphology and development of the sorghum [*Sorghum bicolor* (L.) Moench] panicle was made from photographs of fresh apices and from stained sections of fixed material. From periodic collections, the transition from vegetative to reproductive stages indicated an acropetal initiation of primary branch primordia. Higher orders of branch primordia are commonly found on lower branch primordia. Differentiation of spikelets in the panicle is basipetal and is marked by the appearance of glume primordia. Both fertile and sterile spikelets of a pair are morphologically similar during their early development, but the floret parts of the latter degenerate as the inflorescence matures. A developmental stage system evaluating the degree of panicle development is proposed. Three factors considered to be of importance in the control of yield, which are associated with the development of the inflorescence, are number of primary branch primordia, number of branches arising from each primary branch, and the timing of spikelet differentiation. Of these, the time sequence of acropetal differentiation of primary branch primordia followed by basipetal differentiation of spikelets may be the most important in controlling yield.
PN-AAB-074 \$1.95

ON THE PRESSURE CHAMBER TECHNIQUE FOR ESTIMATING LEAF WATER POTENTIAL IN SORGHUM

A. Blum, C.Y. Sullivan, and J.D. Eastin
April 1973, 2p. (633.174-B658)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in Agronomy Journal, Vol. 65, April 1973

The purpose of this work was to re-evaluate the pressure chamber technique for estimating leaf water potential in sorghum [*Sorghum bicolor* (L.) Moench], with special reference to problems associated with leaf sample crushing under pressure and pressure rate increase inside the chamber. Pressure chamber readings were compared to Spanner-type thermocouple psychrometer readings on leaves of five sorghum genotypes at several stages of growth. A leaf sample holder, constructed from Silicon rubber and accommodated into a brass flange, reduced leaf crushing under pressure. It was found that pressure chamber readings (xylem pressure) cannot be directly used as an estimate of leaf water potential, but should be corrected according to a calibration against a thermocouple psychrometer determinations of leaf water potential. Different rates of pressure increase in the chamber affected the regression between xylem pressure and leaf water potential. The regression improved with a greater pressure rate increase as indicated by smaller error variance estimate. No differences were detected between genotypes in this regression. This technique is, therefore, useful if worked out according to a calibration curve at a standard rate of pressure increase.

PN-AAB-075

\$1.95

PHYSIOLOGIC MATURITY IN GRAIN SORGHUM

Jerry D. Eastin, Joe H. Hultquist, and C.Y. Sullivan
April 1973, 4p. (633.174-E13b)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in Crop Science, Vol. 13, April 1973

External visualization of the apparent dark closing layer in the placental area near the sorghum [*Sorghum bicolor* (L.) Moench] kernel attachment point coincides closely with the cutoff of radioactive assimilate translocation to the kernel. Dark layer determination permits identification of physiologic maturity or date of maximum dry weight accumulation. This judgment is meaningful because yield is a function of both time and metabolic efficiency. Genotypes can be characterized in terms of grain filling-period duration by noting the dates of bloom and dark layer formation. Yield data plus physiologic maturity data permit direct field quantitation of the time and metabolic efficiency components of grain dry weight accumulation.

PN-AAB-076

\$1.95

LEAF WATER POTENTIAL AND STOMATAL ACTIVITY IN SORGHUM AS INFLUENCED BY SOIL MOISTURE STRESS

A. Blum and C.Y. Sullivan
1974, 6p. (633.174-B658a)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in the Israel Journal of Botany, Vol. 23, 1974

Five sorghum (*Sorghum bicolor* Moench) varieties were grown in soil in a growth chamber and submitted to two consecutive soil drying cycles separated by a 3-day recovery period. During each drying cycle measurements were made on stomatal pore width, leaf diffusion resistance (R_1), leaf water potential (ψ_1) and soil water potential (ψ_s). In previously stressed plants stomata were less sensitive to reduction in ψ_s , and ψ_1 was lower at a given ψ_s , as

compared to non-previously stressed plants. In non-previously stressed plants stomata responded sensitively to an initial reduction in ψ_1 , but once closure was initiated (at ψ_1 of about -8 bars) stomata remained partly closed (1/4 - 1/3 of maximum aperture) even when ψ_1 dropped to -19 bars. During this phase control over transpiration was apparently non-stomatal.

PN-AAB-077 \$1.95

A LABORATORY METHOD FOR MONITORING NET PHOTOSYNTHESIS IN LEAF SEGMENTS UNDER CONTROLLED WATER STRESS EXPERIMENTS WITH SORGHUM

C.Y. Sullivan and A. Blum
1972, 7p. (633.174-S949a)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Photosynthetica* 6(1) 1972

A method for monitoring net photosynthesis (P_N) in leaf segments by sensing oxygen evolution with a polarographic oxygen electrode in a closed system is described. Carbon dioxide is supplied by a carbonate-bicarbonate buffer as employed in Warburg manometry. The method incorporates an option for relative humidity (RH) control using saturated salt solutions and an RH sensing device for maintaining a standard atmospheric water stress on the leaf at the time of measurement. — Experiments revealed that sorghum (*Sorghum* sp.) varieties differed in P_N at both high and low leaf water stress as obtained by varying % RH. Sorghum was found to have reduced P_N at leaf water potential below about -5 to -6 bar. The effect of RH on P_N rates was dependent on incident irradiance.

PN-AAB-078 \$1.95

YIELD CONSIDERATIONS IN SELECTED CEREALS

Jerry D. Eastin and Charles Y. Sullivan
1974, 7p. (633.174-E13a)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in the Royal Society of New Zealand 1974

Seed number usually correlates positively with cereal grain yields. Environmental stresses at the time spikelet components are differentiated in sorghum seriously reduce grain number and yield. Competition for assimilates between simultaneously expanding floral and vegetative parts at this time may put a strain on development of spikelet differentiation and expansion, and suppressing vegetative expansion appears to have merit. A second area meriting research relates to delaying senescence in grain in order to lengthen the grain filling period and increase total assimilate supply for grain production.

PN-AAB-079 \$1.95

MECHANISMS OF HEAT AND DROUGHT RESISTANCE IN GRAIN SORGHUM AND METHODS OF MEASUREMENT

Charles Y. Sullivan
1972, 18p. (633.174-S949b)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Sorghum in the Seventies*, New Delhi, 1972

Variability of response to drought and mechanisms of resistance are evident from the few results presented here. It is also evident that there is a great deal of further research opportunity for study

of the drought resistance of the thousands of sorghum types as exemplified in the world collection. We have only touched on the many aspects of drought resistance, but an attempt has been made to emphasize some basic principles and practical methods of measurement. In order for plant breeders to make selections of many of the traits mentioned, specific measurements and tests must be made. An analogy is not too far from improvements made in nutritional and baking quality of wheat, where several factors were first identified and then combined for maximum benefit. They could not be seen with the eye, and selection pressures were obtained from laboratory tests. Sorghum drought resistance improvement should make greater progress if first avoidance and tolerance mechanisms are identified with many sorghums grown in different environments. Once this is done, decisions can be made as to the combination of factors most desirable for maximum yield in the average environment of the particular location.

PN-AAB-080 \$1.95

LIGHT AND YIELD RELATED ASPECTS OF SORGHUM CANOPIES

Max D. Clegg
1972, 23p. (633.174-C624a)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Sorghum in the Seventies*, New Delhi 1972

The considerations presented were aimed at stressing the importance of the light intercepting capabilities of a sorghum crop. The total visible radiation varies considerably day by day throughout a season contributing to large yield variations. However, by canopy modification and adjustment in cropping systems the most efficient use of available radiation can be obtained. Canopy modification toward maximum light interception and distribution is a more justifiable consideration where conditions are favorable for a crop as would be indicated by continued high yields. However, actual canopy evaluation in regard to canopy structure under more adverse conditions is needed. We are now beginning to understand more about the influence of the various growth stages on the producing capabilities of a sorghum plant which, no doubt, will lead to further yield gain within a crop. The development of short season hybrids and the ratooning capabilities of sorghum lend themselves to developing new cropping systems to take better advantage of the visible radiation in a crop producing area. At present existing genotypes are being used successfully, but to improve the performance of grain sorghum production in these systems selections of adapted genotypes are necessary. These considerations coupled with other yield related processes can result in significant yield increases in the near future.

PN-AAB-081 \$1.95

EFFECT OF DELAYED THINNING ON SORGHUM GROWTH AND YIELD

Max D. Clegg and Jerry W. Maranville
February 1972, 2p. (633.174-C624b)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published as Paper No. 3329 Journal Series — Nebraska Agricultural Exp. Sta.

An experiment was conducted to determine if a delay in thinning would adversely affect growth and yield of grain sorghum [*Sorghum bicolor* (L.) Moench]. Results showed that thinning would be performed as early as possible, preferably before plants reach 7.5 cm in height. Yield was reduced when thinning was

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delayed until plants were 15.0 cm to 23.0 cm in height. Stem diameter was reduced and seed size was increased when thinning was delayed until the plants had reached a height of over 31 cm. We suggest that when a delay in time of thinning is anticipated, planting to a desired population based on reliable laboratory germination tests may be preferable.

PN-AAB-082

\$1.95

LIGHT TRANSMISSION IN FIELD COMMUNITIES OF SORGHUM

Max D. Clegg, William W. Biggs, Jerry D. Eastin, Jerry W. Maranville, and Charles Y. Sullivan
August 1974, 6p. (633.174-C624c)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Agronomy Journal*, Vol. 66, August 1974

Most plant canopy and solar radiation studies have comprised theoretical consideration, assuming a randomly oriented leaf arrangement. Lacking are field measurements concerning culturally arranged plant canopies in relation to interception of solar radiation. The purpose of this study was to describe the light environment under field conditions below and within grain sorghum [*Sorghum bicolor* (L.) Moench] canopies. Visible radiation was measured in sorghum using sensors mounted on a traversing system and having about the same sensitivity to direction and spectrum as does a leaf. As much as 89% more light was transmitted to a sensor when it moved between rows rather than across them. Therefore, measurement across rows is recommended. Light transmission profiles of sorghum canopies on clear and cloudy days were similar. Differences between transmission values over a diurnal period were less on cloudy than on clear days indicating more uniform light distribution. Visible radiation transmitted through sorghum canopies of .51-m rows as compared to sorghum canopies of .76 and 1.02-m rows or sorghum canopies of .76-m rows as compared to sorghum canopies of 1.02-m rows was less. This would indicate more visible radiation would be available for photosynthesis with narrower row spacings. Extinction coefficients (K) for canopy layers were calculated and for each layer proceeding downward K decreased. Extinction coefficients of sorghum canopies of different row spacings decreased as row spacing increased. Differences between hourly values of K were less on the cloudy day than on the clear day. For all conditions minimum values of K occurred at solar noon. These results agree with theoretical data.

PN-AAB-083

\$1.95

GRAIN SORGHUM IN THE USA

W.M. Ross and J.D. Eastin
May 1972, 6p. (633.174-R827)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Field Crop Abstracts*, Vol. 25, No. 2, May 1972

Production of grain sorghum [*Sorghum bicolor* (L.) Moench], the second-ranking feed grain of the USA, is concentrated in the Great Plains and Southwest where climatic conditions are generally unfavorable for maize. Grain sorghum culture prior to 1910 was confined largely to Texas, Oklahoma and California, but development of earlier maturing varieties and more recent hybrids, extended the production area northwards to southern South Dakota and westwards to eastern Colorado and eastern New Mexico, in the Great Plains. Texas, Kansas and Nebraska usually produce 75 to 80% of the nation's grain sorghum, with Texas accounting for 35 to 45%. Other important grain producing

States are Arizona, California, Colorado, Missouri, New Mexico, Oklahoma and South Dakota. A smaller percentage of grain production comes from the Corn Belt and the Southeast. Sorghum grain production in the USA in 1971 was a record 22.7 million metric tons from 6.7 million hectares, with an average yield of 3.4 t/ha. In contrast, production in 1934 during the great drought was 480,000 tons with a yield of only 0.5 t/acre. Better tillage, better weed control, use of more fertilizer, and extended irrigation have contributed significantly to increased yields. Plant breeders, agronomists and farmers are now endeavouring to raise production levels even higher. The article covers the factors of production, their interactions, and their relation to successful and profitable grain sorghum culture in the USA. Information is taken largely from other review articles on sorghum and readers will find more complete lists in most of these.

PN-AAB-084

\$1.95

IMPROVEMENT OF THE NUTRITIONAL QUALITY OF WHEAT THROUGH INCREASED PROTEIN CONTENT AND IMPROVED AMINO ACID BALANCE

V. A. Johnson and P.J. Mattern
March 1975, 194p. (633.11-N362d)

University of Nebraska
Crops Research Laboratory
Lincoln, Nebraska 68508

Analyses for protein and lysine of common, durum, spelt, and diploid wheats in the World Collection were completed except for new accessions. Re-analyses of 600 common wheats verified the existence of genetic variability for protein and lysine content. Range of variability for protein and lysine among 3,400 durum wheats was similar to that demonstrated for the common wheats. Distribution and relationship of protein and lysine also were determined to be similar in the two species. Lines with exceedingly high grain protein content from the cross Nap Hal/Atlas 66 point to different genes in the parent varieties and opportunity to breed wheats as much as five percentage points higher than ordinary varieties. Similar evidence of transgressive segregation for high lysine was obtained in the cross Nap Hal/CI 13449. A high protein Atlas 66-derived hard red winter wheat variety CI 17389 developed in Nebraska will be jointly released for commercial production by Nebraska, Texas, South Dakota, and the Agricultural Research Service, USDA in 1975. CI 17389 combines high yield, disease resistance, and excellent processing quality with genetic potential for 1-2 percentage points higher protein than ordinary varieties. The international winter wheat performance nursery is grown at 57 sites in 35 countries. Eighty-four varieties from 23 countries have been evaluated since 1969.

PN-AAB-085

\$14.35

PHOTOSYNTHESIS AND TRANSLOCATION IN RELATION TO PLANT DEVELOPMENT

Jerry D. Eastin
1972, 33p. (633.34-E13)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Sorghum in the Seventies*, New Delhi, 1972

The objective is to discuss physiologic activities in sorghum including photosynthesis and translocation. Meaningful discussion of such physiological activities as they bear on yield can be no better than the perspective within which they are viewed so far as plant developmental pattern limitations. Therefore, some time is devoted to discussing developmental characteristics in sorghum in general to be followed by a consideration of photosynthesis, translocation, etc. in the context of yield analyses when possible. Our understanding of the sorghum crop still

remains quite limited. The store of information regarding the crop is steadily increasing. However, knowledge of physiologic responses is inadequate yet to state the order of yield limiting physiologic functions with the degree of certainty which seems desirable for cultural and genetic improvement purposes. Our perspective is improving regarding limitations in the various developmental stages. Rapid, simple developmental stage evaluations are permitting a more precise field evaluation of both the time production factors and metabolic efficiency production factors in sorghum. Hopefully this is true to the extent that it will be useful in plant breeder selection work. Progress in photosynthesis and assimilate transport work is continuing as it relates to intraplant competition. Much work needs to be done on respiration. A potentially productive procedure for evaluating photosynthesis in the canopy as a whole has been devised and likely will be a useful tool for plant-type-field stand geometry investigations in the near future. The need exists for developing additional field screening techniques. Also much work needs to be done at the molecular level to advance our understanding of control mechanisms regarding differentiation of floral parts and control of the major physiologic processes.

PN-AAB-086 \$2.45

CARBON DIOXIDE EXCHANGE IN WATER-STRESSED SORGHUM

Linda L. Shearman, J.D. Eastin, C.Y. Sullivan, and E.J. Kinbacher
August 1972, 4p. (633.174-S539)

University of Nebraska
Department of Agronomy
Lincoln, Nebraska 68503

Published in *Crop Science*, Vol. 12, August 1972

Carbon dioxide exchange was monitored in potted RS 610 sorghum [*Sorghum bicolor* (L.) Moench] in a growth chamber as it dried out from a freshly watered condition to severe water stress. Carbon dioxide uptake in the light decreased to near the compensation point at water potentials near -25 atmospheres. Leaf resistance to gaseous exchange was high at this point. Evolution of CO₂ in the light occurred as stress became greater. Dark evolution of CO₂ was higher at water potentials near -20 atmospheres than in either the more severely stressed or non-stressed condition. The activity of phosphoenolpyruvic carboxylase remained comparatively high as water stress increased.

PN-AAB-087 \$1.95

RESULTS OF THE FOURTH INTERNATIONAL WINTER WHEAT PERFORMANCE NURSERY

J.E. Stroikey, V.A. Johnson, J.W. Schmidt, P.J. Mattern, and K.D. Wilhelm
October 1974, 159p. (633.11-S921h)

University of Nebraska
The Agricultural Experiment Station
Lincoln, Nebraska 68508

The Fourth International Winter Wheat Performance Nursery was grown in 1972 at 44 sites in 27 countries. Data were reported from 40 sites. The 30 cultivars grown in the nursery included 15 new entries. Twenty-nine cultivars were winter wheats; one was a spring wheat. Data are reported on grain yield, test weight, plant maturity, plant height, lodging, shattering, winter survival, 1000 kernel weight, frost damage, plant diseases, grain protein and lysine content. Two-year mean data summaries also are reported. Supplemental nursery management information is reported for each nursery site. The nursery mean yield from 38 sites in 1972 was 35.5 q/ha. Individual nursery means yields ranged from 14.4 to 71.3 q/ha. Bezostaya 1, a winter cultivar from Krasnodar, U.S.S.R., was the most productive cultivar on

the average over all reporting sites in 1972. Sava (Yugoslavia), Dacia (Romania), Probstdorfer Extrem (Austria), and Zlatna dolina (Yugoslavia) all produced at least 95% of the mean yield of Bezostaya 1. The wide range of adaptability for these cultivars is indicated by their performance in the nursery in 1972. Bezostaya 1 (USSR), Centurk (Nebraska), Blueboy (North Carolina), and Probstdorfer Extrem (Austria) were the highest yielding cultivars on the average for the two years of 1971 and 1972. Cultivar means for test weight from 14 sites in 1972 indicate the superiority of Bezostaya 1, Dacia, C.I.15074 (Nebraska), and Rousalka (Bulgaria). Maturity differences were large between the 29 winter cultivars tested. Nearly 21 days difference existed on the average between the earliest (Rousalka) and the latest (Starke) cultivars grown in 1972. There was excellent expression on the genetic potential for high grain protein content in Atlas 66 and its derivative cultivars, NE701132 and C.I. 15074, in the 1972 IWWPN. Relationship between yield level and protein content was not consistent at individual nursery sites.

PN-AAB-088 \$11.80

**SORGHUM DOWNY MILDEW
A DISEASE OF MAIZE AND SORGHUM**

R.A. Frederiksen, et. al.
April 1974, 10p. (632.452-F852a)

Texas A&M University
Department of Plant Sciences
College Station, Texas 77843

Sorghum downy mildew (SDM), caused by *Sclerospora sorghi*, has become a major disease of maize (corn), sorghum and related species in Texas in the past decade. During these years, programs for the study and control of downy mildew have been centered in Texas. The continual spread of downy mildew throughout the Southern States and into several Central States bordering the maize belt has focused national concern on the potential threat posed by tropical downy mildews. Since 1964, 36 sorghum lines resistant to downy mildew under field conditions have been identified and made available to persons engaged in sorghum improvement programs. Also, more than 30 maize inbreds with moderate to high levels of resistance to sorghum downy mildew have been identified under field conditions. The manner in which resistance is inherited has permitted breeders to develop resistant hybrids of both maize and sorghum. Today some agronomically desirable, downy mildew resistant hybrid cultivars of both maize and sorghum are commercially available. Specific cultivation control practices have reduced disease severity. These include removing inoculum, particularly by deep plowing to bury soilborne spores, and avoiding cultivation of susceptible crops. In fields in which highly susceptible sorghum-sudan-grasses and broomcorn have not been grown, build-up of disease has been less than in fields in which they have been grown. Chemical control of downy mildew is being studied, but to date results have not been encouraging.

PN-AAB-089 \$1.95

IRRIGATED CORN PRODUCTION IN CHILE: INCREASING YIELDS THROUGH INTENSIVE IRRIGATION MANAGEMENT

R.K. Stutler, Don C. Kidman, Juan Tosso, and Norbert Fritsch
December 1974, 28p. (CI-633.15-S937-S)

Utah State University
Department of Agricultural and Irrigation Engineering
Logan, Utah 84322

A three-year program involving research and demonstration on modern concepts of irrigation management for corn was conducted in the Aconcagua Province. Irrigation, land management, fertility, corn variety and plant population were emphasized. Results proved that yield potential of corn is well

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above the current level of production. By adopting the practices in this bulletin, corn producers can increase yields at least 50% with the resources they currently have available. While all of the research was conducted in the Aconcagua Province, the technology can be transferred to other provinces in the corn producing area with slight modification or adaptation. Based on the results of the project, the following recommendations are made for increased corn production in Chile. Proper timing and amount of irrigation is essential for increased production, since corn is very susceptible to moisture stresses. Even short periods of moisture stress, particularly during the critical stages of tasseling and silking, will sharply reduce yields. Plowing should be done prior to irrigation at a 25-30 cm. depth to adequately incorporate residue from previous crops. A preplant irrigation should then be applied. Seed-bed preparation can be done after soil is dry enough to prevent undue compaction by equipment. The tandem disc should be followed by a spike-tooth harrow to break up clods and leave a fine surface mulch. A recommendation of 200 kg. of N per hectare would be adequate for most soils in Aconcagua. In the event that the field has a history of heavy use of nitrogen fertilizer, smaller applications may be sufficient. Several good varieties of corn are available in Chile, including short and full season hybrids. If water is limited, a short season hybrid may be used with greater assurance that enough water will be available to bring the crop to maturity. If irrigation water is not limited then the long season hybrid will produce higher yields.

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FISHERIES

PROGRESS REPORT ON FISHERIES DEVELOPMENT IN BRAZIL

John Jenson
December 1974, 10p. (BR-639.20981-J54)

Auburn University
International Center for Aquaculture
Auburn, Alabama 36830

Technical assistance rendered under the Auburn University Brazil Contract, provided the initial impetus and training for forming an extension service for intensive fishculture within the DNOCS Directorate of Fisheries and Fishculture. This program put research results to practical use in intensive fishculture, which was introduced for the first time to farms in Northeast Brazil. Also, training personnel in basic extension methods was a major accomplishment during the present contract. For continued progress in forming an extension service capable of satisfying the needs of farmers and for systematic development of intensive fishculture to its fullest possibilities, the following recommendations are presented:

Expansion of intensive fishculture will require more trained extensionists to provide the necessary technical assistance that farmers will need. Perhaps through agreements with the state agricultural extension services, DNOCS will be able to meet this manpower requirement. Other possibilities include interagency agreements providing for the transfer of personnel from the State Secretary of Agriculture to DNOCS, which has been done before, or by assigning current DNOCS employees to extension work.

New extension workers from whatever source will require up to a year's training in fishculture and extension work. Personnel chosen should be those who appear to be motivated for this type work and sensitive to the problems of the people they are to assist.

PN-AAB-092 \$1.95

INSECTS AND PESTS

A REPORT ON SEMINAR, WORKSHOP AND TRAINING IN PESTICIDE MANAGEMENT

University of California Pest Management Project
July 1974, 306p. (632.95-C153)

University of California
Department of Entomological Sciences
Berkeley, California 94720

Seminar-workshop conducted in Jakarta, Indonesia, July 1974

The University of California/USAID Pest Management and Related Environmental Protection Project has for sometime been concerned with the whole process of how pesticides in developing countries are distributed, stored, packaged, selected, applied and where necessary, disposal of unwanted materials and containers. This concern centers on safety of humans, efficacy of pesticides in crop protection and impact on the quality of the environment. The project personnel have come to use the term *Pesticide Management* for the entire process of pesticide utilization from packaging to end use or disposal. The quality of pesticide management determines the level of human safety, efficacy of crop protection and environmental impact. In December of 1973, the project sponsored jointly with national agencies in El Salvador the first seminar/workshop on pesticide management. This report details the second seminar/workshop held in Jakarta, Indonesia, 8 July to 3 August, 1974. A third seminar/workshop is scheduled for the Philippines in early 1975 and others are anticipated in the future.

