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S - AGRICULTURE AND RURAL DEVELOPMENT

1978/80

VOL. VI

The World Bank Group Archives

30048866

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Operational Sectors - S - Agriculture and Rural Development 1978 - 1980 - Volume 6

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FORM NO. 635
(6–77)

CLOSE – OUT SHEET

This file is closed as of May 30, 1979

For further correspondence, please see ~~VII~~.

RECORDS MANAGEMENT SECTION

S. Agriculture

May 24, 1979

Mr. John Whitman
Director
International Environmental
Management Institute
696 Virginia Road
Concord
Massachusetts 01742

Dear Mr. Whitman:

Thank you for your letter of May 4, 1979, inviting a presentation by a member of our agricultural staff at the forthcoming seminar on "Principles of Environmental Management in Developing Countries." As I informed you on the telephone, Mr. J. Clive Collins, one of our Senior Agriculturists, has agreed to speak on "Environmental Management in the Context of the World Bank's Lending for Agriculture and Rural Development." Mr. Collins, before joining the Bank, had some 18 years of experience in agriculture in developing countries, covering commercial production, applied research and development planning.

Mr. Collins is proposing to speak briefly about the Bank, its expanding agricultural and rural development lending and its concern for environmental aspects of its projects before proceeding to constraints limiting the application of environmental management in developing countries and an examination of the environmental factors relevant in agricultural resource planning. He would discuss environmental aspects of irrigation, area development and forestry projects, citing examples from the Bank's experience.

Hoping you have a successful seminar.

Yours sincerely,

D. C. Pickering
Assistant Director
Agriculture and Rural
Development Department

JCCollins:rm

OFFICIAL FILE COPY

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

cc. S - Agriculture
cc. S - Environment

OFFICE MEMORANDUM

TO: See Below (One)

DATE: May 23, 1979

FROM: R. Goodland, Environmental & Health Affairs (Finalized in his absence.)

SUBJECT: Tropical Deforestation

1. You are being sent the attached Decision of UNEP's Governing Council (May 1979) because you are working on or are interested in a project promoting tropical deforestation. The resolution attracted strong, broad-based support from Asian, African and Latin American delegations - with Brazil a distinct exception.

2. In view of this most welcome decision, we would be well advised to exercise extreme caution before becoming involved in any projects promoting non-sustainable use of this fragile and valuable resource.

Dr. J. A. Lee, OEHA

Messrs. C. Weiss, PAS
J. Coulter, CGR
G. Darnell, AGR
D. Pickering, AGR
J. Spears, AGR
T. Davis, AGR
B. Thoolen, AGR
P. Eigen, WA2
J. Hanna, WA2
J. Blaxall, AEP
A. Golan, AEP
M. Walden, AEP
R. Wadsworth, AEP
M. Baxter, AGR

R. Stern, AEA
I. Zincir, AEA
K. Haasjes, LCP
P. Greening, LCP
H. Nissenbaum, LC1
D. Koromzay, LC2
D. Mahar, LC2
R. Skillings, PER
H. Mirza, LC2

Ms. H. Martinez, LC1
Messrs. Venkatraman, LC2
C. Keil, AGR
H. Wagner, LCP
R. Fishwick, WAP
J. Martinez, LC2

J. Collins, AGR
Ms. G. Davis, AEP
Messrs. J. Edgerton, AGR
A. Ewing, IPD
B. Gray, AGR
R. Hewson, AEP
J. Greenfield, AEP
S. Nayar, IPD
J. Wallis, LCP
M. Oberdorfer, IPD
M. Saddington, AEP
E. Senner, LCP
P. Whitford, AEP
F. Thomas, LCP
R. Overby, OEHA

Attachment

RG:OMc

DECISION OF UNEP GC VII (APRIL-MAY 1979)
ON TROPICAL FORESTS

TROPICAL WOODLANDS AND FOREST ECOSYSTEMS

Governing Council,

Considering the undeniable environmental and economic importance of forest resources to the social and economic life of the populations of humid tropical regions,

Recognizing the growing worldwide concern about the degradation and the rapid disappearance of the earth's forest cover resulting from the irrational exploitation of tropical forest and woodlands ecosystems,

Deploring the adverse social, economic and environmental impacts which are projected to intensify in the future,

Reaffirming the right of States to exercise permanent sovereignty over natural resources in their territories, and their primary responsibility for environmental protection therein, and recognizing the major role of existing regional mechanisms in this field, and the role of the United Nations Environmental Programme in assisting States, upon request, as appropriate,

1. Reaffirms that humid tropical forest ecosystems constitute a priority concern of the United Nations Environment Programme;

2. Appeals to United Nations bodies and other international organizations concerned by the problem to assist Governments and promote intensified international co-operation with a view to finding appropriate solutions;

3. Decides that the United Nations Environment Programme should be involved in such efforts, in view of the many dimensions of the problem and the catalytic and co-ordinating role of the Programme in matters of worldwide environmental concern;

4. Requests the Executive Director:

(a) In close consultation and full co-operation with the Food and Agriculture Organization of the United Nations, the United Nations Educational, Scientific and Cultural Organization, other appropriate international organizations and Governments, taking into account provisions set forth at the regional level and action derived therefrom, to develop proposals for an integrated programme of activities for conservation and the wise utilization of tropical forests;

(b) For this purpose, to convene a meeting of experts, to include programme and resource managers from international, governmental and non-governmental organizations, developed and developing countries, to decide, taking into account points raised during the seventh session of the Governing Council, on the division of labour and responsibility;

(c) To report on the results of the meeting to the Governing Council at its eighth session;

5. Also requests the Executive Director to ensure that the current activities on humid tropical forests and woodlands are fully reviewed and co-ordinated with a view to identifying and supporting additional complementary activities.

(retyped - Office of Environmental and Health Affairs, May 23, 1979)

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: See Below

DATE: May 23, 1979

FROM: R. Goodland, Environmental & Health Affairs (Finalized in his absence.)

SUBJECT: Tropical Deforestation

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(retyped - Office of Environmental and Health Affairs, May 23, 1979)

F338

yellow

S. Agriculture

The World Bank / 1818 H Street, N.W., Washington, D.C. 20433, U.S.A. • Telephone: (202) 477-1234 • Cables: INTBAFRAD

May 23, 1979

Dr. L.D. Swindale
Director
ICRISAT
1-11-256 Begumpet
Hyderabad 16, A.P.
India

Dear Dr. Swindale:

Inaugural Week Symposium

We have learned with interest that during your inaugural week at the end of August you will be holding a symposium on the development and transfer of technology for rainfed agriculture and the semi-arid tropics farmer.

We would like to participate in this symposium, and I would be grateful if one of my staff members would attend. I propose to send John Russell, who has recently joined our Central Projects Staff, after working in the Eastern Africa region, and who is responsible for reviewing all rainfed agriculture projects financed by the Bank and has been particularly concerned with the semi-arid tropics.

If this is convenient to you we would be grateful to receive materials relating to the symposium.

Yours sincerely,

M. Yudelman
Director
Agriculture and Rural Development Dept.

JRussell:mam
cc: Messrs. Pickering, Ritchie, Russell

S - Agriculture

Mr. William D. Clark, VPE
THROUGH: Mr. Montague Yudelman, AGR
T. James Goering, AGREP

May 22, 1979

Participation in Activities at the International Center for Tropical Agriculture (CIAT)

1. Pursuant to terms of reference dated May 1, 1979, I represented the Bank as observer at the CIAT Seminar on Advances in Research (May 14-16) and the Annual Meeting of the CIAT Board of Trustees (May 18-19) in Cali, Colombia.

2. Seminar on Advances in Research. Solid achievements were reported during 1978 in each of the three major commodity research programs at CIAT--cassava, beans and tropical pastures. The cassava research indicates that the use of improved cultural practices, involving purchased inputs costing no more than about US$3/ha, has the potential to triple farmers' yields from present levels. Emerging problems in the Colombian context relate to the relatively low starch content of some improved varieties and the difficulties of marketing substantially larger output. In the bean research program, significant gains were realized in efforts to develop higher-yielding varieties, many of which demonstrated some resistance to the most important diseases. On-farm trials in the bean program demonstrated that low-cost agronomy practices could increase yields by 50% and were profitable in the major production zones in Colombia. The research program on tropical pastures focuses on the identification/development of high-yielding grasses and legumes suitable for the acid, infertile soils of the humid tropics. In 1978 a highly-productive forage grass entered the stage of large-scale seed production prior to release for commercial use, while three forage legumes which show resistance to disease and pests, have good nitrogen fixation properties and persistence under grazing pressure entered animal production trials as a further step toward possible commercial release.

3. Through the CIAT rice program, in which the Center collaborates closely with the International Rice Research Institute, one improved variety was released for commercial use in Colombia and semi-commercial use in other Latin American countries in February 1978. Average yields of this variety exceed yields from other commercial varieties presently in use in Colombia in both upland and irrigated fields.

4. Training programs by CIAT of technicians and professionals continued to expand during 1978 (314 persons vs. 195 in 1977).

5. Meeting of the Board of Trustees. The major issue concerned the biennial 1980-81 budget proposal for CIAT which, in its original formulation, was some 49% greater in terms of net requirements than the comparable figure for 1978-79. Major factors accounting for the increase was the effect of inflation, the inclusion in the core budget of CIAT outreach staff and some expansion of outreach and research work in the commodity programs. The budget eventually approved by the Board, (net requirements totalling just over US$32.1 million for the biennial period) is some 38% greater than the figure for 1978-79.

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6. Several changes in the CIAT Board of Trustees were made. Retiring from the Board are Messrs. L. Crouch (outgoing chairman) and M. Martinez (Guatemala). Board Member Mr. W. Treitz (Ministry of Economic Cooperation, Federal Republic of Germany) was elected to be the new chairman. Newly-elected members were Messrs. M. Pinero (Argentina), J. Hardon (the Netherlands) and O. Okabe (Japan).

7. Throughout the week there was little direct reference to the World Bank with the notable exception being Mr. Crouch's dinner address to the Board and CIAT staff in which he recognized the World Bank's important and long-standing support of the international agricultural research system. Mr. McNamara, in particular, was noted as one of the strongest individual supporters of the international system. At the same time, Mr. Crouch expressed keen disappointment with the need to cut the CIAT budget from levels which he considered necessary to support high priority research and outreach activities.

8. A full back-to-office report of my trip to CIAT is under preparation.

W. Baum, CPSVP

cc: Messrs. M. Lejeune, CGIAR
J. Merriam, IPA
D. Pickering, AGR
G. Donaldson, AGREP

TJGoering:ga

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S. Agriculture

Mr. Graham Donaldson, Chief, AGREP May 22, 1979

Jim Goering, AGREP

Possible FY1980 AGREP Training Activities in Methodology of Economic Analysis and Appraisal of Projects

1. At present, the most clearly-defined of these activities pertains to training in CBDISPLAY and APAS. Gordon Temple indicates that he expects the CBDISPLAY training workshops (each of 2 hours) to be repeated 10 times during FY1980, while the APAS workshops (each of about 12 hours) might be given twice, each subject to interest shown by Bank staff.

2. I see need for other more or less structured seminars for Bank staff dealing with procedural and methodological questions of economic analysis and project appraisal. One of them, directed toward financial analysts and economists in the agricultural/RD/ag. credit project divisions, would be designed to provide guidance on methodological questions in the financial, social and economic analysis of projects. I see this seminar as being of an "applied" character primarily to provide project staff with guidelines on analytical procedures for the analysis/appraisal of projects in efficiency terms as well as social analysis, a la Squire-van der Tak. The class hours required is of course difficult to estimate at this time. A first approximating might be a workshop, repeated every two months, of perhaps 3 sessions, each of 2 hours. This course would be viewed as complementary to the course now taught by Mr. Ray.

3. A second more general course would be designed for newly-recruited economists/agricultural economists in Bank agricultural projects divisions. The major purpose of this course would be to familiarize project economists with procedural and methodological issues in the project cycle. The material would relate to the economic/social analysis of projects, as well as to matters such as format and content of SARs, review procedures, relationship of projects to Bank economic and sector work, etc. Additional thought needs to be given to the content of this course. A course of this nature might be repeated twice yearly and would be integrated with the training program being developed by the Committee on Information Exchange and Staff Training.

4. A related activity proposed for FY1980 is the preparation of a "Reference Guide for the Financial, Economic and Social Analysis of Agricultural and Rural Development Projects". This guide, to be developed jointly with PAS, would take the form of a loose-leaf manual which includes a systematic treatment of methodological issues in the analysis of projects. Emphasis would be given to the use of examples based wherever possible on Bank-supported projects. This material would be presented in a form which permits updating and revision as required. Gordon Temple and I have spoken informally with Anandrup Ray on this. He would welcome an opportunity to collaborate with us in the preparation of this material.

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8 - Agriculture

NKL

Mr. M.D. ffrench-Mullen, Chief, EMPA1 May 21, 1979

Herman van Wersch and Masud Mian (EMPA1)

Operation and Maintenance of Irrigation Project (Mr. Pickering's memo of April 19, 1979)

1. Efficient maintenance and operation of irrigation projects is very vital to realize their contemplated benefits and therefore, in our credit agreements, covenants have been obtained from the borrowers for their proper maintenance and for the recovery of their maintenance and operation costs from the beneficiaries. In Bank/IDA financed projects technical assistance in the form of overseas and in-country training of the operational staff and adequate provision for maintenance equipment and spare parts is normally included to ensure proper operation and maintenance.

2. In some of the projects which were constructed by the countries in the past, either with or without Bank/IDA participation, special unanticipated problems of general retrogression, bank erosion or siltation may arise requiring outlays, which cannot be covered by the general operation and maintenance budgets. Such projects could be considered for Bank/IDA assistance. In such cases the problems could be diagnosed, remedial actions proposed and the cost and benefits of the treatment studied and subject to their economic viability, Bank/IDA's assistance recommended.

3. Another category of the projects where Bank/IDA assistance could be considered, comprise the on-farm irrigation and drainage system which is normally left for construction and maintenance with the beneficiaries, while the main irrigation system is constructed and maintained by the Government. These channels are not properly constructed by the beneficiaries in the first instance and later their maintenance is neglected. This results in excessive losses from the system through breaches in their banks and evaporation and evapotranspiration from the poorly maintained water courses. This is the area where Bank/IDA's participation can be most beneficial as this would help in rehabilitating water courses and demonstrating to the beneficiaries the merit of their proper maintenance. The Government may recover cost of their rehabilitation and maintenance from the beneficiaries through a surcharge on the water rates.

4. It would be desirable to consider projects of the types described in paras. 2 and 3 for Bank assistance in this region provided it could be established that their improved operation and maintenance would result in increased efficiency and that the benefits generated would be commensurate with the required expenditure.

HvanWersch/MAMian:mam

S. Agricultural

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

May 21, 1979

Mr. Montague Yudelman
World Bank
Room D-823
1818 H Street, N.W.
Washington, D.C. 20433

Dear Mr. Yudelman:

Further to my letter to you of May 15th, concerning Professor Thayer Scudder's research grant from our Office, I understand that you may require a specific request from us to facilitate Professor Scudder's access to Bank documentation.

This is particularly germane with regard to the FELDA schemes in Malaysia, an important segment of the proposed research. As you know, we have no A.I.D. presence in Malaysia, and thus are particularly in need of support in this area.

We would appreciate it if you could see that Professor Scudder is given access to Bank documentation on these projects in as complete a manner as is possible given internal Bank regulations, and the same quality of access to other Bank documentation relevant to settlement projects in Nepal, Indonesia, Afghanistan, Sri Lank and Sudan.

Thank you for your cooperation.

Sincerely,

Harlan H. Hobgood, Director
Office of Rural Development
and Development Administration
Development Support Bureau

cc: Mr. Michael Cernea

F 338
S. Agriculture

Division Chiefs, Agriculture and Rural Development May 21, 1979

D. C. Pickering, Assistant Director, AGR

A Decade of Agricultural Credit Experience in the Bank

Bill Spall, who retires on May 31 as Agricultural Credit Adviser, has agreed to share with projects staff some informal observations concerning his involvement with the Bank's lending for agricultural credit over the past 10 years. A meeting for this purpose has been scheduled for 10:00am on Tuesday, May 29, in Room E1244. You and interested members of your staff are invited to attend.

The meeting will also serve to introduce Brian Argyle who will take over Mr. Spall's duties and to whom future queries on the subsector should be channelled. He can be contacted in Room D811, extension 7-5312.

D C P/JDVP:ga

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NRC

Mr. R. Frank, Acting Assistant Director, EMP — May 18, 1979

S - Agriculture

Franz Heidhues, Acting Chief, EMPA4

Comments on Memo of Mr. D.C. Pickering on Operation and Maintenance of Irrigation Projects

1. Our experience with maintenance of irrigation schemes financed by the Bank, in countries of our Division, is limited since most of the schemes are in an early stage of construction (see attached list). This experience can be summarized as follows:

Egypt

2. The maintenance of the drainage schemes has been considerably improved recently. Special maintenance units, both for the open main drains and for the covered field drainage have been established and funds have been allocated for this purpose. Equipment provided by the Bank for the construction phase (draglines, excavators) is subsequently used for maintenance. Provision was made in the projects for spare parts and for replacement of obsolete pumping units. No need for special maintenance projects.

Greece

3. The Groundwater Development is in advanced stage of construction but would still take about three years to complete. The other two irrigation projects namely East Vermion and Yannitsa, are both in early stage of construction. All the three projects have provision for procurement of operation and maintenance equipment that would be needed to maintain main works. The tertiary network is maintained by TOEVS (Users' Associations).

Iraq

4. The Lower Khalis project is only by 30% completed. A maintenance department has been already established, including three offices, one for the maintenance of lined canals, the second for the maintenance of earth canals, and the third for the maintenance of pumps and other irrigation equipment. The department has been provided with staff, funds and equipment. No special maintenance project is required.

Iran

5. Dez Irrigation project was completed in June 1978. Operation and maintenance equipment was procured under this project. The mission for completion report noted that overall operation and maintenance of the system was lacking as training program once started was not expanded during the construction period.

(Cont'd)

(Cont'd)

6. In conclusion, we do not think that there is scope for special maintenance projects in our area.

7. Some general comments on the memo of Mr. Pickering are given below.

8. Irrigation schemes, in contrast to highways, need mostly routine maintenance (operations repeated every year) than periodic maintenance (operations repeated every five to ten years).

9. However, in some countries where maintenance of irrigation schemes has been neglected for a long period of years, there is scope for having separate irrigation maintenance projects on a nationwide or statewide basis as proposed by Mr. Pickering.

10. These maintenance projects should not, however, be repeated regularly as they may lead to a neglect on the part of the Government of the routine maintenance so essential for the function of the irrigation schemes.

11. In order to improve maintenance in future irrigation projects, we would recommend to include in these projects a maintenance component for equipment, training, etc. with provision for maintenance institution-building. This practice is now being followed in most of the new irrigation (or drainage) projects in our area.

12. Attention should be given to provide the project with funds to cover the cost of spare parts needed for a certain period of the life of the project (5-10 years).

13. Replacement of major items after completion of their lifetime (e.g., pump units, other important irrigation equipment) could be done by including a component in subsequent irrigation projects, or by separate rehabilitation projects.

Attachment

PEconomides/hm

Attachment

Irrigation and Drainage Projects

Egypt	Nile Delta Drainage I	80% completed
	Upper Egypt Drainage I	60% "
	Upper Egypt Drainage II	30% "
	Nile Delta Drainage II	5% "
	Fruit & Vegetables (component)	0% "
Greece	Groundwater Development	60% "
	Yannitsa Irrigation	15% "
	East Vermion Irrigation	3% "
Iraq	Lower Khalis	30% "
Syria	Balikh Irrigation	20% "
	Euphrates Drainage I	not available
Iran	Dez Irrigation	100% "

NRIC
S- Agriculture

Mr. F. Heidhues, Acting Chief, EMPA4 May 16, 1979

Paris Economides and A. Schwenneker, EMP

Operation and Maintenance of Irrigation Projects (Memo of D.C. Pickering, 4/19/79)

Our comments on the above memo are as follows:

1. We fully agree with Mr. Pickering on the poor operation and maintenance condition of many irrigating schemes which the Bank helped finance and on the need for improvement.

2. Irrigation schemes, in contrast to highways, need mostly routine maintenance (operations repeated every year) than periodic maintenance (operations repeated every five to ten years).

3. However, in countries where maintenance of irrigation schemes has been neglected for a long period of years, there is scope for having separate irrigation maintenance projects on a nationwide or statewide basis as proposed by Mr. Pickering.

4. These maintenance projects should not, however, be repeated regularly as they may lead to a neglect on the part of the Government of the routine maintenance, so essential for the function of the irrigation schemes.

5. In order to improve maintenance in future irrigation projects, we would recommend to include in these projects a maintenance component for equipment, training, etc. with provision for maintenance institution-building. This practice is now being followed in most of the new irrigation (or drainage) projects in our area.

6. It should be noted that in many cases, except for some specialized equipment, there is no need for additional maintenance equipment since the equipment provided for the construction of the works could be used later for maintenance (e.g., draglines, excavators).

7. Attention should be given to provide the project with funds to cover the cost of spare parts needed for a certain period of the life of the project (5-10 years).

8. Replacement of major items after completion of their lifetime (e.g., pump units, other important irrigation equipment) could be done by including a component in subsequent irrigation projects, or by separate rehabilitation projects.

PEconomides/hm

S. Agriculture

May 16, 1979

Mr. Bill Kinsey
Overseas Development Group
University of East Anglia
Norwich NR4 7TJ, England

Dear Bill:

During the Nairobi Workshop, while we were discussing institutional issues, you made a brief intervention informing about a recent decision taken by the Ministry of Overseas Development with regard to using sociological expertise in development projects. I would appreciate it if you could send me any pertinent printed information on that, or if not available, just a more precise reference to the substance and date of this decision.

I enjoyed very much being and working with you in Nairobi. With best regards,

Sincerely yours,

Michael Cernea

MC:dc

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

S. Agriculture

May 15, 1979

Mr. Michael Cernea
World Bank
Room D-709
1818 H Street N.W.
Washington, D.C. 20433

Dear Mr. Cernea:

The Agency for International Development has authorized a grant to the Institute for Development Anthropology to enable Professor Thayer Scudder to evaluate the development potential of agricultural settlement in new lands, with special emphasis on less developed countries in the tropics.

This grant, which became effective on May 15, 1979 will continue through October 1, 1980. Evaluation will relate to both spontaneous settlement and to government-sponsored settlement schemes, with emphasis in the latter case relating to the more successful schemes. A brief description of the research program is enclosed.

In authorizing this grant, we have encouraged Professor Scudder to collaborate with your institution and other donor agencies both in regard to your general experience with settlement schemes and, more specifically, in regard to past and ongoing experience in the six countries selected for field visits: Afghanistan, Indonesia, Malaysia, Nepal, Sri Lanka, and Sudan. We consider such collaboration to be especially important in Malaysia since there is no USAID mission there.

Professor Scudder will shortly be contacting you directly in order to discuss his research design and plans, and ways in which his evaluation findings could be made more useful to your own organization. I know he looks forward to a close collaboration with you on this important research program, and I hope it will be possible to work out mutually beneficial collaborative arrangements. Should you have any questions please feel free to call me or Dr. Alice Morton at 703/235-8902 or 703/235-8918.

Yours sincerely,

Harlan H. Hobgood, Director
Office of Rural Development and
Development Administration
Development Support Bureau

Enclosure

S. Agriculture

May 14, 1979

Mr. Zlataric
International Cooperative Alliance
11 Upper Grosvenor Street
London W1X 9PA
England

Dear Mr. Zlataric:

This letter confirms my telephone conversation of 14 May with Mr. Saxena during which arrangements were made for us to confer at ICA at 10:30 a.m. on Friday, 8 June. I very much look forward to meeting you.

As I indicated to Mr. Saxena, Mr. Turtiainen and I are involved in writing a paper on cooperative finance which we hope to publish as a Staff Working Paper of the World Bank. The paper would attempt to explore the nature of cooperative finance and to provide financial analysts some guidelines for the design of development project financing packages involving cooperative enterprises. Our major constraint and a source of uneasiness at this stage in our work stems from our inability to locate definitive references in the field of cooperative finance, other than the more general works of Helm and Rasmussen. I understand that ICA maintains a library, and I would very much appreciate the opportunity to review quickly the materials which it contains while I am in London, and to benefit from any guidance concerning the literature which ICA staff might provide.

Within the next several days I shall send you a copy of a draft of a portion of our paper, and Mr. Turtiainen and I would find very helpful any comments you might wish to offer when I visit your office in June.

Yours sincerely,

J. D. Von Pischke

cc: Mr. T. Turtiainen, ASP
Mr. P. Gittinger, EDI

OFFICIAL FILE COPY

S. Agriculture and Rural Dev.

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Dr. Richard Longhurst
The Institute of Development Studies
University of Sussex
Brighton, Sussex BN1 9RE
England

May 14, 1979

Dear Richard:

Thank you most kindly for sending me the Discussion Paper 142 on Seasonal Discussions to Rural Poverty: Analysis and Practical Implications. I have read it with very considerable interest, as have other colleagues in this department and I propose now to give it wider circulation within the Bank. It has a valid message for regional operational staff so copies will go to all agriculture and rural development division chiefs.

If you happen to be passing through Washington, D.C., and can give me advanced notice, I should very much like to arrange an informal seminar on this topic. Think about it, and in the meantime, my best personal wishes.

Your sincerely,

Don

Donald C. Pickering
Assistant Director
Agriculture & Rural Devt. Dept.

DEP

DISCUSSION PAPER

SEASONAL DIMENSIONS TO RURAL POVERTY:

ANALYSIS AND PRACTICAL IMPLICATIONS

by

Robert Chambers, Richard Longhurst,
David Bradley and Richard Feachem

DP 142

February 1979

This paper reports on a conference on seasonal dimensions to rural poverty. Presentations included specialised papers on climate, energy balance, vital events, individual tropical diseases, nutrition, rural economy, and women, and also multi-disciplinary case studies of tropical rural areas from the Gambia, Nigeria, Mali, Kenya, Tanzania, India and Bangladesh. While care is needed in generalising, the evidence suggested that for agriculturalists in the tropics, the worst times of year are the wet seasons, typically marked by a concurrence of food shortages, high demands for agricultural work, high exposure to infection especially diarrhoeas, malaria, and skin diseases, loss of body weight, low birth weights, high neonatal mortality, poor child care, malnutrition, sickness and indebtedness. In this season, poor and weak people, especially women, are vulnerable to deprivation and to becoming poorer and weaker. Seasonal analysis is easily left out in rural planning. When applied, it suggests priorities in research, and indicates practical policy measures for health, for the family, for agriculture, and for government planning and administration.

This is one in a series of working papers, intended to stimulate discussion on the topics covered. If you would like to comment on this paper, please write to the author, c/o IDS.

Contents

SEASONAL DIMENSIONS TO RURAL POVERTY: ANALYSIS AND PRACTICAL IMPLICATIONS

SUMMARY OVERVIEW

This paper is based on a conference on seasonal dimensions to rural poverty held at the IDS in 1978.* It examines seasonal factors which are adverse for rural people, especially in tropical countries. It finds a common scenario in agricultural communities in which the worst times of year are the wet seasons when, at the same time, there are food shortages, high food prices, high demands for agricultural work, and high exposure to infection, especially diarrhoeas, malaria, and guinea worm. These factors combine to make the wet season a time of stress and crisis for all, but especially for women, children, and the poorer families. The wet season is marked by loss of body weight, low birth weights, high neonatal mortality, poor diet and malnutrition, poor child care, sickness, indebtedness and loss of production through sickness and weakness. It is a time when many poor people become poorer.

Seasonal aspects of rural poverty are easily overlooked because of difficulties of travel during rains, because attention is attracted by those able to work in the fields rather than those unable to work and at home, because many of the sick are unable to get to clinics, because it is a difficult time to provide and supervise rural services, and because the work of disciplines and departments is not geared to the seasonal linkages between nutrition, disease, agricultural work and poverty.

The many practical implications of seasonal analysis include

- seasonal analysis in rural planning, identifying seasonal linkages between food supply and prices, nutrition, health, agricultural activity, and poverty, and measures to overcome adverse combinations;

- priority in public health action to diseases, especially diarrhoeas and malaria, which coincide with seasonal food shortages and peak agricultural activity;

- organising communal child-care at times when women are most busy;

- improving cheap small-scale food storage;

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* The authors would like to thank all those, participants and others, whose research, comments and criticisms have contributed to this paper. Responsibility for any errors or omissions rests with the authors.

- irrigation and off-season public works to spread work round the year;

- adequate local food supplies to prevent seasonally high prices.

PURPOSE AND SCOPE

This report is for those, of whatever ministry, department, agency, discipline, level of seniority, nationality, or political opinion, who are concerned with rural poverty in countries of the Third World. It is based on a mode of analysis which is seasonal and cross-disciplinary and which we believe complements other approaches. It has practical implications. We hope that it will help to indicate ways in which research can be brought to bear on key issues and rural policies and programmes can be better focused.

This report arises from a conference[1/] which set out to explore the severity and causality of seasonal deprivation among poor rural people in Third World countries and the relationships of that deprivation to poverty. A particular purpose was to identify linkages between different factors which vary seasonally as they relate to the lives of the poorer rural people, and especially linkages between the concerns of separate disciplines, for example between health and agricultural labour. Some of the more important of these factors were climatic conditions, disease transmission, morbidity, births, deaths, nutritional status, birth weights and the weights of mothers giving birth, labour demand, wages, prices, credit availability and conditions, and dependent relations both within the family and between clients and patrons.

We summarise below the stage of analysis and conclusions which have been reached. There is room for debate about many points; and further evidence should throw light on many of the state-

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1. The conference - 'Seasonal Dimensions to Rural Poverty' - was organised jointly by the Institute of Development Studies at the University of Sussex, and the Ross Institute of Tropical Hygiene at the London School of Hygiene and Tropical Medicine, and was held at IDS from 3-6 July 1978. Geographically, it was mainly concerned with tropical countries in Africa south of the Sahara and in South Asia. Participants came from six countries of the Third World and four of the rich world. The disciplines represented at the conference included medicine (bacteriology, protozoology, epidemiology and public health), nutrition, geography, demography, statistics, agricultural economics, sociology, social anthropology, public administration, and political science. The papers presented are listed in Appendix A.

ments and suggestions which at this stage still have to be tentative. In spite of this, our considered view is that it would be wrong not to disseminate widely the hypotheses, insights and suggestions for policy and practice which have emerged.

Seasonality operates along various dimensions. The most obvious is climate. In the tropics, rainfall is the most significant determinant of climatic seasons although in various ways humidity, temperature, insolation, wind speed and other aspects are also important. Classification can be on the basis of absolute seasonality (the length of dry period) and relative seasonality (the variability of rainfall about the monthly mean) (41). 2/ Taking these two criteria, the rural population in areas of marked climate seasonality numbers about 220 million in Africa south of the Sahara and about 600 million in the Indian subcontinent(7). Another classification which is significant for agriculture and rural life generally is whether there are one (unimodal) or two (bimodal) seasons of rain.

Besides climate, seasonal patterns are also found in labour demand in agriculture (10, 32) and pastoralism (38), in vital events (2, 13, 17, 20, 31), in migration (30), in energy balance (1), in nutrition (16, 18, 31, 32, 35), in tropical diseases (4, 5, 9, 11, 12, 14, 22, 26, 31, 33, 34, 37, 39, 40), in the condition of women and children (9, 18, 25, 31), in the economics of agriculture (8, 10, 19, 23, 24, 32), and in social relations (15, 23, 42), and in government interventions (6, 21). Stress models can be used to express seasonal variations (3). Seasonal patterns may often be directly linked with climate, and, where it is found, with irrigation; but seasonality in rural life is connected not only with climate and irrigation, but also with technology, and social, economic and political processes and change.

THE SCENARIO

The main hypotheses can be presented as a scenario.3/ We do not suggest that in any one environment all the factors will vary together as described here. We do suggest, however, that many of them do commonly vary together and that there is a widespread tendency for adverse factors to operate concurrently during the wet seasons (see Appendices B, C, D and E). Moreover, these adverse factors hit the poorer people harder.

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2. Figures in brackets refer to the papers listed in Appendix A.

3. This scenario has been built up from many sources, not least the conference papers and discussions. In addition we acknowledge a special debt to the work of Susan Schofield, in particular see her article: 'Seasonal Factors Affecting Nutrition in Different Age Groups and Especially Preschool Children', Journal of Development Studies 11, 1 (Oct. 1974) 22-40.

The scenario is based upon a wet season following a dry season. It can apply where there are two wet seasons a year but it may usually be more marked where there is only one wet season a year. The reader may wish to test out these statements against an environment with which he or she is familiar. The scenario is as follows:

Towards the end of the dry season, water becomes scarce. There is a rise in the labour and energy requirements for fetching water and watering livestock, and also for gathering food, clearing and manuring fields, and non-agricultural activities needed to earn cash to buy food. The poorer people, who may have no land or small plots or weak family labour, begin to suffer more than others. They have less food because they have been able to grow less, because they have fewer livestock, because they may lose a higher proportion of their food reserves in storage, and because they have less money. They may eat less in order to save food for the crucial time of cultivation. Work is scarce and wages are low at this time of year. Some migrate in search of work and food.

The rains bring the start of crisis and of the 'hungry season' or 'lean period'. For cultivators, future food supplies and cash income depend upon timely agricultural operations during an often brief period for land preparation. Poorer farmers are often constrained and delayed by lack of inputs - whether seeds, fertilisers, water or draught power. They may have to obtain these from richer farmers or merchants with whom they are forced into dependent and exploitative relationships, and they may obtain them late or not at all. For all those with land, heavy and urgent energy demands have to be met. If draught animals are used, they are weak from lack of grazing during the dry season. For both small farmers and labourers, heavy manual labour for land preparation (often by men), for transplanting (often by women) and for weeding (often by women) comes at this time when food is short. Labourers benefit from being able to get work, but many people are in negative energy balance and lose weight. At the same time, food prices are high and transport problems in the rains make it difficult for either central authorities or the open market to relieve local shortages. The quality of nutrient intake deteriorates. Anticipating hard work, mothers terminate lactation, or, if they continue with it, are able to give their children only a diminished and less regular food supply with their milk. Food preparation becomes more hurried and the diet less varied and nutritious. Less time is spent on cooking, house-cleaning, water-collection, fuel-gathering and child care, and more of the women's time is spent on agricultural operations.

The rains are also the least healthy time of the year. Diseases differ in their seasonality, but some of the more serious and debilitating peak during or just after the rains. These usually include malaria and sometimes diarrhoeal diseases especially where the wet season is also the hot

season. Guinea worm also peaks at this time, as do infections of the skin. The development of protein-energy malnutrition, and perhaps other stresses, contribute to low immune response. Coinciding with a peak labour demand, when failure to cultivate, transplant, weed or harvest may critically affect future income and food supplies, infections increase the risks and vulnerability of rural people. For the poorer people, too, this is a time of year when inability to work has high costs; for work is least difficult to get and wages are relatively high. This is when the poorer people must work in order to earn enough to tide them over until the next agricultural season. This is also a bad time for mothers and children. Births peak, but body weights of mothers and the weights of babies at birth are both low, and neo-natal mortality peaks. The calorific value of the milk supply of lactating mothers is low. Pregnant and lactating women are weakened by disease and work, and those in the poorer, smaller families are especially vulnerable because of the need to work when work is available, and because there are fewer other family members to relieve them of the burden.

Afflicted by sickness, pregnancies and births, short of food, with food prices high, and with a high need for energy for agricultural work, the poorer people are often driven to distress sales or borrowing. They sell or mortgage land, livestock, jewellery, their future crop, or their future labour; they beg from patrons; they become indebted to money-lenders. The seasonal crisis drives them into dependence. Moreover, the knowledge that there will be future seasonal crises constrains them to keep on good terms with their patrons. They are thus seasonally screwed down into, and kept down in, subordinate and dependent relationships in which they are vulnerable to exploitation. The poor are subordinated to the less poor or the rich; and within the family, the women may be subordinated to the men. Seasonal stress may, in fact, be passed on down the line from the stronger to the weaker, culminating in the women and children, the indigent and the aged. This is, then, a time of year when many dependent and exploitative relationships begin and are reinforced and deepened.

When harvest comes wages are high. Work is very hard, both in harvesting proper and in post-harvest processing, but morbidity is still marked and people are still weak from the food shortages and sicknesses of the lean season. Weight loss is now at its greatest. Besides harvest work, women still have their household tasks to perform. Mortality, especially among older adults, peaks as earlier sickness and hypocaloric stress combine with the high energy demands of harvest and post-harvest work. Food prices are low, which may be good for some of the landless but bad for tenants, sharecroppers and small cultivators who have to sell their crops in order to raise cash both to repay loans (at therefore high interest rates) and for the ceremonies which are soon to follow.

But after harvest things do improve for a time. Food is available, and food intake recovers in both quantity and quality. Body weights rise. Morbidity and mortality decline. There are ceremonies, celebrations, marriages. There is a peak in rates of conception. And then gradually the cycle begins all over again.

In appraising this scenario, several factors combine to prevent non-rural dwellers from realising how severe the adverse conditions in the wet season may be for rural people and especially for the poorer rural people. Except in emergencies rural poverty tends to be underperceived anyway, especially as it affects women and children. But in addition, the wet season is neglected because of problems of travel and tarmac bias; because agricultural activities in the wet season are more likely to be observed than what goes on in villages and inside dwellings where the sick and the undernourished are more likely to be found; because of difficulties in wet season research; and because of the difficulties of data collection and processing covering a whole year of observation. The incidence of diseases in the wet season is also liable to be under-estimated because a low proportion of those affected may attend clinics and hospitals (where records are kept) because of difficulties of travel, seasonal shortages of money, weakness, and the priority of agricultural work. More generally, disciplinary specialisation makes it rare for detailed observation at the level of the village or family to be carried out across the range of adverse factors (medical, nutritional, energetic, demographic, economic, social, political) which may combine concurrently in the wet season.

CASE STUDIES

This composite scenario can be examined in the light of seven case studies. The summary and selective review of evidence which follows both confirms and qualifies the scenario. The reader is referred to the original papers for more detail.

West Africa

The Gambia (16, 31)

Data for the Gambia are derived from two villages - Genieri (16) and Keneba (31). Although there are differences in cropping pattern and in other respects, the two villages share many common features.

The short unimodal rainy season in the Gambia is marked by shortages of food and money, a lower calorie intake for women, exacting agricultural work, high incidence of infections including diarrhoea and malaria, increased contamination of well water and food, low dispensary attendance, low quality of child care, lower body weights of mothers, lower output of breast milk, lower birth weights, and highest child morbidity and mortality. With the breakdown of extended families,

poorer families suffer a severe labour problem, with seasonality contributing to their becoming indebted and pauperized.

Northern Nigeria (Zaria Region) (32, 39)

The Nigerian evidence covers food consumption and agriculture (32) and disease incidence (39). (Further evidence was presented orally in the conference discussion on the different income earning strategies employed at different times of the year by rich and poor people.)

Zaria like the Gambia has a unimodal rainfall pattern but the period of preharvest calorie shortage - the 'hungry season' - is less marked. Seasonal labour peaks are met by higher calorie intakes for the family as a unit, although the nature of allocation within households is not known. Lack of a year-round clean water supply is a major problem and appears to affect health adversely.

There is a distinct wet season peak in malaria, measles, diarrhoea and guinea worm, coinciding with the times of highest labour demand, which is in June-July. Seasonal deprivation is complicated and qualified by other factors such as availability of land and non-farm employment. The case study area (32) is peri-urban and provides opportunities for such employment. The case study examines the differential impact of seasonal factors on two groups - cattle-owners and non-cattle-owners. Clear and simple statements cannot be made that one group is more adversely affected by the seasons than the other. Availability of land and opportunities to supplement farm incomes are important factors cushioning seasonal effects. Cattle-owners would appear more affected by the rainfall cycle and the availability of land and farm labour than non-owners (who are making a transition in this community to economic lives not entirely dependent on land). Cattle owners do nevertheless meet their calorie needs throughout the year. The calorie intake of non-cattle-owners is less at nearly all times of the year. The strategies of the two groups differ and seasons have differential impacts upon them. There are differences in the two groups of quality of land owned, crop production preferences and levels of productivity, hiring of labour and allocation of household labour.

Comparing the Gambia and Northern Nigeria

The seasonal patterns of the incidence of disease are similar in the Gambia and Northern Nigeria, but there is an important contrast in food availability, apparently with less of a hungry season in Northern Nigeria. Undoubtedly there are still individuals at risk. This contrast can be attributed in large part to differences in agriculture:

- In the division of labour. This applies especially among those who are settled cultivators. In rural Zaria women of

childbearing age are secluded and take very little part indeed in farm work, and instead work inside compounds processing food for domestic consumption and for sale. Men are responsible for providing food for the household and the main staple, sorghum, is grown by them. In the Gambia, in contrast, women are involved in grain production and work long hours in the swamps cultivating rice. This may lead to major differences in child care and implies that women have a far higher energy expenditure in the Gambia situation.

- Energy returns of crops. Compared with sorghum in Northern Nigeria, rice in the Gambia probably has a far lower ratio of calories gained in the crop yield to calories expended as human energy input. Sorghum is grown in the Gambia but because of poor soils yields only one third to one quarter of that grown in the Zaria area.

- Storage and the growing season. Northern Nigeria has a shorter period without a staple crop than has the Gambia. Rice also stores less well than sorghum.

- Off farm work. Farmers in Northern Nigeria have more opportunities to earn off-farm income than their Gambian counterparts.

Greater poverty and seasonality in the Gambia appear to push people into shorter-term strategies than in Northern Nigeria and to lead to indebtedness. In Northern Nigeria, despite similar problems of labour demand, a better food production position allows more room for manoevre.

Mali - (the Kel Adrar Twareg of North Mali) (38)

Seasonality is very marked for these nomadic pastoralists who have no agriculture and in some respects differs from seasonality in agricultural societies. Rainfall is very low and very variable. There are three seasons - a cold dry season, a hot dry season, and a hot rainy season. The main food is milk from camels, cattle, goats and to a lesser extent sheep, supplemented by millet. During the hot rainy season there is milk from camels, cattle and sheep, while goat milk comes in the cold dry and early hot dry seasons. During the hot rainy season much milk is drunk and women gain weight. During the hot dry season milk supplies are at their lowest and the energy required for watering animals is at its peak, producing a seasonal energy crisis which is relieved when the rains come and there is fresh grazing.

The poorer people are more vulnerable partly because they tend to have fewer livestock and fewer species of livestock, and therefore a less adequate or well-spaced milk supply round the year. However, food shortages in case of a failure of the rains are mitigated by traditional rain-making ceremonies in which animals belonging to the more prosperous members of the

community are slaughtered and the meat eaten by everyone, and by traditional loans of animals in milk to poorer people who are in distress. It is also difficult for nomads to store the millet needed for the lean period which comes towards the end of the hot dry season. This forces livestock sales at that time, when the livestock:millet terms of trade tend to be adverse, with low livestock prices, and high prices for millet.

East Africa

Kenya (Northern Division of Machakos District) (24,33)

This area has a bimodal distribution of rainfall with a long rainy season from March to May and a short rainy season from October to December. Goats and cattle are common in the farming system. There are two crop plantings each year. The short rains plantings last until the long rains harvest. Short rains maize is harvested green in the fields in January and February when food stocks are low, and the main short rains crop - pigeon peas - takes six months to mature and is harvested later. But the long rains crops of maize and beans do not last until the short rains harvests. July to September are the busiest months. September to October is a difficult time with a tight schedule for the removal of old crops and land preparation for the short rains, which are also the more reliable ones. September to December is the period of greatest food shortage, coinciding with short rains land preparation and weeding. At this time traders import food and prices are high. Problems in Machakos are accentuated by a high rate of natural population increase.

No seasonal effects were observed in the nutritional status of children. Food shortages did not appear serious enough to affect the children. People have access to other sources of income which can smooth out food crop shortages. However, these findings may cover up deprivation in the low farm income bracket.

No seasonal effect on the incidence of diarrhoea has been found, but mortality associated with diarrhoea in under-fives shows a significant rise in March-July. Data continue to be collected and further seasonal findings may emerge.

Tanzania (Bagamoyo District) (14, 23)

In Bagamoyo District (14) in Tanzania there are also two rainy seasons - mid-March to mid-June (long rains) and September to October (short rains). The greatest number of hospital admissions was in the long rainy season (March-June), and the diseases which accounted for these increased admissions were diarrhoea, PEM (protein-energy malnutrition), malaria/fever and anaemia. There was a short but dramatic increase in admissions in August, which so far goes unexplained. The peaks for admissions were as follows: lower respiratory tract disease - April; measles - September-November; diarrhoea - May

and August; PEM - June and August; malaria - May and August; and anaemia - August. These all occurred in a district close to the capital city and well served by roads. Staple crops were rice, maize and cassava along the coast and maize, cassava and millet inland. Fishing along the coast and cattle-raising inland were also practised.

The Ilbaraguyu (23) are pastoralists in Bagamoyo District. For cultivators the busiest period is February-July, with land preparation starting just before the rains. For the pastoralists, however, it is the dry season that is the busy period while they search for scarce grass and water.

For both cultivators and pastoralists the length and timing of the rains are crucial. For pastoralists the dry season creates a greater labour demand than can be supplied by some families; at this time cultivators are employed as herdsmen. There appears to be little cushion to protect cultivators and pastoralists in the area; what is accumulated in the wet season (cultivators' food stocks; increased body weight of pastoralists' cattle) is consumed during the dry season.

South Asia

India (Tamil Nadu) (27, 28, 29, 36); Bangladesh (8, 10), and Matlab Thana (2, 9)

The case studies from South Asia based on the Tamil Nadu Nutrition Project (27, 28, 29), on Bangladesh (8) and its regions (10), and on Matlab Thana in Bangladesh (2, 9) - highlighted the problems of local variation in seasonalities. The Tamil Nadu data were designed for state-wide decision-making, and were therefore at a level of aggregation at which local variations were bound to be masked. For example seasonal variations in wage rates did appear, but probably not to the degree which would be identified in more local studies. Similarly, in Bangladesh, it was shown that despite the commonly supposed uniformity of agriculture in the country, there are considerable regional variations in labour demand profiles during the year (10), and Matlab Thana exhibited a pattern which was only one of many.

For Bangladesh as a whole, however, and with only a few local exceptions, it emerged that the lean period tends to be during September and October, a time of post monsoon floods, during which the main aman deep-water rice crop is maturing as the floods withdraw or fall. In contrast to the African situation in which, at the time of greatest food shortage before harvest, there is typically a high demand for energy for weeding, in Bangladesh there is no equivalent energy demand. Instead, people tend to be isolated, inactive, sick and short of food at that time. The low demand for labour when food is short and prices are high aggravates hunger and sickness. In the Matlab case study this is also shown to be a time when children either gain little weight or lose weight, morbidity

is high, mothers' body weights at birth are low, neo-natal mortality is high (August, September), births are high (October, November, December), food stocks are low, especially among the landless, agricultural wages are low, and rice prices are high. With the aman harvest starting in November and continuing into December, there is a tendency for breast-feeding periods to be short, for children to lose weight and for deaths among those aged 45 and above to peak.

For Bangladesh as a whole seasonality is complicated by a varied distribution of three paddy crops - aus, aman, and boro. Evidence was presented that food intake is lowest before the main, aman, harvest; that rice prices are at a peak before it and at their lowest after it; and that real wages, estimated by dividing the daily wage by the price of rice, are highest during the aman harvest (see also 18).

QUALIFICATIONS AND CAVEATS

While the case studies confirmed that many of the adverse factors hypothesised in the scenario do indeed, in these environments, operate together during the wet season, four qualifications are in order.

First, care is needed in generalising from the cases. This is particularly so when examining the Gambia and Zaria case studies, both of which come from a band of unimodal rainfall south of the Sahara, exhibiting marked seasonalities along several dimensions. On the other hand, even where rainfall is bimodal, or where cropping follows more complex patterns under irrigation, concurrent seasonal peaks of several factors are still found. In the East African cases, for example, although bimodality may have smoothing effects, there remain peaks, for example in labour demand for agricultural activities. Moreover, Bangladesh shows complex seasonality in cropping and labour demand, but still confirms many of the hypotheses.

Second, care is needed in assessing whether, and to what extent, climatic seasons and other seasonalities can be regarded as causes of rural poverty, or as contexts in which it is sustained and deepened. While there are obvious senses in which tropical seasons help to keep poor people poor, there are also dangers in attributing to climate some sort of causal primacy to the neglect of the many other conditions and processes which are responsible for rural poverty. However, unimodal seasonality may, other things being equal, provide a context in which exploitation of the poorer by the richer is made easier than with bimodal or non-modal climatic seasonality.

Third, failure of the rains - an irregular occurrence - may be more significant than the regular rhythm of the seasons in accentuating and sustaining rural poverty. Two types of process need to be distinguished. First is the regular seasonal cycle which leads to repeated but potentially reversible hard-

ship. People are pressed down on a regular basis but the cycle allows them to recover. (This process is sometimes referred to as a 'screw'.) Second are the irreversible effects where disability or misfortune (such as sickness, flood, famine, pregnancy, or death), often linked with erratic climatic occurrences, force an irreversible downward shift from which recovery is not possible. (Such a process can be depicted as a 'ratchet'.) Such misfortunes include, for example, the sale or mortgaging of land, jewellery, livestock, the coming crop or future labour; or the acceptance of a loan which can never be repaid. It seems probable that ratchet effects have a strong seasonal pattern, occurring either in the wet seasons, or when rains fail or other disasters hit.

Fourth, the role of off-farm income sources appears important. These can be 'smoothing devices'. People in an area with unimodal rainfall but with sources of off-farm income may be more able to withstand climatic shocks than people in an area with bimodal rainfall but without off-farm sources of income.

SEASONAL ANALYSIS BY SUBJECT

The Impact of Diseases (4, 5, 11, 12, 22, 26, 34, 37, 40).

The effect of infectious disease upon poor rural communities in the tropics is very great, and the importance of seasonal fluctuations was examined both in the case studies and by considering the specific diseases most likely to vary in their effects. It was necessary to examine whether seasonal variation was great, and how far any resulting seasonal disability was synchronous with the lean period due to other seasonal variables. It was important but difficult to balance the need for generalisation against the marked local variations described for each disease.

The transmission of many infections is seasonal under conditions of seasonal rainfall. Vector-borne diseases, in particular, are affected. But seasonal disability is not inevitable. There are delays and latent periods in the cycle so that disability may follow some time after transmission and be more widely spread out. Many worm infections are so chronic in their ill effects that no seasonal variation in disability is seen. Of the markedly seasonal illnesses, some are transmitted rapidly during a short season while a few are adapted to an annual cycle and have a maturation time of approximately one year.

The main climatic factors determining cycles are rainfall and temperature. They affect disease by way of the breeding of vectors (many of which use surface water), survival of pathogenic organisms, and the proliferation rate of microbes in the environment. The human host also plays a large part. Malnutrition may affect susceptibility to infection and the severity of consequent disease, while seasonal variations in

human behaviour have a large effect: the contact between people at night in a cold dry season will facilitate the spread of some respiratory infections. Climate and human behaviour interact at the beginning of the rains when excreta may be washed into water bodies.

Epidemiological research work has been aware of seasonal variations and studies have often been carried out over periods exceeding a year to take account of this. The application of such knowledge in practical health planning is unusual and practical suggestions are given below. With the widespread advocacy of part-time village health workers, seasonality acquires particular relevance. The greatest demand for their services would in many communities coincide with the time when the health workers need time for their own cultivation work. The practitioner of public health has had to focus his attention more on erratic catastrophes than on planning on a seasonal basis except for dramatic regular epidemics.

Among the vector-borne diseases malaria (5) and guinea worm (22) have the greatest seasonal impact. Schistosomiasis (4) and sleeping sickness may show seasonal transmission but the consequences are drawn out, while Kala-azar and filariasis are often not very seasonal (34). In the savannah areas, malaria transmission increases following the rise in mosquito populations when the rains begin. The consequences, superimposed on poor nutrition, are great in an area such as the Gambia, and infant mortality rises. In some parts of the Indian subcontinent malaria is also a disease of the rains, but in others mosquito breeding is restricted to the dry season when the streams are not in spate.

Perhaps the most dramatically seasonal infection is guinea-worm, transmitted by water-fleas in many parts of the tropics, especially West Africa. Maturation of the worm, which usually lies under the skin of the leg takes almost a year. The female is ready to lay eggs in the early rains at the beginning of the planting season. It emerges from a blister in the leg and its larvae are washed into wells and pools. Marked disability is present for a few weeks, so that cultivation at the most crucial time is not possible, and whole communities may be unable to work. The disability thus not only coincides with the lean time but also does maximal damage to the sowing of next year's crop.

Diarrhoeal diseases (11, 12) show marked seasonal rises but against a continuously high background level in many areas. The peak often comes in the hot season and/or the early rains, but detailed analysis shows that differing causes of diarrhoea have staggered peaks. Cholera may differ from the others, and though sharply seasonal in both east and west Bengal the peak time differs between the two regions.

Respiratory infections (37) may resemble the diarrhoeas in their peak season but this is variable. Cerebro-spinal meningitis (40) is spread by the respiratory route. The immense epidemics of the African savannah tend to occur near the end of the dry season and in a highly predictable manner in any one locality. The large variation between years is a more impressive feature of this meningitis, however. Seasonal variations in infections of the skin (26) have been recorded and may be closely related to the humidity and its effect on the skin flora.

The greatest regular seasonal effects are, then, often due to malaria, the diarrhoeal diseases, and guinea-worm. The brunt of the first two falls upon infants, though all ages are affected. Both these have strong interactions with nutrition and measures that could improve nutrition would benefit the infections and vice-versa. These all have obvious connections with maternal care, coming at a time of peak labour demand.

It is clear that disease is both a cause and a result of poverty and that it can contribute to the effects of seasonal poverty. Disease does not appear to be the cause of differential seasonal poverty except that by adding to the burden of the poorest it increases the risk that some irreversible downward step will be taken.

Births and Deaths

Marked seasonality in births and deaths was identified (2, 13) in the statistics of many Third World countries, some of them showing consistent supra-national regional patterns (13). Analysis of urban and rural Indian birth data by state suggested a negative correlation between temperature and propensity to conceive, and this appeared more marked in urban than in rural India (13). Mortality tended to peak during and after the tropical wet seasons. It was recognised that seasonalities in births and deaths required explanation, that there were limits to what could be explained on the basis of national or subnational aggregate data, and that more micro-studies were needed to throw light on this subject. However, in one case study (20) a seasonality in births could not be linked to climatic factors. Speculation whether there was a best time to give birth was inconclusive, but the common peak of births around the time of harvest did not seem optimal in agricultural societies in which women were required to carry out heavy weeding, harvesting and/or post-harvest processing work. In any given situation many factors are likely to be interacting to produce a seasonal pattern of births.

Energy Balance and Nutrition (1, 16, 18, 32, 35)

Two papers (16, 18) made the point strongly that situations of nutrient intake can appear to be 'satisfactory' on the average with respect to requirements but that seasonal fluctuations can still be generating considerable stress. An

example of how labour demand and calorie requirements can vary is shown by examining rice cultivation by two different means - shifting cultivation and irrigation (1). These appear not to differ greatly in their energy inputs on an annual basis, but a monthly breakdown reveals greater susceptibility to seasonal problems in shifting cultivation than in irrigation.

The problem of assessing nutrient requirements particularly in the absence of a log of individuals' activities is discussed (18). The ability of the body to store nutrients at one time of the year in anticipation of periods of nutrient shortage is cited as a mechanism to 'smooth' out seasonal surpluses and shortages of food. The absolute level at which calorie intake and expenditure occurs is obviously important in determining whether signs of nutrient deprivation occur. Surveys confirm that nutrient intake is lower in periods of food shortage compared to food surplus, though with a notable exception (see 32) where intake appears to increase in response to increased work demands. There are considerable differences between regions. Little data is available to permit a breakdown of nutrient intake by income class.