PN-AAB-093 \$22.65

REPORT OF THE SAHEL CROP PEST MANAGEMENT CONFERENCE

Ray F. Smith and David E. Schlegel
December 1974, 86p. (AFR-632.063-C153)

University of California
Department of Entomological Sciences
Berkeley, California 94720

Conference conducted in Washington, D.C., December 11-12, 1974

In recent months, the increased demand for emergency assistance in the Sahel states has suggested certain conclusions which bear on the medium and long-term recovery and development of the Sudano-Sahelian zone. The present capability of the Sahel states to manage common, annual crop pests is extremely limited. This condition, where it exists, will tend to neutralize attempts at increasing crop production. The Sahel Governments are aware of the crop pest problem, and many are ready to seek a long-range solution to it. The members of the donor community are also aware of the problem. The objectives of the Conference were:

- (1) To establish a technical understanding of the problem. While any one concerned organization possessed valuable information, there had not been a comprehensive compilation and exchange of such information.
- (2) To develop a technical consensus from the standpoint of professional pest control management on the most appropriate approaches to the solution to the problem.
- (3) To help create a forum or network for continued exchange of information bearing on the problem.
- (4) To gain some indication of the kind of assistance donors might provide.

PN-AAB-094 \$6.40

BIRD DAMAGE TO CROPS IN AFRICA AND LATIN AMERICA

John W. De Grazio and Jerome F. Besser
June 1974, 8p. (AFR-632.682-D321a)

U.S. Department of the Interior
Fish and Wildlife Service
Denver, Colorado 80225

Available in English and Spanish

Bird damage to crops, particularly cereal grains, is a serious problem all over the world. The Denver Wildlife Research Center of the U.S. Fish and Wildlife Service is one of the principal federal agencies responsible for developing methods to alleviate bird damage problems throughout the United States. Under an agreement with the U.S. State Department's Agency for International Development (AID), Denver Wildlife Research Center biologists have investigated the kinds and amounts of bird damage to crops in Africa and Latin America to conduct research on ways of reducing bird damage to Latin American grain crops. Surveys in Africa and Latin America indicate that the crops most frequently damaged are grain sorghum, rice, millet, and corn, followed by soybeans, wheat, oil palms, and cacao. Most of the offending birds belong to the weaver finch, sparrow, blackbird, dove, duck, and parrot families. Technology developed to handle bird problems in the United States may be applicable in Africa and Latin America. Two potential techniques that may be useful are chemical frightening and chemical repellent agents. Many of the world's agricultural bird problems are closely related. This means U.S. experience can apply to bird problems overseas and solutions developed in cooperative research overseas can be applicable in the U.S. Thus, the discovery of more effective, more economical, and safer methods of reducing bird damage to crops anywhere should benefit consumers throughout the world.

PN-AAB-095 \$1.95

CONTROL DE RATAS Y RATONES DOMESTICOS

Valencia G. Danilo and Donald J. Elias
January 1975, 4p. (CO-632.693233-V152)

U.S. Department of Interior
Fish and Wildlife Service
Denver, Colorado 80225

Available only in Spanish

Domestic rodents and their control are a problem that has received little, if any, attention in rural areas and communities of Colombia. This paper is an attempt to bring the problem to the attention of the rural inhabitant, to explain the need for rodent control, and to present methods that are easily used and effective in controlling domestic rodents.

PN-AAB-096 \$1.95

IRRIGATION

A STUDY OF VILLAGE ORGANIZATIONAL FACTORS AFFECTING WATER MANAGEMENT DECISION MAKING IN PAKISTAN

Ashfaq Hussain Mirza
March 1975, 139p. (PK-631.7-M677)

Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

Available at above address @ \$3.00 per copy

The purpose of this study is to examine the social factors which affect the water management decision making of Punjabi farmers

in a sample of fifteen Pakistani villages. In essence, the study design is as follows:

The focus of inquiry is on three dependent variables — (1) decisions of farmers to clean watercourses; (2) decisions to change from kacha to pacca warabandi systems of water allocation; and (3) decision to interact with lower level irrigation department employees.

The major independent variable, taken for explanatory purposes, is that of presence/absence of public tubewells to augment the supply of water to watercourses. A second category of independent variables, treated as intervening variables because they are viewed as conditioning the impact of the independent variable on the three dependent variables, are social organizational factors of villages such as: (1) number of agricultural castes; (2) presence or absence of factions; (3) land tenancy type; and (4) residence pattern — locals vs. refugees.

PN-AAB-097 \$10.30

MOSLEM WATER LAW AND ITS INFLUENCE ON SPANISH WATER LAW AND THE IRRIGATION SYSTEM OF VALENCIA

George E. Radosevich
January 1974, 22p. (SP-631.7-R131)

Colorado State University
Engineering Research Center
Fort Collins, Colorado 80521

The influence of Moslem Water Law and the improved irrigation practices and techniques that accompanied the spread of Islam have had a remarkable and important impact on the Iberian peninsula, and in particular upon the irrigation system of Valencia. The system of water users association that developed within the Hispano-Muslim society has been a model used in several parts of the world and continues to be studied for its application where agriculture is essential and water limited. Pakistan applies Moslem water law principles at the local level in the allocation and distribution of water to agricultural users. At the governmental level, however, water management is a provincial matter, and in three of the four provinces, the Canal and Drainage Act of 1873, introduced by the British, still is the rule of law. The interesting feature is that one of the largest and oldest irrigation systems in the world has been suffering from decay the past 50 to 80 years. Salinity is causing the loss of production on thousands of acres of land each year. The major problem is improper management at the farm level and lack of coordination among the provinces. Basically, the very principles that have helped create a very efficient and effective irrigation system in Valencia and in other Spanish districts have not had the same impact in Pakistan, perhaps due to a failure to adapt to the changing social and economic conditions of the Indus.

PN-AAB-098 \$1.95

A THEORY OF THE COMBINED MOLE-TILE DRAIN SYSTEM

Komain Unhanand and Tariq N. Kadir
February 1975, 9p. (631.7072-U57a)

Utah State University
Department of Agricultural and Irrigation Engineering
Logan, Utah 84322

Published in Water Resources Research, Vol. 11, No. 1, February, 1975

A theory of water movement in the combined mole-tile drain system based on the transient state condition was developed. Two general equations were derived to describe the height of the water table at any location in the system at any elapsed time after the drainage process begins. One of the equations is applicable for the stage in which the water table is above the mole drains,

AGRICULTURE

and the other equation is for the stage in which the water table falls below the mole drains. The two general equations were simplified for the point located at midpoint between the tile drains and mole drains in the system. In the derivation, assumptions regarding the flow condition of groundwater and shape of the water table profile at certain boundaries were made. Field experiments were then conducted, and the test data were used in verifying the equation for the first stage. A reasonably good agreement between the theoretical analysis and field data was obtained for this type of research.

PN-AAB-099

\$1.95

LEGUME CROPS

PHOTOPERIOD RESPONSE IN MUNGBEANS (*VIGNA RADIATA* /L./ Wilczek)

M.M.H. Bashandi and J.M. Poehlman
1974, 7p. (635.65-B299a)

Missouri University
Department of Agronomy
Columbia, Missouri 65201

(In *Euphytica*, V. 23, p. 691-697)

Five strains of mungbeans were grown at 8-, 12-, 14-, 15-, and 16-hour photoperiods in plant environmental chambers. The strains did not differ in "days to flower" at the 8- and 12-hour photoperiods, but flowering was delayed and plant height increased differentially when the photoperiod was increased beyond 12 hours. Two strains exhibited only slight sensitivity over the range of photoperiods studied. Two strains failed to flower within 180-day period at the 16-hour photoperiod. The results corroborate observations in the First International Mungbean Nursery in which 28 strains grown at low latitudes (short photoperiods) had a narrow range in days to flowering, with the range becoming wider at the higher latitudes (longer photoperiods). The results provide evidence that response to photoperiod is important in the adaptation of mungbean strains in different latitudes.

PN-AAB-100

\$1.95

PERFORMANCE OF THE SECOND INTERNATIONAL MUNGBEAN NURSERY

J.M. Poehlman, D.T. Sechler, J.M. Yohe, E.E. Watt, R.E. Swindell, and Ellis Benham
1974, 31p. (635.65-M678)

Missouri University
Department of Agronomy
Columbia, Missouri 65201

(In Univ. of Mo., Columbia, Agr. Exp. Station. Special rpt., 171)

The Second International Mungbean Nursery was grown at 18 locations in 11 countries. The test sites, ranging from 3° to 49°N latitude, represented widely different environments. The nursery contained 28 varieties of mungbeans [*Vigna radiata* (L.) Wilczek] representing a wide diversity in plant type, maturity, seed size and quality, disease resistance, yield potential, and geographic origin. M350 from Korea was the highest yielding variety in the IMN for the second straight year. M409 from Peru, a new entry, was the second highest yielding variety followed by M411 (Hybrid 45) from India, M317 from China, and M374 (MG50-10A) from the Philippines. M317 ranked second in yield in the First IMN. M137 was the earliest variety to flower. M374, M317, and M101 had the largest 1000-seed weight. At the low latitudes all strains tended to be short and flower early. Three of the highest yielding varieties — M350, M317, and M101 — have rough, dull seed coats. M416 has yellow seed color. A virus (or

virus complex) was the most common disease being reported from 9 locations. However, differences among the strains were not significantly different for any of the diseases reported. Additional research is needed on identification of mungbean diseases and methods for evaluating disease reactions.

PN-AAB-101

\$2.30

LIVESTOCK

AN EVALUATION OF LIVESTOCK DEVELOPMENT PROJECT

Boyd T. Whittle, Michael Galli, Joseph R. Crockett, Fred L. Mann and Lee Twentyman
November 1974, 35p. (PA-636-A512)

American Technical Assistance Corporation
Westgate Research Park
McLean, Virginia 22101

The Paraguay Livestock Development Project is an institution building activity whose ultimate goal is to improve livestock production. Paraguay is heavily dependent on livestock exports for foreign exchange earnings, while the livestock industry is of great domestic import to the domestic economy and the nutrition of the people. This purpose is to be met through three primary types of outputs:

Training. Two major training outputs are sought: (1) Training of personnel to staff PRONIEGA, FAV and the extension service with sufficient numbers of high quality personnel to build a self-sustaining institutional base, and (2) A steady expansion of FAV graduates to meet the demand for professionals in both public and private sectors.

Research. Performance of a series of studies on animal nutrition, management, breeding, sanitation, and pasture improvement to provide valuable information on new practices applicable to local livestock conditions.

Extension. The establishment of a group of qualified livestock extensionists, assisting ranchers through field demonstrations, short courses and advice, publication of research and extension bulletins, and development of a corps of cooperating ranchers participating in research and demonstration activities.

PN-AAB-102

\$2.60

SOILS AND FERTILIZERS

DENITRIFICATION LOSSES FROM HUMID TROPICAL SOILS OF PUERTO RICO

H.D. Dubey and R.H. Fox
1974, 4p. (RQ-631.4072-D814)

Cornell University
Department of Agronomy
Ithaca, New York 14850

(In Soil Science Soc. of Am. proc., V. 38, No. 6, p. 917-920)

Profile samples from 5 depths (0-25, 25-50, 50-75, 75-100, and 100-125 cm) from three soil types (two Oxisols — Pina sandy loam and Catalina clay, and an Ultisol — Humatas clay) were incubated at 23 ± 1 C under field capacity and waterlogged conditions in an oxygen-helium atmosphere. Evolved N_2 and N_2O were determined after one and two weeks by gas chromatography. Denitrification was related to moisture level, organic matter content, pH, and denitrifying population. Gaseous-N losses occurred almost exclusively from the surface soil (0-25 cm) under waterlogged conditions. Losses ranged from 8 to 31% of the applied $NO_3^- - N$. Some loss (7%) also occurred at field capacity from the surface horizon of the Oxisol having the highest organic matter content, Catalina clay. Losses were directly

related to organic matter content. Raising the pH of the subsoil only enhanced denitrification slightly. Addition of a denitrifying population and mineral nutrients in the form of a soil inoculant to a subsoil with a raised pH and organic matter content increased denitrification equal to that of surface soil. The lack of denitrification at lower depths is believed to be due to an inadequate supply of rapidly available energy material, low pH and mineral nutrients, and consequent lack of a denitrifying population. Since the surface soil rarely gets waterlogged, it was concluded that little possibility of N losses by denitrification in these humid tropical soils exists.

PN-AAB-103 \$1.95

REPORT OF THE WORKSHOP ON EXPERIMENTAL DESIGNS FOR PREDICTING CROP PRODUCTIVITY WITH ENVIRONMENTAL AND ECONOMIC INPUTS

J.A. Silva and F.H. Beinroth
May 1974, 54p. (631.5-S586)

University of Hawaii
Department of Agronomy and Soil Science
Honolulu, Hawaii 96822

The Universities of Hawaii and Puerto Rico have formulated two projects with the assistance of United States Agency for International Development (USAID) to undertake some of the necessary research and to design an extension delivery and communications system that will hasten the application of tropical agricultural research. The purpose of the projects are to correlate food crop yields on a network of benchmark soils, and to determine scientifically the transferability of agro-production technology among tropical countries. The benchmark soils will belong to related soil families as defined in the U.S. Soil Taxonomy, because the family is the level in this soil classification system at which transference of technology is providing possible within the United States. They will be red upland soils or soils developed from volcanic ash which in most tropical countries are as yet inadequately used, but have proved highly productive in Hawaii. The workshop, which is the basis of this report, was held to discuss and hopefully to agree upon the experimental designs and research methodology that would be used in the crop production research in these two projects. Particular attention was paid to designs that could provide valid scientific tests of agrotechnology transfer.

PN-AAB-104 \$4.00

CLASSIFICATION OF THE SOIL SERIES OF THE STATE OF HAWAII IN DIFFERENT SYSTEMS

F.H. Beinroth, H. Ikawa, and G. Uehara
August 1974, 109p. (US-631.44-B422)

University of Hawaii
Department of Agronomy and Soil Science
Honolulu, Hawaii 96822

This bulletin describes the three systems of soil classification most widely used in the tropics and provides tables which allow correlation of soils of tropical countries with soil series of Hawaii. In these tables Hawaiian soils are classified according to the U.S., the French, and the FAO/UNESCO soil classification schemes. The basic purpose of these soil correlations is to provide a mechanism through which the agricultural experience developed in Hawaii over more than 70 years of experimentation can be extended to countries with similar soil conditions. In order to establish which Hawaiian soil series corresponds to a particular soil in a given country, two steps are necessary. First, the classification of the soil under consideration should be determined through consultation of soil maps or of local soil scientists. Then either table 2, 3, or 4 should be used to find its equivalent Hawaiian soil series. Information regarding soil management and other agronomic aspects about these soils may be

solicited from the Department of Agronomy and Soil Science, University of Hawaii, 3190 Maile Way, Honolulu, Hawaii 96822, USA.

PN-AAB-105 \$8.10

A SUMMARY OF RESEARCH TO INCREASE THE EFFICIENCY OF CHEMICAL FERTILIZERS

N.C. Brady, Tomio Yoshida, and S.K. De Datta
July 1974, 23p. (633.18072-B812)

The International Rice Research Institute
Los Banos
Laguna, The Philippines

The development and dissemination of fertilizer-responsive varieties of wheat, rice and other cereals has encouraged steady increases in the use of fertilizer in the developing world. Fertilizer-responsiveness is a key factor in differentiating among the traditional rices and the new high-yielding varieties. Only where at least modest levels of fertility are present, do yield differences between the new and the old become significant. Without fertilizer, the new varieties yield a little better than the old. But with fertilizer, their yield potential is often double or even triple that of the traditional varieties (Figure 1). This fact has encouraged fertilizer usage up to rates of 100 or 150 kg/ha by some of the more progressive rice growers, including some small farmers. Current high prices and low supplies of fertilizers will likely limit, for at least the next two years, the quantity of fertilizers, and especially nitrogen, needed to increase rice yields. This has led to increased interest in methods of maximizing yields using low rates of fertilizer.

PN-AAB-106 \$1.95

EFFECTS OF INCREASED ENERGY COSTS ON FERTILIZER PRODUCTION COSTS AND TECHNOLOGY

G.M. Blouin
1974, 33p. (668.62-B657)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

It has been estimated that the energy consumed in the production of all fertilizer products in the United States (roughly 45,000,000 tons of products) amounts to somewhat less than 3% of the total energy consumed in this country. This could be considered to be an almost negligible amount until the actual quantities in the United States alone are considered, i.e., an estimated 1.9 quadrillion Btu (1.99×10^{15}) for fertilizer production out of a gross consumption of about 75 quadrillion Btu (75×10^{15})/year (12). World production of fertilizers outside the United States increases this energy consumption by another 8 to 10 quadrillion Btu/year. Clearly, the magnitude of energy consumption by the fertilizer industry warrants a detailed energy evaluation of the processes involved and of both near-term and far-term (10-year) possibilities of reducing these requirements by substitution of fuel or feedstocks, processes or other products to increase energy efficiencies. This evaluation of the energy requirements of the fertilizer industry was made under the sponsorship of the International Bank for Reconstruction and Development (Industrial Projects Department). The fertilizer processes described have been chosen as representing the most widely adopted processes for the production of available nitrogen, phosphorus, and potash, the three primary plant nutrients. A brief description of each process is included to identify the major energy-consuming unit operations within each process.

PN-AAB-107 \$2.45

AGRICULTURE

IMPROVED FERTILIZERS FOR DEVELOPING COUNTRIES

National Fertilizer Development Center, TVA
1974, 70p. (631.8-T297c)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

This report is a project report covering the period from December 1972 (when the bulletin "Tailoring of Fertilizer for Rice" was issued) through June 1974. The present project is our expansion of the previous project, which was restricted to the use of fertilizer for rice, in that new and improved fertilizers are to be tested on a number of tropical crops. In addition to actual agronomic evaluations of new materials, increased emphasis is placed on developing and demonstrating methods of introducing new fertilizers to farmers so that they will be properly used or they become commercially available. Additional data has been received from a number of countries pertaining to the use of SCU for rice. In general, these data tend to substantiate those previously reported in that SCU is a superior source of N for rice grain under conditions of intermittent flooding, but that it is no better than conventional sources of N when conditions of intermittent flooding or severe leaching do not exist. A discussion of the commercial potential of SCU in tropical agriculture follows this section. Insufficient data are available for tropical crops other than rice to warrant any general conclusions at this time.
PN-AAB-108 \$5.20

TRANSFER OF KNOWLEDGE IN FERTILIZER RESEARCH AND DEVELOPMENT WITH SPECIAL EMPHASIS ON EXPANDING THE TVA FERTILIZER PROGRAM TO DEVELOPING COUNTRIES

Darrel A. Russel, J.H. Parker, John T. Shields, and B.J. Bond
October 1974, 24p. (631.8-R959)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

A.I.D. Workshop on Research information networking

TVA is constantly evaluating its international research and technical assistance efforts. The program is continually changing to keep pace with changes in the world food and fertilizer situation. To keep abreast of new developments and opportunities for improvement in fertilizer programs in developing countries, TVA staff participates in a host of country, regional, and global conferences and seminars. Through its work and cooperation with other international organizations, TVA is helping to improve food production and the well-being of the developing world's population.
PN-RAA-227 \$1.95

TVA'S DEVELOPMENT OF SULFUR-COATED UREA

R.D. Young
1974, 52p. (668.6241-Y75)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

Sulfur-coated urea (SCU) is the culmination of about 15 years of TVA work on development of controlled-release nitrogen fertilizers. This report covers the development work from laboratory and bench-scale studies, through a small pilot plant of 300 to 600 lbs/hr (136 to 272 kg/hr), and then to a large pilot plant with capacity of 1 to 2 short tons (0.9 to 1.8 metric tons)/hr. The laboratory and pilot-plant equipment are described, operating conditions are outlined, and results of the test work are evaluated. Agronomic tests are being made. Changes in equipment and operating conditions that resulted in the improved

coatings are described. The economics of production of SCU were estimated, and results are given. Plans for a demonstration scale plant are outlined. Under the best practical conditions established in pilot plant tests, the nitrogen in SCU is estimated to cost only about 27% to 34% more per unit than regular urea. This is with urea produced at the facility at an f.o.b. price of \$120/ton and sulfur delivered at \$34/ton. Results from agronomic tests of SCU in 39 U.S. states, 2 U.S. territories, and 26 other countries are summarized. Significant advantages are shown for SCU on several crops and in a variety of cropping situations. Crops for which SCU showed particularly good results include rice under delayed or intermittent flooding, sugarcane, pineapples, fruits and vegetables, forages, and turf. The product also would be very good for horticultural and other specialty fertilizer use. In addition to the several significant advantages of controlled-release of nitrogen, the product has improved storage and handling properties and the sulfur is available as a secondary nutrient.

PN-AAB-109

\$3.85

SULFUR-COATED UREA ESTIMATED COST IN A DEVELOPING COUNTRY

G.M. Blouin
1974, 12p. (338.276-B657)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

Sulfur-coated urea (SCU) is an effective controlled-release nitrogen fertilizer that TVA has developed for commercial production. Its improved agronomic performance and economic attractiveness have been demonstrated on selected crops, particularly intermittently flooded rice and sugarcane. SCU is:

- A controlled-release nitrogen fertilizer that decreases losses of nitrogen through volatilization and/or leaching.
- An exceptionally good product for crops such as rice grown under poor water-management conditions and long-term crops such as sugarcane and pineapple, but not corn, wheat, or other crops that require relatively large amounts of N in a short period.
- A product having good physical properties for handling and storage even under high humidity conditions.
- A product that can be produced by a relatively simple process.
- A somewhat more expensive form of nitrogen, but much less costly than other forms of controlled-release nitrogen.
- A source of sulfur.

PN-AAB-110

\$1.95

ENGINEERING EVALUATION OF SELECTED SEGMENTS OF THE COLOMBIAN FERTILIZER INDUSTRY

D.R. Waggoner and G.M. Spickard
June 1974, 62p. (CO-668.62-W131)

Tennessee Valley Authority
National Fertilizer Development Center
Muscle Shoals, Alabama 35660

This report covers the work of a TVA team which visited Colombia during April of 1974. A team of TVA engineers had previously studied the FERTICOL facility at Barrancabermeja in 1970 and made recommendations for improvement of the operation. Specific objectives of this new study were to:

1. Review the expansion plans recommended by the 1970 TVA team.
2. Consider the feasibility of using domestic sources of phosphate rock to satisfy P₂O₅ demands.

3. Make recommendations concerning the increased use of domestic natural gas sources for nitrogen fertilizer production.

Section I provides general background information. Comments are given concerning use of the natural gas newly discovered in Guajira for producing ammonia and urea. Recommendations to improve the FERTICOL operations are discussed in Section II. Section III contains a discussion of the use of domestic phosphate rock. The technical questions posed by ABOCOL were answered by letter, a copy of which is included in the appendix.
PN-AAB-111 \$4.60

VETERINARY MEDICINE

A BABESIASIS CARD AGGLUTINATION TEST

R.A. Todorovic and K.L. Kuttler
October 1974, 4p. (636.2-T639)

Texas A&M University
Institute of Tropical Veterinary Medicine
College Station, Texas 77843

Published in Am. J. Vet. Res. Vol. 35, No. 10

A babesiasis card agglutination test (BCT) has been developed for detecting specific antibodies in cattle infected with *Babesia bigemina*. The agglutinating antigen was isolated from the blood of a splenectomized calf having 22% *B bigemina* parasitemia. The antigen was preserved with 0.02% formalin and stained with fast green dye. The BCT was performed by adding 1 drop of antigen and 2 drops of plasma or serum on a card and mixing for 5 minutes by rotation. Agglutination was visible in instances of positive reactions immediately after rotation. In cattle intentionally exposed to *B bigemina*, the BCT detected agglutinating antibodies simultaneously with the onset of first parasitemia. This reaction was observed to persist as long as 3 months, or long after the disappearance of parasitemia. Because of its simplicity and apparent specificity, the BCT may have use as a field test to aid in the diagnosis of *B bigemina* infections. The BCT results showed 100% agreement with the complement-fixation (CF) test on those serums prepared from blood collected within 3 months of infection.
PN-AAB-112 \$1.95

INFECTIVITY AND IMMUNOGENICITY OF IRRADIATED BABESIA RODHAINI

J.P. Bishop and K.L. Kuttler
1974, 3p. (636.089072-B622)

Texas A&M University
Institute of Tropical Veterinary Medicine
College Station, Texas 77843

Published in J. Protozool. Vol. 21, No. 5

Babesia rodhaini-parasitized mouse blood exposed to varied doses of γ radiation up to 30 kRad was inoculated into mice. Mice inoculated with nonirradiated *B. rodhaini* developed progressive infections and died 7-11 days postinoculation. Mice infected with *B. rodhaini*-parasitized blood exposed to doses up to and including 22 kRad developed progressive parasitemias which were delayed in comparison to mice inoculated with non-irradiated *B. rodhaini*. Some mice receiving parasitized blood irradiated at 26 kRad did not develop progressive parasitemias. Progressive infections were prevented by exposure to irradiation at 30 kRad. The results of 2 separate experiments revealed that one inoculation of parasitized blood exposed to 30 kRad or higher apparently stimulated a resistance to a challenge infection with nonirradiated parasitized blood. While 20 of 20 control mice died as a result of challenging infections, 9 of 28 mice previously exposed to irradiated parasitized blood survived. The injection of ir-

radiated nonparasitized blood did not produce a discernible acquired resistance to *B. rodhaini*. Presumably the irradiated blood was responsible for the development of acquired resistance to *B. rodhaini*.
PN-AAB-113 \$1.95

ISOLATION OF A BOVINE THEILERIA

K.L. Kuttler and T.M. Craig
March 1975, 3p. (636.2-K97e)

Texas A&M University
Institute of Tropical Veterinary Medicine
College Station, Texas 77843

Published in Am. J. Vet. Res., Vol. 36, No. 3

Dual infections of *Anaplasma marginale* and a *Theileria*, resembling *Theileria mutans*, occurred in splenectomized calves inoculated with pooled blood samples from eastern Texas cattle. *Theileria* was obtained in pure form by treating dually infected cattle with gloxazone and imidocarb which selectively eliminated *Anaplasma*. These theileria infections were responsible for mild, transient reductions in packed red blood cell volume (PCV).
PN-AAB-114 \$1.95

OBTAINING SUPPORT FOR RESEARCH ON ANIMAL HEALTH

Fred D. Maurer
1974, 2p. (636.089072-M453)

Texas A&M University
College of Veterinary Medicine
College Station, Texas 77843

Published in the American Veterinary Medical Assoc. Vol. 165, No. 2

For the past 20 years, the bulk of research support has come from outside sources, primarily from agencies of the federal government. Now, with great curtailment of federal funds, monies for research are being directed even more toward the solution of major human disease problems such as cardiovascular disease, cancer, environmental pollution, and drug effectiveness. Research on these problems necessarily involves extensive use of experimental animals; hence, the role of research veterinarians remains important and many are involved. However, this relative scarcity of federal funds and their national problem orientation can be expected to free some highly competent research veterinarians in veterinary colleges and animal experiment stations for other research. This situation can be an opportunity for the U.S. livestock industry to have previously unavailable top quality research talent apply itself to the solution of animal health problems which have long imposed serious handicaps on efficient, economical production. Likewise, by working closely with the livestock industry, veterinary research scientists can identify new opportunities for research support.
PN-AAB-115 \$1.95

A COMPARISON OF THE ANTIGENIC PROPERTIES OF ERYTHROCYTIC BABESIA BIGEMINA IN ACUTE AND CHRONIC BLOOD BORNE AND TICK BORNE INFECTIONS IN CATTLE

Kenneth Carl Thompson
May 1974, 191p. (636.2-T473)

Texas A&M University
Institute of Tropical Veterinary Medicine
College Station, Texas 77843

The purpose of this study was to determine possible antigenic differences in the causative organisms of the acute and chronic

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blood borne and tick borne *Babesia bigemina* infections of cattle. It was anticipated that the results of the research would further aid in the understanding of the mechanism of immunity of babesial infections. In addition, the antigens may possibly be used in the development of new serologic techniques or vaccines. Thirty-six intact calves were divided into 16 groups of 2 (or 3) and each group inoculated with infective *Babesia* erythrocytic stabilates. Twenty-eight days later they were homologously and heterologously challenged from the same stabilates, and monitored for an additional 20 days. The antigenic variations were more evident by in vitro than in vivo reactions. On the basis of the serological results, antigenic variation within an isolate of *B. bigemina* occurred. Antigenic variation appeared to be influenced by the mode and duration of infection. The hosts' apparent reduced response to homologous challenge and the marked immune response observed with heterologous systems indicated antigenic differences of the *B. bigemina* and confirmed the serological data under the experimental conditions used in this investigation.

PN-AAB-116 \$14.15

THE DEVELOPMENT OF AN INDIRECT FLUORESCENT ANTIBODY TEST FOR TRYPANOSOMA VIVAX IN COLOMBIA

Kenneth Bradley Platt
May 1974, 160p. (CO-636.2-P719)

Texas A&M University
Institute of Tropical Veterinary Medicine
College Station, Texas 77843

An indirect fluorescent antibody test (IFAT) for *Trypanosoma vivax* infections was developed for a survey involving over 2000 cattle distributed throughout 11 department and territories in Colombia. Antigen for the IFAT was derived from a strain of *T. vivax* isolated from a cow in the Department of Cordoba, Colombia. The strain was maintained via serial passage in hemoparasite-free calves. Inoculation of approximately 2×10^9 trypanosomes into splenectomized, triamcinolone acetonide-treated calves resulted in parasitemias suitable for IFAT antigen production at 66 to 69 hours post-inoculation. In field cases of trypanosomiasis, the IFAT was up to 21 times more effective in detecting *T. vivax* — positive cattle on the basis of antibody presence than the thick blood smear technique. Results of the survey revealed the presence of *T. vivax* antibodies in cattle from the department of Boyaca, Cordoba, Meta, Sucre and Valle. No *T. vivax* IFAT antibodies were detected in serums obtained from cattle in the departments of Antioquia, Cauca, Caqueta, Cundinamarca, Tolima and Vichada.

PN-AAB-117 \$11.85

WATERSHED MANAGEMENT

DESIGN OF SMALL WATER STORAGE AND EROSION CONTROL DAMS

A.D. Wood and E.V. Richardson
June 1975, 88p. (627.8-W873)

Colorado State University
Dept. of Civil Engineering
Fort Collins, Colorado 80521

The design criteria and construction methods for small earth and rock-filled dams are presented. The materials and methods to be used are considered for both mechanical and manual labor. Several types of ponds, foundation conditions, and water uses are discussed as design considerations. Special attention is given to the selection of appropriate outlet works and spillways. The construction of earth embankments is quite dependent on available materials, however, placement of water barriers and drains

allows some flexibility in the cross-section design. An appendix is included to address the problem of seepage and its influence on design.

PN-AAB-118 \$6.50

GENERAL ECONOMICS

FACTOR ENDOWMENT CHANGE AND THE STRUCTURE OF COMPARATIVE ADVANTAGE, THE CASE OF JAPAN, 1956-1969

P.S. Heller
1975, 25p. (JA-382.3-H477)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

Using a Leontieff-type analysis, this paper considers the impact of the rapid change in Japan's factor endowment after 1956 on the structure of its comparative advantage in international trade. Exports and imports have been disaggregated by region and degree of development of Japan's trade partners in order to evaluate the persistence of dualism in Japan's trade structure. The results indicate that the disappearance of abundant labor has eroded Japan's comparative advantage in labor intensive goods and caused a convergence in the commodity structure of Japan's exports to developed and underdeveloped economies. Labor-saving technological bias has further accentuated the capital intensification of Japan's export structure.

PN-AAB-119 \$1.95

IMPORT CONTROLS AND PRODUCTION IN TUNISIA DURING THE 1960s

Robert Blake
1974, 45p. (TS-382.3-B636)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This paper examines the effects of the import control system in Tunisia during the 1960s. It discusses (i) Tunisia's import-substitution strategy and the factors which motivated it, (ii) the effects of this system on the terms of trade between industry and agriculture, and (iii) the structure of effective protection accorded to Tunisia's industries. The results indicate a bias in favor of production processes oriented toward the Tunisian rather than foreign markets. The manufacturing industries were promoted relative to primary production. There are also wide divergences among rates of effective protection at the product level, and some of the high rates of effective protection represented subsidization of inefficient producers.

PN-AAB-120 \$3.35

INVESTMENTS, EMPLOYMENT, AND OUTPUT PER MAN IN THE TUNISIAN ECONOMY, 1961-1971

W. F. Stolper
1974, 113p. (TS-338.012-S875)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

An analysis of the overall performance of the Tunisian economy between 1962 and 1971, the period of the Ten-Year Perspective Plan. In the process of the analysis, certain problems of mea-

surement and the solutions adopted are discussed in detail. The manufacturing sector is singled out for special emphasis. Three measures are developed for the analysis: capital-output ratios, capital-labor ratios, and output-labor ratios. These measures are calculated on a disaggregated basis. The major findings are that, though by international standards the performance of the Tunisian economy was very good, the heavy investments concentrated in relatively few industries did not produce commensurate results. The detailed analysis showed that particularly in the public sectors, investments produced insufficient output, were very capital-intensive, and yet produced inadequate output per man. In explanation, a series of policy problems is discussed, including, most importantly the institutional problems of making execution of policy decisions more responsive to the decision of the policy makers. Supporting detail is presented in Appendix Section V and Appendix Tables.

PN-AAB-121

\$8.40

THE FINANCING OF INVESTMENTS IN TUNISIA, 1961-1971

J.G. Kleve

1974, 102p. (TS-332.6-K64)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This study is a detailed analysis of the institutional sources of finance for Tunisia's investment program in the 1960s. After describing the basic macroeconomic patterns of savings and investment in the economy, it examines the savings behavior of the different savings agents. Primary emphasis is accorded to the role of the public sector and in particular, that of public sector enterprises, in the savings and investment process. The interaction of foreign aid and domestic savings is explored. Finally, there is a detailed examination of the flow of funds in the economy, with emphasis on Central Bank and commercial bank behavior over the decade.

PN-AAB-122

\$7.55

MULTINATIONAL OLIGOPOLY IN POOR COUNTRIES: HOW EAST AFRICA GOT ITS PETROLEUM REFINERIES

Barry Herman

1974, 34p. (AFR-332.673-H551)

Michigan University
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

We claim here that the major institutional features of direct foreign investment (i.e., that large multinational firms operate in "imperfect" markets) have implications for the nature and conditions under which direct investments are made and lead to a suggested methodology for studying specific cases. Some of these implications for import-substitution manufacturing investments in poor countries are briefly described, followed by a demonstration that this approach facilitates explanation of direct foreign investment behavior in one sample industry, petroleum refining, and, in particular, explains oil refinery investments in East Africa. Finally, the inefficiency of LDC policies to use foreign investment to obtain oil refinery investments in the 1960s is discussed in the light of realistic alternatives, again using the East African refineries as cases in point.

PN-AAB-123

\$2.50

MEASURING THE COST OF GRANTING TARIFF PREFERENCES

R.C. Porter

1974, 46p. (AFR-382.78-P847)

Michigan University
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This paper is aimed at measuring the welfare cost incurred when partial tariff preferences are granted by one country (or group of countries) to another. Three sources of such welfare cost are considered:

1. Once preferences are granted, the relative prices paid by importers, inclusive of duties, diverge from the relative social costs of importing.
2. The exporters in the country that receives privileged entry to another country's markets may decide to realize part of this advantage through a price rise.
3. The introduction of preferences may lead to distortions of import patterns from the socially optimal.

The techniques developed in the paper are then applied to the preferences accorded in 1971 by the East African Community to certain of its imports from the European Economic Community. This empirical effort suggests that only the first of the three kinds of welfare cost is discernible in the two-year period after the introduction of this very limited EAC-EEC preferential arrangement and that even this first kind of welfare cost was probably extremely small.

PN-AAB-124

\$3.40

CHANGES IN INCOME DISTRIBUTION, 1961-1971

J.G. Kleve and W.F. Stolper

1974, 34p. (TS-301.441-K64)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This paper evaluates the factors underlying the change in Tunisia's income distribution between 1961 and 1971. It concludes that the number of households below the real poverty line has decreased significantly. There has not been any transfer of income from the poorest to the less poor and there does not appear to be an increasing gap between the two groups. It also examines the structure of increases in income among those groups above the poverty lines and notes that improvements in income of wage earners have occurred concurrently with low profits and depreciation. The low profitability of enterprises reflects their inadequate productivity and contribution to the country's rate of economic growth. In fact, Tunisia's substantial growth and the improvement in the standard of living of the less poor was made possible only by capital inflows.

PN-AAB-125

\$2.50

CHINA AND INDIA, A COMPARATIVE SURVEY OF ECONOMIC DEVELOPMENT PERFORMANCE

T.E. Weisskopf

1974, 45p. (FEA-330.95-W428)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This paper draws upon the available evidence from China and

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India to compare systematically the economic development performance of the two nations in the modern postwar period. Three broad economic objectives of development are identified: economic growth, economic equity and economic self-reliance. Separate sections of the paper are devoted to a comparison of the progress made by China and India with respect to each of these three objectives. It is concluded that in each respect China has been more successful than India.

PN-AAB-126 \$3.35

A NOTE ON SHADOW PRICING WITH FIXED TAXES

Peter G. Warr
December 1974, 18p. (338.012-W286a)

University of Minnesota
Center for Economic Research
Minneapolis, Minnesota 55455

In particular it is assumed that the only "distortions" in the economy are those due to government tax policy but that from the point of view of government project evaluators all taxes and tariffs have to be taken as given and fixed. The public sector is presumed to be producing the same commodities as the private sector, so the analysis is concerned only with the valuation of private goods. Public goods are ignored. Note also that the international prices of traded commodities are set at unity. If public projects are given the shadow price vector, s , it is assumed that designers, evaluators and managers of public projects will attempt to maximize $s \cdot x$, the value of public production at these prices, with respect to the public production vector x , subject to $G(x) = 0$, the implicit production function obtaining in the public sector. Confining ourselves to interior solutions, as DS implicitly do, this requires

$$\frac{\varphi G / \varphi x_i}{\varphi G / \varphi x_0} = \frac{G_i}{G_0} = s_i, \quad i, 0 \varphi D,$$

where the shadow price of the numeraire, commodity 0 (assumed to be traded, domestically produced and consumed) is set at unity. The objective of our exercise, then, is to find the value of G_i/G_0 at the optimum and set shadow prices equal to this ratio.

PN-AAB-127 \$1.95

FOREIGN TRADE REGIMES AND ECONOMIC DEVELOPMENT: TURKEY

Anne O. Krueger
1974, 364p. (TU-382.3-K94)

National Bureau of Economic Research
261 Madison Ave.
New York, N.Y. 10016

Also Published by Columbia University Press, New York, N.Y.

In this study the author examines the relationship of the Turkish foreign trade and balance of payments experience to Turkish economic growth. The book is not intended as a comprehensive study of the Turkish economy, but rather as an in-depth analysis of those factors affecting the interaction between foreign trade and growth. In Part One the author presents an overview of the Turkish economy and its growth and places the foreign trade sector in perspective. The structure and growth of the Turkish economy and the major government policies influencing growth are discussed. In Part Two the author is concerned with the origins and results of the devaluation-cum-liberalization experience of 1958 to 1960, regarded as corresponding to Phase III in the terminology developed for the project. In Part Three, Professor Krueger analyzes the return to a Phase II type of experi-

ence in the 1960s, examining the role of planning in that period and its interaction with trade and payments, the import regime, and the determinants of foreign exchange earnings with primary emphasis on export behavior. In Part Four she focuses on the resource-allocation effects and growth effects of Turkey's trade and payments experience and summarizes the main conclusions of her study. Four appendices provide supplementary information, including a brief report on the 1970 devaluation and its aftermath.

PN-AAB-128 \$26.95

FOREIGN TRADE REGIMES AND ECONOMIC DEVELOPMENT: GHANA

J. Clark Leith
1974, 237p. (GH-382.3-L533)

National Bureau of Economic Research
261 Madison Avenue
New York, N.Y. 10016

Also Published by Columbia University Press, New York, N.Y.

In 1957 Ghana became an independent nation with a promising start as one of the wealthiest, most successful and politically mature regions of Black Africa. The Nkrumah government employed economic planning, state enterprises, foreign exchange licensing and control, and internal price controls in order to further the transformation of this former colony into a politically and economically independent state. However, in 1966 these policies were rejected by a military coup. The National Liberation Council (NLC) government formed by the military was committed to the reestablishment of a relatively free political and economic system. Economic controls were relaxed and a civilian government was freely elected, but the new government failed to solve a serious balance of payments problem, and on January 13, 1972, another military coup took place. In this study, the author examines, in great detail, the system of exchange control and attempted liberalization undertaken between 1957 and 1972. He begins with a review of the evolution of the restrictive system in which he examines the workings of the instruments brought to bear on the foreign sector. Then the effects of this restrictive system on the Ghanaian economy are studied. Both the Ghanaian allocation of resources and the growth effects are considered. In five years the control system was discredited and gradual liberalization, beginning with devaluation, was put into effect. A description of the nature, timing, and magnitude of the steps taken to liberalize the system is outlined. A final chapter draws together the major conclusions of the study.

PN-AAB-129 \$17.55

REVIEW OF INCOME DISTRIBUTION DATA: BRAZIL

Carlos Geraldo Langoni
April 1975, 49p. (BR-339-L284)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

The first purpose of this paper is to survey the most important sources of data: the Demographic Census, published by the Brazilian Institute of Geography and Statistics (IBGE), the Income Tax data, published by the Ministry of Finance, and the 2/3 Law data published by the Ministry of Labour. Each of these has different coverage and may be used to achieve specific objectives of the analysis. We are going to describe the characteristics of each source of data and to point out briefly the ways in which these data have been analyzed in studies published about income distribution in Brazil.

PN-AAB-130 \$3.60

REVIEW OF INCOME DISTRIBUTION DATA: COLOMBIA, MEXICO AND VENEZUELA

Urrutia M. Miguel
April 1975, 43p. (LAT-339-U81)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

The purpose of this paper is to analyze the existing studies and statistical data which can be utilized for an in-depth analysis of income distribution problems in Colombia, Mexico and Venezuela. In addition, at the end of each country study the author has attempted to discuss briefly which distribution issues seem to be of interest in each of the three nations. In order to make the exposition more orderly, he has organized the discussion in three parts, each of them corresponding to one of the countries studied.

PN-AAB-131 \$3.20

REVIEW OF INCOME DISTRIBUTION DATA: GHANA, KENYA, TANZANIA AND NIGERIA

Adedotun O. Phillips
April 1975, 43p. (AFR-339-P558)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

In this paper the author attempts three things in respect to each of the four countries under study. First, existing studies of income distribution will be surveyed. Secondly, there will be an appraisal of data availability for future income distribution studies. Lastly, some indications will be given as to desirable areas of emphasis in future studies of income distribution problems in these countries. The unfortunate yet inevitable conclusions of this exercise are that: (1) to date, studies of income distribution in these countries have been thin on the ground; (2) in the few analyses that exist, size distribution has received very scant attention; (3) data availability is not very encouraging, especially in the two East African countries; (4) in most respects, long time-series data are hard to come by, and where they exist the time span covers less than fifteen years; (5) even though the differences between the traditional and modern sectors are all too visible in these countries, existing statistics are not easily divided along these lines for income distribution purposes; and (6) much of future research activities must be oriented toward generating the required distributional data.

PN-AAB-132 \$3.20

REVIEW OF INCOME DISTRIBUTION DATA: PAKISTAN, INDIA, BANGLADESH AND SRI LANKA

Indira Rajaraman
April 1975, 82p. (NEA-339-R161)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

Surveys of household income and consumption are systematically conducted in all the four countries studied here, with varying periodicity. In Section I, a careful assessment is made of the reliability of these surveys. The assessment is done at two levels. At the first level, if there is reason to believe that the primary data from the surveys will be available, what is important is the reliability of the sampling frame used, the sample design adopted, and the concepts used in the formulation of the questionnaire. At the second and more likely level, if there is reason to believe that the primary data from the surveys will not be available, there is the additional consideration of the quality and coverage of the tabulated output. For any estimation of trends in

the absolute condition of the poorest $x\%$ of the population, or of the degree of relative inequality, however, a second crucial input must be price data. Section II explores the options available on this front. In Section III directions for future data collection are looked at. If the object of such empirical work is the estimation of relative inequality within either the population as a whole or sub-groups thereof, there is no alternative available but to overhaul the present surveys (even more importantly, the tabulated output of these surveys) along the lines suggested in Sections I and II, or to conduct independent surveys along the recommended lines.

PN-AAB-133 \$6.10

REVIEW OF INCOME DISTRIBUTION DATA: KOREA, THE PHILIPPINES AND TAIWAN

Hakchung Choo
April 1975, 42p. (FEA-339-C548)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

The main purpose of this study is to assess data availability and problems with data for future research in collaboration with the joint Princeton University/Brookings Institution project on income distribution in developing countries. This report covers three geographically proximate Asian countries — Korea, the Philippines and Taiwan. Following the guidelines provided by the project, this survey consists of three major parts. First, existing studies on income distribution for the three countries are briefly reviewed with emphasis on methodology and on conclusions and findings. Secondly, availability of, and problems with, data relating to income distribution are examined carefully, noting the differences in definitions and classifications among these countries. Also an effort is made to assess the availability of data for consistency checks and for specific interest areas of the joint project. The last chapter deals with some suggestions for particular lines of inquiry for future research, especially in connection with problems of data sources and in view of existing studies on income distribution for this region.

PN-AAB-134 \$3.10

REVIEW OF INCOME DISTRIBUTION DATA: THAILAND, MALAYSIA AND INDONESIA

Oey Astra Meesook
April 1975, 60p. (FEA-339-M495)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

The main purpose of this study is to assess data availability and problems with data for future research in collaboration with the joint Princeton University/Brookings Institution project on income distribution in developing countries. This report covers three geographically proximate Asian countries — Thailand, Malaysia and Indonesia. Following the guidelines provided by the project, this survey consists of three major parts. First, existing studies on income distribution for the three countries are briefly reviewed with emphasis on methodology and on conclusions and findings. Secondly, availability of, and problems with, data relating to income distribution are examined carefully, noting the differences in definitions and classifications among these countries. Also an effort is made to assess the availability of data for consistency checks and for specific interest areas of the joint project. The last chapter deals with some suggestions for particular lines of inquiry for future research, especially in connection with problems of data sources and in view of existing studies on income distribution for this region.