Migration (30)

Seasonal migration (i.e. that which is short term and is adjusted to the agricultural cycle) has rarely been studied. All the areas where it has been identified are in unimodal locations. Tentative generalisations are that landlessness is not a cause; that the longer the growing season in the labour supplying area the less seasonal migration is likely to occur (i.e. where there is less of a definite off season); that it is mostly male; that seasonal migration is associated with areas of limited marketing facilities; and that kinship relations and family structure and participation in agriculture may determine its extent. Seasonal labour circulation appears to be an effective adaptation to a particular economic, environmental and possibly historical situation. It does not appear to be associated with the extremes of rural poverty nor are the worst aspects of migration particularly evident in seasonal labour circulation.

Agricultural Economy and Social Relations (15, 19, 42)

Since the issues are complex and at an early stage of analysis, firm conclusions are not possible about the links between seasonalities, aspects of agricultural economy, and social relations. In Asia, irrigation is often a major factor intervening between climatic seasonality and agricultural practices, making cultivation more reliable, and creating labour peaks. One speculation is that whether dependent relationships are entered into, in situations of high pressure of population on resources (as in much of South Asia) may be related to seasonality as follows: where labour demand is highly seasonal, clients may want patrons but patrons may not want clients; but where labour demand is relatively non-seasonal round the year,

patrons may want clients, but clients may not want patrons so much.

The Africa papers stressed the need to examine historical processes to understand how the accumulation and distribution of wealth provides some rural families with a greater range of strategies to ride over, and indeed exploit, seasonal problems. It was therefore very difficult to separate out seasonal aspects of resource allocation from the entire mesh of poverty and wealth. However, it was clear that certain technological innovations in agriculture tended to help the better off by enabling them more effectively to adapt to seasonal variations in weather. The poor do employ a range of strategies to mitigate the worst effects of seasonality, but when rains fail badly these strategies may have irreversible ratchet effects, such as taking on a debt that could never be repaid, or selling rights to wells.

Much further work is needed to analyse comparative secondary data on seasonalities in labour demand and supply, wages, indebtedness and interest rates, links between these and social relations, and seasonal patterns of impoverishment and enrichment.

Women's Work and Intrafamily Relations (25)

Seasonal variation of work occurs for women in addition to numbers of hours each day performing basic household tasks, child care and maintenance around the farm. Thus even where seasonal fluctuations of men's work are deeper than for women's work, the length of the working day for women in seasonal peak periods can prove critical to their health, especially if they are pregnant or lactating. The effects of seasonal work periods can be seen in the make-shift cooking arrangements ('snacking' by the family), taking infants prematurely off the breast, and physical exhaustion of women. Some data suggest that the seasonal food-energy expenditure ratio moves in a manner that is not compatible with women's seasonal pattern of reproduction. If this does occur then it is important to consider whether developments in agricultural production methods are easing or exacerbating it. Promoting collective child care arrangements and mechanical implements for female tasks are ways to ease the work burden on women, but this requires some investment of funds and a re-arrangement of the social relations of production within the family. It is not at all clear that family women find the opportunity or the power to initiate such changes.

PRACTICAL IMPLICATIONS

Seasonal analysis has practical implications. The most central, affecting most or all rural development programmes and initiatives, is the importance of seasonality for the choice, design and timing of activities. Intentions to prevent impoverishment and to raise the levels of living of the poorer

people will be better realised if the concurrence of adverse factors at certain times, usually during the rains, is identified and then tackled. This implies that, contrary to much past practice, rural planning should have seasonal analysis of poverty as one of its central concerns and that priorities should be related to what happens at the worst times of the year.

The benefits from this approach may be high where the poorer rural people are able to sustain an adequate livelihood for part, or even most, of the year, but are unable to support themselves during a lean period. If a government objective is the provision of basic needs and adequate livelihoods to all citizens, then a focus on the lean period may often have higher returns in terms of livelihoods created - helping many people over the threshold - than attempts to create fewer entirely new livelihoods around the year. Complementary or alternative to this approach is raising food and income floors at other times and improving savings and storage in order to enable the poorer rural people to tide over the lean period.

In suggesting practical implications, two strong reservations must be made. First, effective implementation of rural programmes is difficult. Implementability must therefore be a criterion in appraisal. Second, who benefits from measures depends on local social structure. For example, the famine of 1972 in the highlands of Papua New Guinea was relieved effectively by moving food into the area; in 1974 food was moved into Assam and West Bengal but the famine there was not relieved. The difference was that in Papua New Guinea there was a relatively undifferentiated social hierarchy, so that all had access to the food, whereas in Assam and West Bengal, the local-level hierarchy enabled those who were powerful to benefit while the poorer people did not, or benefited much less. In the design and implementation of programmes, problems such as these have to be anticipated and as far as possible countered.

Each environment is unique and requires its own mix of initiatives. It is useful, nevertheless, to outline some of the measures suggested in the papers, in the conference discussions, and as a result of reflection upon them. While these are separated under headings, the linkages between them should be borne in mind. In assessing priorities, these linkages are crucial: in one environment, for example, tackling a disease which has a crippling effect in the wet season may be a higher priority than farm systems research; but conversely, in another, it may be much more important to identify ways of modifying the technology or the farming calendar in order to enable the smaller, poorer farmers to obtain higher yields; and in many environments, irrespective of the nature of seasons, a redistribution of assets through land reform may be the most effective measure of all.

Seasonal analysis and measures do not require complex or large-scale research. They do require that an interchange of knowledge and ideas take place between rural people, doctors, agriculturalists, planners and administrators; that this occur at the local level; and that priorities be related to the findings.

Research

In assessing research implications, costs have to be borne in mind. The seasonal dimensions may add heavily to the costs of some rural research. The anticipated benefits must be commensurate with these costs. On the other hand, the general neglect of seasonal dimensions in research means that the benefits may at present be rather high compared with alternatives.

Some priorities appear to be:

- Conducting micro level research. It is often at the level of the family and of the individual that different seasonal factors interact, and at which the seasonal screws and ratchet effects occur. Much more needs to be known about the microdynamics of these interactions.

- Reducing malaria and diarrhoea. Research on means to reduce or eliminate these two diseases in particular might have high benefits.

- Conducting research combining the questions and insights of different disciplines. The high pay-off of combining medical, nutritional and social science research is evident from the case studies, and in particular the importance of identifying how morbidity, nutritional status, mortality, birth weight, and so on, vary by socio-economic group, and why.

Health

- Planning public health action to give priority to diseases which coincide with critical periods of the year. While there is much local variation, these may tend to include malaria, the diarrhoeas, guinea worm, and skin infections, all of which tend to peak during the rains and the time of food shortages and high agricultural activity.

- Ensuring adequate health services during critical periods through:
  (a) seasonality in issuing drugs to rural clinics, to fit the seasonality of morbidity and of agricultural work;
  (b) regulating staff leave so that rural staff are at their posts during the critical times of the year and on leave at the least critical;
  (c) improving the mobility of staff at certain times of the year.

- Concentrating health services in areas where poorer people are numerous and seasonal morbidity coincides with and limits agricultural activities.

- Planning health education to fit the pattern of the seasons. The timing of health education deserves appraisal so that it comes at periods when rural people have time to devote to it, and when it will seem relevant. This may quite often be towards the end of a dry season, just before the rains.

The Family

- Identifying the strategies used by poor people to mitigate seasonal stresses, avoiding programmes or actions which weaken those strategies, and seeking measures to support and strengthen them.

- Devising tools and techniques to relieve the drudgery and energy drain during periods of intense crisis for those (poorer households, and women in particular) who are most adversely affected, concentrating especially on those domestic activities which are unpaid and where therefore paid labour will not be displaced.

- Organising communal child care at times of high demand for women's labour.

- Providing food supplies for vulnerable groups (e.g. pregnant and lactating women) and their families at times of food shortage and stress.

- Analysing the seasonality of births, its effects on women, children and the family, and exploring implications for family education, fertility planning, and maternal activities.

- Arranging annual leave and school holidays to enable families to muster their full strengths for the most testing times in agriculture.

Agriculture and Food

- Strengthening and communicating short and long-term weather forecasts.

- Developing water management to spread agricultural activities and to ensure food and income flows more evenly around the year. This involves irrigation, whether through water harvesting, pumping groundwater, or surface gravity flow.

- Using farmer systems analysis and agricultural research and development to identify ways of achieving the same objective, for example through intercropping, serial cropping, minimum tillage, and breeding for drought-avoidance and drought resistance.

- Improving food storage, both through crops which store in the soil such as cassava-manioc, and through methods applicable to other crops, especially in small quantities under village conditions.

- Maintaining adequate national and regional buffer food stocks.

- Where appropriate, decentralising government food stores to have food available in areas prone to seasonal shortages.

- Implementing purchase and pricing policies which (a) provide a floor price for food crops at which the government will intervene as a buyer, and (b) prevent prices rising above a ceiling by releasing food stocks on the market.

- Operating monitoring systems (e.g. with reporting of local food prices) to give early warning of local food shortages.

Government Planning and Administration

- In rural planning paying attention to seasonal dimensions, especially as they affect the more disadvantaged rural people, starting with the scenario and identifying to what extent it fits particular environments. (6)

- Using off-season public works selectively and carefully, bearing in mind the hard lessons of experience (21), in order to provide work and income flows, to create assets from which more rather than fewer people will benefit, and to create future employment.

- Examining the timing of the financial year, and mitigating adverse effects (e.g. if it ends just before the rains, making it difficult to stock rural clinics with drugs and to supply agricultural inputs in time).

- Exploiting slack seasons for the mobilisation, education and organisation of deprived groups such as landless labourers.

- Examining the seasonal peaks and troughs in demand on the time of government field staff, and adjusting programmes accordingly.

CONCLUSION

The hypotheses in the scenario were generally supported by the evidence adduced. At the same time careful qualifications have to be made. The odd bad season may have a more irreversible damaging effect on a poor family than steady screws of deprivation season by season. The many forms of seasonality may vary importantly and subtly both between seasons, and over time. Facile generalisation would be as harmful as rejecting the strong evidence of concurrent variation through which many

adverse factors operate simultaneously; and each environment should be treated as a special case. Nevertheless, the sets of hypotheses in the scenario do provide one starting point for analysis and for rural planning. The evidence presented to the conference supported the thesis that rural poverty is often sustained and deepened by processes which operate seasonally. It also suggested that measures such as those listed above for research, health, agriculture and food, the family, and government planning and administration, might mitigate and even overcome some adverse seasonal effects. But the seasonal mode of analysis should not divert attention from more basic issues. Many of the adverse effects of seasonality, as they are linked with rural poverty, would often be more sharply reduced by reforms which countered urban bias and which redistributed land and water. Before such reforms, seasonally-oriented programmes might perhaps enable the poorer rural people to gain more adequate, secure and continuous flows of food and income and more stable health, and these might help to establish the physical, psychological and social pre-conditions for political organisation and pressure to achieve those reforms. If, after the reforms, the poorer families had direct control of adequate means of production and if they received adequate returns for their labour, they might then be less vulnerable to adverse seasonal effects. Seasonally-oriented programmes would still be needed; but the need would be less acute.

APPENDIX A: Papers presented to the conference on Seasonal Dimensions to Rural Poverty, 3-6 July 1978

1. Bayliss-Smith, Tim, Seasonality, Subsistence Agriculture, and Labour: Implications for the Rural Energy Balance.

2. Becker, Stan and M.A. Sardar, Seasonal Patterns of Vital Events in Matlab Thana, Bangladesh with specific reference to Deaths and Socio-Economic Status.

3. Belshaw, Deryke, Climatic Variables in Seasonal Stress Models.

4. Bradley, David, Schistosomiasis and Seasonal Variables in Infective Disease.

5. Bray, R.S., Seasonality and Malaria.

6. Carruthers, Ian, Government Perception and Response to Problems of Seasonality.

7. Chambers, Robert, Seasonal Dimensions to Rural Poverty.

8. Chaudhury, Rafiqul Huda, Some Aspects of Seasonal Dimensions to Rural Poverty in Bangladesh.

9. Chowdhury, A.K.M., Sandi Huffman and Lincoln C. Chen, Interaction of Agriculture, Dietary Practices, and Infection on Seasonal Dimensions of Energy Malnutrition.

10. Clay, Edward J., Environment, Technology and the Seasonal Patterns of Agricultural Employment in Bangladesh.

11. Cutting, Dr. W.A.M., Seasonal Variations in Rotavirus Infection and Diarrhoea in Childhood.

12. Drasar, B.S., A.M. Tomkins and R.G. Feachem, Seasonal Aspects of Diarrhoeal Disease.

13. Dyson, Tim and Nigel Crook, Seasons of Births and Deaths in Developing Countries.

14. Goetz, James P., Seasonal Variation of Childhood Disease in Bagamoyo District Hospital, Tanzania.

15. Harriss, John and Barbara, Seasonal Dimensions to Rural Poverty: The Vision through Southern South Asian Spectacles.

16. Haswell, Margaret, The Concept of Associating Food Consumption Levels with Extreme Limits of Variation in Human Energy Requirements.

17. Jemai, Yolande, Bibliography on Seasonality of Vital Events in Developing Countries.

18. Longhurst, Richard and Philip Payne, Seasonal Aspects of Nutrition.

19. Longhurst, Richard and Philip Raikes, Aspects of Seasonality and Rural Economy in Africa.

20. Macrae, Sheila, Seasonality of Births: The Solomon Islands - A Case Study.

21. Maxwell, Simon, Seasonal Dimensions to Rural Poverty: The Role of Public Works.

22. Muller, R., Seasonal Aspects of Guinea Worm Infection.

23. Ndagala, D.K., The Socio-Economic Implications of Seasonality on Pastoral Production: A Case Study of the Ilbaraguyu of Central Bagamoyo - Tanzania.

24. Onchere, Simeon R., Seasonality of Food Production and Farm Resource Use in a Medium Potential Agricultural Area of Kenya.

25. Palmer, Ingrid, Seasonality of Women's Work: Patterns and Trends.

26. Porter, Michael J., Seasonality of Infectious Skin Disease in the Tropics.

27. Rajagopalan, S. and P.K. Kymal, Seasonal Dimensions to Rural Poverty: Tamil Nadu Nutrition Project - A Pilot Study.

28. Rajagopalan, S. and P.K. Kymal, Seasonal Dimensions to Rural Poverty: Tamil Nadu Nutrition Project - A Pilot Study Findings of Tamil Nadu Nutrition Project.

29. Rajagopalan, S., Seasonal Dimensions to Rural Poverty: Tamil Nadu Nutrition Project - A Case Study.

30. Rempel, Henry, Seasonal Out-Migration and Rural Poverty: Causes and Effects.

31. Rowland, M.G.M., Alison Paul, A.M. Prentice, Elisabeth Muller, Melanie Hutton, R.A.E. Barrell and R.G. Whitehead, Seasonal Aspects of Factors Relating to Infant Growth in a Rural Gambian Village.

32. Simmons, Emmy B., A Case Study of Seasonal Variation in Food and Agriculture.

33. Slooff, R., Health and Disease of Under Fives in Machakos District, Kenya.

34. Southgate, B.A., Seasonal Factors in Human Filarial Infections and Human Leishmaniasis.

35. Sukhatme, P.V., A Comment on Longhurst and Payne.

36. Sukhatme, P.V., A Comment on Rajagopalan.

37. Sutton, R.N.P., Climate and Respiratory Disease.

38. Swift, Jeremy, The Role of Seasonality in a West African Pastoral Economy.

39. Tomkins, Andrew, Defining Health Problems of a Rural Savanna Area - Zaria.

40. Waddy, B.B., Seasonal Aspects of Cerebrospinal Meningitis.

41. Walsh, R.P.D., Climatic Seasonality in the Tropics.

42. Watts, Michael, The Sociology and Political Economy of Seasonal Food Shortage: Some Thoughts on Hausaland.

APPENDIX B: Hypothesised Seasonal Variations

Factors		Seasons						
		Dry			Wet			Harvest
		Early	Mid	Late	Early	Mid	Late	
Diseases	C-S Meningitis			-				
	Malaria					-	-	-
	Diarrhoea					-	-	-
	Guinea Worm					-	-	-
	Skin Infections					-	-	-
	Filariasis	-						
	Schistosomiasis	-						
	Yaws					-	-	
Energy, Food and Nutrition	Agricultural energy demand	(-)	+		-	-	-	-
	" " Men		+		-		(-)	-
	" " Women	(-)	+			-	(-)	-
	Food stocks	+	+		-	-	-	+
	Prices for food purchase	+	+		-	-	-	+
	Food quality	+	+			-	-	+
	Body weight/ energy balance	+	+		-	-	-	-/+
Economic	Debt and repayment factors			(-)	-	-	-	-
	Screws and ratchets	+	+		-	-	-	(-)
Social and Demographic	Child care	+	+		-	-	-	-
	Deaths	-	+	+		-	-	-
	Neo-natal deaths as % of births					-	-	
	Conceptions		H	H				
	Births						H	H

Key:

+ = a positive, favourable, condition or effect
- = a negative, unfavoumble, condition or effect
(-) = a less marked or less widespread negative, unfavourable condition or effect
H = High

APPENDIX C: Variation of Factors by Month, Matlab, Bangladesh

	Rain	Flood	% Mothers ill in month	Fathers/ Mothers % days ill in bed	Births	Body weight of Mothers at birth	Neo-natal Mortality rate	Deaths of persons aged 45+	Child weight gain	Breast feeding, time	Labour demand in agri-culture	Daily wage rates	Rice price	Household Food Stocks	
														> 2 Acres	Land-less
M						H	L				H	H		L	
A						H	L				H	H			H
M			H								H				
J	H												H		
J	H	H								H		L	H	H	
A	H	H	H	H		L	H		Lose				H		
S		H	H	H		L	H				L		H		
O			H	H	H	L				H	L	L	H	L	Nil
N			H	L	H	L		H	Lose		H		L		H
D					H			H		L			L	H	
J			L	L				H			L				
F				L							L				L

H = High L = Low

Sources: Becker and Sardar (2); Chowdhury, Huffman and Chen (9); personal communication E.J. Clay.

Note: The main harvest is in November/December.

APPENDIX D: Variation of Factors by Month, Zaria Region, Nigeria

	Rain	Births	Infant Deaths	Ag. Work	Sorghum Price	Household Food Stocks	Incidence Gastro-Enteritis	Incidence of Weaning	PEM[1/]	Calorie Intake	
										Cattle Owners	Non-Cattle Owners
M							H			H	L
A	H							H		H	H
M	H			H	H			H		H	H
J	H			H	H		H			H	H
J	H			H	H	L	H		H	H	H
A	H				H	L	H		H	H	H
S	H				H					H	H
O		H			H					L	L
N		H	H	H						L	L
D			H							H	L
J										H	L
F										H	L

Sources: Simmons (32) Tomkins (39)

Note: H = High L = Low The main harvest (sorghum) is in November-December with early crops (millet) in August-September.

1/ Protein Energy Malnutrition

APPENDIX 2: Variation of factors in North Ghana

	Rain	Infant Deaths	Ag Work	Birth Weight	Child Weight Gain	Breast Milk Intake	Child Nutrient Intake	Energy Intake		Body Weight		Disease Prevalence		
								Preg women	Lact	Preg women	Lact	Diarr-hoea	Lower respir-atory	Malaria
M			L		H		H							
A			L		H		H							
M					H		H							
J	H		H		H							H		
J	H		H	L		L		L	L			H	H	H
A	H	H	H	L	L	L	L	L	L	L	L	H	H	H
S	H	H	H	L	L	L	L	L	L	L	L	H		H
O	H	H	H	L	L	L	L	L	L	L	L	H		H
N			H	L		L								H
D														
J														
F			L				L							

Sources: Rowland et al, (31) Haswell (16)

Note: H = High L = Low

The main harvest is in November. The rainy season lasts from June to October inclusive.

S-agric + RD

Mr. Montague Yudelman, Director (AGR) (through Mr. Leif Christoffersen)
Ted J. Davis, (AGR)

May 11, 1979

Proposed Plan of Operations and Staffing for AGR Support to the Operating Division on M & E of Agriculture and Rural Development Projects

1. The special Working Group on Project Monitoring and Evaluation issued its final report February 16, 1979. The report clearly spelled out the deficiencies of M & E systems and found specifically that much too little professional manpower has been allocated to the subject both in the regional operating divisions and in CPS. In FY79 RORSU has been able to devote almost two manyears to the subject, this manpower coming from part time work of four staff members. The Working Group specifically recommended at least one full time M & E specialist in each region and three additional full time M & E specialists in RORSU. It is my understanding that specific allocation of additional manpower were not accepted for the regions in the FY80 budget, but it is expected that certain reallocations of responsibilities will result in more manpower being devoted to M & E by the operating departments. 1/ The FY80 budget will, I am advised, authorize two additional M & E specialists for RORSU.

2. As reported by the Working Group, only a minority of projects which specified M & E provisions have resulted in adequate implementation. In FY78, 75% of all agriculture and rural development projects made some provision for M & E systems. Conservative estimates indicate that among projects already approved about 250 projects have some provision for M & E, virtually all of which need additional professional assistance.

3. Therefore, it is obvious that even with two additional professional staff the role of RORSU cannot be viewed as covering the entire spectrum of Bank needs for M & E activities, but must work principally in the areas of: guidelines and standards, operational support and advice, project assistance, as a pool of specialist manpower for selected mission work with special emphasis on implementation assistance, training of project officers and of Bank staff, and monitoring of the progress of M & E systems in AGR projects.

4. The proposed work program can only be effective if more manpower and resources are devoted to the subject by other units within the Bank. Specifically, RORSU will urgently require the institution of a continuing intra-Bank coordinating mechanism to ensure support from other units and departments. There are repositories of expertise in the Rural Development and Employment Division of DPS, the Development Research Center of DPS, the

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1/ South Asia Projects Department has created a new Evaluation and Planning Unit in order to specifically allocate more professional manpower for M & E.

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Economics and Resources Division of AGR, and the ad hoc special units within the operating departments. This mechanism could perhaps take the form of a working group, coordinated by AGR which would ensure the allocation of resources from the various units within the Bank to specific M & E tasks. The VP CPS would receive from AGR semi-annual progress reports on the implementation of the M & E action program and on the progress of M & E systems in agriculture and rural development projects.

5. As the core resource for this work program, RORSU should, with its two new positions, devote 3.5 manyears of work to M & E systems during the next fiscal year. Attachment 1 shows the allocation to the sub-tasks recommended by RORSU.

6. The Terms of Reference and the qualifications for the two new M & E specialists should be, in essence, the following: the first position should be filled by an individual, preferably an economist, who has had several years of Bank experience in design and implementation of rural development projects and is fully conversant with the management information needed in these projects. The individual should have the proper grounding in methodologies for M & E systems and should be able to take a leadership role in communicating concepts, procedures, and methodologies to Bank staff and project management through work shops, seminars and direct advice and guidance. The second M & E specialist should be experienced and well grounded in statistical requirements of sample collecting, porcessing and analyzing primary data in developing countries (with special reference to M & E data) and should be well grounded in quantitative research techniques with knowledge of computer programming and analysis.

7. If RORSU can get these additional staff on board early in next fiscal year, its major goals for that year would include:

1. Guidelines for M & E systems in agriculture and rural development projects (as an Annex to OMS 3.55);

2. Begin a flexible manual to contain the technical information required of M & E systems;

3. Creating an M & E technical information center (e.g. case studies and documents from other organizations) and opening channels of communication with M & E officers, both in the Bank and in the field;

4. Semi-annual progress reports to management on M & E systems;

5. A minimum of 4 in-Bank workshops for Bank staff and 2 additional regional workshops in the field for project managers and evaluation officers;

6. Provide direct assistance to about 15 rural development projects in designing and implementing their M & E systems.

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Major knowledge gaps on which operational research are required, inter alia, include:

1. Role of "farm management surveys" in developing selective feedback of farm level information;

2. Alternatives to farm management surveys;

3. Administrative problems of information flows from multi-institutional implementing systems;

4. Problem solving through ad hoc surveys;

5. Linking M & E systems to: (a) project reporting requirements, (b) project supervision and (c) project completion reports;

6. Development of indicators or proxies and methods for early assessment of project impact;

7. Testing of low cost data processing technology (e.g. micro/mini computers) in selected projects as a tool for alleviating bottlenecks to M & E processing and quick feedback;

8. Testing simple methodological designs for evaluation of field data.

Attachment

TJDavis/cc

cc: Messrs. D. Pickering, AGR; D. Turnham, AGR
RORSU Staff

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S. Agriculture

May 11, 1979

Mr. Milton L. David
Executive Vice President
Development Planning and
Research Associates, Inc.
P.O. Box 727
Manhattan
Kansas 66502

Dear Milt:

Many thanks for the copy of the Gasohol Report and the extra bonus of your very excellent paper on the "state-of-the art" on this subject. Both are being circulated among colleagues at the Bank.

On May 28 I go to Cyprus for a week for talks regarding planning for the Southern Conveyor System, a concept to transfer water from the mountains of western Cyprus to the industrial tourist zones of Famagusta in the east. Ferretti is no longer there (he is in Tunis), but I expect to see some of the Hellenic Mining Group.

Please make some extended efforts to get together during one of your forthcoming trips to Washington, D.C. We do eat dinners, as well as lunches, around this area.

Very best wishes to all.

Sincerely,

F. L. Hotes
Irrigation Adviser
Agriculture and Rural
Development Department

FLHotes:rm

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FAO

INSTITUT DE RECHERCHE DES NATIONS UNIES
POUR LE DÉVELOPPEMENT SOCIAL

UNITED NATIONS RESEARCH INSTITUTE
FOR SOCIAL DEVELOPMENT

Agriculture

Télégrammes : UNATIONS, GENÈVE
Télex : 22 212 ou 22 344
Téléphone : 34 60 11 31 02 11

RÉF. No : HV/JM
(à rappeler dans la réponse)

PALAIS DES NATIONS
CH-1211 GENÈVE 10

10 May 1977

Dear Mr. Yudelman,

See Documents

Attached is a paper and appendix on Integrated Rural Development (IRD) for FAO which may be of interest to you. I am presently preparing a final copy for printing by FAO in June and would very much appreciate any comments you or your office would have on this draft. The second attached paper is a project outline of the research project that I am doing here at UNRISD. In this project I am testing the methodology as well as the two primary survey instruments, the Village and Household Basic Data Inventories as presented in the above IRD draft paper appendix. This project is expected to be completed by October this year and the results should by then be ready for preparation for practical application in some pilot case studies.

While with UNRISD I remain involved with FAO on a consultant basis in preparing two small case studies in Tanzania and Zambia. These will not be full fledged IRD case studies as outlined in the IRD draft paper but will concentrate primarily on the regional scalogram analysis for rural development assessment and planning. The two projects are scheduled to commence approximately in September-October of this year.

You may recall our meeting in 1973 when I talked to you at the recommendation of Dr. Shlomo Reutlinger concerning the possibility of my joining your staff. Subsequently, I agreed with Mr. Christiansen to get in touch again after completing my expected research here at UNRISD. Since then, before joining UNRISD in August last year, I spent three years with FAO in Ethiopia, the Philippines and at Rome headquarters working on rural development projects and the IRD practical conceptualization. By the end of this year I have therefore four additional years experience in practical and theoretical rural development work. I will be ready for my next challenge in rural development by about January 1978. My family and I are also most interested in returning to Washington D.C. which we consider home. I am enquiring therefore what my chances are at this time of joining your staff by about January 1978. My personal experience record at the World Bank personnel office severely needs an updating which I will do if I could receive the appropriate form for this purpose from the World Bank personnel office.

I look forward to hearing from you soon.

Sincerely yours,

Harold E. Voelkner

Mr. Montague Yudelman,
Director,
Agriculture and Rural Development
Department,
International Bank for Reconstruction
and Development,
Washington, D.C. 20433, U.S.A.

Record Removal Notice

The World Bank Group Archives & Records Management

File Title	Barcode No.
Operational Sectors - S - Agriculture and Rural Development 1978 - 1980 - Volume 6	30048866

Document Date	Document Type	
May 10, 1979	Memorandum	

Correspondents / Participants
To: Douglas Andrew (EDS)
From: Michael Cernea (AGR)

Subject / Title
Information on Sociological Activities in Rural Development Projects

Exception(s)

Additional Comments
Declassification review of this record may be initiated upon request.

The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.

Withdrawn by	Date
Kim Brenner-Delp	December 12, 2022

S. Agriculture

APAS Users

May 10, 1979

G. Temple, AGREP

APAS Questionnaire

1. APAS was released for Bank-wide use and a training program initiated in December 1978. Now with two training workshops and six months' experience, we should like to assess the extent to which that APAS has been of practical use to project staff.

2. Specifically, has APAS successfully contributed as was originally intended toward saving staff from hours of desk calculator work so that they can focus on matters of substance? What have been the major problems analysts face when applying APAS to project work? Does APAS' performance vary by type of project? We hope your response to the attached questionnaire will provide answers to such questions and supply pointers toward improvements which will make APAS better suited to project needs.

3. I would be grateful if you could complete the attached questionnaire and return it to D-858 by the end of May. By no means should you feel restricted to the space provided. Additional sheets for comments are always welcome.

Attachment

cc: Ms. Kimaro

GTemple:oh

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S. Agriculture

Mr. Graham Donaldson, Chief, AGREP May 9, 1979

Gordon Temple, AGREP GTpt

Timber Price Projection

1. At the request of Mr. Belai Abbai, I met with Mr. K. Takeuchi to discuss the Commodity Division's price projections for timber. The current set of price projections, are for Lavan and Sapelli logs, relatively high value hardwoods which are seldom financed by the Bank. In line with requests from Regional foresters, I requested that the Commodity Division provide guidance for pricing Gmelina arborea, certain species of Eucalyptus, and pine -- species that are more representative of Bank financed forestry projects. I also urged that next year's timber price projections bear closer relation to species actually financed by Bank projects.

2. Mr. Takeuchi and I agreed that it would be useful for Mr. John Spears to call a meeting of concerned parties after his return from mission. I met this morning to discuss the proposed meeting with Mr. Spears. He agreed to call a meeting of Commodity Division, Regional foresters, and AGR to discuss real price growth rates for timber prices to be used in Bank forestry projects.

cc: Mr. Spears

GTemple:oh

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fcb ACC

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME Cables: FOODAGRI ROME Telex: 61181 FOODAGRI Telephone: 5797

Ref. UN 10/65

9 May 1979

Dear Mr. Davis,

ACC Report on Inter-agency Action in Rural Development

Further to my letter of 15 March on the above subject, I wish to inform you that by the deadline of 25 April two requests for amendments of the draft report had been received. The first was from the United Nations and was as follows:

1. The last phrase of the last sentence of paragraph 36 reading "rather than in the planning itself" should be omitted since it would appear to be unnecessary.

2. Paragraph 42 should be reworded to read: "It is felt that the inter-agency approach to rural development has shown sufficient promise that it should continue. However, mindful of the General Assembly's decision that the machinery for inter-agency coordination should be designed to meet the specific requirements of inter-governmental bodies, the form and content of the continuation of the effort will be determined after the results of the World Conference for Agrarian Reform and Rural Development, which is expected to recommend a programme of action for rural development, are known, and the Economic and Social Council and the General Assembly have pronounced on the recommendations thereof."

The second was from IFAD, which requested that the last sentence of paragraph 19, on page 8, should be deleted and the following sub-paragraph inserted in its place:

"IFAD has identified a selected group of seven countries for special programming missions during 1979. The main focus of the Fund's efforts in these countries will be to help formulate an integrated strategy to attain the three interrelated objectives of increasing food production, reducing rural poverty and improving nutrition. Bolivia and Somalia are included in the list."

Mr. T.J. Davis
Chief, Rural Operations Review and Support Unit
Agriculture and Rural Development Department
World Bank
1818 H. Street, N.W.
Washington, D.C. 20433

cc: to all participants
(copy attached)

RECEIVED
1979 MAY 17 PM 4: 18
INCOMING MAIL UNIT

The final text of the report, incorporating the above amendments, has now been sent to Mr.D.Cordovez, Assistant Secretary-General, Office of Secretariat Services for Economic and Social Matters, United Nations, New York, for processing and submission to CPC and ECOSOC.

Yours sincerely,

Declan Walton

Declan J. Walton
Director
Office for Inter-Agency Affairs

ACC TASK FORCE ON RURAL DEVELOPMENT

Fifth Meeting

Rome, 5 - 9 March 1979

Participants

IFAD, Rome:

- Mr. S. Aziz
  Assistant President

ILO, Geneva:

- Mr. Peter Dunkel
  Senior Officer
  Rural Employment Policies Branch

UN:

- Mr. J.R. Mathiason
  Social Affairs Officer
  Department of International Economic and Social Affairs, New York
- Mr. T.S. Zoupanos
  Deputy to the Director
  External Relations and Inter-Agency Affairs, Geneva

UNCTAD, Geneva:

- Mr. A.E. Calcagno
  Acting Chief, General Studies Branch
  Commodities Division

UNDP, New York:

- Mr. Gordon Havord
  Acting Director
  Programme Development Support and Evaluation Division
  Bureau for Programme Policy and Evaluation

UNEP, Nairobi:

- Mr. R.J. Olembo
  Acting Director
  Division of Environmental Management

UNESCO, Paris:

- Mr. Leslie Cobley
  Chief, Agricultural Education Section
  Division of Literacy, Adult Education and Rural Development

UNFPA, New York:

- Mr. A. Thavarajah
  Chief, Office of Policy Analysis and Statistics

UNHCR, Geneva:

- Mr. A. Diegues
  Rural Settlement Planner
  Programming and Coordination Section

UNICEF, New York:

- Mr. Nailton Santos
  Chief, Programme Analysis and Evaluation Section

UNIDO, Vienna:

- Mr. S. Nanjundan
  Head, Regional and Country Studies Section

UNV, Geneva:

- Mr. S. Nyambi
  Area Officer

WFC, Rome:

- Mr. P.I. Markov
  Senior Economist

WFP, Rome:

- Mr. Joseph Moscarella
  Economic Adviser

WHO, Geneva:

- Dr. A. El Bindari Hammad
  Programme Area Leader, Primary Health Care and Rural Development
  Division of Strengthening of Health Servi

WORLD BANK, Washington:

- Mr. T.J. Davis
  Chief, Rural Operations Review and Support Unit
  Agriculture and Rural Development Department

S. Agriculture

Mr. G. F. Donaldson, Chief, AGREP May 9, 1979

J. D. Von Pischke, AGREP

Work Program: April 1979 - March 1980

1. The attached work program is submitted in response to your request.

2. Details beyond September are subject to even wider margins of error than those between May and September.

Attachment

JDVon Pischke:oh

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TENTATIVE WORK PROGRAM
J. D. Von Pischke
May 9, 1979

Hours per month[a/]

Activity	1979 April	May	June	July	Aug	Sept	Oct	Nov	Dec	1980 Jan	Feb	March
OSA - Routine	71	10		10		10	10	20	20	20	25	40
OSA - Tanzania tea	25	30		10	5	10						
OSA - Turkish banks	2	15	80	20	5							
GAS - Cooperative finance paper & article	8	20	6			20[c/]	20	20	20[d/]	10		
GAS - Analysis of deposit-taking institutions								10			25	40
GAS - Sector lending & credit project design activities		5					10	10	20	25	30	
GAS - Project management information systems						10	15	20	10	20	20	
DMS - Monitoring & evaluation of ag. credit projects (various activities)	11	10	5		35[e/]	10	20	20		10	10	10
DMS - Disbursement study	1					5	10					
EVL - Kenya credit project audits	2	30	5	20		10						
RES - Editing book of ag. credit readings		10		10		10						
RES - Staff paper on ag credit institutions	20	5	24[f/]			20	20[g/]					
RES - Group credit						5		5		10	10	
PPA - Crop insurance paper				80			40	40[h/]	40	10		
Unidentified											30	50
GEN, TRG and other[b/]	22	35	10	20	5	20	25	25	20	25	20	30
LEV - Annual leave	8		40		120	40			40	40		
Total[a/]	170	170	170	170	170	170	170	170	170	170	170	170

---

a/ One month = 170 hours.
b/ Credit Union credit committee work requires approximately 9 hours per month.
c/ Target completion of circulation draft of the paper.
d/ Target completion of journal article draft
e/ Presentation of paper at conference in Canada.
f/ Presentation of paper at conference in England.
g/ Completion of staff working paper draft.
h/ Completion of circulation draft of paper.

S- Agriculture

May 9, 1979

Mr. Richard L. Meyer
Associate Professor
Dept. of Agricultural Economics
and Rural Sociology
The Ohio State University
2120 Fyffe Road
Columbus, Ohio 43210

Dear Dick:

Many thanks for your letter of 18 April confirming receipt of my paper and providing other details of the forthcoming Wye conference.

Mr. Spall and his successor, Mr. Argyle, both regret that they are unable to attend this conference.

I am willing to share a room in view of boarding limitations at Wye. I shall get from London to Wye on my own, and will expect to arrive around 4 pm on Monday, June 11.

I look forward to receiving the conference papers in due course.

Sincerely yours,

J.D. Von Pischke

cc: Messrs: Argyle, Spall

JDVP:ga

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S. Agriculture

Mr. Ted J. Davis (AGR)

May 9, 1979

Michael Cernea (AGR)

Inquiry from the Executive Director's Office

1. Mr. Douglas Andrews, from the Executive Director's office for Australia, called me to inquire about RORSU's activities on sociological aspects of rural development projects.

2. Mr. Andrews indicated that the Australian AID Agency wrote to the Bank's Australian Executive Director, expressing interest in the World Bank's experience with sociological aspects of project work. The Australian AID Agency has been informed by one of our sociologist-consultants, whom we employed recently about the Bank's work in this field, and it seems they want to develop a similar effort.

3. The request referred specifically to the methodology for including sociological data in project design, preparation, appraisal and evaluation and to the studies carried out for preparing the Workshops on sociological variables of project work. I promised Mr. Andrews a set of our sociological papers and I will meet him for a more detailed personal discussion.

MCernea:dc

cc: Messrs. Christoffersen, Ms. Serena Han

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S. Agriculture

Those Listed Below

May 9, 1979

Ted J. Davis, AGROR

Institute of Cultural Affairs - Seminar in the INTER-AMERICAN DEVELOPMENT BANK - "Human Development Projects: An Approach to Community Development in Latin America"

On May 7 I circulated a memo inviting individuals to attend a seminar given by ICA at the Inter-American Development Bank. The date and time have been changed from Monday, May 14 at 9:30 A.M. to Tuesday, May 22 at 2:20 P.M.

I attach their invitational notice.

Attachment

cc: Messrs: M. Yudelman, AGR; L. Christoffersen, AGR; D. Pickering, AGR; D. Turnham, AGR; G. Donaldson, AGREP; J. Simmons, PPR; J. Kearns, OPD; J. Duloy, DRC; B. Woods, EDC; J. Shilling, AEA; R. Rowe, ASP; C. Ramasubbu, LCP; K. Haasjes, LCP; P. Greening, LCP; A. Otten, LCP; J. Wallis, LCP; M. Cernea, AGROR, M. Furst, AGR

TJDavis/cc

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THE INTER-AMERICAN DEVELOPMENT BANK

DEPARTMENT OF ECONOMIC AND SOCIAL DEVELOPMENT

Presents a Seminar on

The Institute of Cultural Affairs

"Human Development Projects: An

Approach to Community Development in Latin America"

TO BE HELD AT THE:

Inter-American Development Bank
Andrés Bello Auditorium
801 17th St., N.W.

* TUESDAY, May 22, 1979 - 2:30 p.m.

Questions Contact:
Ms. Betty Rice
Tel.: 634-8490

* PLEASE NOTE THE INDICATED CHANGES IN DATE AND TIME.
WE REGRET ANY INCONVENIENCE.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION Non-Regional File

OFFICE MEMORANDUM S. Agriculture

TO: Mr. Boucher (IRD) DATE: May 8, 1979

FROM: F.L. Hotes (Irrigation Adviser, AGRDR/CPS)

SUBJECT: FAO Expert Consultation on (Subsurface) Drainage Design Factors in Rome, Italy, October 22-27, 1979

1. Mr. Yudelman has referred your note of April 27, 1979, on subject matter to me for action. Our response should be to the effect that the Bank is pleased to accept the invitation and plans to send a delegation of up to three observers to the Consultation.

2. The name of only one Bank representative is known at the moment, but the names of the other two will be sent to FAO in September, when operational schedules will permit designation of specific individuals.

Attendees: Frederick L. Hotes - Irrigation Adviser, Agriculture & Rural Development Department, Central Projects Staff.

One probably from South Asia Projects Department.

One probably from Europe, Middle East and Africa Projects Department

3. Copies of the announcements and this memorandum are being sent to Messrs. Pranich and Naylor, Division Chiefs who have indicated that they would like to send a representative.

FLHotes:rm

cc: Messrs. Pranich, Naylor (with copy of 4/12/79 FAO letter and enclosures); Yudelman/Pickering (AGRDR/CPS)

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

Mr. Branch
F.518
SAJC

OFFICE MEMORANDUM

TO: Distribution below

DATE: May 7, 1979

FROM: Donald C. Pickering, AGR

I. Agriculture

SUBJECT: Biological Control of Nematodes

Attached are seven copies of CIP circular of March, 1979 on biological control of Nematodes. It mentions the discovery of a fungus (Paecilomyces lilacinus Thom. Samson) which, reportedly, destroys 80 to 90 per cent of root-knot nematode eggs (Meloidogyne spp.) and also the nematode females. The technology is currently under field test. If it proves successful, it is likely to have substantially favourable impact on potato yields and quality.

Distribution - all Division Chiefs (Agriculture)

cc: Assistant Directors - Agriculture.
Messrs. Collins and Russell, AGR
Attachment
DCPickering:MNaseem:mmr

SEP 17 RECD

CIP CIRCULAR

International Potato Center
Lima – Peru

Volume VII, No. 3 March 1979

Biological Control of Nematodes

A fungus that destroys 80 to 90 percent of root-knot nematode eggs (*Meloidogyne* spp.) has been discovered by nematologists at the International Potato Center (CIP) in Lima, Peru. The fungus (*Paecilomyces lilacinus* Thom. Samson) is not harmful to plants and may provide a natural biological control of nematodes.

Nematodes, tiny thread-like worms, severely limit food production throughout the world because of their feeding primarily on plant roots. They have extensive host ranges and interact with fungi, bacteria and viruses producing disease complexes. In addition to reducing potato yield, root-knot nematodes reduce tuber quality.

Destroys Eggs and Females

CIP nematologists first discovered the nematode-killing fungus in early 1978 on an infected root sample brought from Huanuco, in Central Peru. Research has since been conducted on pathogenicity to determine the use of this fungus as a potential biological control.

The fungus, known to infect root-knot nematode and potato cyst nematode eggs, is of the group Hyphomycetes. It penetrates the egg, grows in it and eventually destroys the embryo. Since eggs of root-knot nematodes are clumped in a gelatinous mass on the root surface, all eggs are often destroyed. The fungus also attacks and proliferates inside developing females, killing them. If large numbers of eggs and females are destroyed, a limited number of the nematodes will develop in subsequent generations.

According to Dr. Parviz Jatala, head of the CIP Nematolo-

Parasitized root-knot nematode eggs showing fungal hyphae completely replacing embryo (magnified 400 times). 15A 4/79

The International Potato Center (CIP) is a scientific institution, autonomous and non-profit making, established by means of an agreement with the Government of Peru with the purpose of developing and disseminating knowledge for greater utilization of the potato as a basic food. International funding sources for technical assistance in agriculture are financing the Center.

gy and Entomology Department, the nearly complete devastation of the nematode eggs makes the fungus so unique for biological control.

Populations Reduced 80 – 90%

Jatala and scientific assistant Renate Kaltenbach have been conducting tests on this fungus for about a year. "When the rate of reproduction of the fungus-inoculated and non-inoculated nematodes is compared, the rate of reproduction in the first generation may be the same in both treatments, but 80 to 90 percent of the eggs of the fungus-inoculated nematodes may be infected," he explains. "The populations in succeeding generations may be reduced 80 to 90 percent. Therefore, there will be a progressive reduction of the nematodes in succeeding generations and perhaps they will be eventually eradicated."

Posterior portion of a well developed round female root-knot nematode showing threadlike infection and spread of the fungus inside (magnified 60 times)

The fungus has been shown to prosper under greenhouse conditions, so now CIP nematologists are planning to conduct field tests. Population dynamics studies to determine the rate of nematode reduction under field conditions will be carried out.

According to Jatala, potential uses of the fungus might include dusting seeds with fungal spores or introducing the fungus to the soil through irrigation water or in combination with fertilizer.

Other Fungi Being Studied

Meanwhile other researchers are studying additional fungi which might provide biological control of nematodes. Dr. B.B. Brodie, of Cornell University, and Mónica Lazaro, a graduate student from the National Agrarian University in Lima on a CIP assistantship, are investigating biological control of the potato cyst nematodes. Samples from diverse habitats in Peru have been collected and checked. More than 35 fungi have been isolated and are currently being tested for pathogenicity.

Jatala reports several fungi have been identified which affect the potato cyst nematode, but further studies are needed to determine the efficiency of these fungi as biological control agents. These tests are being conducted by scientific assistant Marcia Bocángel under the supervision of Jatala and Brodie.

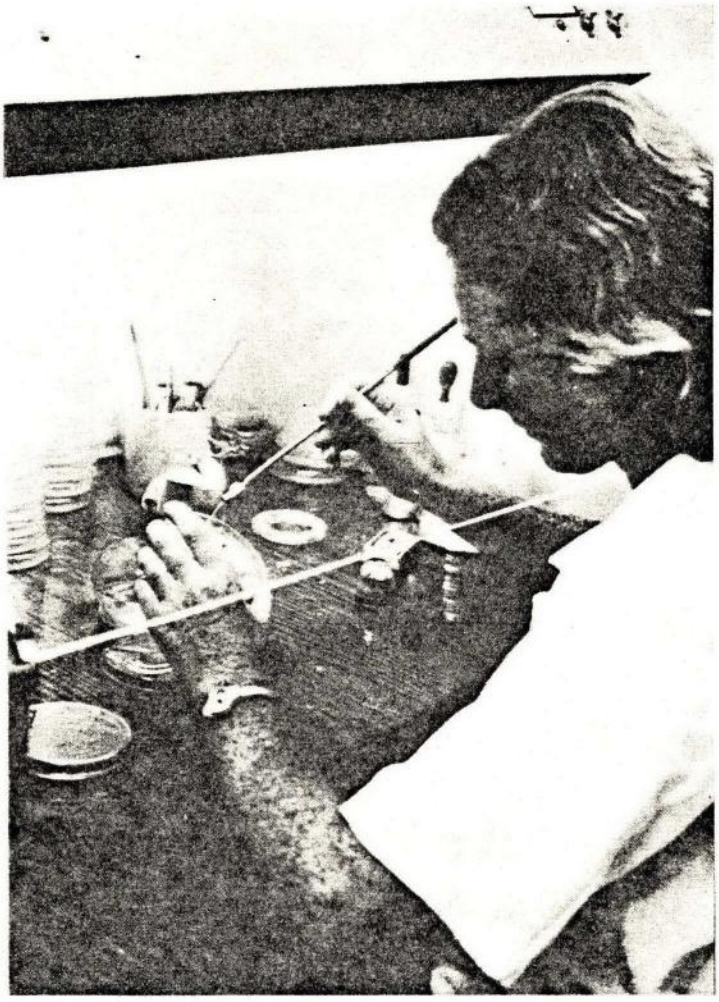
Known Resistant Plants

Plants resistant to both root-knot and potato cyst nematodes have been identified. These resistant materials are currently being used in the CIP breeding program to improve quality as well as combining other desired characteristics. These characteristics include resistances to frost, bacteria, viruses, insects and other pathogens in highland and

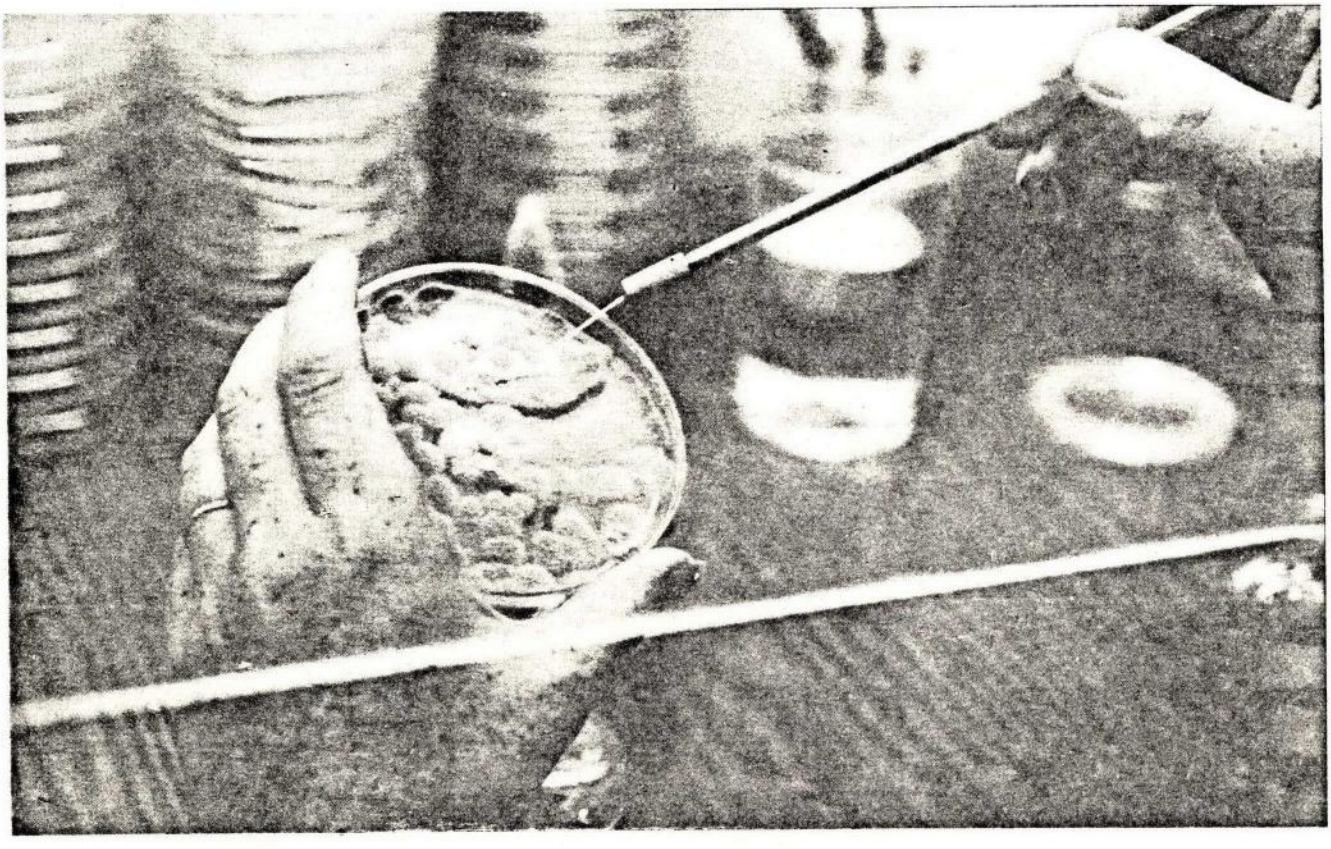
lowland tropics and adaptability to the hot lowland tropics.

The nematode-killing fungus has particular appeal in reducing losses due to nematode infection because chemical control of nematodes is costly and often unavailable to farmers in developing countries. Resistant varieties have been thought previously to be the most likely means of control. However, this fungus in combination with additional cultural practices might provide an alternative to chemical control. Other aspects of an effective management program include crop rotation and cultural practices, such as time of planting, fallowing, elimination of weed hosts, use of irrigation and fertilizers.

Ayn Strattner
Center Support Communications



Scientific assistant Renate Kaltenbach maintains a pure culture of the nematode-infecting fungus by periodic transfer in sterilized medium (37 4/79 Mazzi). *Bottom photo is a close-up of the fungus growing in sterilized medium* (36 4/79 Mazzi).



CIP CIRCULAR

International Potato Center
Lima – Peru

Volume VII, No. 3 March 1979

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Ayn Strattner
Center Support Communications

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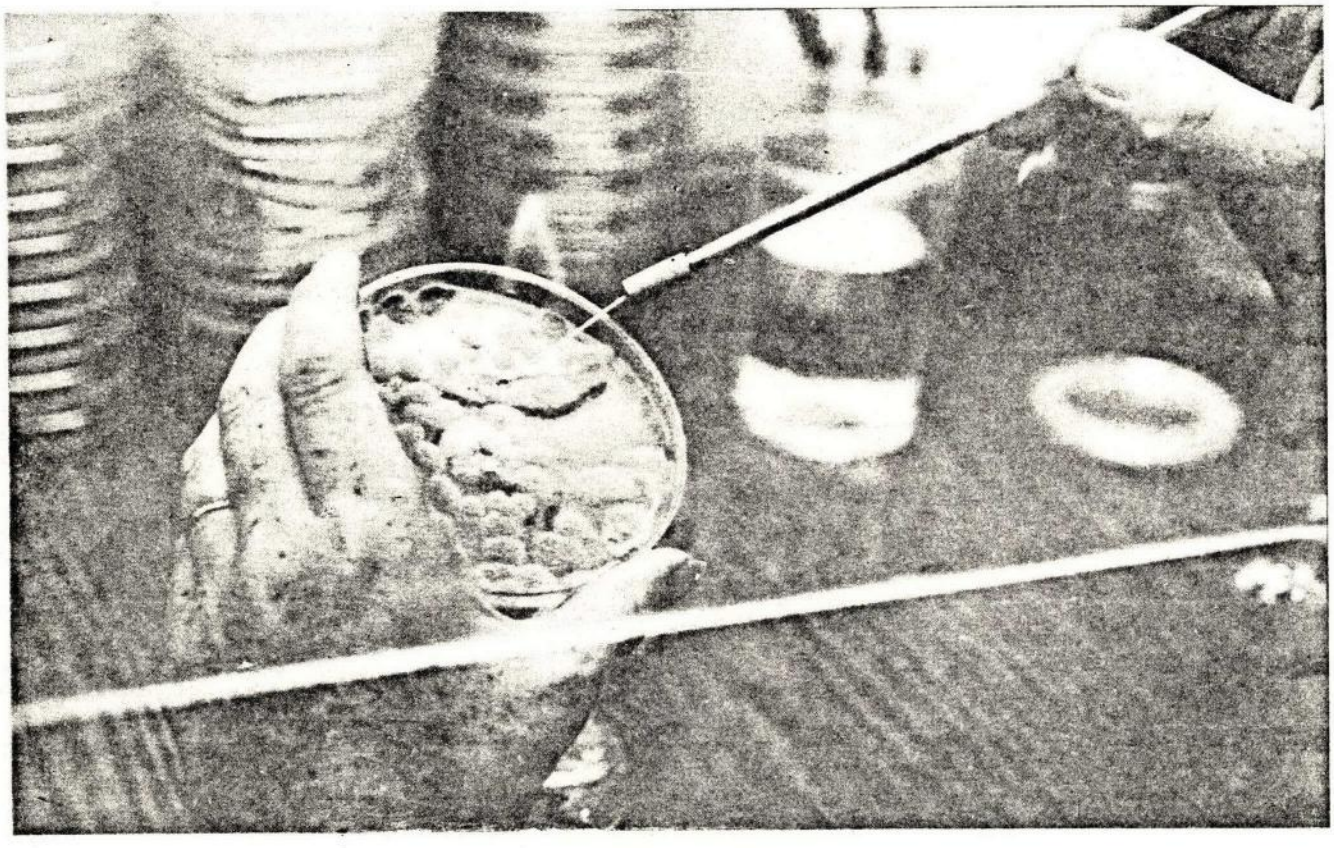

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Biological Control of Nematodes

A fungus that destroys 80 to 90 percent of root-knot nematode eggs (*Meloidogyne* spp.) has been discovered by nematologists at the International Potato Center (CIP) in Lima, Peru. The fungus (*Paecilomyces lilacinus* Thom. Samson) is not harmful to plants and may provide a natural biological control of nematodes.

Nematodes, tiny thread-like worms, severely limit food production throughout the world because of their feeding primarily on plant roots. They have extensive host ranges and interact with fungi, bacteria and viruses producing disease complexes. In addition to reducing potato yield, root-knot nematodes reduce tuber quality.