PN-AAB-135 \$4.45

ECONOMICS

INCOME DISTRIBUTION AND GROWTH IN LESS DEVELOPED COUNTRIES: SOME REFLECTIONS ON THEORY AND POLICY

Charles R. Frank, Jr. and Richard Webb
July 1974, 65p. (339-F828)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

In this paper we first consider, in Section II, some simple theoretical models of income distribution and growth in less developed countries with emphasis on the distinction between the traditional (or informal) sector and the modern sector. In Section III, we discuss the case of extreme dualism in which incomes in the modern and traditional sectors diverge very significantly and the divergence seems to grow. In Sections IV and V, respectively, we analyze the income distribution implications of the distribution of human capital assets and of private physical assets among the population. In Section VI, we discuss how government expenditure and taxation policies can modify the distribution of income. In Section VIII, we consider the various policy options available which might alter the distribution of income and the theoretical constructs useful in the analysis of these policies. We identify four distinct sets of policies: (1) market interventions, (2) confiscatory policies, (3) redirection of public services, and (4) government expenditure-oriented policies. Each of these policy sets is analyzed in a different manner.

PN-AAB-136

\$4.80

INFLATIONARY FINANCING, INDUSTRIAL EXPANSION, AND THE GAINS FROM DEVELOPMENT IN BRAZIL

D.L. Huddle
1975, 45p. (BR-332.414-H884)

Rice University
Program of Development Studies
Houston, Texas 77001

(In Program of Development Studies, No. 60)

The main concern is how inflation interacted with the distribution of income in Brazil through the structure of demand — both as a cause and as a result. In Latin America there is the phenomenon of “locked inflation” in which inflation rates increase, growth diminishes, and distribution of income is such that demand will not sustain the pattern of industrial production already achieved. The disequilibrium in commodity markets was partly the result of government subsidization of investment in industry which resulted in a transfer of income to the entrepreneurial class. The added spending by this class was primarily for luxury goods and investment goods which are more capital-intensive than wage goods. Thus, the implicit tax of inflation on wage earners was reinforced by a relatively reduced demand for labor services. The inflation could have eventually led to a lock-in whereby further economic growth became impossible with or without inflation, and without continued and increasing foreign aid and/or exports. Since foreign aid has been diminishing, if growth based upon expansion of exports became less feasible over time, the lock-in could become inevitable. Through the use of budget studies, simulation, production data, factor intensity and input-output we determined that although credit distribution was heavily biased, and worsened income distribution, consumer demand was never sufficiently weak to support a lock-in in Brazil.

PN-AAB-137

\$3.35

A PROPOSAL FOR RESEARCH ON DISTRIBUTION OF GAINS, WEALTH AND INCOME FROM ECONOMIC AND POLITICAL DEVELOPMENT

James W. Land
Summer 1972, 71p. (301.441-R497)

Rice University
Program of Development Studies
Houston, Texas 77001

The Program of Development Studies is primarily concerned with the role income distribution plays in determining the development of a country and the way such development affects the distribution of income. The research necessarily requires considerable interdisciplinary cooperation. Discussion Paper No. 24 considers the following specific issues in relation to the Program: (1) the effect of distribution of wealth and income on the growth and investment strategy pursued by government and private economic decision-making units; (2) the determination of tax type and its base and, indirectly, the level of government expenditures through distribution and size of income; (3) the extent to which differences in political parties and public policies are the result of compromise between those seeking rapid economic growth and those seeking a more equal distribution of gains from growth; (4) the sense in which differences in development programs reflect only responses to desires of different elitist economic, political, regional, and social groups; (5) the determination of the role of foreign investment by distribution of income; and (6) the creation of inflationary pressures. The author deals with what he considers the most important aspects of the distribution of gains from development insofar as it effects the rate and composition of growth, political and social development, and the economic and political strategy pursued to achieve development.

PN-AAB-138

\$5.25

AGRICULTURAL CREDIT

THE INTERACTION OF CREDIT AND UNCERTAINTY IN DETERMINING RESOURCE ALLOCATION AND INCOMES ON SMALL FARMS, SURAT DISTRICT, INDIA

Michael G.G. Schluter
February 1974, 80p. (IN-332.71-S346a)

Cornell University
Department of Agricultural Economics
Ithaca, New York 14850

This study examines factors constraining small farmers from intensifying production through adoption of new cereal varieties, increasing fertilizer use, dairying, and changes in cropping combination. The primary data source is a cross-section survey of 120 farmers in Surat District, for 1971-72. The sample is drawn equally from high, middle and low income villages, but is stratified so that the proportion of small farmers is similar to that in India as a whole. The study concludes that expanding cooperative credit availability would increase fertilizer use, and encourage a shift to higher income crops (new varieties and sugarcane) on irrigated small farms. Greater flexibility of loan repayment would make small farmers more willing to use available credit. On unirrigated farms, research must play a vital role both to increase yield levels, and to develop varieties or cultivation practices which will minimize yield losses in years of low rainfall.

PN-AAB-139

\$5.90

AGRICULTURAL ECONOMICS**THE PRICING OF AGRICULTURAL CAPITAL INPUTS IN PAKISTAN**

Mohammad Afzal, Rauf Azhar, Mohammad Ahsan, Dana G. Dalrymple, Lyle P. Schertz, and James R. Sayre
1974, 89p. (PK-338.13-D151)

U.S. Department of Agriculture
Economic Research Service
Washington, D.C. 20250

In order to study the prices and the pricing process of three main capital goods in agriculture, viz., fertilizers, tractors and tubewells, it was decided to conduct a preliminary field survey wherein farmers as well as firms and agencies involved in the import, production and distribution of the three capital goods were interviewed with the help of specially prepared questionnaire. The interviews were carried out in November and early in December, 1973 in Peshawar, Islamabad, Lyallpur, Lahore, Karachi, Hyderabad, and Quetta areas, thereby covering all major regions of Pakistan. The three capital goods studied involve somewhat different production and pricing processes. Fertilizer is manufactured domestically as well as imported. The marketing margins and the retail prices are set by the Central Government. Tractors are at present imported but there are plans for domestic assembly. Trading margins and prices of tractors are also controlled by the Central Government. Tubewells are manufactured in Pakistan from imported raw materials and components. While the Central Government does not fix margins or retail prices, it does influence them through its regulation and distribution of raw material inputs. Thus, one could say that the results of the survey basically reflect administered pricing. However, it may be pointed out that the prices actually paid by the farmers are often in excess of those fixed by the Government. The three capital inputs have been discussed in three separate chapters and received identical treatment consisting of a review of the structure of distribution, an examination of costs and prices, and finally, a review of problems and issues. Since prices are affected by the institutional structure, a certain amount of overlap is involved. Some of the policy discussions deal as much with structure as with price.

PN-AAB-140

\$6.60

GENERATING EMPLOYMENT IN RURAL AREAS

Gunvant M. Desai and Michael G.G. Schluter
June 1974, 11p. (IN-331.763-D441)

Cornell University
Department of Agricultural Economics
Ithaca, New York 14850

This paper suggests policy measures for generating additional employment in the farming sector by inducing certain changes in the cropping pattern. A starting point is the proposition that different crops require different amounts of labor and it is possible to grow alternative crops under almost all conditions. In situations where the labor requirement of alternative crops vary widely, cropping pattern is, perhaps, the most important determinant of the level of rural employment. It is suggested that policies to induce changes in the cropping pattern have a relatively short gestation period, particularly because certain changes seem possible even without creation of additional infrastructure; in some situations investible surpluses in the rural areas could be mobilized to establish industries which would change the cropping pattern in favor of labor intensive crops; the increment in employment is of an on-going nature; wage income generated would always exceed the amount of expenditure incurred; and finally, these policies would contribute simultaneously to the twin objectives of growth and raising income of the poor.

PN-AAB-141

\$1.95

MODERNIZING AGRICULTURE, EMPLOYMENT AND ECONOMIC GROWTH — A SIMULATION MODEL

John W. Mellor and Mohinder S. Mudahar
June 1974, 43p. (331.11-M527)

Cornell University
Department of Agricultural Economics
Ithaca, New York 14850

This paper presents a simulation model which grows out of concurrent formulation of a conceptual framework by Lele and Mellor. The simulation model emphasizes the role of foodgrains as a basic wages good constraint to employment, and the relationships between income from foodgrains production and demand for employment creating goods and services. Particular emphasis is given to demand for various agricultural commodities and the effect of different, technologically induced income distribution patterns on that demand. Using a simulation approach allows experimentation on the economy described by the simulation model. Here, the main focus is on determining the growth and level of employment in various sectors of the economy in response to technological change and household demand patterns.

PN-AAB-142

\$3.20

EMPLOYMENT GENERATION IN AGRICULTURE: A STUDY IN MANDYA DISTRICT, SOUTH INDIA

W. G. Donovan
June 1974, 53p. (IN-331.763-D687a)

Cornell University
Department of Agricultural Economics
Ithaca, New York 14850

A detailed, micro study of the effect of changes in combination of enterprises on income and employment with particular reference to new production technologies and labor intensive enterprises. The data for the study came in large part from farm surveys in Mandya district, Karnataka, and from a survey of laborers employed in rural public works schemes. Those detailed data then provide the basis for analysis of various policy alternatives for increasing the participation of landless laborers in the fruits of economic growth. The study examines a wide range of such potentials and compares their implications in different types of physical conditions and in comparison with public works and other means of expanding employment. Attention is also given to policy measures for facilitating increased labor intensity in agricultural production.

PN-AAB-143

\$3.90

FOOD AID AND INTERNATIONAL ECONOMIC GROWTH

Uma K. Srivastava, Earl O. Heady, Keith D. Rogers, and Leo V. Mayer
1975, 162p. (338.91-S774)

Iowa State University
Dept. of Agricultural Economics
Ames, Iowa 50010

The study reported in this book was made to better quantify the effects of previous food aid programs on development, producer and consumer welfare, agricultural progress, and fiscal structures in recipient countries. Analysis is made of conditions under which consumer welfare can be enhanced and farmers can be insulated from negative price impacts. The reference country is India. The study was made at the invitation and under the financing of the United States Agency for International Development. The results contained herein are only part of those forthcoming from the cooperative project carried out in the Center for Agricultural and Rural Development of Iowa State University.

PN-AAB-144

\$12.00

ECONOMICS

OPTIMAL ALLOCATION OF AGRICULTURAL RESOURCES IN THE DEVELOPMENT AREA OF PATACAMAYA, BOLIVIA, A LINEAR PROGRAMMING APPROACH

Claudio Pou
1972, 479p. (BL-338.1-P872)

Iowa State University
Department of Economics
Ames, Iowa

Economic questions such as farm sizes and profits are considered. Farm size is defined as the number of persons on the cooperative farm, actual size of the farm, and the degree of mechanization. The farm size providing the highest income per person in the cooperative is about fourteen hectares per person. If a loss of ten percent income is acceptable, the farm size can be reduced to seven hectares per person. It is more advantageous to raise crops than sheep, because sheep raising yields lower profits and requires a higher use of labor. Partial mechanization is better for smaller farms, while full mechanization is more profitable in larger farms. This pattern evolves because the smaller farms have a higher land-to-land ratio. Recommendations suggest the renting of land, upgrading of managerial and mechanical skills, standardized record keeping, and availability of an agricultural economist.

PN-AAB-145 \$35.45

ANIMATION RURALE AND ENCADREMENT TECHNIQUE IN THE IVORY COAST

H.J.C. Elliott
1974, 35p. (IV-630.96668-E46)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

The strategy for increasing output in savannah regions of the Ivory Coast has gone through several phases: a period of coercion in the war years; government support of cooperatives in the pre- and immediate post-Independence period; crop-specific extension and rural "animation" throughout the 1960s; and recent experiments with a transformation approach based on mechanized cultivation. This paper discusses the strengths and limitations of each of these approaches as they apply to the development of rice and cotton, focusing on how successfully the strategy made the crop attractive to the farmer and how well it broke critical supply, production, and marketing bottlenecks.

PN-AAB-146 \$2.60

AGRICULTURAL DEVELOPMENT ON THE BRAZILIAN FRONTIER: SOUTHERN MATO GROSSO

John H. Sanders and Frederick L. Bein
January 1975, 39p. (BR-338.1-S215)

University of Minnesota
Institute of Agriculture
St. Paul, Minnesota 55108

The shifting systems of cultivation to new crop areas as older areas deplete their soil has been frequently criticized. However, given the relatively elastic supply of virgin land especially on the frontier and the high price of biochemical substitutes for land in the form of fertilizer and fertilizer-responsive varieties, the expansion of conventional inputs is an entirely rational method to increase agricultural output. Moreover, the magnitude of this population reshuffling needs to be emphasized. The net migration to the frontier states from 1950-1970 involved 2.8 million migrants and enabled these states to expand their roles in

Brazilian crop production. From 1950 to 1970 Parana increased its share of total Brazilian crop area from 8.3 to 14.7 percent, Goias from 2.0 to 5.0 percent, and Mato Grosso from 0.7 to 1.7 percent. This paper is concerned with the implications of this large-scale in-migration in Mato Grosso for agricultural development and with the rapid expansion of agricultural mechanization in this frontier area. Little substitution for land with chemical fertilizer has taken place and a final section offers some hypotheses for this.

PN-AAB-147 \$2.90

A CES APPROACH TO THE MEASUREMENT OF INDUCED FACTOR AUGMENTATION: A TEST FOR JAPAN

Patrick Yeung and Terry L. Roe
January 1975, 37p. (JA-338.1-Y75)

University of Minnesota
Institute of Agriculture
St. Paul, Minnesota 55108

The Hicksian version of the induced innovation hypothesis focuses the cause of technological change on changes in relative input scarcities. The importance of this hypothesis lies in considering the source of technological change, not as exogenous, but as endogenous to the system within which this change takes place. The various attempts at empirical verification of the hypothesis have also been discussed. A shortcoming of these attempts is that they do not explicitly consider the mechanism which induces the biases. Also, they cannot consider the rate of technical change and its direction within the same model. To overcome this weakness, a more direct test of the induced innovation process is devised with Ahmad's framework. A factor augmenting CES production function is formulated so as to derive a direct test of the hypothesis that relative factor prices are a determinant of technical change biases. The major objectives of this paper are to demonstrate this approach and to report the results from its application to the case of Japanese agriculture from 1880 to 1940.

PN-AAB-148 \$2.75

TRANSPORT COST AND OTHER DETERMINANTS OF THE INTENSITY OF CULTIVATION IN RURAL ZAIRE

Lucy Cardwell and James McCabe
April 1975, 37p. (CG-331.127-C269)

Yale University
Economic Growth Center
New Haven, Connecticut 06520

In this paper the authors analyze variables which may be expected to have opposite qualitative effects on rates of rural-urban migration and rural employment density. These variables include factors influencing the terms of trade faced by farmers such as the monopsony power of individual buyers, and the cost and availability of transport. They also include factors influencing the real opportunity wage in nearby cities such as money wages and commodity prices. *A once and for all* change in these variables will in a static model with no population growth alter agricultural employment permanently and bring about a short-run, though significant, deviation in the rural-urban migration rate from a stationary equilibrium. In Part II a simple partial equilibrium model relating agricultural employment to transport cost and market structure is presented. Part III outlines the empirical procedure used and tests some of the main relationships derived from the model, based on micro cross-section data from the 1970 agricultural census of Zaire. The last section summarizes the policy implications of our analysis.

PN-AAB-149 \$2.75

AGRICULTURAL MARKETING

STUDY OF THE TUNISIAN GRAIN MARKETING SYSTEM

Harry B. Pfost, Reynold Dahl, William Thornburrow, and Kenneth Steinke
August 1974, 100p. (TS-338.1731-P531)

Kansas State University
Food and Feed Grain Institute
Manhattan, Kansas 66506

The Kansas State University team studied the grain storage and marketing system from the time of harvest through the point of processing for food or feed. Storage facilities for grains at the buying centers of the Office of Cereals are inadequate and much grain is stored outside where it is subject to weather damage. The construction of an estimated 100,000 tons of additional bulk storage is recommended; the cost would be approximately 1,400,000 Dinars. Storage facilities through the remainder of the grain marketing system appears adequate. Storage facilities at the local level for seed and fertilizer are inadequate. The additional storage recommended above should provide facilities for storing agricultural inputs. An oversimplified grain pricing structure which does not reflect storage and transportation costs leads to inefficiencies in the over-all marketing system. For example, flour mills have much empty storage space which is not utilized because there is no price incentive to store. Transportation from point to point within the country may not reflect the cheapest routing because of oversimplification of cost for transportation. The problem of supplying farm inputs, handled through the grain marketing centers, should be studied to determine if the system could be improved to provide farmers with seed and fertilizer at the time when needed. Other recommendations are covered in the Section IX.

PN-AAB-150

\$7.40

RECOMMENDATIONS FOR IMPROVING PHILIPPINE GRAIN MARKETING AND PRICE STABILIZATION PROGRAMS

Richard Phillips
May 1974, 46p. (RP-338.1731-P562)

Kansas State University
Food and Feed Grain Institute
Manhattan, Kansas 66506

Several key factors affecting Philippine grain management in the New Society need to be recognized. The experience of coping with the severe rice shortages last fall have created renewed awareness of the importance of grain management, including corn and wheat products as well as rice. The sharp rise in prices of petroleum fuels and nitrogenous fertilizers has increased grain production costs significantly in the Philippines and around the world. Consumers are forced to spend larger percentage of their incomes for the staple foods. World reserves of grain stocks are at unprecedented lows. Higher priorities must be placed on minimizing waste and other losses, on efficient handling, processing and distribution, and on the management of storage stocks. The long-term upward trend in total domestic rice and corn production barely has been able to keep up with the increasing household requirements. Average annual imports of rice, corn and wheat have had to be increased slightly over the past 20 years. The current all-out efforts to close the production gap are hampered by tight supplies of critical farm inputs, particularly fertilizers.

PN-AAB-151

\$3.40

VERTICAL COORDINATION OF FOOD SYSTEMS SERVING LARGE URBAN CENTERS IN LATIN AMERICA

Harold M. Riley and Kelly M. Harrison
May 1973, 14p. (LAT-338.1-R573)

Michigan State University
Department of Agricultural Economics
East Lansing, Michigan 48823

The purpose of this paper is to call attention to the problems of coordinating food marketing systems serving large urban centers with the vertical production-distribution sub-systems that link back to the rural supply areas. Up to this point the Conference has focused its attention upon the organization of retailing and wholesaling activities within the large urban centers. We now want to broaden our perspective to examine the problems of coordinating all phases of the food system which reaches from urban consumer back to the farmer. The paper is divided into four parts: (1) a brief summary of our view of the basic changes in food system organization during the economic development process; (2) some observations about the potential benefits from vertical coordination of food systems; (3) a few examples of vertical coordination arrangements that we have observed here in Latin America; and (4) concluding remarks. The ideas and information in this paper draw upon our research and consulting activities dealing with agricultural marketing problems in Latin America. The primary purpose of these activities has been to carry out diagnostic studies of internal food marketing systems and to formulate recommendations for marketing improvements. In each instance the authors have described and analyzed the food systems serving large urban centers with a particular orientation toward the identification of ways to improve market coordination as a means of reducing food costs to consumers, increasing the volume of food produced and consumed, increasing farmer incomes, and ultimately to stimulating economic development.

PN-AAB-152

\$1.05

GENERAL EDUCATION

COMMUNICATION MEDIA AND TECHNOLOGY: A LOOK AT THEIR ROLE IN NON-FORMAL EDUCATION PROGRAMS

Henry T. Ingle
August 1974, 67p. (371.33-I51)

Academy for Educational Development, Inc.
1414 22nd St. N.W.
Washington, D.C. 20037

This Bulletin contains selective digests of not readily available published and unpublished documents, research reports, summaries, descriptive articles, conference reports, international surveys and observer or participant reports on the use of communication media and technology in non-formal educational projects around the world. Specific instances are cited in which media and technology are being used in these projects, along with background information on each of these efforts with particular emphasis being given to projects in the less-developed regions of the world. The purpose of this publication is to review the role communication media and technology have played in the area of nonformal education, to bring interesting projects and approaches to the attention of others working in this area, and to identify lessons learned from their use which might serve as tentative guidelines for future development. Some sixty countries are cited as having had relevant experiences with the use of the media and technology to provide varying types of learning opportunities and information to their people. Some of these efforts have been successful in terms of fulfilling stated objectives; others have not. Each provides, however, valuable insights into the process of planning for the use of media and technology in non-formal education.

PN-AAB-153

\$4.95

PUBLIC HEALTH

ECONOMICS OF EDUCATION IN SIERRA LEONE

Suhas L. Ketkar
April 1975, 38p. (SL-370.19-K43)

University of Michigan
Center for Research on Economics
Ann Arbor, Michigan 48108

Available from above address for U.S. \$1.00 plus postage and handling

This paper presents a critical evaluation of Sierra Leone's educational system. From benefit-cost analysis, the social profitability of investment in primary and secondary schools is estimated to exceed that in higher education. The manpower requirement and supply projections indicate that the largest shortage is also likely to occur at the middle level. Hence it is concluded that Sierra Leone should place greater emphasis on primary and secondary education. One way of obtaining resources for this is to let the university students bear a larger proportion of total costs. It is argued that such a policy will introduce an element in educational financing.

PN-AAB-154 \$2.80

DEVELOPMENT OF GENERATIVE COMPETENCY-BASED INSTRUCTIONAL SYSTEMS IN AGRONOMIC EDUCATION

P.C. Brams, Jay Shores, and E.A. Brams
1974, 6p. (630.71-B815)

Prairie View A&M College
Department of Agronomy
Prairie View, Texas 77445

(In J. of agronomic education, V.3, p.54-58)

Higher order generative solutions to complex agronomic problems can be attained with accountable open instructional systems. Examples show that increased degrees of openness can be achieved by enlarging the learner's effect on the learning activities and/or evaluation. The degree of complexity of the cognitive or affective determines the appropriate degree of system openness, the greatest degree of openness being commensurate with the highest order generic objectives.

PN-AAB-155 \$1.95

THE CONNECTION BETWEEN EDUCATION AND INCOME DISTRIBUTION

Frederick H. Harbison and Joan Maruhnic
August 1974, 63p. (370.19-H255)

Princeton University
Woodrow Wilson School
Princeton, New Jersey 08540

A very broad definition of education is used in this paper. It has three major components: first, *formal education* at primary, secondary and higher levels consisting for the most part of age-specific, graded, pre-employment schooling; second, *non-formal education* consisting mainly of organized out-of-school education and training programs; and third, *work-related skill and knowledge generation* consisting mainly of training-on-the-job which is an integral component of all working environments. Thus education, as conceived in this paper, encompasses a broad range of learning opportunities and programs. In this context, an education system is more aptly called a "nation-wide learning system". The nation-wide learning system thus is a mixture of formal schooling, nonformal education, and work-related skill acquisition. These three kinds of learning opportunity have an impact on income distribution. More specifically, they may increase the mobility of individuals from lower to higher income groups; they may alleviate or aggravate low-end

poverty; and they may increase or decrease disparities in income between the rich and the poor.

PN-AAB-156 \$4.65

PUBLIC HEALTH

GENERAL PUBLIC HEALTH

EVALUATION PLAN FOR THE DEIDS AND RELATED PROJECTS

David J. Klaus
July 1974, 87p. (614-K63)

American Institute for Research
Washington, D.C. 20016

The Development and Evaluation of Integrated Delivery Systems (DEIDS) Program has been initiated to explore new methods for providing low-cost, far-reaching health services in the developing countries. These efforts are designed to improve overall health and well-being, particularly for those with very low incomes, by furnishing needed medical, nutritional and family planning services where these are not now available. The basic approach of the DEIDS Projects and similar Integrated Health Delivery Programs is the expansion of indigenous health services through the use of innovative techniques intended to increase their outreach, effectiveness and impact. This report describes the development of the model, illustrates its application using the Ecuador DEIDS Project as an example, discusses the features and utilization of the model in planning future health service delivery programs, and presents recommendations as to further steps which should be taken in support of the DEIDS effort.