Destroys Eggs and Females

CIP nematologists first discovered the nematode-killing fungus in early 1978 on an infected root sample brought from Huanuco, in Central Peru. Research has since been conducted on pathogenicity to determine the use of this fungus as a potential biological control.

The fungus, known to infect root-knot nematode and potato cyst nematode eggs, is of the group Hyphomycetes. It penetrates the egg, grows in it and eventually destroys the embryo. Since eggs of root-knot nematodes are clumped in a gelatinous mass on the root surface, all eggs are often destroyed. The fungus also attacks and proliferates inside developing females, killing them. If large numbers of eggs and females are destroyed, a limited number of the nematodes will develop in subsequent generations.

According to Dr. Parviz Jatala, head of the CIP Nematolo-

Parasitized root-knot nematode eggs showing fungal hyphae completely replacing embryo (magnified 400 times). 15A 4/79

The International Potato Center (CIP) is a scientific institution, autonomous and non-profit making, established by means of an agreement with the Government of Peru with the purpose of developing and disseminating knowledge for greater utilization of the potato as a basic food. International funding sources for technical assistance in agriculture are financing the Center.

gy and Entomology Department, the nearly complete devastation of the nematode eggs makes the fungus so unique for biological control.

Populations Reduced 80 – 90%

Jatala and scientific assistant Renate Kaltenbach have been conducting tests on this fungus for about a year. "When the rate of reproduction of the fungus-inoculated and non-inoculated nematodes is compared, the rate of reproduction in the first generation may be the same in both treatments, but 80 to 90 percent of the eggs of the fungus-inoculated nematodes may be infected," he explains. "The populations in succeeding generations may be reduced 80 to 90 percent. Therefore, there will be a progressive reduction of the nematodes in succeeding generations and perhaps they will be eventually eradicated."

Posterior portion of a well developed round female root-knot nematode showing threadlike infection and spread of the fungus inside (magnified 60 times)

The fungus has been shown to prosper under greenhouse conditions, so now CIP nematologists are planning to conduct field tests. Population dynamics studies to determine the rate of nematode reduction under field conditions will be carried out.

According to Jatala, potential uses of the fungus might include dusting seeds with fungal spores or introducing the fungus to the soil through irrigation water or in combination with fertilizer.

Other Fungi Being Studied

Meanwhile other researchers are studying additional fungi which might provide biological control of nematodes. Dr. B.B. Brodie, of Cornell University, and Mónica Lazaro, a graduate student from the National Agrarian University in Lima on a CIP assistantship, are investigating biological control of the potato cyst nematodes. Samples from diverse habitats in Peru have been collected and checked. More than 35 fungi have been isolated and are currently being tested for pathogenicity.

Jatala reports several fungi have been identified which affect the potato cyst nematode, but further studies are needed to determine the efficiency of these fungi as biological control agents. These tests are being conducted by scientific assistant Marcia Bocángel under the supervision of Jatala and Brodie.

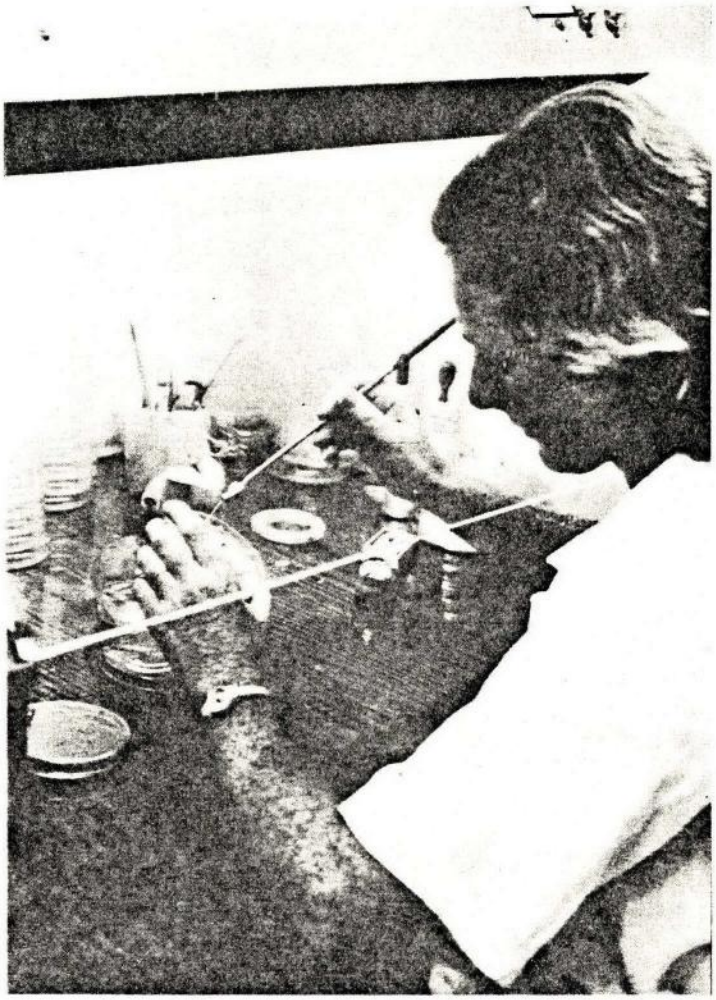
Known Resistant Plants

Plants resistant to both root-knot and potato cyst nematodes have been identified. These resistant materials are currently being used in the CIP breeding program to improve quality as well as combining other desired characteristics. These characteristics include resistances to frost, bacteria, viruses, insects and other pathogens in highland and

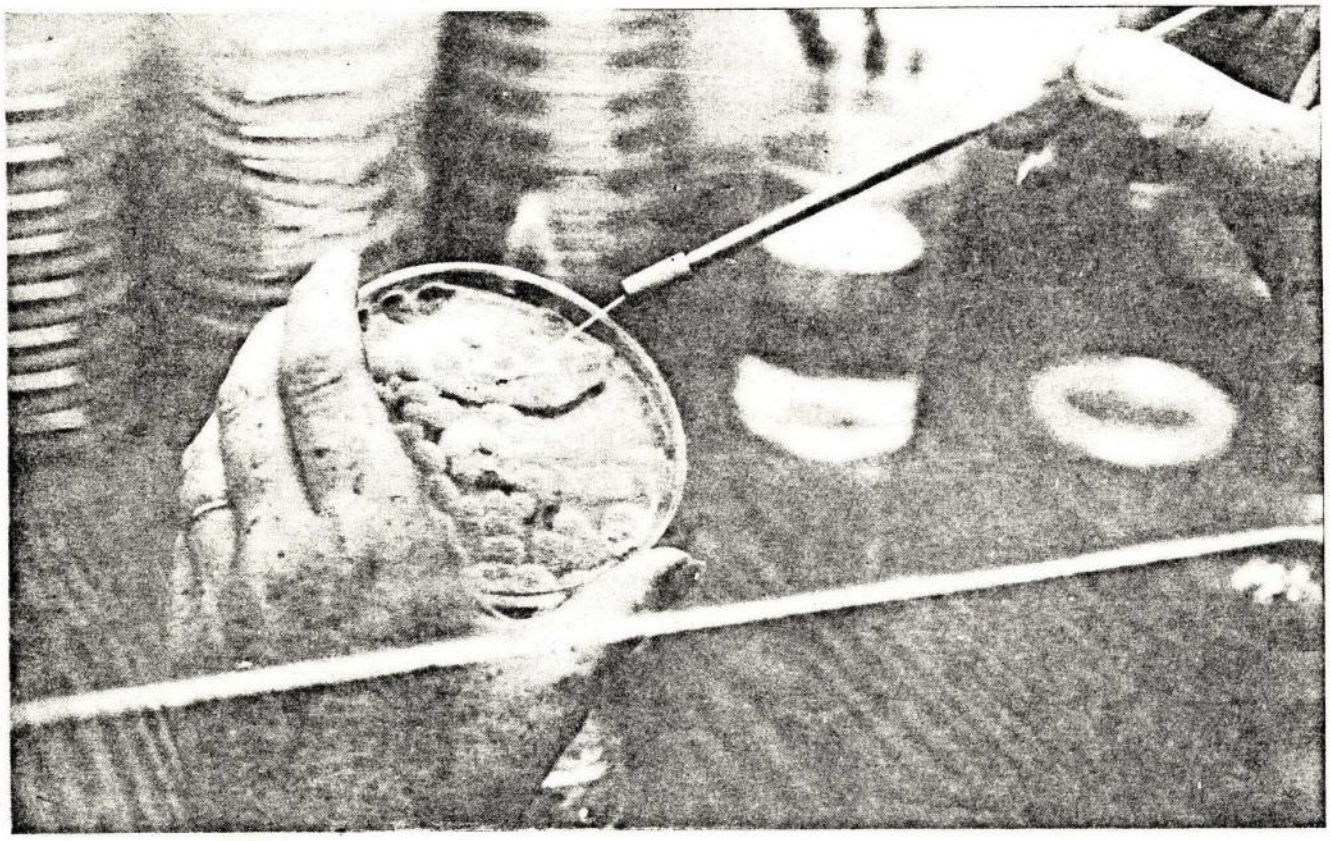
lowland tropics and adaptability to the hot lowland tropics.

The nematode-killing fungus has particular appeal in reducing losses due to nematode infection because chemical control of nematodes is costly and often unavailable to farmers in developing countries. Resistant varieties have been thought previously to be the most likely means of control. However, this fungus in combination with additional cultural practices might provide an alternative to chemical control. Other aspects of an effective management program include crop rotation and cultural practices, such as time of planting, fallowing, elimination of weed hosts, use of irrigation and fertilizers.

Ayn Strattner
Center Support Communications



Scientific assistant Renate Kaltenbach maintains a pure culture of the nematode-infecting fungus by periodic transfer in sterilized medium (37 4/79 Mazzi). *Bottom photo is a close-up of the fungus growing in sterilized medium* (36 4/79 Mazzi).



WORLD BANK / INTERNATIONAL FINANCE CORPORATION

yellow
S-Agriculture

OFFICE MEMORANDUM

TO: Those Listed Below

DATE: May 7, 1979

FROM: Ted J. Davis, AGROR

SUBJECT: Institute of Cultural Affairs - Seminar in the INTER-AMERICAN DEVELOPMENT BANK - "Human Development Projects: An Approach to Community Development in Latin America"

The Institute of Cultural Affairs (ICA), the Chicago headquartered community development organization, has impressed a number of staff within the World Bank with their projects aimed at maximizing community involvement in the developmental process.

AGR and South Asia Projects sponsored a seminar in December 1978 by ICA focusing on their experience in the State of Maharashtra in India. Since then an ad hoc working group has continued the ICA contact and it may be the subject of a research-cum-evaluation effort.

The Inter-American Development Bank has issued an invitation to World Bank staff to attend a seminar presented by ICA entitled, "Human Development: An Approach to Community Development in Latin America". The time and place are as follows:

Inter-American Development Bank
Andres Bello Auditorium
801 17th St., N.W.
Monday, May 14, 1979 - 9:30 A.M.

Those expecting to attend should notify Ms. Betty Rice at 634-8490.

cc: Messrs. M. Yudelman, AGR; L. Christoffersen, AGR; D. Pickering, AGR; D. Turnham, AGR; G. Donaldson, AGREP; J. Simmons, PPR; J. Kearns, OPD; J. Duloy, DRC; B. Woods, EDC; J. Shilling, AEA; R. Rowe, ASP; C. Ramasubbu, LCP; K. Haasjes, LCP; P. Greening, LCP; A. Otten, LCP; M. Cernea, AGROR; M. Furst, AGR; J. Wallis, LCP

TJDavis/cc

S. Agriculture

Mr. G. F. Donaldson, Chief, AGREP May 7, 1979

J. D. Von Pischke, AGREP

Discussions with my target group

1. Since joining AGREP in April 1978, I have had a series of lunches with individual members of my target group, which consists of financial analysts in agricultural divisions and agricultural credit specialists. To date, I have had 27 such lunches, most of them with people I had not met before. I have found these meetings extremely worthwhile. The contacts which these initiatives developed have provided a disproportionate number of requests for my assistance and reactions.

2. One of the most rewarding aspects to me from these meetings has been an increased awareness of the generally very high caliber of technicians in these financial posts. A handful are chartered accountants with considerable experience in the field, others have run their own sets of accounts as financial controllers, some have been commercial bankers and agricultural lenders, and still others bring to the Bank a diversified background which enables them to participate very effectively in project work.

3. The approaches of two groups of analysts and credit specialists have interested me the most. One group is rather small and consists of persons who are not at all interested in being closely identified with their functional title. Their reaction is along the following lines: "Financial analysis is fine, but in the Bank, generalists have better prospects than specialists. Therefore, I have tended away from the financial aspects of projects, except to the minimum extent required, and am more interested in the totality of project design and in the Bank's internal project decision mechanisms." (One analyst expressing this view also took exception to my use of "target group" to refer to line staff--"That means you want to shoot us down!")

4. The second group consists of chartered accountants and others with similar qualifications. These professionals bring a very special view to their work, and I have been fascinated by their observations. In general, they would not give the Bank or many of the agencies in agriculture which it bankrolls very high marks in terms of information systems. It appears from my conversations with members of this group that there are a number of management areas where Bank agricultural project entities often do not perform well, which could expose the Bank to charges of imprudence or negligence if unsympathetic, qualified outside observers were ever to investigate these aspects of our operations at the field level. In general, I have found members of this group taking a very constructive and positive approach to their work, even though a certain sense of dispair is sometimes apparent with regard to the prospect of those ultimately responsible for agricultural projects (i) according exceptional priority to upgrading accounting and management information systems in the field at the project level and (ii) devoting a significantly greater share of internal resources to systems and financial audit problems at the project entity level.

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5. Another concern which has been expressed has to do with project entity management. Several persons raising this issue have advocated that the Bank should provide special management training for project entity staff as a first stage of project implementation, before the project is really underway in the field. Others have suggested that a model management information system should be developed to provide the types of data required for efficient management of an agricultural or rural development project, and that this system should be a central focus of project design and implementation.

6. It is my impression that the frequency and intensity of expression of several of these concerns warrant consideration and should be brought to the attention of management. One way of doing this might be to establish working groups to develop issues. I would suggest that AGR consider the formation under its auspices of working groups in project management training and in project management information systems as a means of beginning to focus attention Bank-wide on issues which appear, from my conversations with members of my target group, to be regarded by line staff as serious problems on a professional level which are not adequately dealt with by the Bank.

cc: Mr. Pickering (AGR)

JDVP:vau

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S-Agriculture

ERT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742, (617) 369-8910, 489-3750, TELEX: 923 335 ENVIRORES CNCM CABLE: ERTCON

JS

Could you use the EDI presentation for this? Could you go-over?

4 May 1979

Dr. Donald Pickering
Assistant Director General
Agricultural Development Department
The World Bank
1818 H Street, NW
Washington, DC 20433

Clive: Don suggested you might enter to go to this?

Dear Dr. Pickering:

It was a pleasure talking with you on the telephone yesterday. As I mentioned, we are holding an international Seminar on Principles of Environmental Management in Developing Countries, from 11 to 22 June. Enclosed please find the seminar brochure and partial list of registered participants. Other participants, such as from Egypt and the People's Republic of China, are not yet listed.

I would very greatly appreciate your nominating a speaker from your staff who could give a presentation on the environmental management principles, or aspects, of agricultural development in the Third World. The presentation might cover issues of resource management, land use planning, problems associated with pesticides and fertilizers, irrigation and disease vectors, and other environmentally-related issues of agriculture.

The most effective speaker would be someone with actual experience in the planning and management of agricultural projects. We are not so much interested in having an environmentalist, such as from Dr. Lee's group, as a practicing agriculturalist, who can speak from experience in facing the environmental aspects of agri-development.

The session might last from 2.5 to 3 hours, including time for discussion among the participants. Again, the focus should be on principles, not specific projects, although examples should be used to illustrate issues.

We will pay for travel and overnight expenses, if necessary. As I told you, Dr. Kalbermatten, the Bank's Water and Waste Advisor, is also giving a presentation, though on a different day. We are not in a good position to offer an additional honorarium; however, we are donating $1,000 to the IDA in respect to Dr. Kalbermatten's presentation, and hope this might also cover the presentation by your department. If not, let us discuss new terms.

In addition to the personal presentation, we would like a written copy of the paper in advance, hopefully no later than 31 May, which we will print and include in the appropriate section of our seminar workbook, titled, Principles of Environmental Management. I also would like any visuals, graphs, charts, etc. in advance so that they may be prepared for printing or presentation during the seminar.

Once you identify a speaker, I will talk with the person in detail about the seminar and the specific presentation. We are especially interested in a frank and candid discussion of the issues, conflicts, and trade-offs, with a focus on opportunities for problem-solving and the work of The World Bank in agricultural development.

We are excited about the seminar and the kind of exchange that we hope will take place. I am delighted that you are interested in considering taking part. Please let me know if you have any questions; meanwhile, I am looking forward to hearing from you about a speaker.

All best wishes.

Sincerely yours,

John Whitman
Director
International Environmental
Management Institute

ERT

Seminar on Principles of Environmental Management in Developing Countries

REGISTERED PARTICIPANTS

1 May 1979

Argentina

Pedro Bras Harriott
General Manager
National Institute for Fisheries Research
and Development
Mar del Plata

Burundi

Benoit Ndorimana
Director
Ministry of Geology, Mines and Industry
Bujumbura
(On behalf of His Excellency Gaspard Emery Karenzo, Minister of Geology and Mines)

Cameroon

Ngi Ngi Nicolas
Director of Hydrocarbons
Ministry of Mines and Power
Yaounde
(On behalf of His Excellency H. N. Elangwe, Minister of Mines and Power)

Canada

(Two to four delegates to be announced)
Canadian International Development Agency
Ottawa

Professor Michel Maldague
President, International Conference on the
Environment
Laval University
Quebec

Colombia

German Gomez
Head, Air and Water Pollution Control Division
Ministry of Health
Bogota

El Salvador

His Excellency J. Eduardo Reyes
Minister for Economic and Social Planning and Coordination
San Salvador

France

(To be announced)
Council of Europe
Strasbourg
(On behalf of Secretary General G. Kahn-Ackermann)

Ghana

Johnson Addo
Geological Survey
Accra

Kwabena Awuku
Head, Department of Science Education
University of Cape Coast
Cape Coast

Indonesia

Herman Haeruman
Chairman, Bureau for Natural Resources and
Environmental Management
National Development Planning Agency (BAPPENAS)
Jakarta

Iraq

Adib Ahmed
Directorate General of Human Environment
Ministry of Health
Baghdad

Kenya

His Excellency Dr. J. G. Kiano
Minister for Water Development
Nairobi

Peter Mwanza
Coordinator, Program Activity Center for
Environmental Education and Training in
Africa
United Nations Environment Program
Nairobi

Elizabeth Wangari
Ministry of Tourism and Wildlife
Nairobi

Kuwait

Saud Al-Hamlan
Environmental Engineer
Shuaiba Area Authority
Safat

Kuwait (cont'd)

Mejren Al Shallal
Head of Air Pollution Unit
Ministry of Public Health
Kuwait City
(On behalf of His Excellency Dr. Abdul Rahman Al Awadi,
Minister of Health)

Nigeria

Ben Osuno
Head, Petroleum Inspectorate
(and one other delegate)
Nigerian National Petroleum Company
Lagos

Peru

(three delegates to be announced)
CENTROMIN Peru
Ministry of Energy and Mines
Lima

Saudi Arabia

Abdullah Al Saadi
Chemist
Saudi Basic Industries Corporation (SABIC)
Riyadh

Dr. J. A. Jishi
Director General
Jubail Project
Jubail Industrial City

His Excellency Engr. Sammy A. Mosly
Director General with rank of Vice Minister
Yanbu Project
H.M. Council of Ministers, Kingdom of Saudi Arabia
Jeddah

(five to seven delegates to be announced)
Directorate General of the Meteorological and
Environmental Protection Administration
Ministry of Defense and Aviation
Jeddah

South Africa

H. Martens
Chairman, Ecological Research Group
Department of Transportation
Pretoria

Professor Jack Van Wyk
Potchefstroom University
Potchefstroom

Sri Lanka

Sri Lal Caldera
Secretary General and Director
Plan Implementation and Publications
UNESCO Youth Organization of Sri Lanka
Colombo

Justin Dias
Chairman, Sri Lanka Tyre Corporation
Kelaniya

Sudan

Farouk H. Ahmed
Senior Soil Conservationist of the Ministry of Agriculture,
Food and Natural Resources
Khartoum
(On behalf of His Excellency Abdulla Ahmed Abdulla, Minister of Agriculture, Food and Natural Resources)

Thailand

Twesukdi Piyakarnchana
Director, The Institute of Environmental Research
Bangkok

United States

Bessie Boyd
Program Analyst
Selected Development Problems Division
Development Resources
Bureau for Africa
Agency for International Development

Professor Ray Horn
Senior Research Associate
Institute for Social Research
University of Michigan
Ann Arbor

Milton Wilson
Senior Project Manager
Saudi Arabian Parsons Ltd. (Jeddah)
Ralph M. Parsons Company
Pasadena

S. Ind. Dev. and Finance

May 4, 1979

Ms. Marcia L. Grad
1039 South Parker Road, (G7)
Denver, Colorado 80231

Dear Marcia,

Thank you for the drafts you sent us on the portions of the Study completed so far -- Appendices A, B and C and the case study on FMO.

Regarding the three appendices, I have very few comments except to note that the sheets on JICA and PICA are still incomplete. In the introductory "Background" section, I suggest that the second paragraph say "investigate and describe in detail the programs of selected organizations active in providing . . ." to avoid any invidious implication.

The FMO case study I have reviewed rather quickly. My main concern regarding this draft is that it includes no financial information -- on scale of operations, on FMO's total ssets, and to what extent these take the form of equity capital or borrowings, any indication of the magnitude of its financing in different countries, anything on plans or expectations for future growth, etc. Much, if not all, of such information should be available from FMO's most recent Annual Report, which I presume was supplemented by your interview.

Your interview format also calls for a description of some illustrative case studies of the facilitator's operations. Such descriptions would substantially enhance the value of the FMO case study.

A couple of nit-picks:

(a) On page 9 the reference to Tanzania Investment Bank should, I believe, be Tanzania Development Finance Limited.

.. /2

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(b) On page 11, middle paragraph -- I presume "judicial" should be "legal".

I am, as you can understand, very concerned about the slipping deadline as the date for the ICONE meeting approaches. We have all thought of this report as an important input for the meeting. Would any further assistance from us be useful in getting it completed in good time?

With best regards,

Sincerely yours,

David L. Gordon
Director
Industrial Development & Finance Department

cc - Mr. Wm. McCrea

DLG:jm

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S. Agriculture

Mr. Graham Donaldson, Chief, AGREP May 3, 1979

Jim Goering, AGREP

Draft Memorandum to AGREP Staff
on Economic Review and Support Activities

As requested, I attach a draft of the proposed memo to AGREP staff on Economic Review and Support Activities. It's a bit rough but I thought it best to get your reaction at this time. I regret the delay in getting this to you.

Attachment

TJG:vau

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WORLD BANK / INTERNATIONAL FINANCE CORPORATION

Non-Regional file

OFFICE MEMORANDUM

TO: Mr. C. Ameur (Resident Mission, Nairobi) DATE: May 3, 1979

FROM: J. Russell and J.C. Collins (AGR/CPS)

S. Agriculture

SUBJECT: The Planting of Sugar Cane in Relation to Anti-Erosion Measures

1. Your memorandum of April 24, 1979, through Mr. Dewar to Mr. Pickering, was passed to us for comment. We appreciate your desire to find a crop suitable for bund stabilisation which can provide a better return, either in financial or nutritional terms, than grass species. However, we both have considerable reservations with regard to the suitability of sugar cane.

2. In describing the local conditions, you mention rainfall ranging from 800-1200 mm and, in the East African context, we assume this to fall in a single wet season of about 6 months duration. Even at the upper end of the range, this is a marginal water supply for cane (which has been estimated to require some 1,250-1,500 mm under South African conditions (cool winter season) and up to 2,000 mm in Hawaii, where year-round temperatures are uniform Low rainfall, coupled with poor distribution, would severely limit cane yield and bring about a sharp changefrom growth to ripening and subsequent senescence. While low yields might not be critical for subsistence production, it might make such production less attractive, and the sharply defined harvesting and planting seasons could conflict with other crop peak demands for seasonally scarce labour.

3. Cane is a demanding crop and would be unlikely to thrive in soils where erosion has already depleted fertility, or where soil depth (and moisture retention) might be limiting. Given the probable soil and climatic limitations, and a low technology subsistence production system, one is probably going to get at best about 20 tons cane/ha, with about 12% sugar content and an extraction of, perhaps, 40% giving 1 ton sugar/ha.

4. To get satisfactory establishment, cane would be planted early in the rains and would take some three-four months before covering in, even at fairly close row-spacing. This establishment period would represent a severe erosion hazard, and replanting would probably be needed every three years if yields are to be maintained. After harvesting in the dry season, little new growth may occur until the following rains---it will depend on residual soil moisture after harvesting---and, if the cane is cut at ground-level to encourage good ratooning, it will again expose the soil to erosion until a good cover has developed. The heavy traffic at harvest time might also adversely affect soil stability, even if the cane is head-loaded out.

5. The production of low-grade sugar for family consumption will require the use of wood for fuel in the boiling process, as cane residues are insufficient to fuel an inefficient open-pan boiling process. This, in itself, would seem to increase the erosion risk in some situations where fuel wood collection has already seriously depleted tree cover on slopes.

6. If cane is grown for sugar, the amount of tops available for livestock feed at harvest time is quite small. As harvesting would likely take place over a short period, some means of ensiling the tops might be necessary to enable livestock to utilise them effectively during dry season grazing shortages. If fodder production were a major objective, however, the cane should be cut frequently to get high yields of high quality fodder, and not left to ripen when fiber content of most of the leaves is high.

7. Finally, sugar is considered by nutritionists to have a very low food value, so the dietary benefits would be negligible.

8. While it would be worthwhile including sugar cane in a trial of possible crops for use in the situation you describe, we both think other plants more suitable than cane could be found for stabilisation of bunds in areas where absence of livestock makes grass cover unattractive.

JRussell/JCCollins:rm

cc: Messrs. Pickering (AGR/CPS); Dewar (Resident Mission, Nairobi)

WORLD BANK/INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

~~Tec/IR~~ Pl prepare a joint reply

TO: Mr D.C.Pickering (through Mr R.J.Dewar)

DATE: 24th April, I979.

FROM: C.Ameur

Letter No:3I9

SUBJECT: The planting of sugarcane in relation to anti-erosion measures:

I have on several occasions supervised projects which included an anti-erosion component i.e: 486-ET.Wollaita Agricultural Development project; 593-BU Second Coffee Improvement project; 439 RW-Mutara I. In those projects anti-erosion measures comprised bunding, contour ploughing and in most cases, the planting of either Tripsacum or Pennisetum grass for the retaining of bunds.

Most of the areas involved are at an altitude of between 800 and I500m and rainfalls average from 800 toI200mm. Also common to those various regions is a high population density resulting in an increasing shortage of land. The range of subsistence crops is often limited and the ensuing farmer's diet is usually far from satisfactory.

In order to improve the farmers' diet I have whenever possible suggested that sugarcane be grown on at least part of the bunds instead of a fodder grass when little livestock is reared in a given area. The growing of sugarcane would have the merit of providing the rural population with some of it's highly needed carbohydride requirements. The leaves could also be used either as a fodder or as mulch, since sugarcane produces nearly as much green material as Pennisetum and Tripsacum grass, in similar climatic and soil conditions. (around 25 to 40 t/ha when not irrigated.)

Although the areas considered are somewhat marginal for the growing of sugarcane, at least as regards high yields and sugar content one should keep in mind that the sugar obtained would be for family consumption only and not for industrial use. Sugarcane is already grown in those areas on a very limited scale around houses. Apparently people have never thought of planting bunds with such a useful perennial crop. Sugarcane which can last from 6 to I0 years, has a rather deep root system of 0.50 to 0.70m which could firmly anchor bunds.

The purpose of this memo is to inquire whether there are examples around the world of such farming practices and whether you think they deserve wider support.

C.C: Mr Blanchi.

All Agricultural Staff.

Joint reply sent

5/4/79

CAMEUR/zmb

WORLD BANK / INTERNATIONAL FINANCE CORPORATION Non-Regional File

OFFICE MEMORANDUM

TO: Bank Irrigation, Water Supply and Hydropower Staff DATE: May 2, 1979

FROM: F.L. Hotes (AGR/CPS) and J. Kalbermatten (EWT/CPS)

cc. S. Agriculture
cc. S. Energy, Water & Telecom

SUBJECT: Seminar on Mathematical Models in Studies of Problems of Water Supply, Hydropower, Irrigation, Navigation, Floods, Pollution and Other Water Management Problems

1. On Tuesday, afternoon, May 15, 1979, Room C1006, 1400-1600 hours, a lecture and question period will be led by Mr. J. Malfi of SOGREAH of Grenoble, France, on subject matters. Interested staff are invited to attend. The models have been used in studies in the Mekong, Senegal and Niger River Basins. The topics covered should be of interest to both engineers and economists who may work on such problems. Please let Mrs. Melonson know if you plan to attend (ext. 7-2763).

2. Two sets of some background papers are available for review in the Water Supply Library, Room D1023:

Application of Mathematical Modeling to Dam-Break Wave Propagation Problems

Application of Mathematical Modeling to River Transport of Sediment and Pollutants by Unsteady Flow

Application of Mathematical Modeling to Power Canal Surge Simulation

Application of Mathematical Modeling to Two-Dimensional Flood Propagation Problems

Modelling of Unsteady Flow in River and Flood Plain Networks Using the CARIMA System

FLHotes:rm

cc: Messrs. Imhoff (EDS); Sheehan, Rovani (EWT); Yudelman, Pickering (AGR/CPS)

Taken care of by phone - no-one from here to attend - DLG

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS
AGRICULTURE HALL

EAST LANSING · MICHIGAN · 48824

S - Agriculture
cc. S - Ind. Dev. & Finance

1 May 1979

Mr. David Gordon
Director, IDFD
The World Bank
1818 H Street Northwest
Washington DC 20433

Dear David:

As I mentioned on the telephone, the first conference sponsored by our Off-Farm Employment Project is scheduled for 30 May - 1 June 1979 on this campus. A provisional agenda is enclosed along with a description of the field research phase of the project. You will note the opening feature of the conference will be a preliminary draft of a "State of the Arts" paper on the main subject of the contract. We shall send a draft copy to you in the early part of May. We are looking forward to interactions on this paper as a basis for final preparation.

The country reports necessarily will be interim in nature, but nevertheless interaction among the researchers, and observations by others in attendance, should be very rewarding. The final session will provide opportunities to reflect on research methodologies and to anticipate further requirements for a knowledge base in policy and program formulations.

I hope very much that you will be able to attend the conference, even if only for one day. Please let me know if some other person in the IDFD should be invited also.

It was a pleasure talking with you yesterday, and I trust we shall be able to meet later this month.

Cordially yours,

Carl

Carl Liedholm
Professor of Economics

CL:mt

Enclosures

RECEIVED

1979 MAY -4 AM 10:44

INCOMING MAIL UNIT

International Conference on Rural Off-farm Employment

Kellogg Center

Michigan State University

30 May - 1 June 1979

Wednesday, 30 May

8:30 Purpose and Plan for the Conference

8:45 Implications of the State of the Arts Paper for Policy and Future Research
Carl Liedholm
Enyinna Chuta

9:30 Discussion of Paper

10:30 Recess

10:45 General Discussion

11:45 Buffet Luncheon and Tour of Campus

2:15 Research Activities by International Assistance Agencies

3:45 Recess

4:00 Research Activities by Other Organizations and Individuals

Thursday, 31 May - Reports on Country Research Activities
(30-45 minutes for presentation - balance for discussion)

8:30 Bangladesh

9:30 Jamaica

10:30 Recess

Thursday, 31 May continued

10:45 Honduras

12:00 Lunch

1:15 Haiti

2:15 Thailand

3:15 Recess

3:30 General Discussion opened by two panelists

8:15 Opera (optional, tickets $5.00, $7.50, and $9.00)

Friday, 1 June - Research Requirements to Support Promotion of Small-Scale Enterprise and Rural Nonfarm Employment

8:30 Alternative Approaches for micro level surveys

9:15 Opportunities for multi-country applications of in-depth micro level study results

10:00 Recess

10:15 Macro research to support policy and program formulations

11:00 Discussion

12:15 Lunch

1:30 Plans for next conference

2:15 Informal discussions

Applied Research for Designing and Evaluating Rural Off-farm Employment Projects

A pressing need in many developing countries is expansion of rural off-farm employment opportunities, for farmers as well as for nonfarm residents. Such expansion has the potential to (1) help accelerate overall economic growth and bring a more equitable sharing of it; (2) support efforts to expand food and agricultural production through supplying off-farm inputs and services; (3) alleviate heavy (and growing) national unemployment and underemployment in many countries; and (4) stem rural-to-urban migration which is creating serious problems in many metropolitan areas.

The Department of Agricultural Economics of Michigan State University (MSU) has entered into a Cooperative Agreement with the Office of Rural Development and Development Administration of the Development Support Bureau in the U.S. Agency for International Development to undertake a set of activities relating to off-farm employment in developing countries. As a major component under this agreement, MSU will further refine and help apply a previously devised procedure for identifying and assessing the nature and importance of rural nonfarm small-scale enterprises, their operating practices and important internal characteristics. Specific data on the extent of employment by such firms and insights on factors influencing their levels of employment are inadequate or nonexistent in most developing countries. This knowledge is basic for governments to

prescribe strategies, policies and programs for expanding employment by small enterprises and increasing output of goods and services to meet local as well as urban and export demands.

The MSU procedure, in terms of both content and delivery time for results, is closely attuned to needs of USAID country missions and other donors and host country planners and administrators. Thus, results from an early phase, useful in initial project identification, can be obtained within a few months from study conceptualization. Subsequently, at least preliminary results from a longer phase can be produced in time for formulating final project papers or proposals. Complete analyses usually are published so they may be used by academic personnel and a broad cross-section of society as well as other government planning and operating agencies.

The results of previous research indicate that the rural nonfarm sector can contribute to both growth and improved equity within countries. Highlights of findings to date include the following: First, where careful enumerations have been made, it has been found that the number of small-scale firms, employment by them, and their output vastly exceed official estimates — sometimes several fold. Second, capital required per worker in small firms is only a fraction of that in more capital intensive, larger firms and the capital has a smaller import (foreign exchange) component. Third, returns to capital invested in small firms usually is much greater than in larger firms. Fourth, many small firms have very effective, economical apprenticeship programs which have community-wide benefits in terms of skill formation and realistic training. Fifth, a substantial proportion of the goods and services produced by such firms conform to local

preferences, entail relatively little transportation costs and usually enjoy a strongly positive income elasticity. Overall, therefore, the small-scale rural nonfarm sector deserves careful study to establish the kinds of measures governments may take to more fully realize its latent potentials.

Moreover, research on nonfarm employment is complementary to that on food production problems which many countries have to continue to emphasize. A more viable rural nonfarm small enterprise sector can be directly supportive of agricultural development in three important ways. First, it provides inputs and services in response to derived demands following introduction of improved agricultural technologies. (In Sierra Leone, blacksmithing accounted for 12 percent of value added by small-scale industries in the mid 1970s and 93 percent of this was generated in villages.) Second, the rural nonfarm sector can process agricultural output and expanded employment in the sector leads to increased demand for agricultural output. Third, it provides employment opportunities for farm residents during slack farming seasons. In Taiwan and the Republic of Korea, farmers now receive around 40 percent and 20 percent of their incomes, respectively, from nonfarm employment. In both cases, the nonfarm income sources have helped to raise incomes of small farmers relative to larger farmers and relative to fully employed nonfarm workers.

In terms of employment, the small-scale firms (those employing fewer than 50 workers) already are very important. An MSU study conducted in Sierra Leone (1974-75) showed such firms accounted for 95 percent of manufacturing employment; other studies showed 70 percent in Nigeria (1973), 71 percent in Tunisia (1974), 79 percent in the Philippines (1974), and

69 percent in Colombia.

A number of useful generalizations can be made regarding the nature and importance of the rural nonfarm small-scale sector. But in significant respects, almost every country probably differs from others in important details. In any case, virtually every government official with responsibilities for development of this sector desires insights from his own society as a basis for prescribing developmental measures. Donor agencies also prefer country-specific information. The research program developed by MSU is readily adoptable to particular country situations.

A two-phased approach is employed; these can be generally described as follows:

Phase I entails a complete enumeration of small firms in the chosen area. Information is obtained from each on type of enterprise or activity, location, description of buildings and manufacturing or processing facilities and number of workers, by major categories. This phase can usually be completed within a few months.

Phase II - From the firms identified in Phase I, a stratified random sample is chosen for more intensive study. Stock data, collected at the beginning and end of the study period, encompass characteristics of the operation (e.g., family occupational background, age, education, training and previous experience, and size of household), type and ownership of enterprise, source of original capital and current credit and management practices. Flow data, collected once a week or more often, consist mainly of labor, material, and financial inputs and material outputs. Frequent enumerator visits to collect flow data are needed since few operators keep business records and many are also involved in other activities. To

compute returns to individual factors and overall profitability rates, accurate basic data are required. The preferred length of study period for Phase II is one year to cope with seasonal operating variations. However, if there is a greater urgency for results or initial funding is limited, preliminary indications are obtainable from a shorter period using similar stock data, but relying on recall and/or projections for at least part of the flow data. In most cases, since few firms keep operating records, such abbreviated surveys do not remove the need for a full twelve month study, the first part of which, in fact, can be concurrent with the phase to obtain the preliminary indications.

Data from the survey of firms are supplemented by macro or sectoral information to assess the economic environment in which the firms operate. Also usually recommended are companion surveys on household expenditures by a cross section of the entire population as a basis for projecting demand/markets for the sector's output.

Uses of Results

The internal analyses of firms reveal levels of efficiencies, and particular constraints to improving efficiencies and/or expanding output. The final reports usually include recommended changes in policies affecting small firms and suggestions for direct financial, technical training or other assistance which may be provided to help improve performance of the sector. Results of household surveys, as indicated above, provide a basis for estimating demand for the sector's output.

Finally, results of the studies can materially help in the development of national income accounts. In many developing countries, the lack of solid statistics on rural nonfarm small-scale firms has often led to the

underestimation of their contribution to the national economy.

Financial Support for the Studies

The AID funding under the Cooperative Agreement permits visits to developing countries by project personnel from MSU. However, all field costs of studies normally will be funded from other sources such as USAID missions or other donors in the host country or by the host country itself. Consultations also are provided at MSU for specialists from developing countries. Such discussions were sufficient to initiate studies in two countries (Haiti and Honduras) when MSU staff time did not permit country visits.

Invitations for MSU involvement will be viewed preferentially where there is a perceived need articulated by the government and the USAID country mission or other donors. In addition, there should be a local research or other institution with the personnel to provide leadership and support staff for undertaking the survey and analytical procedures and there should be expertise to meaningfully apply the results.

Present Activities

Field studies are currently underway in Bangladesh and Jamaica. In the former, the Bangladesh Institute of Development Studies has been funded by the USAID (via the Planning Commission and the Bangladesh Small and Cottage Industries Corporation) to conduct the program for the government. An MSU staff member drafted the study plan and periodic visits to Bangladesh are being made by MSU staff. In the case of Jamaica, a semi-autonomous government agency, the Small Enterprise Development Corporation, and the University of the West Indies are giving joint

leadership for the study. A staff member of MSU, resident in Jamaica, will participate in both the survey and analyses. Moreover, more senior MSU staff will make occasional visits to that country. In both cases, significantly, the major user of study results is a party to the study arrangement.

In Haiti and Honduras, a Phase I survey is being conducted. A modified Phase II will be carried out soon in Honduras with likelihood of the normal Phase II within the next year. Exploratory discussions have been held with officials of several other countries.

The project is under the direction of Professor Carl Liedholm. Prior to this cooperative agreement, he and Dr. Enyinna Chuta designed and conducted a proto-type study in Sierra Leone. (See "Economics of Rural and Urban Small-Scale Industries in Sierra Leone" (1976).) For this document or further project information, write to

Carl Liedholm
202 International Center
Michigan State University
East Lansing, Michigan 48824

Non-Regional File

WORLD BANK · INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Distribution List

DATE: May 1, 1979

S. Agriculture

FROM: Fred Hotes (Irrigation Adviser, AGR/CPS)

SUBJECT: Seminar on Report on Operation, Maintenance and Repair Costs of Four Selected Irrigation Districts

1. On Monday afternoon, May 14, 1979, at 1400-1515 hours in Room C1006, Bank consultant Kenneth McSwain will make a summary presentation of subject report, copies of which will be available from my office for those planning to attend (call ext. 7-2763). The presentation will include some 35 mm slides.

2. Following the presentation there will be a discussion of the report. It is intended subsequently to have a final draft of the report reproduced for distribution to Bank staff, borrowers and others as a Staff Working Paper.

Attachment

FLHotes:rm

cc: Agriculture Assistant Directors; Agriculture Division Chiefs (6) each; Bank Irrigation Engineers; Duloy (DRC); Singh (DED); van der Tak, Ray, Raizen (PAS); Sheehan, Kalbermatten (EWT)

S - Agriculture

Division Chiefs of Agriculture and Rural Development May 1, 1979

Ted J. Davis, Chief, RORSU

Workshop on Monitoring and Evaluation for Rural Development Projects

The fourth Workshop on Monitoring and Evaluation for Rural Development Projects will be held on May 16 and 17, 1979, in Room E-436. The method of work during these two days will be intensive small working group discussions of case problems. A copy of the agenda is attached.

As in previous workshops, the major objective is to upgrade the quality of M & E systems for rural development projects through training of Bank project staff from each division.

You are invited to kindly nominate one participant by May 7, 1979.

Attachment

AMAhmad:dcm

cc: Messrs. Yudelman, Christoffersen, Pickering, Turnham, Thoolen

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AGENDA FOR THE WORKSHOP ON
MONITORING AND EVALUATION OF
RURAL DEVELOPMENT PROJECTS

May 16-17, 1979

May 16 (Wednesday)

9:30 - 10:00 a.m.	Introduction and Purposes of the Workshop
10:00 - 10:15 a.m.	Coffee Break
10:15 - 11:15 a.m.	Working Group Session I:
	Project Objectives and Information Needs for Monitoring and Evaluation
11:15 - 12:00 p.m.	Plenary Session:
	Presentation of Results from Working Group Session I
12:00 - 2:00 p.m.	Lunch
2:00 - 3:00 p.m.	Working Group Session II:
	Design of Information Collection, Processing and Analysis Systems
3:00 - 3:15 p.m.	Coffee Break
3:15 - 4:30 p.m.	Plenary Session:
	Presentation of Results from Working Groups Session II

May 17 (Thursday)

9:30 - 10:45 a.m.	Working Group Session III
	Survey Design and Sampling Techniques
10:45 - 11:00 a,m.	Coffee Break
11:00 - 12:00 p.m.	Plenary Session:
	Presentation of Results from Working Group Session III
12:00 - 2:00 p.m.	Lunch
2:00 - 3:00 p.m.	Working Group Session IV
	Organization and Staffing of Monitoring and Evaluation Systems
3:00 - 3:15 p.m.	Coffee Break

3:15 - 4:30 p.m.	Plenary Session:
	Presentation of Results from Working Group Session IV
4:30 - 4:45 p.m.	Evaluation of the Workshop

S Agriculture

Mr. T. James Goering, AGREP

May 1, 1979

Graham F. Donaldson, Chief, AGREP

CIAT--Terms of Reference

You will represent the Bank as observer at the CIAT Seminar on Advances in Research (May 14-16) and the Annual Meeting of the CIAT Board of Trustees (May 18-19) in Cali, Colombia. During those meetings, you will, as appropriate, reflect the views of the World Bank on matters pertaining to Bank support of the CIAT research program and related activities. Upon return to Washington on about May 20, you will prepare a brief back-to-office and full report.

Cleared with and cc: Mr. D. C. Pickering, Acting Director (AGR)

cc: Messrs. Warren Baum (CPSVP)
Montague Yudelman (AGR)
Michael Lejeune (CGR)

TJG:vau

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S. Agriculture

May 1, 1979

Mr. C. F. Casey
Department of Agricultural Economics
216 Warren Hall
Cornell University
Ithaca, New York 14853

Dear Frank:

I am looking forward to having you here at the end of May. In the meantime, I would like to give you some perspective on your summer assignment.

The first part of your assignment, the summarization of World Bank Group support of livestock development since 1970, is relatively straightforward. I have enclosed sections from a recent summary of World Bank lending in fisheries in order to illustrate the basic approach. There should be approximately 50 livestock projects to cover; however, this number will be substantially increased by including non-livestock projects with an important livestock component.

For your reference, Bank investment in livestock can be for on-farm development and/or infrastructural support. On-farm development is usually financed by credit and traditionally has gone to relatively large-scale beef and/or dairy units in Latin America. The credit is designed to cover such factors as pasture improvement, fencing, supplemental feed, veterinary services and importation of improved breeds. Infrastructure support can be divided into a number of different components, the most important of which are veterinary and extension services, marketing facilities, training abroad, foreign technical assistance, grazing reserves, breeding stations and demonstration or pilot units. The emphasis on infrastructural support is particularly important in Africa, where development is obviously constrained by the absence of infrastructure, and Asia in the new and expanding area of dairy development.

The second part of your assignment, work on a policy note on small livestock, is less well-defined than the first part, partly because it is not yet clear what direction the policy note will take. For the present, I am thinking in terms of three large sections; namely, (i) the historical evolution of the small livestock sector in various regions of the world, (ii) the technical and economic possibilities and (iii) appropriate support for small livestock development in a Bank sector and project work. Moresspecifically, the first section would attempt to find patterns that develop as a country

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original retyped

develops; for example, how and under what conditions poultry and pig operations develop from scavenging through farm-yard operations to large-scale industrial complexes. The second section would discuss the comparative economics of raising different species in different circumstances; while the third section, which would be based on the insights learned in the first two sections, would define useful guidelines for Bank work.

Although you will be expected to do a literature search which covers both sections (i) and (ii), in any remaining time you should be more or less free to concentrate on any aspect of the policy note that you wish. I should be able to work jointly with you much of the time and am sure that we will find our work most interesting.

The Bank has published a number of policy papers. I have included here "Forestry Policy Paper," which is considered to be one of our best policy papers. As far as I can discover, only one policy-type note on livestock projects has ever been prepared in the Bank. It deals only with Latin America and pre-1973 projects, but I have enclosed it because it does provide a potentially useful starting point.

Sincerely yours,

Judith Graves
Economist
Economics and Policy Division
Agriculture and Rural Development Department

Enclosures

JG:vau

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S- Agriculture

Mr. J. D. Von Pischke, AGREP

April 30, 1979

Graham F. Donaldson, Chief, AGREP

Terms of Reference for Attendance at Wye College
Agricultural Credit Workshop in June

1. You should spend June 11 through June 14 in Wye, England, attending an agricultural credit workshop being sponsored by the Overseas Development Institute, Ohio State University, USAID, the Ministry of Overseas Development and others.

2. It is understood that you will present a paper, "The Political Economy of Specialized Farm Credit Institutions in Low-Income Countries," which has previously been cleared for publication.

3. Within 24 hours of your return, you will prepare a back-to-office report summarizing the conference and your impressions from it, with particular attention to points relating to the Bank's agricultural credit projects and activities, which will be forwarded through Mr. Clark to Mr. McNamara as required.

cc: Mr. W. Spall (AGR), Mr. D. Pickering (AGR)

JDVPischke:vau

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NRIL.
S. Agriculture.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. D. C. Pickering, Assistant Director, Gen. Agr. DATE: April 30, 1979

FROM: C. P. R. Cottidge, Chief, ASPAE

SUBJECT: CIMMYT - Workshop on Managing National Agricultural Production

Roger Rowe sent me a copy of a minute you sent him regarding a proposed workshop on managing national agricultural production to be held in December, 1979.

Firstly, I would query the choice of participants. Politically, the countries concerned are not the best of friends and this does not auger well for free discussion amongst policy makers. Perhaps I'm being over-sensitive.

Secondly, I feel that the subject matter is more relevant to less developed countires than the intended participants. India in particular, and, perhaps to a lesser extent the other countries, are all fully aware of the issues outlined in the seminar overview and all making concerted efforts (through Bank Group aided Agricultural Research and Extension projects) to improve the situation. The constraints to improved performance are also fully recognized. To my way of thinking, the workshop would be more meaningful if the case studies could demonstrate innovative ways of overcoming constraints to improved production.

In brief, I find that the authors appear to have little knowledge of the sub-continent and the more recent developments in agriculture taking place there.

cc: Mr. R. Rowe, ASP

CPRN/irl

MAY 01 RECD

Speak LR

CIMMYT

MEMORANDUM

April 3, 1979

TO: Interested Parties

FROM: Winkelmann, Lynch, Tasch DCL

SUBJECT: Up-date on the Workshop on Managing National Agricultural Production.

We would like to bring all interested parties up to date on current plans as well as solicit contributions, suggestions, and ideas for the preparation of management workshops for policy makers.

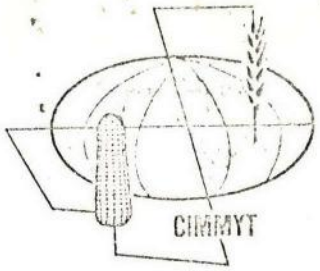
Progress to date on the workshop

1. Some fourteen cases have been identified for the first workshop. The list includes: a) three introductory cases on farmers' circumstances, showing how farmers quickly adopt appropriate technologies and how they resist inappropriate technologies; b) three cases set in Ecuador on agricultural research; c) three cases set in India on seed production and distribution; d) two cases set in Egypt on fertilizer selection and distribution; e) two cases set in Mexico on marketing of maize; f) a final case set in Mexico integrating lessons from earlier cases. (See attached outline).

2. We are in the process of arranging a mini-workshop (3 days: 6-8 cases) to take place in June in the Philippines. This mini-workshop will be attended by some thirty Philippine policy makers.

3. We are targeting the first week-long workshop, to occur in December 1979, on participants from the Sub-Continent -- Bangladesh, India, Nepal, Pakistan. We are now developing a list of potential participants and resource people.

On the last point we would like all interested parties to recommend candidates for the first workshop. We expect to have 35 to 40 participants for a December workshop lasting approximately five days. Experience suggests that we should invite roughly 80 people. We are planning to invite high level officials at roughly the director's rank in Ministries of Agriculture, Finance, Planning, etc. whose decisions impinge on agriculture. We would also appreciate suggestions for resource people, i.e. people whose experience qualifies them to give additional insight and depth to the situations presented in the case materials.



At present, we have six case drafts in various stages of completion. Case research is continuing actively: initial field research will be performed in India and Turkey in April and May, while additional field data will be collected in Egypt in March. Furthermore, an initial field trip to Ecuador, to develop three cases on agricultural research, is scheduled for April/May.

The effectiveness of the case studies we are developing depends in large part upon critical feedback. We are soliciting feedback from national policy makers, professors experienced in the teaching of case studies in agricultural management, and others having extensive experience in international agriculture.

FEBRUARY, 1979

WORKING OUTLINE

ISSUES IN MANAGING NATIONAL AGRICULTURAL PRODUCTION

Case Studies from Maize and Wheat Producing Countries

SEMINAR OVERVIEW

The seminar will bring together experienced policy makers, scientists and other decision makers whose initiatives influence agriculture to discuss case studies which examine the role of public policy in the development and diffusion of agricultural technology. The seminar will: 1) emphasize the importance of technical relationships and farmer circumstances in the formulation of effective public policy; 2) provide a vehicle for interchange among participants in order to capture the diversity and depth of participant experience with issues related to agriculture; and 3) refine decision making skills.

The first seminar, to be held in late 1979, will consist of a curriculum of approximately 14 cases to be studied and discussed by 35-40 participants over a period of five days. Each case study will focus on a specific decision making situation and will include background material and technical notes describing in detail the dimensions of the situation. Participants will utilize the background material, technical notes and their own experience to formulate a solution to the problem posed by the case. In addition, the seminar will feature presentations by prominent figures in international agriculture.

CONCEPTUAL BASIS AND ORGANIZATION

Effective policy regarding the development and diffusion of improved agricultural technology must be formulated in the context of a dynamic system whose principal elements are:

- the rationality and production circumstances of the farmer,
- the physical and biological relationships which characterize agriculture, and
- the market demand for farmer produce.

DAY 1. FARMER CIRCUMSTANCES/FARMER RATIONALITY

Sensitivity to the farmer as an economic decision maker and to the milieu within which he operates is the foundation of effective policy. Farmers' decisions to adopt or reject new technologies are based primarily upon factors of profitability and risk, which in turn relate to physical, biological, and market considerations.

DAY 2. THE ROLE OF RESEARCH

National agricultural research is a national policy instrument which can shape the development of technology to achieve specified national goals. An effective agricultural research program provides its staff an organization and incentives which are consistent with overall research policy objectives.

DAY 3. SEED PRODUCTION AND DISTRIBUTION

An agricultural system's ability to produce and distribute viable seed, which embodies genetic and varietal research, is often a necessary condition for the diffusion of technology.

DAY 4. THE ROLE OF PURCHASED INPUTS

The extent to which farmers are able to adopt improved technologies often depends upon the availability of purchased inputs, such as fertilizer. Policies which orient fertilizer selection, procurement, storage, distribution and use can be crucial in meeting the needs of farmers.

DAY 5. MARKETS AND MARKETING

Properly functioning markets for agricultural products often provide the economic incentive for the development and diffusion of new technologies. Through the development of marketing infrastructure and pricing policies, public decision makers can facilitate farmers' access to markets.

OUTLINE OF CASE STUDIES

The cases presented in the seminar portray actual decision making situations. Each case is intended to serve as the basis for discussion rather than to illustrate either effective or ineffective handling of a particular administrative situation.

DAY 1. FARMER CIRCUMSTANCES/FARMER RATIONALITY

Case 1. Early Tillage in the Anatolian Plateau

The "traditional" farmer fails to adopt a new technology developed for him by scientists and policy makers. Upon closer examination of the case, the farmer is seen not as

an intransigent traditionalist, but rather as an "income seeking risk averter" who fails to adopt the new technology because it is not appropriate to his economic, biological, physical, and social circumstances.

Case: Turkey/wheat-early tillage

Case 2. The Farmer as Innovator

An improved technology which suits farmer circumstances can be rapidly adopted by farmers with little need for extension efforts or policy initiatives.

Case possibilities: Turkey/wheat-herbicides
Nigeria/cowpeas

Case 3. Developing and Diffusing Effective Agricultural Technologies

The distinct perspectives of the farmer, policy maker, and scientist influence their approaches to the development and diffusion of agricultural technologies. The development and diffusion of effective agricultural technologies requires interaction among these three groups to formulate a "systems approach" which takes agricultural, economic and political considerations into account.

Case: Kenya/maize

DAY 2. THE ROLE OF RESEARCH: ECUADOR

Case 4. Allocation of National Research Resources

The director of Ecuador's National research organization reexamines the allocation of research resources in light of changing economic, technical, and political factors.

Case 5. Organization of National Research and Extension Efforts

The Ecuadorian Ministry of Agriculture considers various alternatives for the re-organization of Ecuador's extension service.

Case 6. Role of On-farm Research

The Ecuadorian National Institute of Agricultural Research attempts to develop a policy for the role of on-farm research in INIAP's overall research strategy.

DAY 3. SEED PRODUCTION AND DISTRIBUTION: INDIA

Case 7. Role of the National Government in Seed Production

India's National Seeds Corporation considers three alternative schemes for increasing the supply of quality seed to Indian farmers.

Case 8. Seed Marketing

The Tarai Development Corporation is faced with developing a marketing strategy which will make quality seed available to farmers at the proper time and in the appropriate form.

Case 9. Fine Tuning a Seed Industry: Varietal Selection

The managing director of the Tarai Development Corporation must develop next year's wheat seed production plan in light of projected market demand and disease susceptibility characteristics of the leading high-yielding varieties.