PN-AAB-157 \$6.45

CONSULTANTS REPORT ON THE HEALTH SECTOR ASSESSMENT HAITI

Arne Barkhuus
July 1974, 17p. (HA-614.097294-B255)

American Public Health Association
1015 Eighteenth St. N.W.
Washington, D.C. 20036

The assessment team consisted of three members: Drs. Arne Barkhuus and Frank Beckles, who spent about 10 weeks in Haiti, and Mr. Gauldbaum of HEW who spent two weeks. Mr. Gauldbaum was largely concerned with an analysis of the financial position of the Ministry of Health and an examination of the organization and functioning of the medical stores. Drs. Barkhuus and Beckles were charged with an examination of the health problems of Haiti in order to provide a basis for an evaluation of the present role of USAID in the health field and the relation of its activities to those of other bilateral organizations, international organizations, and voluntary agencies. Most importantly the consultants were to recommend to USAID practical solutions for some of the most urgent health problems of the Republic. Certain special problems were to be given priority once a general picture of the situation in Haiti had been established; such as:

- (1) Recommendations for the future of the Malaria service (SNEM) specifically with regard to its possible expansion into the rural health field.
- (2) The problem of malnutrition and its relation to a possible development of a low cost rural delivery service.
- (3) The possibility of strengthening the health administration through health planning activities.
- (4) The improvement of MCH services and family planning activities.

PN-AAB-158 \$1.95

PLANNING CONSULTATION TO THE HEALTH SECTOR ASSESSMENT PANAMA

Carl M. Ahlstrom
November 1974, 15p. (PN-614.09862-A285)

American Public Health Association
1015 Eighteenth St. N.W.
Washington, D.C. 30036

The purpose of this consultancy was, in concert with other health professionals under the leadership of Dr. Joseph Davis, to develop the scope of work for the Health Sector Assessment in Panama and initiate documentation of needed health programs. Primary responsibility was indicated for the following:

1. The study of dynamics of changes within the health sector.
2. The study of health sector activities as a vehicle for other rural development activities.
3. The study of health sector administrative problems.
4. Advising on the implementation strategy of the Development Assistance Plan (DAP)

PN-AAB-159 \$1.95

AN ANALYSIS OF THE STRUCTURE, EQUITY, AND EFFECTIVENESS OF PUBLIC SECTOR HEALTH SYSTEMS IN DEVELOPING COUNTRIES, THE CASE OF TUNISIA, 1960-1972

P.S. Heller
1975, 110p. (TS-614.09611-H477)

University of Michigan
Center for Research on Economic Development
Ann Arbor, Michigan 48108

Available from above address for \$1 plus postage and handling

This paper presents an economic analysis of the health and medical sector in Tunisia. After reviewing the structure of investment and recurrent expenditure policy over the first planning decade, it analyzes the effectiveness with which resources are allocated in the health system. It provides a theoretical framework for the analysis of medical referral systems as well as an analysis of (1) the pattern of demand for medical services, (2) the operating characteristics of Tunisia's medical referral system, (3) the causes of capacity underutilization in hospitals and (4) the incidence of government medical expenditure. Finally, the paper evaluates Tunisia's medical manpower strategy.

PN-AAB-160 \$8.15

MOTILITY OF PLASMODIUM BERGHEI OOKINETES IN VITRO

C.A. Speer, M.C. Rosales-Ronquillo, and P.H. Silverman
1975, 6p. (614.4323-S742a)

University of New Mexico
Department of Biology
Albuquerque, New Mexico 87131

(In *J. of invertebrate pathology*, V.25, p.73-78)

Motility of *Plasmodium berghei* ookinetes, which developed in primary and established cell line cultures obtained from *Anopheles stephensi* mosquitoes, was studied by using still photomicrographs and normal speed cinephotomicrography. At 18-72 hr. after inoculation of *P. berghei* infected blood from hamsters or mice, motile ookinetes were seen in both mosquito cell cultures; the most active specimens were observed at 24-30 hr. Ookinetes underwent a sporadic forward gliding movement, during which a variable degree of rotation of the body upon its longitudinal axis usually occurred. Some specimens rotated repeatedly upon their axes without any forward progression. The direction of the gliding movement always coincided with the curvature of the ookinete body. In those specimens in which no

rotation of the body occurred, a circular course resulted. Ookinetes covered a distance of as much as 50 μ m during a single gliding movement. A few ookinetes undergoing locomotion appeared to leave a path or trail on the substrate. Occasionally, an ookinete penetrated a red cell with its slender anterior projection, resulting in lysis of the cell. After red cells had been penetrated by ookinetes, the parasites already within these cells fused with each other to form larger spheroidal bodies. Penetration of cultured cells was not observed.

PN-AAB-161 \$1.95

IN VITRO OOKINETE DEVELOPMENT OF THE RODENT MALARIAL PARASITE PLASMODIUM BERGHEI

M.C. Rosales-Ronquillo and P.H. Silverman
1974, 9p. (614.4323-R773d)

University of New Mexico
Department of Biology
Albuquerque, New Mexico 87131

(In *J. of parasitology*, V.60, No.5, p.819-824; and in V.60, No.6, p.1039-1040)

In vitro development of *Plasmodium berghei* ookinetes occurred in primary cell cultures as well as established cell lines from *Anopheles stephensi* Liston (Diptera: Culicidae). Two morphological forms of viable ookinetes were observed in cultures conditioned within a constant temperature ranging from 18 ± 1 C to 21 ± 1 C for 2 to 24 hr. in fresh serum-free minimum essential medium (MEM) prior to inoculation of infected blood. Ookinetes exhibited either gliding, snakelike, or spiral forward movements. Some ookinetes apparently attempted to penetrate red blood cells (RBC), usually indenting the surface of the RBC. Factors which might influence ookinete formation such as temperature, pH, age of cell cultures employed, and length of time the cultures were maintained at constant temperatures (ranging from 18 ± 1 C to 21 ± 1 C) prior to inoculation of infected blood are discussed.

PN-AAB-162 \$1.95

QUALITATIVE ANALYSIS OF PHOSPHOLIPIDS ISOLATED FROM NONVIABLE PLASMODIUM ANTIGEN

Raana Beckwith, Robert H. Schenkel, and Paul H. Silverman
February 1974, 9p. (614.532-B397)

University of New Mexico
Department of Biology
Albuquerque, New Mexico 87131

Published in *Experimental Parasitology*, Vol. 37, 1975

Plasmodium berghei infected mouse blood, and *Plasmodium knowlesi* infected monkey blood were processed by the French Press to prepare Antigen "A", a parasitic fraction known to impart immunity, and Antigen "B", a byproduct of Antigen "A" production. Normal mouse erythrocyte material was also prepared. The lipoidal material from these preparations was extracted using chloroform: methanol (1:1) and concentrated under nitrogen. This material was resuspended in chloroform and thin-layer chromatography was used to separate and identify the phospholipids therein. Antigen "A" contained sphingomyelin, phosphatidylcholine, phosphatidylinositol, and phosphatidylethanolamine. Antigen "B", and uninfected mouse erythrocytic material, contained sphingomyelin, phosphatidylcholine, phosphatidylserine, phosphatidylethanolamine, and possibly phosphatidylinositol. The absence of phosphatidylserine in Antigen "A", its presence in Antigen "B", and in normal mouse material indicates that the protective Antigen "A" is free of host erythrocytic membrane fragments.

PN-AAB-163 \$1.95

SCIENCE AND TECHNOLOGY

SCIENCE AND TECHNOLOGY

GENERAL SCIENCE AND TECHNOLOGY

EAST AFRICA SEMINAR AND WORKSHOP ON REMOTE SENSING OF NATURAL RESOURCES AND ENVIRONMENT, HELD AT NAIROBI, KENYA, MARCH 21-APRIL 3, 1974

Morris Deutsch
1975, 184p. (AFR-333.7-D486)

U.S. Geological Survey/OIG
Reston, Va. 22090

Report on total program covering East Africa Seminar and Workshop on remote sensing of natural resources and the environment held in Nairobi, Kenya, March 21-April 3, 1974, attended by participants from 10 English-speaking African nations. Appendices are included for Seminar proceedings, workshop lectures and outlines, field trip reports and critiques by participants, and reports on potential applications of an operational earth resources satellite for the participating countries.

PN-AAB-164 \$13.60

PROCEEDINGS OF THE M.I.T. SYMPOSIUM ON STRATEGIES FOR A.I.D. PROGRAMS IN SELECTED AREAS OF SCIENCE AND TECHNOLOGY VOLUME 1: SUMMARY

J.P. Ruina
April 1974, 60p. (600-R934-1)

Massachusetts Institute of Technology
Technology Adaptation Program
Cambridge, Massachusetts 02139

The subjects considered in the course of the symposium and therefore in these volumes were construction, transportation, housing, water resources and nutrition — all highly relevant to concerns of the developing countries and all subjects of current interest at MIT. The four volumes of this report contain most of the papers that were commissioned to formulate questions and issues. Volume 1 contains the following papers and lists of participants:

Introduction and Background, J.P. Ruina

Panel Reports

The U.S. Foreign Assistance Program: Past, Present and Future, Curtis Farrar

Technology Utilization in Developing Countries: An Economic Overview, Richard S. Eckaus

Summaries of Papers

List of Participants

PN-AAB-165 \$4.45

PROCEEDINGS OF THE M.I.T. SYMPOSIUM ON STRATEGIES FOR A.I.D. PROGRAMS IN SELECTED AREAS OF SCIENCE AND TECHNOLOGY VOLUME 2. HOUSING, TRANSPORTATION AND WATER RESOURCES

J.P. Ruina
April 1974, 162p. (600-R934-2)

Massachusetts Institute of Technology
Technology Adaptation Program
Cambridge, Massachusetts 02139

The subjects considered in the course of the symposium and therefore in these volumes were construction, transportation, housing, water resources and nutrition — all highly relevant to concerns of the developing countries and all subjects of current interest at MIT. The four volumes of this report contain most of the papers that were commissioned to formulate questions and

issues. Volume 2 contains the following papers by participants in the symposium:

Incremental Infrastructure, Richard Bender

Self-Help Infrastructure: Applications of Irregular, Small-Scale, Incremental Systems for Residential Utilities, Ian Donald Turner

Roads and Highway Transportation in Developing Countries, L. Odier

Urban Transportation Problems in Developing Countries: The Role of Technology, George W. Wilson

Comments on the Transportation Papers, Louis Berger

Technology Utilization in Water Resource Development and Management, Ian Burton

Evolution of Modelling in Water Resources Planning, Frank E. Perkins

PN-AAB-166 \$12.00

PROCEEDINGS OF THE M.I.T. SYMPOSIUM ON STRATEGIES FOR A.I.D. PROGRAMS IN SELECTED AREAS OF SCIENCE AND TECHNOLOGY VOLUME 3: THE CONSTRUCTION INDUSTRY IN DEVELOPING COUNTRIES

Fred and Rossow Moavenzadeh and Janet Ann Koch
Spring 1975, 369p. (600-R934-3)

Massachusetts Institute of Technology
Technology Adaptation Program
Cambridge, Massachusetts 02139

This report presents a state-of-the-art review of the construction industry in the developing countries. It discusses the role of construction in the process of development and its importance to economic growth, employment creation, and income generation and re-distribution. Our report considers the issues facing the growth of a viable indigenous construction industry in the developing world within the context of the activities involved in the creation of constructed facilities — planning, design, construction, and maintenance; it also examines the environment within which the industry has developed. For each construction activity the report reviews available capabilities, the various resources needed for the development of an indigenous industry, and some possible means of accommodating these needs. In order to provide a specific focus for the discussions, the authors utilized information available on five emerging nations at different stages of development — Colombia, Korea, Iran, Kenya, and Ethiopia. These countries differed not only in economic, social, and political structure and in their extent of development, but also presented a wide variation in the availability of natural resources.

PN-AAB-167 \$27.30

PROCEEDINGS OF THE M.I.T. SYMPOSIUM ON STRATEGIES FOR A.I.D. PROGRAMS IN SELECTED AREAS OF SCIENCE AND TECHNOLOGY VOLUME 4: FOOD TECHNOLOGY

J.P. Ruina
April 1974, 29p. (600-R934-4)

Massachusetts Institute of Technology
Technology Adaptation Program
Cambridge, Massachusetts 02139

The subjects considered in the course of the symposium and therefore in these volumes were construction, transportation, housing, water resources and nutrition — all highly relevant to concerns of the developing countries and all subjects of current interest at MIT. The four volumes of this report contain most of the papers that were commissioned to formulate questions and issues. Volume 4 contains the following papers by participants in the symposium on the subject of Food Technology:

Introductory Remarks, James Levinson
*Some Reflections on Conditions of Transfer of Modern Food
 Technology*, Aaron M. Altschul
Production of Food and Feed by Fermentation, Arthur E.
 Humphrey
 PN-AAB-168 \$2.15

**RADIO BROADCASTING AND TELECOMMUNICATIONS IN
 NEPAL**

G.W. Rathjens, R.C. Butman, and Ramesh Vaidya
 1975, 25p. (NP-384-R234)

Massachusetts Institute of Technology
 Center for International Studies
 Cambridge, Massachusetts 02139

In previous studies the authors considered the possible use of television for educational purposes in Brazil and India and, in a very cursory way, of radio and television in Ethiopia. The analyses focused entirely on the means of delivering "the message" to the television or radio receiver, e.g. by satellite, terrestrial microwave links, physical delivery of film or tapes, etc. without making judgments as to whether or not television, or radio, would be effective, and in particular cost-effective, as a medium for instruction, either in the schools or for adult education. They felt that those analyses, and others of a similar nature, were inadequate in that they focused on the question of communications for education in isolation, failing to treat adequately the possibility that the same communications links might be used with benefit not just for education but for a number of purposes, indeed, with educational radio or TV often being a secondary user. This led them in this study and in a companion document to consider the question of communication from a broader perspective as they extended their studies to Nepal and Indonesia. The discussion of problems and possibilities in the case of Nepal is somewhat arbitrarily divided into three parts: radio broadcast services generally, radio for education in the schools, and two-way telecommunications. They have not treated the possibility of television, feeling that the costs, difficulties of maintenance, and problems of power supply make it unrealistic at this time as a communications medium for Nepal, except possibly for the Kathmando Valley. Neither have they concerned themselves with the problems of mail and newspaper distribution. Their analysis is based largely on information obtained during a visit to Nepal in late May-early June 1974.

PN-AAB-169 \$1.95

TELECOMMUNICATIONS DEVELOPMENT IN INDONESIA

R.C. Butman
 1974, 53p. (ID-384-B987)

Massachusetts Institute of Technology
 Center for International Studies
 Cambridge, Massachusetts 02139

The development and implementation of a telecommunications network in a lesser developed country requires a substantial amount of speculation since growth patterns cannot be predicted with high accuracy. In Indonesia, these uncertainties coupled with difficult geography lead us to suggest serious consideration of the use of a satellite communications system designed in a manner to minimize growth problems and to provide a maximum of flexibility in serving a wide range of earth stations. Such a system could be initiated with the lease of an INTELSAT IV spot beam transponder, assuming no legal or political obstacles to such a lease. The spot beam is to be preferred over the global beam because of its greater initial circuit capacity and because a later switch to a domestic satellite could be made without changing earth station parameters or performance (only the antenna needs repositioning). The INTELSAT global beam transponder

could be considered for initial use if there were no concern with the implementation of small "telephone booth" stations for isolated industry use. The low power of the global beam makes these small stations unduly expensive. The satellite system, started with INTELSAT IV, can at a later date make use of a second INTELSAT IV transponder for TV distribution. As a system use increases, or as more users request service, the shift to a dedicated satellite can be made without transients. The high capital investment in a domestic satellite does not have to be carried during the initial phases of the system implementation when traffic will be light.

PN-AAB-170 \$3.90

AN INTERNATIONAL CENTRE FOR MANATEE RESEARCH

National Science Research Council
 February 1974, 38p. (GY-599.55072-N277)

National Academy of Sciences
 2101 Constitution Avenue
 Washington, D.C. 20418

Copies are available without charge (while supplies last) from above address

Tropical food production is often directly hampered by aquatic weed infestation in rivers, man-made lakes, and irrigation schemes. The weeds impede navigation, irrigation, drainage and hydroelectricity production. Manatees may offer a significant approach to overcome this problem. Native to more than 40 tropical countries of the Americas and Africa, manatees or sea cows are the world's only herbivorous, totally aquatic mammals. Their voracious appetite for plants has been turned to good use in Guyana, South America, where they have been introduced into canals and have effectively cleared aquatic weed infestations. Manatees might, in future, prove to be important for aquatic weed control throughout the tropics, since many tropical waters in Africa, Asia, and the Americas are climatically suitable for them. There could be a consequent impact on water-borne diseases, drainage and irrigation, hydroelectric schemes, transportation, and fishing. At the same time, manatee meat is highly prized and holds promise of contributing to food supplies. But manatees are almost extinct and their use will only become practicable when their reproduction and numbers are adequately assured. Scientists from 8 countries, representing 23 research institutions, considered comprehensively the status, utility, conservation, and biology of manatees at a workshop held in Guyana 7-13 February 1974. It was concluded that research on manatees is urgently needed and is critical to the survival and utilization of the species.

PN-AAB-171 \$2.80

**SEMINAR ON INDUSTRIAL ENERGY CONSERVATION
 SEMINAR ON SOLAR SPACE HEATING AND COOLING**

National Academy of Sciences
 1975, 27p. (KS-621.47-N277)

National Academy of Sciences
 2101 Constitution Avenue
 Washington, D.C. 20418

This report is a staff-prepared summary of the Seminar on Industrial Energy Conservation and the Seminar on Solar Space Heating and Cooling, held in Seoul, Korea, November 13-15, 1974. The seminars, part of a series of activities initiated by the Ministry of Science and Technology-National Academy of Sciences Joint Committee on Scientific Cooperation, were jointly sponsored by the Ministry of Science and Technology, the Industrial Advancement of the Ministry of Commerce and Industry, and the U.S. National Academy of Sciences, and were held under the auspices of the Korea Energy Management Association (industrial energy conservation) and the Korea Atomic Energy

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Research Institute (solar space heating and cooling). Participation by the National Academy of Sciences was made possible through funds provided by the Office of Science and Technology, Bureau for Technical Assistance, Agency for International Development and by the Ministry of Science and Technology and the Industrial Advancement Administration, Ministry of Commerce and Industry of the Republic of Korea.
PN-AAB-172 \$2.00

COMPUTER APPLICATIONS AT THE ECUADORIAN INSTITUTE OF STANDARDIZATION (INEN): OBSERVATIONS AND RECOMMENDATIONS

Joseph Hilsenrath
April 1975, 14p. (EC-389.6-H655)

Office of Standard Reference Data
National Bureau of Standards
Washington, D.C. 20234

This report contains specific suggestions for computer applications at the Ecuadorian Bureau of Standards (INEN). The suggestions, based on observations and discussion during a 10-day visit by the author in Quito, Ecuador, cover editing and typesetting of Ecuadorian standards, data storage and retrieval, and statistical analysis of experimental data.
PN-AAB-173 \$1.95

COASTAL ZONE POLLUTION BY OIL AND OTHER CONTAMINANTS: BASED UPON A CASE STUDY IN INDONESIA IN 1973

Peter H. Freeman
1974, 190p. (ID-551.46-F855)

Smithsonian Institution
Office of International and Environmental Programs
Washington, D.C. 20560

The impacts of marine pollution by oil and other contaminants such as municipal sewage, industrial effluents, agricultural chemicals, and sediment must be assessed against this combination of environmental conditions, marine life, and resource values. As used here, marine pollution is the introduction by man, indirectly or directly, of substances into the marine environment (including estuaries) that result in harm to living resources, hazards to human health, hindrance to marine activities (including fishing), impairment of seawater quality, and reduction of amenities. The purpose of this document is to provide guidelines useful to tropical nations for the prevention and control of pollution of coastal waters by oil and other contaminants. The guidelines focus on the information needed to assess environmental, economic, and social impacts of coastal zone pollution. Knowledge of these impacts is fundamental to the development of policies, laws, rules, and regulations for preventing and controlling pollution of coastal waters — or any other common property resource. The anticipation of harmful impacts can also be a key ingredient in the planning and management of coastal zone resources.
PN-AAB-174 \$14.10

THE ENVIRONMENTAL IMPACT OF RAPID URBANIZATION: BASED UPON A CASE STUDY OF SEOUL, KOREA IN 1972 AND 1973

Peter H. Freeman
1974, 99p. (KS-628.53-F855)

Smithsonian Institution
Office of International and Environmental Programs
Washington, D.C. 20560

The Agency for International Development commissioned the Smithsonian Institution's Office of International and Environmental Programs to undertake a case study of a developing-

country city which had experienced rapid growth in order to develop the basis for urban environmental guidelines. In 1971-1972 a case study was made of Seoul, Korea, whose 6.3 million population has been arrived at with a doubling rate of approximately ten years. That case study is summarized in Part III of this document. The urban environmental problems for which guidelines have been formulated are based largely upon the problems studied in Seoul. Interpretations and recommendations developed by nine scientists and engineers who participated in the case study were translated to the extent possible into guidelines of wider applicability.
PN-AAB-175 \$7.30

THE ENVIRONMENTAL IMPACT OF A LARGE TROPICAL RESERVOIR: BASED UPON A CASE STUDY OF LAKE VOLTA, GHANA

Peter H. Freeman
1974, 93p. (GH-627.86-H855)

Smithsonian Institution
Office of International and Environmental Programs
Washington, D.C. 20560

To date, guidelines specific to impact assessment of tropical dams have not been developed, particularly as regards hydrobiological and ecological impacts. The need for such guidelines motivated the Agency for International Development to commission the Smithsonian Institution's Office of International and Environmental Programs to undertake a case study in Ghana of Volta Lake, formed by the Akosombo Dam on the Volta River. The purpose was to develop an empirical base of information from which guidelines could be evolved. This was one of three case studies undertaken. The other two studies addressed the environmental impact of rapid urbanization (Seoul, Korea) and the environmental impact of marine pollution by oil in the tropics (Indonesia). It is hoped that these guidelines will be useful for planners of future tropical dams, as well as for managers of existing dams, who are concerned with obtaining the best information possible on the potential environmental impacts of these important public investments. It is further hoped that these guidelines will be improved over time as our knowledge of the man-made lake ecosystem in the tropics increases.
PN-AAB-176 \$6.90

INDUSTRIAL DEVELOPMENT

REPORT ON EVALUATION OF OPPORTUNITIES INDUSTRIAL CENTRE-LAGOS, NIGERIA

Eugene Beard, Richard V. Bernhart and I.T.F. Staff
October 1974, 132p. (NI-331.86-B368)

General Research Corporation
Operations Analysis Division
McLean, Virginia 22101

Five Nigerian vocational schools in the Lagos area were visited to provide perspective for comparative purposes with the Opportunities Industrial Centre, Lagos (OIC/L). All schools but one appeared to be providing adequate training for rapidly expanding Nigerian industrial skill needs. The exception, the Nigerian Army Resettlement Scheme (NARS), is coping with the special problem of rehabilitating disabled military veterans. Although comparative cost data are fragmentary, it appears from this limited information that OIC/L is performing effectively. (See Tables 1 and 2.) OIC/L has, in addition, introduced a number of significant innovations which set it apart from the others. These include: an accelerated course schedule, individualized instruction, counseling and placement on jobs. They are accomplishing these objectives to a fair degree. They also are trying to involve the community in the support of the school. Although slow in

coming, evidence of success in this area is accumulating and is judged satisfactory by the consultants. Industrial Training Fund (ITF) staff, seven in all, were assigned to the task to introduce them to evaluation techniques. They were totally involved throughout. Their reviews of OIC/L all recommend ITF support with varying degrees of emphasis. The consultants concur in this recommendation.

PN-AAB-177 \$9.80

A SEVEN-COUNTRY SURVEY OF CERTIFICATION LICENSING AND QUALITY MARKS PROGRAMS

Kenneth S. Stephens
March 1975, 22p. (658.516-S833)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

The survey report compares the state-of-the-art condition of certification licensing and quality programs in Hong Kong, India, New Zealand, the Philippines, Republic of China, Singapore, and Thailand. Items touched on include: age of program, authorization of program size, operational procedures, costs of licenses and inspections, standards, degree of cooperation with other countries, and testing laboratories. By means of comparisons between programs and analysis of each, some areas requiring attention are identified, principally: trade agreements and cooperative certification; savings in sampling and testing procedures; quality of the measurement process.

PN-AAB-178 \$1.95

AN INTERNATIONAL COMPILATION OF SMALL-SCALE INDUSTRY DEFINITIONS

Richard Johnston, Kay Ellen Auciello, and Linda M. Wagenfeld
January 1975, 71p. (338.003-A898)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

The compilation contains the definitions of "Small-Scale Industry," either official or generally understood, supplied by 72 countries which responded to requests for this information. Each entry attempts to define the concept in terms of capital invested, sales, employment, and nature of product. A statistical table of relevant data is included (population, per capita national income, small-scale industry data). Indications are that no single precise definition of small-scale industry can be applied to all countries, because each area is unique in its social structure, population, educational system, and level of economic development. Only in a few instances do legal definitions exist, although most areas have specific regulations and promotion agencies concerned with indigenous small industries or handicraft operations. Quantitative parameters are not readily available, for the most part, and this indicates the need for further research in this area.

PN-AAB-179 \$5.25

IMPROVING THE PRODUCTIVITY OF A SMALL INDUSTRY IN RURAL KOREA

Herbert Eller, Ross W. Hammond, and Ben E. James, Jr.
December 1974, 31p. (KS-338.095195-E45)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

A team of Soong Jun University and Georgia Institute of Technology staff members conducted productivity improvement research on the operations of the Yong Jak Fishing Pole Factory in Yong In, Korea. This rurally located labor-intensive industry employs 50 persons in the production of 120,000 bamboo fishing

poles per year. Identified problems include large raw material inventories, dependence on a few customers, peaks and valleys in business volume, bottlenecks in the production process, lack of product diversification, and lack of strong financial resources. Production bottlenecks include inefficient space utilization, back flow of materials and people in the plant, excessive paint drying times and goods in process storage, inordinate employee time consumed in hand matching bamboo sections. Recommendations for improvement are made in the areas of marketing, facilities, and production. Marketing recommendations focused on pole standardization, diversification of products, development of promotional literature, new customer development, and utilization of available technical assistance. In the facilities area, a new layout and a revised work flow were designed to reduce materials handling. In the production process, changes were recommended in selection of bamboo sections, sizing by gauging, and in the reaming, boring, winding, plugging and painting operations.

PN-AAB-180 \$2.30

PROVISIONAL KEYWORD INDEX OF THE SMALL-SCALE INDUSTRY CASE STUDIES

Data Center Staff
February 1975, 29p. (338.012072-I61)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

One of the continuing objectives of the Industrial Development Division under the U.S. Agency for International Development 211(d) grant program is to acquire case histories of small-scale industry, particularly those in developing countries. Case material was requested from various organizations in many countries, as well as located in published bibliographies and indexes. This work is the first effort of the International Development Data Center (IDDC) to abstract and index those case histories currently held in the IDDC collection. The establishment of small-scale enterprises and their future success or failure are dependent upon a host of factors. Analysis of each case history or industry study isolated specific actions that actually occurred in the life of one or more business enterprises. Even the modest number of studies in this Index revealed certain recurrent themes or actions that affect the progress of small-scale industry. These actions are represented in this Index by keywords or terms, each of which is defined as it relates to industrial development. Each case history title listed relates to one or more of these keywords or terms. Although the abstracts of these studies are not included in this publication, they are available at IDDC and will be included in the revision of this Index. This compilation of a few studies will be expanded over the remaining life of the project in an attempt to produce a body of useful knowledge concerning small-scale industry.

PN-AAB-181 \$2.15

GUIDE TO INTERNATIONAL STATISTICAL SOURCES AND NATIONAL DEVELOPMENT PLANS AT THE INTERNATIONAL DEVELOPMENT DATA CENTER

Data Center Staff
October 1974, 34p. (017.1-C699)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

The Guide provides an index to and brief descriptions of specific statistical sources at IDDC concerning the countries of the Georgia Tech counterpart organizations in a project funded by a 211(d) institutional grant from the U.S. Agency for International Development. Sources (pamphlets and serials) are classified by subject and geographic scope. Subject classifications were

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adapted from those used in the *Statistical Abstract of the United States*. Geographically, emphasis is placed on Brazil, Colombia, Ecuador, Kenya, Korea, Nigeria, and the Philippines, but the Guide also includes statistical materials that encompass regions (Africa, Asia, Latin America) and the world.
PN-AAB-182 \$2.50

CURRICULA RESEARCH AND DEVELOPMENT (SOONG JUN UNIVERSITY, SEOUL, KOREA)

Herbert Eller
July 1974, 81p. (KS-620.007-E45)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

This report researches the need for industrial engineering curricula in the Republic of Korea and the nature of the courses needed. It briefly evaluates the status of technical education in Korea, the status of engineering education at Soong Jun University, and Soong Jun's opportunity to meet technical education in Korea today. Included are a suggested industrial engineering program leading to a bachelor's degree, a curriculum study guide applicable to all engineering departments to aid faculty members in revising their respective engineering programs, and a detailed curriculum with course descriptions for an industrial engineering department. In general, it was found that technical education in Korea presently consists primarily of high-level theoretical programs or of substandard programs with too little emphasis on laboratory training. Curricula need to be revised to provide a more reasonable balance between theory and applied technology. In the field of industrial engineering specifically, the number of industrial engineering graduates in Korea presently is too small to meet the needs of the country's growing industrial sector. Consequently, there is a definite need for an applied industrial engineering program such as the one planned at Soong Jun University. (Subsequent to the publication of this report, Soong Jun successfully petitioned the Ministry of Education for permission to establish a Department of Industrial Engineering. The degree program will be initiated in the fall of 1975).
PN-AAB-183 \$6.00

GUIDELINES FOR INDUSTRIAL EXTENSION PERSONNEL

Robert E. Collier
November 1974, 96p. (338.0107-C699)

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

This series of 13 guidelines is intended for use as a supplement to management and technical assistance efforts in the field and as training course background materials. Additional guidelines will be produced as new needs are perceived, but the current compilation includes the following titles:

- An Approach to Furnishing Industrial Extension Services to Small-Scale Industry
- The Generation and Evaluation of Venture Ideas
- Selection of Appropriate Technology
- Resource and Technical Analysis
- Advising the Prospective Entrepreneur on Going into Business
- A Systematic Approach to Small-Scale Industry Growth
- The Presentation of Investment Proposals
- Factors in Plant Layout
- A Simplified Cost and Control System for Small Industrial Concerns
- Inventory Control for Small-Scale Manufacturing
- Production Planning and Control for Small-Scale Manufacturing

- How to Use a Private Management Consultant
- Selected Bibliography

These guidelines address themselves to the most prevalent and most frequently recurring problems that appear to be characteristic of small and medium-size industries regardless of their geographical location. They are generalized to be broadly applicable to companies in developing countries, although it is recognized that they may not be equally applicable to all country situations.

PN-AAB-184

\$7.10

GENERAL SOCIAL SCIENCE

THE COMPARATIVE STUDY OF THE IMPACT OF MASS COMMUNICATION ON SUBSISTENCE FARMERS IN GUATEMALA

Edgar G. Nesman and Thomas A. Rich
April 1975, 27p. (GT-301.24-N462)

University of South Florida
Academy for Educational Development
Tampa, Florida 33620

This paper is a report on an exploration in the use of mass media to transmit new knowledge, attitudes and practices to a traditional society. There are three related questions that are considered in the study: Is it realistic to expect changes to take place in a traditional society within the span of a few months? If such changes take place are they measurable? and, Can the differential effect on these changes by mass media, combined with group and individual communication methods, be determined? The mass media in this particular study is radio. The knowledge, attitudes and practices are related to agriculture. Subsistence farmers in southeastern Guatemala are the tradition oriented population. From the preliminary analysis of the data it would appear that mass media (radio) can be used to effect change in knowledge and attitudes among a traditional population such as the subsistence farmers in southeastern Guatemala. (Both hypotheses comparing radio to no radio at the level of knowledge and attitudes were confirmed.) It also suggests that the possibilities of knowledge, attitude and practice change increase as group meetings and personal visits of technicians are added to the message system. (Two of the four hypotheses were confirmed.)

PN-AAB-185

\$2.00

NONECONOMIC FACTORS IN THE STUDY OF ECONOMIC DEVELOPMENT

Robert Cartier
Winter 1975, 37p. (301.5072-C327)

Rice University
Program of Development Studies
Houston, Texas 77001

Economists were the first of the social scientists to investigate planned economic development, offering ideas on economic growth and building models of development since the first part of the nineteenth century. However, most early economists did not make extensive use of noneconomic factors in their work. As the science of economic development progressed and our knowledge of the nonwestern world increased, it became apparent that sociocultural factors played a great part in economic development than traditional economic models indicated. To incorporate noneconomic factors into the economists' interpretations of economic development, concepts of sociocultural behavior were adopted from the writings of anthropologists and sociologists. Relatively recently social scientists, other than economists, have also begun to examine planned economic development, using

multivariable frameworks and overall perspectives which are cultural in their orientation. When both the early and the more current models of development are reviewed, we see that social groups and cultural values emerge as two of the most significant of noneconomic factors.
PN-AAB-186 \$2.75

THE BODPAGAUN PROJECT: A CASE OF ECONOMIC DEVELOPMENT

Robert Cartier
Winter 1975, 33p. (NP-301.5072-C327)
Rice University
Program of Development Studies
Houston, Texas 77001

The Tibetan community located in a high Himalayan valley of Nepal has long been the site of economic development programs. The developmental schemes carried out in this community involved agricultural and dairy programs which were financed and managed for several years by international aid agencies. These economic programs were designed to provide the Tibetan community with a stable means of livelihood, but the programs were generally unsuccessful due, for the most part, to social forces in the community that blocked the implementation of the economic programs. By examining the present economic foundations of the Tibetan settlement, we see that the same social factors that foiled the planned economic programs also worked to encourage other means of economic development. Known as the Bodpagaun Project, this instance of engineered development serves as a heuristic example for investigating the ways that sociocultural factors may influence attempts to initiate development in small societies of South Asia. The sociocultural factors particularly prevalent in the history of the Bodpagaun Project are social groups and religious values, both of which had a great deal to do with the outcome of the individual development programs as well as with the relative success of the overall project itself.
PN-AAB-187 \$2.45

SOCIAL GROUPS AND RELIGIOUS VALUES AS FACTORS IN ECONOMIC DEVELOPMENT: A SOUTH ASIAN EXAMPLE

Robert Cartier
Winter 1975, 29p. (NEA-301.5072-C327)
Rice University
Program of Development Studies
Houston, Texas 77001

This study examines the role of social groups and religious values in the economic development of peasant communities. Writings on economic development published since 1950 often state that social groups and religious values are prime factors in the modernization of village societies. Most of these writings depict social groups and religious values as aspects of traditional village culture which hinder and obstruct economic reform. But a growing number of recent analyses indicate that social groups and religious values can also be positive forces for the implementation of economic innovations. These two sociocultural factors are reported as being highly significant to community development whenever they coexist in the form of religiously distinguished social groups.
PN-AAB-188 \$2.15

DEVELOPMENT PLANNING

MANPOWER AND EMPLOYMENT DEVELOPMENT FOR ECONOMIC GROWTH AND SOCIAL JUSTICE

James E. Hendricks, Keith V. Schroeder, Curtis C. Hall, Mildred E. Olsen, and W. Scott Boyd
April 1975, 303p. (331-A265a)

Agency for International Development
Office of Labor Affairs
Washington, D.C. 20523

This is a technical manual, designed for the use of developing country officials and for United States development officials and technicians who have a need for information on how manpower and employment programs can function as an integral part of a total development effort, with the objective of achieving an expansion of employment opportunities, enhancing the well-being of working men and women, improving the level of living of the general population and especially the poor, and economic growth of the economy. It is hoped that this manual will be useful to all development officials as well as those specializing in manpower and employment functions. The manual presents a system for developing goals, programs, administration and program evaluation based upon a careful identification and analysis of social, economic and administrative problems that may exist in the country. A careful application of the system should be of considerable assistance in developing increasingly effective programs. The material emphasizes the fact that the development and execution of manpower and employment programs can be successful only if they are an integral part of an overall development planning and program execution process. Ways in which manpower and employment programs can be made an integral part of the development planning process are suggested in Chapter VIII.
PN-AAB-189 \$22.40

A SURVEY TO DETERMINE THE SCOPE AND DIRECTION OF FUTURE AMERICAN VOLUNTARY AGENCY ASSISTANCE TO THE PEOPLE OF LAOS

James Mac Cracken, William P. Masterson, Norman Smith, Elsa Haglund, Mona Mollerup and James P. Delaney
November 1974, 166p. (LA-309.2235594-M132)

Catholic Relief Services — U.S.C.C.
1011 First Avenue
New York, New York 10022

Following consultation with AID Washington and the U.S. Ambassador to Laos, CRS invited a team to be formed and to go forthwith to Laos. The purpose was to determine within Laos the following factors with regard to an envisioned program and/or project of CRS for the rehabilitation and resettlement of displaced persons within that country.

1. Which are the immediate needs within the areas of Community Development, Agriculture, Housing, Health and Nutrition?
2. Among these needs, which have been given priority by the Minister of Plan of Laos?
3. Which of these needs can best be met by the expertise of a voluntary agency?
4. Which of these needs are the most generic in scope and will reach the greatest number of persons?
5. What are the priorities among these needs and the reasons given for priority? Which solutions are possible immediately?
6. What existing structures, either public or private, or substructures, could be used as a counterpart agency to carry out programs and projects?
7. Would it be necessary, in fact, to have two different sets of priorities, one geared exclusively to tribal people?
8. Should needs be focused on community or family? Are there special needs for children?
9. Would the realistic facts in Laos limit the contribution by a voluntary agency to the immediate needs rather than long-term development?

PN-AAB-190 \$12.30

SOCIAL SCIENCE

SOCIO-ECONOMIC ANALYSIS FOR HUMAN RESOURCE POLICY AND PROGRAM REFERENCE

September 1974, 202p. (301.32-C396)

U.S. Department of Commerce
Bureau of the Census, SESA
Washington, D.C. 20233

This report is the initial product for ASIA/TECH/SPP/EP prepared by the Socio-Economic Analysis Staff of the International Statistical Programs Center, U.S. Bureau of the Census. The two-year task, begun in June 1974, is to review, collect, describe, and analyze socio-economic variables in the context of AID's human resource and rural development policies and programs. Although preliminary in nature, this report, based on Indonesian data, presents aggregate profiles of current and future program target populations that heretofore have not been described in terms of the dynamic variability between and among socio-economic factors. Significant in this report are the magnitudes of the projected age-sex distribution of cohorts: (1) excluded from the education system; (2) migrating to urban areas; (3) needing family planning information; (4) entering the labor force; and (5) dependent upon the income of those employed in the modern and traditional sectors. Given the sheer size of the population, there are no known short-term approaches to accelerating the aggregate human resource development process. However, there are correlations and determinants that explicitly optimize investments designed to mitigate the negative effects listed above.

PN-AAB-191 \$14.95

LOCAL ORGANIZATION FOR RURAL DEVELOPMENT IN ASIA

Norman Uphoff and Milton J. Esman
November 1974, 178p. (FEA-301.35-U67)

Cornell University
Center for International Studies
Ithaca, New York 14853

The authors recognize that local organization is not the only factor possibly accounting for rural development. Resources and technology are certainly also independent variables affecting the extent and pace of rural development. But for purposes of analysis they focused on local organization, examining its relation to rural development performance, measured in terms of agricultural productivity and various dimensions of rural welfare: health, nutrition, education, security, employment, participation and equity. The 16 cases were analyzed in terms of local organizational *linkage* — the extent and effectiveness of communication and interaction between different levels of organization down to the local level — and *relevance* to rural development functions (see Tables 2 and 3). This analysis revealed a rather clear division between the "more organized" and the "less organized" cases, and our subsequent analysis of rural development performance compared the two sets of cases. In analyzing rural development performance, in terms of agricultural productivity and various aspects of rural welfare, sharp and consistent differences were found between the two groups, though variations within the groups were not always so clearly associated with differences in degree of organization.

PN-AAB-192 \$13.20

LOCAL INSTITUTIONS AND EGYPTIAN RURAL DEVELOPMENT

James B. Mayfield
November 1974, 150p. (EG-301.35-M468)

Cornell University
Center for International Studies
Ithaca, New York 14853

Poverty is a way of life for nearly two-thirds of the people in Egypt. Poverty means hunger and malnutrition. Malnutrition leads to sickness and general ill-health. Disease, in turn, debilitates and reduces human output, which then aggravates the tendency toward greater poverty. To break this vicious circle requires energy and knowledge and change, aspects of development that unfortunately are lacking in most of the rural villages of Egypt. To remedy this situation requires a prodigious effort — for Egypt must tackle ill-health and ignorance, increase agricultural and industrial production, provide welfare services, and emancipate the rural communities from the habits and social structures of bygone centuries. The size of such a task is tremendous, for it requires the government to go into the villages, to awaken, inspire, and, in the early stages, to lead. The central government must enlist the enthusiastic support of the village communities to provide the labor for self-help projects and to participate in the introduction of services such as education and health. Development is primarily a form of communication and persuasion. The fundamental purpose of community development in Egypt is to generate within the fellahin a clear desire for change, which, through progressive adaptation of modern techniques, will lead to their achieving a higher standard of living.

PN-AAB-193 \$11.10

LOCAL GOVERNMENT AND RURAL DEVELOPMENT IN YUGOSLAVIA

Zdravko Mlinar
November 1974, 134p. (YO-301.35-M685)

Cornell University
Center for International Studies
Ithaca, New York 14853

The after-war socio-economic development of Yugoslavia is commonly characterized and measured in terms of the industrialization, deagrarianization and urbanization of the country, rather than in terms of agricultural or rural development. The main aspirations and expectations refer to a pattern of socio-economic changes indicating movement away from traditional peasant and village life. Factory, industrial worker and urban way of life were the symbols of progress and prosperity. Even the development of rural areas and agriculture was evaluated from the point of view of the withering away of differences between rural-urban and agricultural-industrial sectors. Statistical data indicate that such an orientation has been largely implemented: there has been a mass transfer of the labor force from agriculture to industrial employment and — to a lesser degree — of the population from rural to urban areas. This represents one of the most important structural changes in the country. The proportion of the agricultural population in the total population decreased in the period after World War II by more than 30 percentage points. In the period of 23 years (1948-1971), there was a transfer of 5,480,000 people, or approximately 240,000 every year from agriculture to other sectors.

PN-AAB-194 \$9.90

LOCAL GOVERNMENT AND AGRICULTURAL DEVELOPMENT IN TURKEY

Douglas E. Ashford
November 1974, 110p. (TU-301.35-A825)

Cornell University
Center for International Studies
Ithaca, New York 14853

The role of local government in Turkey's rural and agricultural development gives complex and instructive illustration of the problems of overall institutional change in developing countries. Turkey's considerable economic and social growth since World War II must be viewed against the background of her large farm population. This was estimated at 77.7 percent of the employed

population in 1962 and 72.3 percent in 1967, and was expected to be roughly 68 percent of the employed population under the Third Plan (1973-1977). Although the agricultural sector is in many respects declining in Turkey, the farmer remains the key figure in Turkish political and economic life. From 1955 to 1967, in fact, the number of Turks employed in agriculture has increased from just under 9.5 million to nearly 10 million. When one considers also the number of partially employed persons supported in the rural society and the vast numbers of Turkish children in the countryside; when one considers also the controlling vote of the farmer in Turkish politics, not to mention the vital economic contribution of the rural sector to Turkey's continued industrial and economic growth; one begins to see the significance of the organization and operation of rural local government and its related agencies.

PN-AAB-195

\$8.15

RURAL LOCAL GOVERNANCE AND AGRICULTURAL DEVELOPMENT IN TAIWAN

Benedict Stavis

November 1974, 131p. (TW-301.35-S798)

Cornell University

Center for International Studies

Ithaca, New York 14853

This study will help people in developing countries evaluate the Taiwan model, as they ponder economic and institutional policies for development. The study will also be useful to Americans trying to understand the problems of poor, Asian farmers. The conclusions are summarized here:

1. Over the past decades, there has been an impressive growth in agricultural production.
2. There has been an overall improvement in the standard of living for most rural people. A rather small segment of the rural population has experienced a large increase in wealth or power. Despite growth in agricultural production, farm expenses have gone up too, so that farm profits have been close to constant. The major source of growth in rural income has been non-farm income.
3. Success in agricultural development has many causes; favorable geographic conditions have been important. Also important is the lengthy period of development when Taiwan was a Japanese Colony, especially in the period after 1920.
4. Local institutions have been very important in generating agricultural change, and assuring that most rural people get some benefits from change.
5. The strength of local institutions seems to stem from the central political system in Taiwan, not from mass participation.

PN-AAB-196

\$9.70

LOCAL GOVERNMENT AND RURAL DEVELOPMENT IN SRI LANKA

John S. Blackton

November 1974, 75p. (CE-301.35-B631)

Cornell University

Center for International Studies

Ithaca, New York 14853

This monograph seeks to examine the interaction between rural local institutions and development in the rural sector of Sri Lanka. The case of Sri Lanka commended itself to the purposes of the study in a variety of ways. On the one hand, the rural sector is institutionally rich both in terms of the number and the variety of local organizations. On the other hand, Sri Lanka's performance on the development side has been mixed in character, reflecting unspectacular gains on the economic growth side, but unusual success in the pursuit of distributional equity. Most

of the empirical work which has been done on the pattern of rural development in Sri Lanka has focused upon structural economic factors or on the role of economic institutions (rural credit, crop insurance schemes, etc.). Such research has gone a long way towards explaining the pattern of development outcomes, and it is not a purpose to take issue with this work, but rather to amplify one particular dimension of institutional change in Sri Lanka which has received relatively little attention.

PN-AAB-197

\$5.55

LOCAL GOVERNMENT AND RURAL DEVELOPMENT IN SOUTH KOREA

Ronald Aqua

November 1974, 78p. (KS-301.35-A656)

Cornell University

Center for International Studies

Ithaca, New York 14853

This study is primarily concerned with the general issue of what role local governmental agencies have played in rural development in South Korea and will not attempt a systematic consideration of either central-local or government-citizen relations. Both of these topics are germane to our more general analysis, however, and will receive some attention within a broader context. The approach will be largely descriptive, and while some provocative conclusions will be suggested, the author must emphasize the limited scope of his field work and the fact that any study of a nation that is undergoing rapid social and economic change cannot avoid the limitations of a restricted time frame of analysis. The study is divided into two parts. The first part examines in aggregate terms the role that agriculture has played in the South Korean economy after first setting down the major institutional arrangements for local government and rural development in recent Korean history. From this macro-level survey of rural local institutions and rural development, the study proceeds to examine the findings of a field trip to two rural counties. Based on the micro-level analysis drawn from this field study, some general conclusions concerning the role of local governing institutions in rural development in South Korea is presented.

PN-AAB-198

\$5.80

LOCAL GOVERNMENT AND RURAL DEVELOPMENT IN THE PHILIPPINES

Santiago S. Simpas, Ledivina Carino and Arturo G. Pacho

November 1974, 117p. (RP-301.35-S612)

Cornell University

Center for International Studies

Ithaca, New York 14853

This paper proceeds as follows: The first chapter discusses the general Philippine situation, particularly its local government, economy and rural development profile. Chapter II covers Capiz, where we will examine how government goes about attaining rural development particularly in our two sample municipalities there. Chapter III discusses Abra where a private agency has devoted efforts sometimes in cooperation with, and sometimes separate from, government, and Chapter IV summarizes the discussions and presents our conclusions.