DAY 4. ROLE OF PURCHASED INPUTS: FERTILIZER/EGYPT

Case 10. Fertilizer Allocation, Distribution, and Use Policy

In light of a dramatic increase in domestic production of nitrogen fertilizers, the Egyptian High Committee for Fertilizer Policy reviews national fertilizer allocation policy.

Case 11. Fertilizer Selection

The High Committee for Fertilizer Policy is asked to propose measures to improve efficiency of nitrogenous fertilizers in Egypt.

DAY 5. MARKETS AND MARKETING: MEXICO

Case 12. Maize Marketing in Northern Veracruz

In an effort to obtain higher farmgate prices, a maize producer stores his harvest and reviews his marketing alternatives.

Case 13. Guaranteed Price of Maize

The Chairman of CONASUPO's Maize Pricing Committee reviews guaranteed price recommendations for maize to determine the price level that will best effect national self-sufficiency in maize production.

Case 14. Marketing and Technological Innovation: Triticale/Mexico

A task force of scientists, policy makers, farmers, and businessmen are charged with developing a strategy for promoting the production and use of triticale in Mexico.

S. Agriculture

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

Distribution below

DATE April 27, 1979

Donald C. Pickering, Assistant Director, AGR

Long Range Planning Committee Report, January 1979

1. IRRI has produced a report entitled "Long Range Planning Committee Report" dated January 1979 which offers very interesting and updated information on rice production possibilities in the rice producing countries of the developing world. Two copies of Chapters 3, 4 and 7 of the Report which focus on:

1. Production environment and its interaction with technology;

2. Potential for production increases through research input; and

3. Program plans by research problem areas

are attached for use in your Division. I hope you and your staff find the material relevant and useful.

2. Should a need arise to consult other material contained in the Report, please refer to your respective Assistant Director as I am sending him the full report.

Distribution: Division Chiefs - 2 copies each of Chapters 3, 4 and 7 of the report

cc: Assistant Directors - one copy each of the full report

Attachment

DCPickering:MNaseem:mmr

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CHAPTER 3

FACTORS CONSTRAINING RICE FARM PRODUCTIVITY

Before 1960, the average rice yield in Asia was 1.9 t/ha and it was believed that a technology to produce substantially higher yields was not possible for tropical rice areas. By 1975 the average yield of rice in Asia was 2.5 t/ha and the maximum yield of modern varieties in fertilizer trials at IRRI was 7.0 t/ha. A breakthrough existed but its impact on average Asian rice yields was limited.

IRRI has given increasing attention to the problem of identifying and overcoming constraints to on-farm rice yields. Such constraints keep the high yield potential from being realized over a wider area. The major constraints are classified as physical, biological, and socioeconomic.

The physical constraints are either relatively fixed at a location or vary predictably. Temperature, solar radiation, some soil characteristics, water depth, and flood duration vary within a relatively narrow range or with a predictably seasonal pattern at a given location. The physical factors have the additional characteristic of being impossible or difficult -- thus, expensive -- for man to modify.

The biological constraints include the destructive biological forces that interact with the rice plant and associated crops to reduce yields. Insects and diseases of rice, and weeds are the most important; birds and rats are also problems. Certain of these biological forces are more difficult to overcome as cropping intensity increases. Two routes for overcoming the biological constraints are available -- manipulation of the genetic characters of the rice plant and reduction of the constraints through management. Much of IRRI's work has been on genetic manipulation -- the creation of rices with genes to resist disease or insect attack. It now seems, however, that many problems require a combination of genetic resistance and agronomic management.

Socioeconomic constraints are the social, institutional and economic forces that influence farmers. Farmers socioeconomically influenced actions in the use of rice technology, and the uncontrollable forces of nature determine actual production. Thus, socioeconomic constraints are closely related to the production relationships inherent in the technology -- the more productive the technology, the greater will be the incentive to use it, given any set of socioeconomic forces.

Before considering possibilities for overcoming any constraints, it is useful to define three levels of rice farm productivity.

1. Present productivity -- that currently being achieved by rice producers.

2. Potential productivity -- that achievable if the maximum output combination of known technology is applied within the limits set by the fixed environmental elements.

3. Foreseeable productivity -- that achievable within the fixed environmental limit if a concerted research effort based on present knowledge were applied.

The basic task of biological research is to raise the level of potential productivity. As potential productivity increases, the opportunity for increasing actual productivity also increases. The larger the difference between the actual and the potential, the greater the opportunity for extension of new technologies to farmers.

The foreseeable productivity is an estimate of the upper limit of increase that can be obtained. The level of foreseeable productivity is a function of the level of scientific knowledge. The foreseeable productivity cannot be empirically estimated; it can only be estimated by knowledgeable scientists.

Physical constraints

In any environment physical constraints are difficult or expensive to change, and generally are dominant. As a result, the potential productivity of a technology is inherently lower within *poor* environments than within *good* environments (those with less physical constraints). With that in mind it is useful to examine some major physical or environmental constraints.

Water. Lack of water when needed is probably the most widespread constraint to higher rice yields. A water shortage is highly probable at the beginning and at the end of the growing season in many rice-producing areas. Yield reduction from drought at the early stages of crop growth may be relatively minor but that from lack of water during the reproductive stage can be a major loss. Drought can affect rice in all environments, including deepwater areas. It tends to be less of a problem in irrigated areas, but even there it occurs with a fairly high frequency. Drought stress is especially damaging to rice crops grown in dry season, when the rate of evaporation is high.

It must be recognized that drought occurs in all environments, and that rice varieties with high yield potential should be capable

of producing well after some drought stress.

Water that exceeds a 30-cm depth keeps the yield of most improved rices below their potential level and probably discourages farmers from using fertilizer and other intensive management inputs. Excess water conditions, although probably somewhat less widespread than drought, are still common. One may distinguish between floods, a temporary condition of excessive water, often moving, and deep water that stays in the rice field through an extended part of the season.

Water depth in excess-water areas sometimes exceeds 2 meters in parts of Bangladesh, Vietnam, and Thailand; in some areas it reaches 5 meters. However, water depth regularly exceeds 1 meter in only less than 5% of Asia's rice lands. Large areas of rainfed rice land in Thailand, Bangladesh, India, Burma, and Vietnam regularly have intermediate-deep water, i.e., water deeper than 30 cm but less than 1 meter.

The improved rice technology now available has little advantage over farmers' technology in areas with deep or intermediate-deep water. That means that the present and potential productivity are about equal. In such water depths dwarf rice varieties cannot yield as well as traditional varieties and little in the way of an improved cropping pattern has been suggested for such areas.

Water availability is a major factor conditioning the intensity of cropping systems used by farmers. The development of shorter duration varieties that can be harvested within 3 months of planting and are not dependent on day length for maturation should provide an opportunity for shifting the crop timing and allow two crops to be produced where only one had previously been produced. But too little is known about all the environmental parameters that would permit the introduction of the second rice crop. Water availability is one obvious parameter, and closer identification of the critical levels of water availability is required for intensified cropping systems.

Soil constraints. There are large areas of saline soils that currently grow rice but have low yield. Other areas grow no rice but have the potential to grow it. About 27 million hectares of the saline soils of South and Southeast Asia are on humid areas of coastal plains. Many of those areas could be brought into rice production through varietal development. Varieties now grown in saline soils have salt tolerance but low yield potential because of poor plant type and susceptibility to diseases and insects. Varieties with acceptable levels of salt tolerance have been identified.

The largest area in alkali soils in Asia is in the hot, dry Indo-Gangetic plain. These areas are not in crop production, but the presence of groundwater makes their reclamation possible through application of gypsum and leaching. During reclamation rice would be an ideal crop if suitable varieties were available. The foreseeable productivity is moderate, but must be considered because no crops are presently grown in these otherwise suitable areas.

Nearly 15 million hectares of the acid sulfate soils found in the tropics and subtropics are physiographically suited to rice. These soils when dried are extremely acid and lethal to crops but when submerged become neutral. When rice is grown on these soils, it may suffer from aluminum toxicity in the early stages of soil submergence.

Temperature related. In high-elevation areas, temperate regions, or for the dry season (winter) crop in many rice-growing countries, low temperatures limit rice production. The area affected by low temperature is substantial, although its exact size is not known. Improved technology will contribute to yield stabilization and may permit intensified cropping if the duration of cold-tolerant varieties can be shortened. The foreseeable benefits are high because other biological constraints to rice production, except blast, are at low levels in low-temperature areas.

Where a traditional rice cultivation calendar has been changed or rice has been introduced as a new crop, high temperature is sometimes a problem. In Punjab, India, for example, in experiments with two rice crops plus wheat, the first rice crop flowers when the temperature is high. That high temperature appears to be a critical constraint to a successful first rice crop. In southern Iran there is potential for expanding rice production but high temperature is limiting, and in tropical Africa, high temperature is an important limiting factor to successful rice cultivation. Several other countries have excessively high temperatures that induce a high percentage of panicle sterility in the dry season crop.

Biological constraints

Because of their inherent capacity to change and adapt, the biological factors of the environment -- insects, diseases, weeds, rats, and birds -- represent one of the greatest challenges of current agricultural research and, as production intensifies, the problem will become more acute. That is especially true for humid tropical areas where serious diseases and insect problems are more prevalent than under other conditions. Apart from the major problems, there are a number of minor insects and diseases that have a significant cumulative effect, some of which may become

major problems as rice growing intensifies.

Next to the vagaries of weather, damage from insects and diseases provide the most significant constraint to rice production. Weeds are a universal problem whether rice is grown as an upland crop, in paddies, or as a floating rice in deep water. Insects and diseases are most troublesome where the climate permits rice growing throughout the year. Likewise, some improved agronomic practices that induce dense crop stands and succulent plants sometimes favor the growth and development of plant pests.

Global figures on the extent of crop damage from rice pests are not widely available. In specific cases, however, the area damaged has been recorded. In the Philippines, for example, tungro virus virtually destroyed 70,000 hectares in 1971, and 40,000 hectares in 1972, and the brown planthopper damaged at least 80,000 hectares in 1973-74. Other examples of damaging pest epidemics include tungro virus infestations in Bangladesh, India, and Thailand, and the brown planthopper outbreaks in India, Indonesia, and Sri Lanka.

While it is impossible to generalize on the importance of the biological factors that limit rice yields, some insight may be obtained from a series of experiments throughout Asia to identify the yield constraints from insects, weeds and inadequate fertilizer. In several years of study in farmers' fields, researchers increased insecticide, herbicide, and fertilizer inputs to the levels needed to achieve maximum yields and compared the yields with those in other farmers' fields.

Yields could often be increased 1 t/ha in the wet season and 2 t/ha in the dry season. At most sites it was possible to identify one factor that accounted for at least 0.5 t/ha of the yield constraint. Inadequate fertilizer was most often the most important constraint in the dry season, and insects and diseases in the wet season. Weeds were generally less important. These findings, although not representative, indicate the importance of the biological constraints and the potential that present technology has for reducing those constraints.

Rice diseases. Chemical control of rice diseases has proven impractical. The control of virus diseases through control of insect vectors by insecticides has generally been ineffective. There is no effective chemical available for control of bacterial blight or bacterial leaf streak, and although chemicals can control fungal diseases, they require a large expenditure. Although useful for supplementary or emergency purposes, fungicides cannot be relied

upon as the main control mechanism for the low-income tropics. Improper application often wastes much of the costly chemicals, and adds to water and soil pollution problems.

The large reservoir of available rice germplasm provides an opportunity for controlling rice disease through genetic manipulation. Screening many thousands of cultivars has identified the sources of resistance to most of the major diseases and insects. The resistance genes in those cultivars are being incorporated into new rice lines with other desirable traits. The efforts required to incorporate resistance to several diseases are great, but many new IRRI lines have multiple resistance to several diseases and insects.

A further complication in breeding for disease resistance is the presence of different strains or races of the disease organism. A rice cultivar may be resistant to one but susceptible to another race of the same pathogen. That complicates efforts to develop stable resistance. Rice viruses are least variable and bacterial pathogens vary in virulence -- a few new races have been recently demonstrated. The blast fungus is most variable; races differ in different locations and seasons and thus multiple crossing and international testing are necessary.

Disease control through genetic means not only is feasible but has already shown good results. Further efforts are needed, in anticipation of pathogen variability, to increase the level of resistance and to deal with specific diseases in specific areas. Another approach to disease control is through cultural practices. By understanding the epidemiology of the pathogen, some cultural practices may reduce the incidence of diseases, such as sheath blight, to which a high level of resistance has not been found.

Insects. More than 100 different species of insects damage rice. About 20 are of major economic significance; some of them cause complete crop loss. Even when infestations are low, the damage by various insects cumulate to cause substantial yield losses. A 15-20% yield loss caused by insects is common. Insect incidence seems to be more intense in crops grown with improved agronomic practices and high levels of fertilizers than under less intensive practices. Densely planted rice fields often provide insects a more attractive microclimate than nitrogen-deficient, low-yielding rice crops.

Recently, the leafhoppers and planthoppers have become more important, apparently because they are vectors of the known virus diseases of rice and also because the modern plant type and cultivation practices suit them. The rice gall midge has also been very destructive in endemic areas, which have increased in

recent years.

The use of insect-resistant varieties has provided effective practical control against several of the species. Stem borers, which have been a major pest of rice for a long time, appear to have declined in their relative importance in many areas apparently because the modern semidwarf varieties have a certain degree of natural resistance to them. Rice varieties resistant to leafhoppers and planthoppers have had dramatic impacts, with resistant varieties providing highly effective control of leafhopper and planthopper damage. However, new planthopper biotypes capable of surviving on resistant plants have developed and become a serious threat to the use of conventional resistant varieties.

It now appears necessary to develop a stable form of plant resistance to pests that can be maintained over wide areas and longer periods. The concept of *horizontal resistance*, as used to combat plant diseases, is being simultaneously explored. However, the feasibility of the application of this technique is largely unknown. Developing horizontal resistance is, however, a longer process than developing single gene resistance. It will likely not be undertaken by national programs, which will increase IRRI's responsibility.

The use of insecticide has been a major method of control. Continued use of insecticide appears inevitable, although the most appropriate strategy is to use insecticide only when needed. Proper timing and method of application can considerably minimize the total requirement of insecticides.

The complexity of the insect problem, and the general socioeconomic conditions of rice farmers imply the need for an integrated method of insect control for practical, long-lasting insect control. Most of the progress on control to date has been through varietal resistance and use of insecticides. While improvement of these two aspects must be continued, it is important to further intensify the work on such other aspects related to insect control as the basic ecology of the common pests, and possible biological and cultural control techniques. The year-round cultivation of rice in the tropics can be an ideal situation for the multiplication of various insect parasites and predators. However, the role of these organisms in control is poorly understood. Similarly, if integrated control is to be effective, more information on natural population fluctuations and the factors affecting those fluctuations should be obtained.

Weeds. Weeds are perhaps one of the most difficult production constraints in agriculture. Adequate weed control is more critical for modern varieties grown with high levels of fertilizer than for traditional rices grown without fertilizer, although the

importance of weeds in both is often overlooked. The relative unimportance of weed control seems to be substantiated by the studies of farmers' yield constraints. However it is unclear whether the generally small contribution of weed control to crop yield is due to the lack of weeds or the lack of weed control techniques more effective than farmers' techniques.

A wide variety of direct and indirect methods of weed control is available and one of the best guides to the choice of weed control method is the relative cost of labor and chemicals. Herbicides are frequently looked upon as a threat to on-farm employment but analysis of the Philippine situation suggests that in areas where weed control has traditionally been poor, use of herbicides has complemented labor to raise farm production. In much of tropical Asia, integrated methods of control of annual weeds -- use of limited quantities of low-cost chemicals in combination with direct and indirect weed control techniques -- may be the most attractive alternative from agronomic, economic, and ecological points of view.

Rodents and birds. Rice-crop damage by rodents, birds, and other vertebrate pests is very severe in many areas. But these problems are not specific to rice and there is no justification for IRRI to be heavily involved in research related to these pests. It seems more appropriate that IRRI use and disseminate the findings of scientists and institutions concerned with the control of those pests.

The problems of biological constraint described in the four sections above are examples of the challenges encountered or expected. Clearly, a comprehensive approach is needed to gain an understanding of the total biological environment and to find solutions that are long lasting. Frequently, the problems have been viewed only as individual components; their interrelationships have not been clearly recognized. The crop cultivars, the insect and disease organisms and their natural enemies, and the cultural management component must be studied as an interrelated system.

Socioeconomic constraints

Economic variables are the most quantifiable of the socioeconomic factors limiting rice yields on farms. That makes them easiest to recognize and evaluate. The degree of market orientation, the relation between prices of inputs and products, and the costs and returns resulting from a particular technology under particular conditions, are examples of economic factors often identified as constraints. Institutional conditions and social factors that may cause otherwise profitable technology to become unattractive to potential adopters also are constraints.

Profitability. The primary contribution of research toward overcoming economic constraints is the identification of the actual or potential economic incentives created by new technology. A suggested technology that is not profitable must be redesigned by the technologist, or must be directed toward an economic environment where it will be profitable.

A simplistic view is that lack of profitability is the easiest constraint to eliminate -- make the inputs free and farmers would acquire the incentive to maximize output. This would, however, eliminate the allocation mechanisms of the economy and create waste; for example, free fertilizer and tractor services would cause farmers to overuse those inputs and underuse such inputs as compost and family labor. The situation would be similar to that existing in some irrigation systems where water has a low fixed cost and farmers make no attempt to conserve its use.

Another problem is that free agricultural inputs would have to be subsidized by taxes on other sectors, an arrangement that would be difficult to sustain. The difficult issue is always the most appropriate degree of subsidization. On the other hand, many governments intentionally reduce production incentives through price ceilings or taxes on inputs. Economic research can identify the effect of such policies.

Technology may provide profitable opportunities for increasing rice farm production, but if the opportunities are less attractive than alternatives in the nonfarm sector, farmers act rationally in not using the technology. Quantification of the alternatives open to farmers is hampered by the unavailability of the type of information needed to judge the attractiveness of such alternatives.

Risk is another factor often considered as a constraint. It is directly related to physical and biological constraints. Physical and biological constraints that are highly variable, such as drought, result in highly variable yields. It is hypothesized that yield variability discourages farmers from using technologies that would, on the average, be profitable. There is no standard methodology for measuring risk or for determining whether risk is a constraint. Research on risk must deal with these issues before it can determine the importance of risk as a constraint or suggest policies to alleviate it.

Labor and power. Energy and manpower are important inputs into the production process and it is often suggested that they limit productivity. Past studies have failed to show a relationship between power and productivity within otherwise homogenous samples. It appears that increased energy inputs increase productivity in a complex, long-term set of interrelations that are not easily

recognized. Cross-national comparisons seem to show the relationship most clearly, but so many other factors vary across countries that it is difficult to attribute the productivity differences to power. Careful research is needed to identify the appropriate role of power and mechanization in permitting intensification of rice technology.

Institutions. It is possible to include the effects of most tenure arrangements in the calculations of profitability. Tenure arrangements tend to be highly variable and dynamic in some situations, especially where governments are attempting land reform. This variability hampers the accurate descriptions of tenure that are necessary for their use in profitability calculations. With some contracts, tenants have as great an incentive to use modern technology as owners, so share tenancy need not be a constraint. In other situations the opposite is true. The research problem is to identify situations where tenure is a constraint.

Unavailability of credit is suggested as a major constraint by many. Credit use is often related to income and social status, suggesting that credit leads to higher output and income, but the direction of the relationships is not conclusively known. Repayment of institutional credit has been a major problem where governments have attempted to relieve the credit constraint, and often government credit programs are not effective in getting farmers to use modern technology. A major challenge to economists is to develop methods to study these issues to determine the extent to which lack of credit is a constraint. At the same time, techniques to overcome the problems with existing credit programs must be devised.

Social and institutional factors sometimes are constraints to increased production. Situations where certain groups are excluded from access to inputs that are integral parts of a new technology are an example. More subtle are social situations in which the values held by people are such that they are not interested in using a potentially productive technology. These may range from situations where farmers are unwilling to work as many hours as a technology requires to situations where farmers prefer not to borrow money, even though credit is available. In most cases, the social constraints change gradually over time but they have been known to crumble under the pressure of government propaganda efforts. Careful identification of the social constraints may clear the way for changes, such as those that have been mounted by the People's Republic of China since 1945 and by the Republic of Korea since 1970.

Existing research and development systems are sometimes major constraints. The weakness of research often lies in the inability

to address the reality of the farm setting and to link technology to specific environments. The lack of local specificity of recommendations leads to losses and to farmers' reluctance to adopt higher input technologies. Another factor is the weakness of the links between research and extension, and extension itself!

CHAPTER 4

FEASIBLE POTENTIAL FOR PRODUCTION INCREASES THROUGH THE APPLICATION OF RESEARCH INPUT

The identification of some of the constraints to high rice yields has unfolded a wide range of opportunities for increasing rice production through research. Specialists believe that significant progress toward removing nearly all constraints could be made if enough resources were made available over a long enough time. The relevant question is how much progress can be made toward identifying and overcoming constraints in a fixed period if the level of research inputs (resources) is fixed.

The criterion of research success is the total expected net increased value of rice and allied crop output resulting from research on a given problem (see Chapter 6). The relevant productivity increase is that from the current potential productivity (the maximum with the best combination of all known technology) to the foreseeable productivity (the level that could be achieved with a concerted effort based on present knowledge). Total productivity is a function of the area affected and the productivity gain per hectare. To have a consistent measure of crop area that avoids double counting, some classification of rice land must be adopted. It seems most convenient to classify rice lands according to a dominant physical factor -- temperature, soil problems, or water conditions.

No existing data classify the world's rice land by these three dominant physical factors. In fact, the only universal criteria of area classification are political boundaries, which are of little research interest. Many countries classify their rice area as irrigated or nonirrigated, and many provide information on the season during which rice is grown. On the basis of this information, a great deal of judgment, and various scattered surveys, the world's rice land is grouped into the seven categories in Table 1.

IRRI is primarily concerned with the rice-growing South and Southeast Asia, which contain 61% of the world's rice area. China adds 25% and the other developing countries in the Middle East, Africa, and Asia make up 8%. IRRI has had several exchanges of scientific missions with China, but because of their relatively recent nature and the lack of information about China, no IRRI priorities are greatly influenced by Chinese conditions. Among the other developing countries of the world the proportion (%) of rice in the various categories that are identified in Table 1 is as follows:

Table 1. Hectarage of rice grown in areas where water factors or soil and temperature factors dominate.

Region	Total area (thousand ha)	Area (thousand ha) where the dominant factor is: Water: Irrigated	Water: Shallow rainfed	Water: Intermediate rainfed	Water: Deep water	Water: Dryland (upland)	Temperature or soils: Arid, high temp., saline alkaline	Temperature or soils: Long day, low temp., short season
India	38,402	12,558	12,634	6,080	2,362	2,404	2,045	319
Other S&SEA	45,133	10,531	15,091	6,791	4,634	5,875	1,598	613
China	34,133	30,718	2,734	0	0	681	na	na
Other developing	10,316	1,236	439	999	0	4,777	454	2,411
USA, Japan, USSR	4,201	4,144	0	0	0	57	na	na
Other	5,228	na	na	na	na	na	na	na
Total world	137,413	na	na	na	na	na	na	na

Source: Appendix I.

	Developing countries except China	Asian developing countries except China	India
Water dominant			
Irrigated	26	27	33
Shallow rainfed	30	32	33
Intermediate rainfed	14	14	16
Deepwater	7	8	6
Dryland (upland)	14	10	6
Temperature-soil dominant			
Arid, high temperature	5	5	5
Long day, low temperature	4	4	1

It is useful to consider these proportions as indicative of the relative importance of research on the major problem in each type of area.

Areas where water is dominant

In most rice-growing areas of the world, water is the dominant factor affecting the feasible potential for increasing production. For convenience of discussion, these areas can be divided into five categories: irrigated wetland, shallow rainfed, intermediate-deep lowland, deepwater, and dryland. Dryland is defined as having no irrigation and no natural or artificial means for the entrapment of surface water. Irrigated areas are those where water can be provided artificially and drainage is adequate. Rainfed lowland areas have bunds for the entrapment of surface water but no means for adding groundwater or surface water from distant areas. Shallow rainfed areas are those where water depth is not normally expected to exceed 30 centimeters. Intermediate-deep rainfed areas, are those where water may normally range from 30 centimeters to 1 meter. Deepwater areas are those where the water is normally expected to exceed 1 meter at some stage of plant growth; they cover unbunded areas much larger than single farms.

There is a complete gradient of growing conditions with respect to water, and precise divisions are impossible. Because hydrological data for most of the world's rice lands do not exist, or have not been compiled, the estimates of areas involved in the rough divisions above are approximate. By elimination,

rainfed lowland occupies 45-55% of the area, with shallow rainfed areas twice as important as intermediate rainfed.

Irrigated lowland. Irrigated lowland rice contributes to production far out of proportion to the land area devoted to it; it occupies about 25% of the rice area and accounts for 40% of total rice production. The technology developed by IRRI during the past 15 years has been directed almost exclusively (but not intentionally) toward such areas and the return on the research investment has been remarkably high.

But despite the success with irrigated rice technology IRRI cannot reduce that research effort. Since IR8 was developed, some research efforts have consisted of what might be termed maintenance research necessitated by the natural cycle initiated by the more intensive production IR8 made possible. Intensive production practices resulted in the increased incidence of destructive diseases and insects, which, in turn, prompted the development of resistant varieties. Those, in turn, resulted in the development of new insect biotypes and forms of diseases, which, in turn, now require further research input.

The cycle is familiar in the developed countries. In a sense, the process is location specific and endless, and the research effort to cope with it must quickly be shifted into national research programs, a development that will require increased training. However, even then, it is not contemplated that IRRI's research inputs into irrigated rice culture will be reduced. Production from irrigated rice areas has steadily increased and a sustained continued investment in research is expected to produce sustained increase in production. The possible increase from present potential to foreseeable yields for irrigated rice is estimated to be about 1.3 t/ha in areas with 1 rice crop and about 2.0 t/ha in areas with 2 rice crops.

Irrigated, single-cropped areas have floor or drought limitations either before or after the rice crop, but generally drought in the remaining part of the year. The duration of the irrigated periods varies from 5 to 8 months. The potential for additional crops is substantial, because the duration of the irrigated rice crop can generally be reduced by 35-45 days. In part of the area dry seeding will permit early rice crop establishment, which can result in two rice crops or in the introduction of dryland crops after rice. One guess is that in at least 60% of the present irrigated single-crop area an additional rice crop can be introduced without additional irrigation investment. In 40% a dryland crop can be established.

The potential productivity[1] would then be achieved at a cropping intensity of 2.2.

Irrigated double-cropped areas generally have irrigation water available for 9 to 12 months. Crop intensification possibilities are substantial as these areas tend to have good water control. An additional dryland crop can be grown in those areas where soils permit it in 30% of this category. The potential cropping intensity would then be 3.0.

Rainfed wetland. Rainfed wetland rice has been virtually ignored because of its complexity, but it offers the greatest untapped potential for increases in production through research inputs by IRRI. By any estimate it accounts for about half of the rice land in South and Southeast Asia. In the shallow rainfed area, the main problem is drought; in the intermediate rainfed area floods are more important, although all rainfed areas are susceptible to both drought and flood. The currently available rice technology has not been widely adopted in rainfed lowland areas, apparently because it is unsuited.

Three major accomplishments are needed in the development of improved technology for rainfed lowland areas:

- Development of a cultivar that has a high degree of drought resistance and a hardy, nitrogen-responsive plant type.
- Development of a cultivar that has flood tolerance, either in the form of submergence tolerance (shallow rainfed) or elongation ability (intermediate rainfed), and drought tolerance and a hardy, nitrogen-responsive plant type.
- Establishment of a collaborative network that will permit the development of research in crop establishment and fertility management.

On the basis of our past research findings and experience with the International Rice Testing Program and collaborative research projects, it appears that these items could be accomplished and that the feasible potential for increasing rice production in rainfed wetland areas with reasonable research inputs is second only to that in irrigated areas. Yield potential

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[1]The potential productivity in terms of the benefits from cropping systems research is conditioned by the technology currently available, but the extent of its realization in farmers' fields depends on such structural aspects as credit, power, labor and market conditions.

in rainfed lowland areas might be increased by 1.2 t/ha, about double the present potential. In addition, yield-stabilizing factors such as drought resistance and flood tolerance would improve farmers' situations. Such dramatic gains cannot be expected in a short time but it is the responsibility of research to make certain that the technology is available when farmers have the appropriate incentives to adopt it.