PN-AAB-199

\$8.65

AGRICULTURAL GROWTH AND LOCAL GOVERNMENT IN PUNJAB, PAKISTAN

S. Javed Burki

November 1974, 74p. (PK-301.35-B959)

Cornell University

Center for International Studies

Ithaca, New York 14853

SOCIAL SCIENCE

In this paper the author has attempted to trace the relationship between political and economic factors, using the rates of agricultural growth in the districts of Pakistan as a dependent economic variable. For the purpose of this analysis, the role of independent variable was assigned to constituency building activity of the regime. He started out by differentiating between three regions. The first region was made up of eleven districts in the province of Sind. In these districts high rates of agricultural growth were produced almost entirely by expansion of land under cultivation. In the second region, with seven Punjab districts, the high rate of growth was produced almost entirely by increase in land yields. In the third region, made up of the remaining 12 districts of the Punjab, there was an insignificant increase in agricultural output.

PN-AAB-200 \$5.50

PEOPLE'S COMMUNES AND RURAL DEVELOPMENT IN CHINA

Benedict Stavis
November 1974, 182p. (CH-301.35-S798)

Cornell University
Center for International Studies
Ithaca, New York 14853

This paper has three major sections. The first, Chapter 1, specifies the growth in agricultural production and the changes in welfare of China's rural inhabitants. It considers non-material, psychological factors as well as changes in the material standard of living. The following four chapters constitute a section describing in some detail rural local institutions in China, with an emphasis on the 1962-72 period. Chapter 2 outlines the historical and social developments that led to the formation of rural people's communes, relating these to the production teams and brigades which comprise the sub-units of a commune, and to the country and national governments above. Chapter 3 explains the division of responsibility, primarily with regard to economic functions, among the component parts of a commune. Chapter 4 describes the management of each level in the commune, including formal distribution of power, managerial personnel, and financial operation. Chapter 5 focuses on political leadership, which provides a dynamism and coherence for the rural local institutions. The third major section of this paper is Chapters 6, which examines how the improvements in rural welfare and productivity are related to both central and local institutions. Those readers with a special interest in the relationship between rural local institutions and rural development may wish to leap ahead to Chapter 3G, Chapter 6B, and to the conclusions in Chapter 7.

PN-AAB-201 \$13.50

LOCAL INSTITUTIONS AND RURAL DEVELOPMENT IN PAKISTAN

Norman K. Nicholson and Dilawar Ali Khan
November 1974, 106p. (PK-301.35-N627)

Cornell University
Center for International Studies
Ithaca, New York 14853

Our task as we set out on this project was to investigate what relationship existed between the structure and functioning of local institutions in Pakistan and the success which at least certain areas of the country have experienced in the "green revolution". Our conclusions generally have been that the institutional structure of the Pakistan countryside has been extremely weak. Village-level institutions for organizing the village for collective action and for raising resources to perform new developmental functions have been lacking or ineffective. To some extent and for a limited period, the Union Councils functioned as agents for the Rural Works Program in the rural de-

velopment effort, but the program soon returned to administrative domination and at no time did the Councils' initiative appear to have been critical to the success of the works program. As organizations intermediate between the farmer, on the one hand, and government and the market, on the other, neither the Basic Democracies nor the cooperatives have proven viable. Local institutions in Pakistan, then, can claim little success in facilitating public action at the local level, in improving rural infrastructure, or in facilitating the farmers' economic activities.

PN-AAB-202 \$7.85

LOCAL INSTITUTIONS AND RURAL DEVELOPMENT IN JAPAN

Ronald Aqua
November 1974, 109p. (JA-301.35-A656)

Cornell University
Center for International Studies
Ithaca, New York 14850

The present study attempts to draw together some of the literature on agricultural development, rural living conditions, and institutional change at the local level in Japan, so that conclusions may be reached about the relationship between institutional change and rural development in that country. The Japanese case is a particularly interesting one, not only because it has so often been cited as a model for other rice-culture nations in Asia and elsewhere, but also because of the existence of a wealth of primary source materials that cover a hundred-year time span in Japan's modern history. Many of these materials have yet to be exploited to their fullest extent, but scholars have already succeeded in uncovering a great deal regarding Japan's early developmental history. In describing that history in this study, it will become apparent that many gaps in our analysis still exist, particularly when we attempt to discuss in a *systematic* fashion the relationship between institutional change, social change, and economic development.

PN-AAB-203 \$8.10

RURAL LOCAL GOVERNANCE AND RURAL DEVELOPMENT IN MALAYSIA

Stephen Chee
November 1974, 110p. (MY-301.35-C515)

Cornell University
Center for International Studies
Ithaca, New York 14850

This paper deals with the role of local institutions in rural development in Peninsular Malaysia (or West Malaysia). The scope of the paper has been confined to the basic question of whether or not local structures of governance play an instrumental role in raising agricultural productivity, increasing incomes and expanding welfare. To address this issue, the study focuses on the politico-administrative structures of district, parish and village governance and the economic institution called the Farmers' Association in the state of Selangor. Although there are ecological and institutional variations from area to area the analysis of local governance and rural development in Selangor is generalizable to the rest of Peninsular Malaysia. Nevertheless, there is an important shortcoming in the microlevel mode of analysis adopted in this study: it represents a less than total picture of the dramatic progress of rural development in Malaysia. That success story, however, has been well documented elsewhere.

PN-AAB-204 \$8.15

THE DYNAMICS OF INSTITUTIONAL CHANGE AND RURAL DEVELOPMENT IN PUNJAB, INDIA

S.S. Johl
November 1974, 182p. (IN-301.35-J65)

Cornell University
Center for International Studies
Ithaca, New York 14850

The main purpose of this study is to analyze the direct and indirect contributions of local governing institutions to rural development in the Indian Punjab. This study is conducted at four different levels. The dynamics of rural development in Punjab as indicated by the levels and changes in various rural development indicators are discussed in Chapter II. This is followed by three different chapters each describing the role of different factors in rural development. The role of the obvious and significant factors which include farm technology and technical change is analyzed in Chapter III. The direct and indirect contributions of local governing institutions are discussed in Chapter IV. The role of residual institutional and the non-institutional factors is discussed in Chapter V. A techno-institutional approach to rural development is suggested in Chapter VI. A theory of institutional change and its measurement is proposed and discussed in Chapter VII. Finally, the study concludes with a summary and main conclusions.

PN-AAB-205 \$13.50

PANCHAYATI RAJ AND RURAL DEVELOPMENT IN ANDHRA PRADESH, INDIA

G. Ram Reddy
November 1974, 95p. (IN-301.35-R313)

Cornell University
Center for International Studies
Ithaca, New York 14850

The theme presented in this monograph has been that the administrative approach to rural development is inadequate; it is too narrow to encompass the complex problems of agricultural development. Agriculture development requires a perspective that would harmoniously blend macro-level needs and organizations. Vigorous national policies to promote agricultural development, giving it a strong technological base and adequate resources, are desirable and essential. The national policies that put all their eggs in the administrative basket are not likely to succeed for they lead to the weakening of political institutions. Furthermore, as long as there is no transformation in the political-administrative institutions, national policies will remain ineffective. More and more administrative institutions are being created to attend to development work but they resemble old institutions and retain a built-in elitist bias. Therefore, to make the administration more responsive, nonbureaucratic institutions have to be strengthened in order to effect the diffusion of political power. Public servants serve the public very poorly as a rule when that public is poor, illiterate, unenfranchised politically, and without prestige.

PN-AAB-206 \$7.10

RURAL ELECTRIFICATION AND DECENTRALIZED DECISION-MAKING IN RAJASTHAN, INDIA

Susan G. Hadden
November 1974, 102p. (IN-301.35-H126)

Cornell University
Center for International Studies
Ithaca, New York 14850

This study sheds light on the thorny problem of how respective economic and political values may be served by greater popular participation in rural development decisions. Here we examine the types of criteria employed in choosing villages to receive electricity both before and after the decentralization decision just described, in an attempt to determine what effects this decision had on the way in which villages were chosen. Its conclusion is that through controlled decentralization — a procedure by which

a higher-level governmental body retains the power to determine the technical or economic characteristics of recipients of goods in development programs — decentralization can improve both political and economic efficiency. A mixture of political and economic criteria for selecting villages to receive electricity which was essentially haphazard before decentralization became somewhat more ordered afterwards, and profits increased as well.

PN-AAB-207 \$7.55

RURAL LOCAL GOVERNMENT AND AGRICULTURAL DEVELOPMENT IN JAVA, INDONESIA

Gary E. Hansen
November 1974, 84p. (ID-301.35-H249)

Cornell University
Center for International Studies
Ithaca, New York 14850

An examination of the dynamics of rural development in Indonesia essentially entails a study of three distinct perspectives. It involves an illumination of their constituent elements and an elaboration of the connecting links which tie these discrete elements into a larger and more integral pattern of social and institutional interaction. First, initial attention must be focused on the primary physical and resource endowments around which the rural dweller must organize his existence, particularly those characteristics which relate to the larger problem of agricultural productivity. Second, cognizance must be given to those social and economic determinants which structure the character of interaction among rural dwellers, both as individuals and as members of more distinct social entities. Finally, attention must be given to the role of government and the extent to which it is either a reflection of the first two perspectives or an independent and autonomous agent of change, intentionally and systematically molding and shaping those sets of relationships which constitute the pre-existing physical, social and economic order.

PN-AAB-208 \$6.20

THE ELUSIVENESS OF EQUITY: INSTITUTIONAL APPROACHES TO RURAL DEVELOPMENT IN BANGLADESH

Harry W. Blair
November 1974, 137p. (BG-301.35-B635)

Cornell University
Center for International Studies
Ithaca, New York 14850

The author begins by endeavoring to pinpoint the major political and economic factors involved in community development and cooperatives as instruments of the rural development process, in order to have some standards by which to judge the programs in Bangladesh. He then moves to a very brief consideration of the environment within which development programs must operate in Bangladesh, and proceeds to an analysis of seven specific developmental efforts that have been mounted by the Pakistan and successor Bangladesh governments. Most important among these is the Comilla cooperative credit program itself, which has also been the object of most of the scholarly attention paid to development in Bangladesh in the last ten years or so. Second, he considers the cooperative program begun in Rangunia Thana of Chittagong District as an alternative to the Comilla approach and preferred by some to the Comilla model. Third, the Thana Irrigation Programme, newer than the Comilla cooperatives although already a more widespread effort, is analyzed in some detail. The Thana Irrigation Programme and the Comilla cooperative approach are now in process of being combined and spread to the whole country in a carefully phased plan, the Integrated Rural Development Programme, which he takes up as the fourth topic.

PN-AAB-209 \$10.15

SOCIAL SCIENCE

LOCAL GOVERNANCE AND RURAL DEVELOPMENT IN THAILAND

Marcus Ingle
November 1974, 104p. (TH-301.35-151)

Cornell University
Center for International Studies
Ithaca, New York 14853

Rural development is defined in terms of agricultural production/productivity, income levels/distribution, and general welfare/well-being. The paper contains a description of how local organizations operate and interrelate in Thailand's four major regions. Two general hypotheses on the relationship between local governance and rural development are proposed and reviewed: First, local government organizations serve as intervening variables influencing rural development through the provision of services which improve access to development resources; and second, village government units and officials function as independent variables influencing general well-being in outlying rural areas. The study concludes that local organizational arrangements, primarily those based on traditional patterns of governance, play an important role in promoting rural development. The RTG is encouraged to continue exploring the relative effectiveness and economy of alternative organizational arrangements for promoting rural development.

PN-AAB-210 \$7.70

A SEVEN COUNTRY SURVEY ON THE ROLES OF WOMEN IN RURAL DEVELOPMENT

Mary Ann Riegelman, Keith M. Moore, and Dorothy Glancy
December 1974, 288p. (301.412-R554)

Development Alternatives, Inc.
1823 Jefferson Place, N.W.
Washington, D.C. 20036

This is a composite report on current and potential roles of Latin American and African rural women based primarily upon field research in seven countries. The survey presents preliminary conclusions concerning project research required, if local-level rural development efforts are to succeed in drawing upon the skills and work patterns of women, as well as men, in mobilizing human and natural resources for progress. The report's findings and conclusions are based upon field study of existing rural projects and a preliminary survey of constraints and opportunities for women in the economies of Ghana, Kenya, Lesotho, Nigeria, Bolivia, Paraguay and Peru. Research focused on rural women's active decision-making and participation roles in agricultural production, generally the source of discretionary income in rural areas. However, some attention is also paid to traditional women's concerns such as family care, family planning and education of children — concerns which to date have absorbed the lion's share of developers' efforts aimed at rural women.

PN-AAB-211 \$21.30

IMPLEMENTING THE U.S. AID - MC NAMARA MANDATE: WHAT BIG FOREIGN DONORS CAN DO ABOUT GETTING THE BENEFITS OF RURAL DEVELOPMENT TO THE SMALL FARMER

Elliott R. Morss, Donald R. Mickelwait, and Charles F. Sweet
June 1974, 90p. (301.35-M886)

Development Alternatives Inc.
1823 Jefferson Place, N.W.
Washington, D.C. 20036

The purpose of this research is to provide U.S. AID with information on what can be done to help the small farmer in the Third World. Particular emphasis is being placed on specifying the level and type of small farmer *involvement* so as to maximize

small-farmer *benefits*; it is assumed that for this to have a long-term effect, projects must ultimately carry themselves, and this has led us to look for mechanisms to make projects *self-sustaining*. The research approach is primarily inductive: it is based on a detailed examination of the various activities and design of more than 40 rural development projects operating in the Third World (for list of projects, see Attachment A). The report summarizes the author's work to:

- specify the determinants of effective local action in rural development projects;
- identify cost-effective methods of data collection; and
- provide field support to rural development projects for the design and implementation of information systems.

PN-AAB-212 \$6.70

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. VOL. 1. SUMMARY REPORT: PROJECT OBJECTIVES, METHODOLOGIES, & MAJOR FINDINGS

William W. Seifert and Nake M. Kamrany
December 1974, 121p. (AFR-309.2-M414-1)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This report in two volumes is complete in itself. The "working papers" listed below are not essential to the report.

The goal of this project was to develop a framework for evaluating alternative development strategies for the Sahel-Sudan region of West Africa. This summary of the work consists of five parts. Part I provides an introductory statement of the project's background and objectives. Part II outlines approaches which were examined as potentially useful in constructing a framework for identifying and assessing long-term development strategies for the Sahel-Sudan region and describes the approach followed. Part III presents our interpretation of the basic problems facing the Sahel-Sudan region, while Part IV examines alternative actions that might be taken to cope with the basic problems. Part V summarizes the findings of the various sectors into which the overall study was subdivided. These include: (1) Agricultural Development, (2) Economic Considerations, (3) Health, Nutrition, and Population, (4) Industrial and Urban Development, (5) Socio-Political Factors, (6) Technology, Education and Institutional Development, (7) Transportation, (8) Water Resources, (9) Energy and Mineral Resources.

PN-AAB-213 \$8.95

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION VOL. 2. A FRAMEWORK FOR AGRICULTURAL DEVELOPMENT PLANNING

W. Gerald Matlock and E. Lendell Cockrum
December 1974, 310p. (AFR-309.2-M414-2)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This report in two volumes is complete in itself. The "working papers" listed below are not essential to the report.

A planning framework for Integrated Sustained Yield Arid Land Agricultural Production Systems (ISYALAPS) based on limitations of natural resources was created and tested for the Sahel-Sudan region of West Africa. This six-country region (Chad, Mali, Mauritania, Niger, Senegal, Upper Volta) suffers from a harsh, variable climate which, with the traditional agricultural system, has contributed to widespread ecosystem degradation in

the past decade. From north to south agriculture varies from oasis culture and nomadic and transhumant livestock production (camels, goats, sheep, and cattle) to sedentary cereal crop (mainly millet and sorghum) and export crop (cotton and peanuts) production. Conclusions were made as follows: (1) the climate will continue to be variable but without major change, (2) the environment has been greatly harmed, (3) wildlife potential as a food source is limited, (4) the existing agricultural system cannot continue to support the present human and animal population, (5) the region can be more productive, (6) broadly conceived and adequately implemented programs will be required, (7) the ISYALAPS planning framework is workable for this and other arid regions, and (8) lack of data severely limits detailed analysis.

PN-AAB-214

\$22.95

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 1. ECONOMIC CONSIDERATIONS FOR LONG-TERM DEVELOPMENT

Nake M. Kamrany, Rodrigue Tremblay, Joseph J. Stern, Anwar H. Kazmi, Barry McCormick, and James D. McQuigg
December 1974, 375p. (AFR-309.2-M414-3)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region," and is not essential to the main summary report.

This annex has two parts. In Part I, three types of interrelated diagnoses have been attempted. First it is pointed out that the region is plagued by many economic constraints. These include the climate, monetary system, population growth, and heavy dependence upon foreign aid. Second, we have identified certain gaps and distortions such as in savings, foreign exchange, and absorptive capacity. Included in the analysis are such policy parameters as taxes, interest, wages and pricing. In the Appendices specific case studies are presented including (A) a technical discussion of macroeconomic projections, (B) aspects of fiscal policy in Senegal, and (C) variability of precipitation in the Sahel-Sudan region of Africa. Although generalizations for the region cannot be drawn from these specific studies, we believe that the information and analysis contained in these studies provide valuable data base and insight into the problems and prospects of the region. In Part II, selected economic data are presented. These data have been collected from secondary sources, mostly from publications of international agencies.

PN-AAB-215

\$27.75

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 2. HEALTH, NUTRITION, AND POPULATION

John B. Stanbury and Judith A. Childs
December 1974, 315p. (AFR-309.2-M414-4)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

The health-care system of the Sahel-Sudan region is fragmented and severely undermanned at all levels. Health resources are inequitably distributed, with a strong trend toward urbanization.

Curative medicine receives an inappropriately large fraction of available resources; investment in preventive medicine would give the maximum cost-benefit advantage. Communicable diseases of many kinds are highly prevalent and their impact is heightened by a chronic state of undernutrition in many regions. Improvements in health will require improvements in nutrition, water supply, waste disposal, public health programs and hygiene, education, and transportation, as well as in the health-care delivery system. Programs for improvements in infant and child feeding and for vaccination against measles could significantly reduce the infant mortality rate. An immediate result of such programs, however, would be an expansion of the dependency ratio (proportion of dependent children) and a further strain on available food resources, schools, and other services geared to the young age-groups. These considerations must be taken into account in long-range planning for the area. While many recommendations can be made for improving the health-care system, the principal ones are integration of all components of the system, improvements in monitoring disease, reorientation of the system toward preventive medicine, with emphasis on mother-and-child care, use of all communications media in health education, and strengthening health education in order to amplify health-care delivery.

PN-AAB-216

\$22.30

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 3. INDUSTRIAL AND URBAN DEVELOPMENT

Roy Nick McPherson
December 1974, 190p. (AFR-309.2-M414-5)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

Industry accounts for only about six percent of the Sahel-Sudan's GNP. Nonagricultural exports come principally from the extraction industries (iron ore in Mauritania, phosphates in Senegal). Manufacturing industries play a minor role, but significant expansions in textile production, construction, and food processing have occurred in the past decade. Goods manufactured in the Sahel-Sudan cannot, however, compete successfully in the export market with those from industrialized countries. Skill in design, uniformity in quality, and response to market conditions are at present not adequately developed. Although urban areas still account for only 11.3 percent of the region's total population, urbanization has recently been proceeding at a rate substantially higher than the growth of the general population (7.0 percent versus 2.2 percent). The drought has contributed to the rate of urbanization, but even without drought conditions a continued high urban rate of growth can be expected. The industrial strategy analyzed in this section is tied to agricultural development. The findings of the analysis include these: Locating industries in the rural sector so as to help develop rural areas, thereby reducing the problems in the urban centers created by high growth rates; evolving a pattern for the development of rural towns, in which industries and the service sector (education, medical, and welfare) would evolve together and serve to reduce the economic and social gap between the rural and urban areas; converting the present specialized agricultural communities into balanced agro-industrial communities capable of greater utilization of local resource and able to move fully to supply local needs.

PN-AAB-217

\$14.10

SOCIAL SCIENCE

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 4. SOCIO-POLITICAL FACTORS IN ECOLOGICAL RECONSTRUCTION

Lois H. Godiksen, Nake M. Kamrany, John N. Paden, and Hugh H. Smythe
December 1974, 433p. (AFR-309.2-M414-6)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

In Part I (Chapters One and Two) of this volume we described and analyzed the human baseline, consisting of demographic and cultural patterns. We have paid particular attention to urbanization and migration and the relations between the urban and rural areas. We used planning relevant criteria in a culture cluster analysis to identify distinct groups in the region and pointed out the importance of taking the cultural patterns of these groups into account in any plans and strategies. In Part II (Chapters Three to Eight) we examined different levels of decision-making, and different types of resources available for the implementation of any plans of action which might be developed. In Part III (Chapters Nine and Ten) we explored the human factor in ecological construction in broader terms than decision-making and implementation. We reviewed the vicious circles of poverty characterizing the region, presented a summary of the agro-ecological strategy (ISYALAPS) and discussed some of the socio-political implications for breaking the "three circles" of poverty and for evaluating the practical dimensions of the ISYALAPS strategy. In the concluding section of this report we have summarized our analysis and findings. We have also included a rather extensive bibliography. The appendix to this annex provides the data base for much of the analysis in the report.

PN-AAB-218

\$32.05

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 5. A SYSTEMS ANALYSIS OF PASTORALISM IN THE WEST AFRICAN SAHEL

Anthony C. Picardi
December 1974, 365p. (AFR-309.2-M414-7)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

The long-term problem of desertification and recurring famine is analyzed with a series of system dynamics simulation models. This is the first application of the system dynamics methodology to a case study of the tragedy-of-the-commons problem. The models provide a framework for understanding the ecological and social dynamics of the pastoral system. They are used to estimate the range-land's maximum sustainable yield and potential for recovery, to analyze the implementation of sustained yield use, and to define some trade-offs between population and certain quality-of-life indicators.

PN-AAB-219

\$27.00

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 6. TECHNOLOGY, EDUCATION, AND INSTITUTIONAL DEVELOPMENT

Joseph E. Soussou, Hani K. Findakly, K. Nagaraja Rao, and William W. Seifert
December 1974, 160p. (AFR-309.2-M414-8)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

This study of the role of technology in the Sahel-Sudan region is divided into three parts:

Part I, "Technological Solutions Proposed for the Problems of the Sahel-Sudan," reviews some of the major technology-based ideas which have not been fully studied yet and which might contribute to the development of the region. By and large, these technology-based ideas or technological "fixes" require large capital outlays and additional research and development before they can be applied in the region. Their contribution to the development of the region will depend primarily on the simultaneous implementation of programs for human-resources development.

Part II, "Choice of Technology: Forces Affecting Choice and Decision Process," addresses itself to issues related to technology policy. This section includes criteria for the selection of technology and suggests an interactive simulation model as a medium for discussing and generating ideas and alternatives. This section rejects the concept of shopping for technology and emphasizes the need for the formulation of national policies that in some instances override economic criteria, stressing instead institutional and human resources development.

Part III, "Education and Institutional Development", argues that in the long run the capacity to make technological choices in the Sahel-Sudan countries can be progressively improved through a carefully planned program of institutional development. The success of any institutional development program depends very much on the quality of formal and nonformal education programs, and the interaction between them and with the production sectors.

PN-AAB-220

\$11.85

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 7. THE ROLE OF TRANSPORTATION

Paul O. Roberts, Hani K. Findakly, Jorge Rebelo, and Dimitrios Tsamboulas
December 1974, 164p. (AFR-309.2-M414-9)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

This study presents a framework for evaluation of transport projects and selection of investment policies. The selection of transport investments and policies is dependent upon their influence on other activities in the modern and traditional sectors in the Sahel-Sudan region. The region encompasses six nations of francophone west Africa, including Chad, Mali, Maritania, Niger, Senegal and Upper Volta. The economies of these coun-

tries, although slightly different from one country to another, are largely agricultural-based and a majority of the population reside in the rural areas. A recent prolonged drought spell has aggravated the development problems facing these nations. In seeking to develop the analytical framework, this study has proceeded along two lines. First, a review of the transport conditions in the region was conducted to develop a data base for use in cost simulation models for the transportation system. Second, the transport costs generated by these models were utilized to examine more generally the role of the transport system in the economic activities in the region, especially those in the rural areas. This study has focused primarily on road transportation, because of the extent of the region and the predominantly agricultural nature of the economy. However, other modes of transport have also been addressed whenever their role became relevant to the overall transport picture.

PN-AAB-221 \$12.15

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 8. AN APPROACH TO WATER RESOURCES PLANNING

David C. Major, Paul H. Kirshen, and Zsofia Lengyel
December 1974, 294p. (AFR-309.2-M414-10)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

This report describes a systematic framework for the analysis of long run investment needs in the water resources of the Sahel-Sudan region. The work was conducted as part of a larger project resulting from a contract between the United States Agency for International Development and the Massachusetts Institute of Technology's Center for Policy Alternatives. Part I of the report summarizes key literature and data on the region's water resources. Part II includes descriptions and illustrative applications of two systems models that provide a framework for long run water resources planning in the region. Part III contains a detailed description of a proposed planning process appropriate for the long term planning of the region's water resources.

PN-AAB-222 \$21.75

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 9. ENERGY AND MINERAL RESOURCES

Joseph E. Soussou
December 1974, 160p. (AFR-309.2-M414-11)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

Formulation of long-term alternatives for development of the Sahel-Sudan region requires assessment of the region's natural resources and construction of a framework for their more thorough national utilization. This study is concerned with two classes of resources: energy and mineral. Energy resources are important because they vitally affect the region's economy and ecology. In the face of the rising energy consumption which accompanies development and rising costs initiated by recent oil

price changes, balance of trade problems are likely to worsen, thereby hampering the development of the region. The critical ecological impacts are associated with the extensive use of wood as a fuel. In this semi arid region, where the recovery period of vegetation ranges from 10 to over 100 years, the long-term impact of deforestation and brush-fires must be evaluated. Mineral resources present a completely different type of problem. While insufficient local energy resources and rising prices increase costs of needed imports, additional exploitation of mineral resources and rising mineral prices augment the value of capital needed for development. This study investigates the potential role of minerals — and various means of enhancing it — in the overall development of the region.

PN-AAB-223 \$11.85

A FRAMEWORK FOR EVALUATING LONG-TERM STRATEGIES FOR THE DEVELOPMENT OF THE SAHEL-SUDAN REGION. ANNEX 10. LISTING OF PROJECT LIBRARY HOLDINGS AND ORGANIZATIONS CONTACTED

Anne E. Graybill and Joseph E. Soussou
December 1974, 151p. (AFR-309.2-M414-12)

Massachusetts Institute of Technology
Center for Policy Alternatives
Cambridge, Massachusetts 02139

This volume consists of working papers for the main report, "A Framework for Evaluating Long-Term Strategies for the Development of the Sahel-Sudan Region", and is not essential to the main summary report.

The specific goal of the M.I.T. study was to develop a framework for evaluating long-term development strategies for the Sahel-Sudan region. The overall effort was subdivided into a number of subject areas, as indicated by the listing of volumes in this report series. Each of the subgroups made extensive use of the existing library facilities at M.I.T. and in the Cambridge area. In addition, consultants to the project utilized resources at their disposal. A list of those sources particularly relevant to the work of each subgroup is included in the appropriate volume. In addition to these documents, the group also collected a number of specialized documents, reports, and memoranda from a variety of sources including the countries of the Sahel-Sudan area, international donor agencies, private contractors, educational institutions, etc. This Annex includes a list of these documents as well as a list of the institutions and groups which were contacted in relation to the Sahel-Sudan study. The list of documents is subdivided into subjects which generally relate to the titles of the various volumes in this M.I.T. report series. The document numbers provided are those assigned by the project librarian and have no significance beyond this particular collection. Those wishing to obtain copies of these documents should secure them from the original sources.

PN-AAB-224 \$11.20

PRACTICAL APPROACHES FOR LAND USE PROGRAMMING AND CONTROL ADAPTABLE FOR THE INTERMEDIATE-SIZE CITY IN DEVELOPING COUNTRIES

Malcolm D. Rivkin
October 1974, 155p. (711.42072-R625)

Rivkin/Carson Inc.
2900 M. St. N.W.
Washington, D.C. 20007

This study represents a first attempt at examining the issues involved and the potential role for AID and other international assistance agencies in improving LDC capacity to deal with land use problems in intermediate cities. It was begun as a modest effort to identify the array of land use planning and control

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techniques suitable for application in medium and smaller size cities in LDCs. This study report is organized as follows:

- A. An examination of the development context in which the intermediate city has evolved to claim attention.
- B. A review of those land use planning and control techniques which could be made applicable to intermediate city situations.
- C. Reports of field investigations which expand on the interrelationships between institutional structure and land use control techniques.
- D. Recommendations for approaches to international assistance, along with specific proposals to AID for program activity in this field.

PN-AAB-225

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LAND TENURE

DROUGHT AND THE DEVELOPMENT OF SAHELIAN ECONOMIES: A CASE STUDY OF HAUSA-TUAREG INTERDEPENDENCE

Stephen Baier and David J. King
1975, 11p. (AFR-333.32-B152)

University of Wisconsin
Land Tenure Center
Madison, Wisconsin 53706

Available *only* from above address in English or French

With the return of relatively good rains in 1974 in the countries of Sahelian West Africa, development economists, aid agencies, and local governments can look beyond the immediate problems of drought relief; they can begin to plan programs for reconstruction and development. Unfortunately the development policies and reconstruction programs now being considered have little chance of success. Planners are ignoring the cultures, economies, and bases for survival of the desert-edge peoples. In order to understand why this is the case, it is necessary to examine not only the age-old mechanisms of survival in the Sahel, but also the assumptions of the development planners. Proposals for development policies have grown out of the debate as to whether the problems of desertification associated with the drought have been man-made or are consequences of a natural phenomenon — climatic change. This debate obscures a neglected issue of extreme importance in the formulation of policy for the future. The basis for survival in the Sahel was interdependence between desert and savannah, pastoral and arable, herder and farmer. A case study of the area which is now Niger and northern Nigeria demonstrates that the pre-colonial economies of the Hausa and Tuareg functioned as two interdependent sectors within a regional economy, interacting across the ecological frontier at the desert edge. By examining this interaction in detail, it is possible to devise an illustrative set of development policies for Niger and Nigeria which would provide a new basis for interdependent Hausa and Tuareg livelihoods.

PN-AAB-226

\$1.95

CHILE'S EXPERIMENTS IN AGRARIAN REFORM: FOUR COLONIZATION PROJECTS REVISITED

William C. Thiesenhusen
January 1975, 8p. (CI-301.35-T439e)

University of Wisconsin
Land Tenure Center
Madison, Wisconsin 53706

Published in *American Journal of Agric. Economics*, Vol. 56

Analyzing four settlements in Chile's Central Valley located from Santiago to Linares and established by a private founda-

tion, the Instituto de Promocion AGRICOLA (INPROA), the author concluded in 1964 that, "Reform tends to raise the incomes of campesinos immediately . . . the income of new landholders (families) was, on the average, increased two or three times under the (new) system". This statement was qualified in two ways: the sample group was studied soon after the reform took place; and four colonies constituted a rather small sample. This paper attempts to overcome the first difficulty; its purpose is to provide panel design data which are often lacking in discussions of agrarian reform and colonization and to allow the reader to generate some hypotheses that might be worthy of further investigation and analysis. Thus, data on families living on all four farms were gathered again in 1970. Both 1964 and 1970 were considered by local agronomists as "normal agricultural years." The key questions concerning some of the economic issues are:

- (1) How are net family and per capita income and their distribution different in 1970 from the situation in 1964?
- (2) How do colonists spend their income?
- (3) How has labor use changed over the study period?
- (4) What factors are associated with "economic success"?

In 1964, three post-reform tenure patterns were being used on the four settlements. Table 1 describes both these patterns and those found in 1970, the principal income sources, and the pattern of interviewing used.

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Angela Hernandez de Caldas, Jefe, Departamento de Documentacion, Centro de Informatica Economica, Camara de Comercio de Bogota, Apartado Aero 29824, Bogota, Colombia

Journal: *Camara de Comercio de Bogota, Colombia*, a quarterly analyzing socio-economic aspects of Colombia and the Andean Group, in Spanish. Offered free in exchange for journals dealing with the economy, markets, and technology and its transfer.

Mrs. Adoracion C. Boone, Librarian, Dairy Training and Research Institute, U.P.L.B. College, Laguna 3720, Philippines.

Journal: *DTRI Annual Report*, a yearly report on the dairy institute, in English. Free in exchange for journals in dairy science and related fields.

Mr. Nasim Akhtar, Associate Editor, Department of Zoology, Gordon College, Rawalpindi, Pakistan.

Journal: *Bulletin of Hydrobiological Research*, a bulletin published at irregular intervals, in English. Free but prefer to exchange for other journals.

Biblioteca Perez Guerrero, Facultad de Ing. Agronomica y Med. Veterinaria, Universidad Central, Apartado A 46-07 Quito, Ecuador
Journal: *Veterinaria Equatoriana*, a journal treating veterinary medicine, appearing irregularly, in Spanish. Offered in exchange for other journals.

Publications, Center for Research on Economic Development, University of Michigan, 506 East Liberty Street, Ann Arbor, Michigan 48108.

Materials offered: 1) Contact this address for information about free exchange of information. 2) For an annual subscription of US\$5.00 subscribers can receive all CRED publications, which are research papers on economic development. 3) Research papers entitled "Discussions Papers" are available to non-subscribers for US\$1.00 plus postage and handling.

Mrs. P. Sahertian-Bakhoven, Clearing House Manager, BIOTROP - SEAMEO Regional Centre for Tropical Biology, Botanic Gardens, Bogor, Indonesia

Journals: *BIOTROP Bulletin*, monograph series on special subjects, irregular but about four times yearly; *BIOTROP Newsletter*, a quarterly; other publications, In English. Free in exchange for other journals.

Dr. E. (Hope) Medina Spyropoulos, Editor, Development Associates, Inc., 1521 New Hampshire Ave., NW, Washington, DC 20036.

Journals: *Infamilia Hemisferica*, a quarterly pamphlet dealing primarily with population and family planning. In English and Spanish.

Luz E. Luderitz, Librarian, Departamento de Oceanologia, Area do Matematicas y Ciencias Naturales, Universidad de Chile, Casilla 13-D, Vina Del Mar, Chile

Journals: *Revista de Biologia Marina*, an annual publication in Spanish with English summaries. Offered in exchange for journals of oceanology and marine biology.

J. A. Villars, Librarian, Council for Scientific and Industrial Research, PO Box M.32, Accra, Ghana.

Journal: *Ghana Science Abstracts*, a quarterly bulletin containing abstracts of scientific and technical publications originating from Ghana, in English. Offered in exchange for other journals.

Ing. Gustavo de la Torre R., Sub-Direccion de Difusion, Direccion General de Investigacion, Apartado 2791, Lima, Peru.

Journals: *Revista de Investigaciones Agropecuarias* and *Informes Especiales*. Journals on research in agriculture (food crops) and special reports on these subjects, in Spanish. Offered in exchange for other journals.

Dr. Robert W. Howe, Director, ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, The Ohio State University, 1800 Cannon Drive, 400 Lincoln Tower, Columbus, Ohio 43210.

Journals: ERIC/SMEAC: *Mathematics Education Bulletin*; *Science Education Bulletin*; *Environmental Education Bulletins*. These are issued separately several times per year, describing ERIC products, summaries and reviews of research, publication announcements, etc. In English, offered free but would appreciate exchanges for other journals and bulletins in English. Will also send publications list of other materials which are not free but usually priced under US\$5.00.

Mrs. Soemiyati, Librarian, Horticultural Research Institute, Departemen Pertanian, Pasarminggu, Jakarta Selatan.

Journal: *Bulletin Penelitian Hortikultura*, a quarterly containing research articles on agronomy, plant breeding, pests and diseases, food technology, and economic aspects of horticultural crops. In Indonesian with summaries in English, offered in exchange for other journals.

Nadeemul Hasnain, Editor, Research Association (Anthropology), Department of Anthropology, Lucknow University, Lucknow, India.

Journal: *Research Bulletin*, a quarterly of contemporary research and reviews in all branches of anthropology and sociology. In English, offered in exchange for similar journals.

Dr. Mary C. Rainey, Director, Non-Formal Education Information Services Center, Institute for International Studies in Education, 513 Erickson Hall, Michigan State University, East Lansing, Michigan 48824.

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Mr. Hamilton Nonato Marques, Pesquisa E Planejamento Economico, Caixa Postal 2.672 - ZC 00, CEP 20,000, Rio de Janeiro, Brasil

Journal: *Pesquisa e Planejamento Economico*, a semiannual periodical focusing on the Brazilian economy and economic development, in Portuguese. Free in exchange for similar journals.

Mr. Rabindar Singh, Director, National Buildings Organization, "G" Wing, Nirman Bhavan, Maulana Azad Road, New Delhi - 110001, India.

Journals: *Journal of National Buildings Organization* (semiannual). *N.B.O. Abstract*, a monthly review of construction techniques, design of buildings particularly repetitive type, building materials, socio-economic aspect of housing, rural housing, and planning, in English. Free in exchange for journals dealing in above subjects.

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If you want to receive copies of their journals *write directly to the addresses below*:

Mrs. Sare L. Wanambwa, Librarian/Sub-Editor, East African Freshwater Fisheries, Research Organization (EAFFRO), P.O. Box 343, Jinja, Uganda, East Africa.

Journal: *The African Journal of Tropical Hydrobiology and Fisheries*, a journal on fisheries science, technology and management; fish biology and limnology with special emphasis on Africa and tropical environments, in English with a few papers in French. Free in exchange for other journals.

Prof. Nguyen-van-Ai, Secretary General, National Scientific Research Council, P.O. Box 2780, Saigon, Vietnam.

Journal: *Khoa-Hoc Nhan-Van*, an annual magazine on human science, in Vietnamese with summaries in English or in French. Free in exchange for other journals.

Ato Yilma Seyoum, Public Relations Officer, Institute of Agricultural Research, P.O. Box 2003, Addis Ababa, Ethiopia.

Journal: Annual Reports and Proceedings of Annual Seminars, and therefore not a journal, covering results of agricultural research and related disciplines, in English. Titles of separate technical publications on request. Exchange is preferred, otherwise free.

Mr. Arturo R. Ortiz, Asociacion Mundial de Vivienda Rural, Avenida Libertador, Edif. Zulia - Local 56, Apartado 16224, Zona 101, Caracas, Venezuela.

Journal: *Revista Internacional de Vivienda Rural*, a journal to focus attention internationally on economic and social development of rural communities, in Spanish and English. Free in exchange for other journals.

Dr. Tran Phuoc Duong, Faculty of Science, University of Cantho, 1, Tu Duc Avenue, Cantho, South Vietnam.

Journal: *University of Cantho Annales*, a journal on science and agriculture, in English and French. Free in exchange for other journals.

Mr. S. S. Rangachar, Editor, Small Industry Extension Training Institute, Yousufguda, Hyderabad - 500045, India.

Journals: *SEDME*, a quarterly publication on small enterprises development, management and extension. *SENDOC Bulletin*, a bi-monthly with abstracts of information on small industry, management, extension and related topics. *Appropriate Technology Documentation Bulletin*, a quarterly on new products and processes. These are in English and are offered in exchange for other journals.

Ms. Bicia Maria Wagner Figueira, Librarian, Universidade Federal Da Bahia, Biblioteca Central, Salvador-Bahia, Brasil.

Journal: *Boletim Bibliografico*, a quarterly biographic listing of titles of graduate theses completed in many subjects, from Agriculture through Geo-Sciences to Sociology, in Portuguese. Free in exchange for other journals.

Mrs. Martha Ann Deadmore, Editor, SIDN Newsletter, Industrial Development Division, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia 30332, USA.

Journal: *SIDN Newsletter*, a quarterly newsletter focusing on small industry development in developing countries, featuring articles on activities of organizations involved in industrial development and small industry promotion, in English. Free upon request. News items, editorial contributions, and "letters to the editor" are welcome.

Mr. V. K. G. Nair, Documentation Officer, Rubber Research Institute of India, Rubber Board, Kottayam 686 009, India.

Journal: *Rubber Board Bulletin*, a quarterly on the agricultural, chemical/technological and economic aspects of natural rubber, in English. *Report of Activities of the Rubber Board*, a semi-annual report on administrative, research and development activities of the institution, in English. *Indian Rubber Statistics*, an annual, in English. *Rubber*, a monthly popular magazine, in Malayalam. Other occasional booklets and reports, free in exchange for other journals.

S.A. Winjobi, Agricultural librarian, Institute of Agricultural Research and Training, P.M.B. 5029, Ibadan, Nigeria.

Journal: *Reprints, Research Bulletins, Annual Reports*, etc. on all aspects of Agriculture, in English. Free in exchange for other journals.

S. P. Agrawal, Executive Director, Shree Ramayan Vidyapeeth, 15 Institutional Area, Lodhi Road, New Delhi, India.

Journal: *Shree Hari Katha*, a quarterly journal of research in comparative religion and its impact on Society, in Hindi and English, in exchange for other journals.

Jose Carlos Costa de Andrada, Editor Organization, Av. Vieira de Carvalho, 40 - 30 andar, Cep 01210, Sao Paulo, Brazil.

Journal: *Jornal Agroceres*, a monthly publication covering general information on agricultural research, production and marketing, in Portuguese. Free in exchange for other technical journals in agriculture and research.

S. M. Dhawan, Officer-in-charge, Library, National Physical Laboratory, Hillside Road, New Delhi-110012, India.

Journals: *NPL Technical Bulletin* and *NPL Annual Report*. Both give information about physics and related sciences, in English. Free in exchange for journals, scientific and technical reports in the same subjects.

Mr. S. Varma, Editor for Research and Deputy-Director for Publications, Haryana Agricultural University, Hissar - 125 004, India.

Journal: *HAU Journal of Research*, a quarterly publishing original research papers in agriculture, veterinary and animal sciences, basic sciences, and humanities, in English. Free in exchange for other journals in similar subjects.

John Flanagan, Tropical Products Institute, 56-62 Grays Inn Road, London WC1X 8LU, England.

Journal: *Tropical Science*, a quarterly emphasizing tropical and subtropical plant and animal products, in English with French and Spanish summaries. Free in exchange for similar journals. Other publications are free to official organizations in developing countries. A list of publications is available on request.

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Journal: *Revista Geografica*, a quarterly periodical in Spanish with resumes in English and French. Free in exchange for other journals.

Director of Research, Arunachal Pradesh Administration, Shillong, India.

Journal: *Resarun*, a quarterly bulletin of papers and articles on research in cultural, historical and linguistic fields, in English. Free in exchange for other journals.

T. C. Jain, Librarian, International Crops Research Institute For The Semi-Arid Tropics (ICRISAR), City Office, 1-11-256, Begumpet, Hyderabad-500016, A.P., India. Journal: *a catalogue of periodicals, ICRISAT Library*, in English. Free in exchange for journals.

Dr. Allan Deutsch, Information Services Administration, International Plant Protection Center, Oregon State University, Corvallis, Oregon 97331, USA.

Journal: *Infoletter*, a bimonthly newsletter on weed research and control, and related topics, in English (mostly). Free, but also will be pleased to receive journals in exchange.

Mr. Z. A. Nizami, Director, Master Plan and Environment Control Department, Rizvi Chambers, Akbar Road, Karachi-3, Pakistan. Journal: *Newsletter*, a monthly newsletter on metropolitan planning and development, in English. Free in exchange for other journals, particularly those in the same subject area.

Mrs. Thelma Dublin, Program Director, Information Center on Instructional Technology, Academy for Educational Development, 1414 22nd Street, NW, Washington, DC 20037.

Journal: *Instructional Technology Report*, a bi-monthly newsletter on developing countries' use of educational technology for formal and non-formal education, in English. This newsletter, and bulletins on the same subject, are free. Institutions should request to be added to the center's mailing list.

Mr. Charanjit Chanana, Executive Director, Marketing & Economic Research Bureau, E-71 Greater Kailash, New Delhi 110048, India.

Journal: *Journal of Marketing and Economic Research*, a quarterly in English. Prefers to exchange for other journals.

Dr. Alfred de Souza, Editor, Indian Social Institute, Lodi Road, New Delhi 110003, India.

Journal: *Social Action*, a quarterly review of social trends - sociology, economics, politics, socio-economic development, population and family, education, industrial relations and management, in English. Free in exchange for journals in English from research and development institutions in developing countries, or US\$8.

Mrs. Muna Ibrahim Osman Ishag, National Council for Research, P.O. B. 2404, Khartoum, Sudan.

Journal: *El Buhuth*, a quarterly review of scientific research in English. Free in exchange for other journals.

Mr. Kazi S. Ahmed, Secretary, Institute of Statistical Research and Training, University of Dacom, Science Annexe, Dacca-2, Bangladesh.

Journals: *Journal of Statistical Research*, a semi-annual journal, in English. Free in exchange for other journals, specimen copy free on request.

Rural Demography, a semi-annual journal, in English. Free in exchange for other journals, specimen copy free on request.

Mrs. Malkanthi Nanajakkara, Librarian, Marga Institute, P.O. Box 601, Colombo, Sri Lanka.

Journal: *Marga*, a quarterly on social and economic issues pertaining to development in Sri Lanka in English. Free only in exchange for journals dealing with similar subjects.

Mr. Jaouquin Gonzalez F., Subgerente Tecnico, Federacion Nacional de Arroceros, "Fedearroz", Carrera 7 No. 13 - 58 Piso 10, Bogota Columbia

Journal: *Revista Arroz*, a journal of technical, commercial, and statistical information in the field of agriculture, in Spanish. Free in exchange for other technical journals in agriculture and research.

Dr. M. N. Azam, Secretary, National Science Council, 21-E Block 6, P.E.C.H.S., Karachi-29, Pakistan.

Journal: *Science News*, a quarterly journal, a compilation and publishing of scientific research done in Pakistan, in English. Free in exchange for other journals.

M.S. Rana, Dy. Librarian, Meerut University Library, Meerut (U.P.), India.

Journals: *Mathematica*, a journal of the Meerut University Mathematical Society. *M.U. Journal of Economics* *M.U. Journal of Political Science*. *Indian Journal of Philosophy* *Journal of Studies in Political Science*.

These journals, in English, are free in exchange for journals in the same subjects.

The Librarian, Periodicals, Gifts, and Exchange Section, Central Reference and Research Library, C.S.I.R., P.O. Box M.32, Accra, Ghana, West Africa.

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Journal: *Revista do Ensino*, a journal on education, in Portuguese. Free in exchange for similar journals.

Mr. Kemal A. Faruki, Hon. Secretary, Pakistan Institute of International Affairs, Aiwan-e-Saddar Road, Karachi-1, Pakistan. Journal: *Pakistan Horizon*, a quarterly journal on international relations, in English. Free in exchange for other journals.

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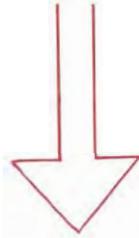
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Journal: *Archivos de Pediatria del Uruguay*. In Spanish. Free in exchange for other journals.

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