Most rainfed rice-growing areas are cropped to a single rice crop; perhaps 30% of such areas grow a following dryland crop. There are 4-7 months with more than 200 mm rainfall and generally 2-4 months with 100-200 mm of rainfall. Drought generally limits crop intensification. Early planting combined with early maturing varieties will result in double cropping of rice in 45% of the rainfed complex. Partially overlapping this 45% will be an area (55%) that will allow the production of a dryland crop after rice. The potential cropping intensity for the rainfed rice-growing areas would then be 1.7.

Deepwater. There is limited potential for increasing rice production in deepwater rice areas where the maximum water depth is expected to exceed 1.0 meter. Some research in this area should be continued because the information gained might be useful in intermediate rainfed areas where excessive water is frequently a problem. The expected foreseeable yield increase is 0.8 t/ha.

At present farmers practice a wide variety of cropping systems in deepwater rice areas. In some areas the deepwater rice crop is being replaced by a preflooding irrigated rice crop. Deepwater rice areas are also suitable for dryland crops after floodwater has receded (after rice) because water tables often remain high. Heavy soils may impose a limitation, but on medium-textured and light-textured soils some farmers have already developed an efficient cash crop production system after deepwater rice. The potential for further crop intensification is perhaps 10% additional rice and 20% additional dryland crops. The potential cropping intensity is similarly difficult to estimate, but it may be 1.5.

Dryland. Dryland (upland) rice has attracted the attention and considerable interest of many, especially those concerned with Latin America and Africa. It is much less important in Asia. Because of low yields, its present contribution to production is small relative to the area it occupies. Except in Brazil, where more than 3 million hectares are grown in a unique mechanized culture, dryland rice is largely a subsistence crop. In Africa it is often associated with the slash-and-burn system of cultivation practiced in the humid tropics. Dryland rice will persist, or even increase, as long as the shifting type of cultivation is practiced.

The soils and rainfall patterns in upland rice areas vary widely and, as a result, the varieties and associated cultural practices are location specific. The major disease of dryland rice is blast (*Pyricularia oryzae*), which almost always attacks susceptible cultivars. The currently grown varieties, most of which are traditional, apparently possess a stable form of resistance. Drought is obviously a yield constraint in dryland areas and, because of the subsistence nature of the crop, resistance to drought is essential. Such resistance is always characteristic of dryland varieties but it exists at the expense of agronomic characteristics essential to high yield potential, e.g. the dryland varieties are low-tillering types that will usually produce some grain in the most unfavorable of moisture regimes but will not markedly respond to inputs even with favorable moisture.

On the basis of the above considerations, it must be concluded that the feasible potential for increasing rice production in dryland areas is small. Assuming that the drought problem can be overcome through breeding, there are other factors which, in combination, present great problems. The high degree of location-specificity caused by variation in soils and rainfall patterns requires that distinct varieties be identified for each location -- a massive, costly effort.

Unless the problem of breeding for stable resistance to blast can be resolved, which is extremely doubtful, local breeding or testing programs would have to be implemented in each upland rice area to provide for the replacement of the improved varieties once their blast resistance is overcome (and it would be overcome in the predictably short period of 2-5 years). It would be irresponsible to introduce an improved dryland variety into areas without establishing a research program that would guarantee its replacement when needed.

Apart from varieties, the associated improved cultural practices that would be required to take even partial advantage of improved varieties would also require a great deal of local research.

Given the development and extension of an optimum technology package for dryland rice, which assumes surmounting all the difficulties mentioned above, the contribution to production would still likely be small. A 100% increase in production would result in an average yield level that would still be less than 2 t/ha.

Prospects for improving productivity by modifying the cropping system in dryland areas may be somewhat brighter. Rainfall patterns vary widely in dryland areas but long rainy

seasons are probably more common than in wetland areas. An important determinant of this production complex are its well-drained soils and substantial depth to the water table. Dryland rice is grown where the production potential of nonrice crops is limited by high rainfall but where ponding of water is not practiced because of high infiltration rates or steep slopes. Some dryland rice-growing areas may have potential for wetland rice production that has not been realized because of recent settlement. Dryland rice is generally combined with other crops where this is possible. Cropping intensities vary from 1.3 to 1.85 in Batangas, Philippines, to well above 2 in parts of Mindanao, Philippines, and Lampung, Indonesia.

The potential cropping intensity for dryland rice areas is difficult to predict as no adequate measure of the present status exists. It will probably be about 1.6.

Areas where temperature is dominant

There are fairly large rice areas in the developed countries where low temperatures dominate, but there is no justification for IRRI's deep involvement in such areas. However, some rice is grown at high elevations in the tropics, and as the winter crop of the low-elevation subtropics, where low temperature is a dominant factor. In addition, substantial areas in Korea, Iran, Afghanistan, and India face the complex of long days, short growing seasons, and low temperatures. These areas make up about 4% of South and Southeast Asia's rice land.

Excluding Korea, some of the world's poorest people inhabit these areas and subsist mostly on rice and other grain crops. Therein lies the justification for continued IRRI involvement. Also, a number of experiment stations in these areas could take advantage of collaboration and assistance from IRRI to improve their varieties and production practices. Small investments by IRRI can pay relatively large dividends.

In the areas affected by low temperatures, rice yields could probably be doubled with the use of adapted varieties and improved cultural practices. However, due to the remoteness of the areas and the high degree of location-specificity of the varieties now grown, progress will be slow. In many low-elevation areas of the subtropics modification of the cropping system may be more promising than breeding for increased productivity. The area devoted to wheat during the cooler months on the Indian subcontinent has increased significantly. The key to its further expansion lies in developing rice varieties of appropriate growth duration and systems of crop management for the warmer months.

High-temperature tolerance is a new area of research for

IRRI, and its importance, in terms of area affected, is confined to parts of northwestern India, Pakistan, and the Middle East, which account for about 4% of Asia's rice area. In addition some locations in Africa and Latin America have this limitation.

Recent trends to intensified cropping patterns have shifted the traditional planting dates of rice in certain areas. In some cases, this shift has resulted in a situation where the crop flowers during the hottest part of the year, and in substantial spikelet sterility. Varietal tolerance has been identified and there is good evidence that heat tolerance can be incorporated into high-yielding improved-types. Lack of water is the only other major constraint that may operate in such areas. Insect and disease problems are minor. Thus, the feasible potential for increasing rice production with reasonable research inputs is fairly large. It should be possible to raise yields from the present 2-3 t/ha to 4-5 t/ha. Irrigation is a requirement for even 1 crop, and with appropriate technology, cropping intensity could reach 2.0.

Areas where soil problems are dominant

In densely populated South and Southeast Asia, as much as 100 million hectares of land physiographically and climatologically suited to rice production are uncultivated largely because of soil problems such as salinity, alkalinity, strong acidity, or excess organic matter. There are also about 50 million hectares of cultivated land, where deficiency of zinc, phosphorus, or iron, or excess of iron or aluminum limits rice yields.

The feasible potential for increasing rice production with reasonable research inputs by IRRI, in areas where adverse soils are the dominant factor, is apparently great. Varietal tolerance to a certain degree of many adverse factors has been clearly demonstrated.

The question of the long-term effects of growing increasingly tolerant varieties on these soils is unresolved. It may discourage appropriate research or government action in the area of soil amendment and management and ultimately intensify the soil problems to a point where no tolerant variety will suffice. Therefore, long-term breeding for varieties that are tolerant of various soil deficiencies is not advisable.

The appropriate strategy for overcoming toxicity problems is less obvious. Tall, traditional, tolerant varieties such as Pokkali have been grown for years in the coastal saline areas of South India. There is apparently no reason to expect that increasingly tolerant varieties will aggravate the toxicity situation in these and other areas. Therefore, the potential for

increasing rice production with reasonable research input by IRRI seems very promising for areas where soil toxicities are the dominant factor. Although accurate estimates of the current rice-growing area affected by these problems is difficult to obtain, the priorities for research should be salinity, alkalinity, highly reduced organic soils, and finally other toxic soil elements. It should be possible to double or triple current yields of 0.5 t/ha in affected areas by combining tolerance with an appropriate improved plant type and other desirable varietal characteristics.

CHAPTER 7

PROGRAM PLANS BY RESEARCH PROBLEM AREAS

IRRI's largest research area, genetic evaluation and utilization (GEU), in the last 5 years, absorbed nearly 40% of total research efforts. Its second largest, the cropping systems program, has absorbed 20%. Control and management of pests -- weeds, insects, and diseases -- have received 10% as has soil and crop management for rice. Small-scale machinery development and testing has used about 8% of the total and the study of irrigation and water management about 4%. Research on the constraints to higher rice production has received 4%, the study of consequences of the adoption of new technology about 2%, and the study of the climatic environment and its influences on the rice plant about 2%.

GENETIC EVALUATION AND UTILIZATION

The GEU program is IRRI's largest and most complex research endeavor. Its primary function is to identify and make available to rice breeders in national programs, rice cultivars with specified desired characteristics. Those characteristics may be combined with a range of others, or may be single traits. A concerted effort has been expended in the last 5 years to integrate resistance to as many major insects and diseases as possible in the rice plant. Questions now are being asked as to whether such broad spectrum resistance is necessary. Also, the effect of screening at IRRI seems to have been the selection of types with somewhat less robustness than breeding materials from areas with greater inherent production constraints than Los Baños.

A result of some of these trends is the increasing emphasis on identifying the genetics of desirable characteristics, on making early generation materials available for in-country selection, and on greater selectivity in exchange of genetic materials. The development of techniques such as pollen culture, tissue culture, and the rapid growth of lines under regulated temperature and light conditions to permit rapid advance of breeding generations, will be very helpful.

The GEU team will also intensify its work to raise the yield potential beyond present levels. Current efforts include combining attributes for number of grains per panicle, grain size, and grain-filling ability of the plants. Other work includes increasing the size of the culm but maintaining the number of

tillers per hill. Development of F_1 hybrids may also provide a source of increased yield.

Attention to data-handling procedures is still required. Present procedures are not adequate to cope with the volume of information about breeding material that must be evaluated, nor are they geared to the needs of a multidisciplinary program wherein several scientists simultaneously need current, comprehensive data on the breeding materials. The computer is being extensively used to remedy this problem and this trend will continue.

The improved genetic materials being disseminated through IRRI have undoubtedly contributed to increased food production but they have also minimized the genetic diversity of the world's rice crop. Genetic uniformity has been responsible for pest epidemics on certain crops in the past. Therefore, IRRI initiated an international rice genetic survey in 1978 to monitor the genetic composition of the world's current and potential improved rice varieties.

Two types of changes are likely to take place in GEU over time: a shift toward more basic activities that will permit a better understanding of rice genetics on which to build further advances, and a gradual transfer of varietial development activities to national programs. As national varietal development programs grow and mature, they will assume responsibility for more applied activities, create a greater need for strong foundations, thereby requiring more IRRI efforts in the mission-oriented basic research area. In the future GEU will engage in the following activities.

Germplasm resources conservation

- Continue systematic canvassing of indigenous germplasm in various countries and regions.
- Re-collect special types from areas where GEU tests have identified accessions having special desirable features.
- Obtain the cooperation of a second seed bank abroad in providing duplicate storage.
- Develop a global network for genetic conservation and rejuvenation of seed stocks.

Agronomic characteristics

- Define and develop appropriate plant types for other than lowland irrigated environments.
- Develop early maturing lines to increase cropping intensity,

while retaining work on lines with medium and longer maturity.

- Develop a continuous range of nitrogen reponse types from high-input types (IR8) to nearly zero-input types.

- Regain the IR8 yield potential, recognizing that some sacrifices in this quality were made in incorporating the attributes of insect and disease resistance.

Grain quality

- Continue current work on grain-quality measurement with emphasis on developing simpler methodologies for use elsewhere.

- Incorporate intermediate amylose content into varieties of high yield plant type.

Disease resistance

- Continue to identify sources of resistance and breed for resistance to blast, sheath blight, bacterial leaf blight, tungro virus, grassy stunt virus and other important diseases such as leaf scald in Latin America.

- Expand research on the genetics of the host-parasite relationship.

- Investigate the concept of stable horizontal resistance to minimize the problem of development of new races of blast. Undertake similar work on bacterial leaf blight because new races seem to be developing.

- Investigate the pathogenic variability of blast and bacterial leaf blight pathogens.

- Increase, if possible, the level of tungro resistance in present breeding lines. Most lines now have field resistance, which may break down under heavy virus pressure.

- Study the mechanisms of disease resistance in collaboration with scientists in developed countries.

Insect resistance

- Develop lines with resistance to insects for which no resistance is now known. Diversify present sources of resistance.

- Investigate the genetics and causes of resistance.

- Pursue genetics-based methods of minimizing the brown-planthopper biotype problem. Use the International Brown Planthopper Nursery to identify varieties with broad resistance. Screen the germplasm collection to locate additional sources of resistance. Develop multigenic resistant lines. Determine if the strong resistance of *Oryza australiansis*, *Oryza latifola*, and other wild species can be transferred to rice.

- Investigate varietal resistance to rice gall midge, which does not occur in the Philippines, through a collaborative international project.

Protein content

- Test whether the relative genetic ranking of lines for protein per seed is consistent over season and nitrogen levels. That could prove an effective method of evaluating the earlier generation breeding lines.

- Screen traditional indica rices for major genes that condition high grain protein content for incorporation into improved varieties.

- Critically review the current breeding strategy and selection criteria for protein improvement in relation to those of similar breeding programs of improving plant endosperm protein content, taking into account the greater calculated bioenergetic requirement of grain protein production compared with starch production.

- Verify the usefulness of high-protein rice as a replacement for low-protein rice in augmenting human nutrition through a cooperative growth study in preschool children on a rice-based diet.

Drought resistance

- Critically evaluate lines for various aspects of drought resistance in the drought-screening greenhouse. Continue mass screening of germplasm bank materials and breeding lines in the field.

- Intensify efforts to unravel the physiologic and morphohistologic mechanisms that contribute to drought resistance and recovery under diverse environments. Seek collaborative research with institutions in developed countries to advance the scope of basic research aspects.

Give high priority to screening methodology.

- Direct breeding efforts toward combining the essential drought resistance components into genetic lines intended for different agroclimatic or cultural conditions.

Adverse soil tolerance

- Develop improved breeding lines with tolerance for adverse soils through systematic hybridization, screening and evaluation.

- Improve techniques for mass screening of germplasm accessions and breeding materials for tolerance for adverse soils.

- Evaluate promising genetic materials, in cooperation with national scientists, in countries where the problems occur.

- Conduct a minimum of basic studies on the genetic, biochemical, and physiological aspects of tolerance for adverse soils.

- Give priority, in the initial stages, to salinity, alkalinity, iron toxicity, and zinc deficiency. Future studies will emphasize tolerance for aerobic soils, reduction products and other problems.

Deepwater rice and flood tolerance

- Describe the prevalent diseases, insects, growth duration, photoperiod sensitivity requirements, prevalent soil types, cultural practices, frequency and duration of flooding, and other factors that affect deepwater and intermediate-depth rice.

- Transfer photoperiod sensitivity and deepwater tolerance from floating rice to disease- and insect-resistant semidwarf rices.

- Seek to incorporate into high yielding rices tolerance of submergence of as long as a week and some degree of elongation ability.

- Continue cooperation with the Thai Department of Agriculture. Continue collaborative work with the United Kingdom's Ministry of Overseas Development to strengthen work on deepwater rice in Bangladesh.

- Increase the research on somewhat more basic deepwater research at IRRI, using newly completed deepwater plots.

Temperature tolerance

- Continue screening for tolerance for low and high temperatures.
- Determine whether temperature tolerance at one stage is related to another tolerance or to overall plant growth.
- Determine the effect of both high and low temperature in inducing spikelet sterility in rice.

International Rice Testing Program

- Organize test nurseries from year to year depending on the utilization of the germplasm by national programs and the methodologies they adopt.
- Emphasize the International Rice Observational Nursery (IRON) because it can provide the most widely applicable information because of its diverse genetic material and the multiple stresses to which it will be exposed.
- Obtain more specific information from special nurseries.

International rice genetic survey

- Collect complete information on older varieties, post-IR8 varieties, and elite breeding lines being developed through national programs.
- Collect hybridization records made since the initiation of cross breeding at national stations.
- Put all information in computer storage compatible with that for IRRI plant breeding.

RICE-BASED CROPPING SYSTEMS

The cropping systems program is IRRI's second largest research program. Its general objective is to identify more productive rice-based cropping systems acceptable to typical rice farmers in South and Southeast Asia.

After a rapid growth phase associated with the establishment of the program it now seeks a more complete integration of research activities with those of the water management, machinery development, and rice agronomy programs. As time goes by, the cropping systems program will increase its role as problem specifier for programs

generating technology for rice (genetic as well as crop management related). Greater in-depth research is needed, in view of the general limitation to site-related objectives in the rice-based cropping systems research program. Also, further methodological studies are needed to develop the means of introducing and objectively testing (rapidly), the impacts of new machines and altered (irrigation) water management systems on cropping pattern performance.

The cropping systems program will continue to seek to understand and respond to the needs of national programs. Network training activities will peak in 1978 and then taper off as national training programs become established. Collaborative research as defined by the Asian Cropping Systems Working Group will become the major network activity from 1979 onward. The Working Group will take an increased responsibility in management of the network.

Cropping systems research activities can be placed in five broad categories: the study of environment-technology interactions, description of the environment, development of new component technology, cropping pattern design, and cropping pattern testing. A summary of the relative emphasis along the continuum (Table 5) from basic to applied research indicates a near-future emphasis on methodology development and a longer term shift toward more basic research activities associates with knowledge development.

The study of interactions between environment (physical, biological, and socioeconomic) and technology (genetic, chemical, mechanical, operational) is now a major activity. The focus is primarily on simple and direct interactions between environment and technology. Interactions between different technological components, as modified by environment, will be studied in the future.

Description of the environment can be adequate only when an understanding of the performance of technology across different environments leads to the ability to identify appropriate measures of the environments. These indices are used in the process of large-scale environmental description that identify differences in cropping potential.

Studies on the technology-environment interaction would lead to the generation of new component technology where existing technology fails. The information source for this activity is primarily the testing activity in IRRI-managed sites, but will increasingly come from cropping systems testing work in network sites in the national programs. Identification of component technology requirements and its desired characteristics will also increasingly come from predicted technology behavior.

Improvement in the design of cropping patterns beyond the present capability wholly depends on the above program activities. Methodological improvements in cropping pattern design will receive major attention. They will identify efficient ways of using results obtained in the search for environment-technology interactions and the environmental description. In the future, cropping pattern design will be extended to the specification of infrastructural and institutional requirements of intensified cropping patterns.

The testing of cropping patterns continues to be a major source of feedback on component technology requirements. The IRRI-managed sites and, increasingly, selected network sites are providing the data base for analyses of environmental-technology interactions and hence for more efficient ways to define environments in terms meaningful for the explanation and prediction of cropping systems performance. For the near future substantial emphasis on testing will continue, although, in the long run, the importance of this activity will decrease as testing is increasingly done by national programs. In the future, the cropping systems program will undertake the following activities.

Environment and its influence

- Complete agroclimatic classification of the Philippines, Bangladesh, and Indonesia on the basis of mean monthly rainfall classes.
- Evaluate the effect of physical factors -- rainfall, rainfall variability, solar radiation, temperature, landscape, hydrology, and soil type -- on cropping pattern potentials.
- Evaluate the effect of land, labor, capital, and institutional factors on the feasibility of crop intensification.
- Identify the most appropriate indexes for environmental factors that will allow their estimation from secondary sources.

Cropping systems pest control

- Determine the small farmers' understanding of his insect pest problem and how he identifies and deals with it. Develop control measures that involve small rather than drastic changes.
- Where feasible, determine quantitative major insect and disease problems on the existing cropping systems.
- Shift the major insect control strategy from pesticides to

pest-resistant varieties and cultural methods.

- Search for suitable means of weed control in rice and rice-based cropping systems by a combination of weed control methods, including land preparation, competitive varieties, and herbicides.

- Evaluate the effect of plant densities and plant type on weed competition at different fertility levels.

- Study the effects of a weed control practice in one crop on weed and crop growth in the subsequent crop grown in dryland, wetland, or various combinations of soil conditions.

Soil and crop management

- Identify minimum or zero tillage practices that can reduce turnaround times between crops in a sequence.

- Identify environmental conditions suitable for the dry seeding of rice.

- Evaluate methods for the establishment of dryland crops after rice on paddies where there is a high risk of temporary flooding, and where soils are heavy, and also evaluate the possibility of intercropping or relay cropping.

- Develop methods for better use of residual moisture in paddies by early dryland crop establishment, mulching, or other techniques.

- Complete a soil-moisture-balance model that will predict the depth of standing water on the paddy and saturated and unsaturated soil moisture conditions during the growth of rice and subsequent crops.

- Investigate the management bottlenecks preventing the introduction of additional crops into cropping systems network sites.

- Build a bank of data on environment-related crop performances from cropping pattern monitoring throughout the network. Use it for extensive studies on cropping pattern adaptation and the definition of agroclimatic potential in relation to land and weather factors.

Socioeconomic factors

- Develop measures of the economic environment that explain

variations in cropping systems within similar physical environments. Apply such measures to Philippine outreach sites and to other sites in collaboration with Asian Cropping Systems Network programs.

- Use economic analysis of cropping pattern components, economic determinants of cropping pattern potential, and computer simulation of technique to systematize the design phase of cropping systems research.

- Complete a handbook outlining the methodology for economic testing of cropping patterns for use in the Cropping Systems Network.

- Provide information on the economic conditions that favor the introduction of new cropping patterns as they become ready for extension.

Asian Cropping Systems Network

- Expand network activities to include cooperation with national programs in Burma and Nepal, and, if possible, in Malaysia.

- Limit the analytical work of relating environment to productivity of network sites selected on the basis of representative environmental characteristics. Increase emphasis on the interdisciplinary aspects of research and research organization.

- Support staff training and research design throughout the network in 1978 and 1979. Reduce this support toward 1980 as local training improves.

- Increase the sharing of methodology and results.

Reproduction evaluation

- Use multilocation testing to test hypotheses on the design of cropping patterns and their components for different environmental conditions. Include the testing of complete cropping patterns and their components.

- Formalize the mechanism for transfer of results from basic research to applied research and to production through refinement of methods for multilocation testing, study of pilot extension programs, and support of pilot extension programs.

CONTROL AND MANAGEMENT OF RICE PESTS

Pests of rice include diseases, insects, and weeds as well as birds, rats, and larger mammals. IRRI research is confined to diseases, insects, and weeds that are specific to rice. In addition to the work of incorporating host resistance, which is discussed in the GEU section, research will continue on other methods of controlling these diseases and insects.

Diseases

The varietal-resistance breeding work of GEU is supported by studies of the genetics of the pathogens and their variability, as well as research on the mechanisms of disease resistance. The epidemiology of rice diseases is a second area of research, and chemical control is a third. Table 7 shows the relative emphasis within the three broad areas. In the future, research on diseases will:

- Investigate the epidemiology of tungro, rice blast, and sheath blight with the objective of developing disease forecasting systems and methods of cultural control. For this, studies of the various diseases will be made under controlled conditions and in the field.

- Study the development of diseases in dryland and wetland rice fields, as affected by weather conditions. A simple computer simulation will be developed when data are available.

Insects

Insecticides are the main line of defense against rice insects despite the significant advances made in host plant resistance and other means of control. Research will continue to develop methods of insecticide use that minimize the adverse environmental impact of such application. At the same time, increased emphasis will be given to alternative control measures. Researches on insect control and management plans to:

- Test available insecticides thoroughly, using various methods of application and to determine the effectiveness of the various methods, their impact on ecology, and the pesticide residues involved.

- Investigate microbial decomposition of pesticides.

- Expand insecticide screening to include the rice bug, leaf folder, and the whitebacked planthopper.

- Conduct further studies on timing and techniques of insecticide application.

- Conduct adaptive trials at selected locations.

- Study population dynamics, bionomics, and migration of leafhoppers and planthoppers in cooperation with the United Kingdom's Ministry of Overseas Development and with the International Centre of Insect Physiology and Ecology (ICIPE).

- Determine the potential for biological control of various insects. Continue studies under way in collaboration with the United Kingdom's Tropical Products Institute (TPI) on sex pheromones of various insects.

- Identify antifeedant compounds.

- Collaborate with other institutions in the development of more effective insecticide formulations for insect control.

- Develop cultural control measures for the brown planthopper.

- Develop practical sampling procedures and determine economic levels to be used in pest management programs.

- Collaborate with Philippine government agencies in the development and implementation of pilot pest management programs for rice.

Weeds

The objective of the weed control program is to understand the total weed control program in Asian rice production from an agronomic as well as an economic standpoint. Research includes evolution of techniques, materials, and methods, and their economics. Future research will

- Develop suitable integrated weed control practices using appropriate varietal types and shifting weed populations in land and water management systems, and cultural practices such as land preparation and dry fallowing during the off-seasons.

- Continue appropriate studies on herbicides.

- Evaluate the suitability of alternative weed control techniques for small Asian farmers.

Table 7. Relative emphasis on various aspects of the control and management of rice diseases at IRRI.

		Past	Present	Future
Varietal resistance				
• Methods of screening	Fungus	* * *	* *	*
	Bact.	* * *	-	*
	Virus	* * *	* *	*
• Testing varieties and progenies	F	* * *	* *	* *
	B	* * *	* *	* *
	V	* * *	* *	* *
• Variability (genetics) and nature of pathogens	F	* * *	* * *	* *
	B	* *	* * *	* *
	V	*	*	* *
• Genetics of host resistance	F	*	*	* * *
	B	*	* *	* * *
	V	*	-	* * *
• Mechanisms of resistance	F	*	*	*
	B	-	-	*
	V	-	-	*
Epidemiology				
• For forecasting	F	-	*	*
	B	-	-	*
	V	*	* * *	*
• For cultural or biological control	F	-	*	* *
	B	-	-	*
	V	-	-	*
Chemical control	F	*	*	*
	B			
	V			

SOIL AND CROP MANAGEMENT

The objective of research in soil and crop management is to understand the fertility of rice-growing soils as influenced by a broad range of natural conditions. Methods of conserving and increasing the natural supply of the major nutrient elements and of increasing fertilizer efficiency by improving land and water management form a major research focus. Understanding the nature and properties of problem soils when flooded is a second area. The long-term effects of management practices on the chemical properties of, and nutrient balance in, rice growing soils and on the growth and yield of rice is a third area. Specific future plans are:

Soil fertility management

- Study methods to obtain more efficient use of nitrogen and other nutrients by the rice plant in rainfed fields.
- Study the differential performance of rices in soils of low fertility.
- Evaluate low-cost phosphate sources such as rock phosphates. Investigate the interrelationships between phosphate apllication and nitrogen supply from the soil and the economic benefits from trade-off between phosphate and nitrogen application and nitrogen mineralization.
- Study direct and indirect methods of increasing fertilizer efficiency. Examples of indirect methods are good land preparation, water management, and adequate insect and weed control.

Role of soil microorganisms

- Study nitrogen fixation including fixation of nitrogen in the root zone of rice, and fixation of nitrogen by blue-green algae associated with the water fern, *Azolla*.
- Conduct balance-sheet studies on nitrogen in rice soils in coordination with the long-term fertilizer trials at IRRI.
- Study the dynamics of soil nitrogen under noncontrolled water conditions. Monitor the seasonal change in the distribution of mineral nitrogen within the soil profile for at least 2 years in both well-drained and poorly drained fields.
- Study the release of soil nitrogen in the dry season to

better understand the balance between soil nitrogen and plant uptake of soil nitrogen during the subsequent rainy season.

- Determine the role of soil microorganisms in continuous cropping studies in rainfed and dryland rice-growing areas.

Soil characterization

- Identify, characterize, map, and evaluate problem lowland rice-growing soils, both those currently in production and those that potentially could be used in Asia, Africa, and Latin America. Establish soil and plant criteria for identifying injurious soils.

- Continue research on identification and amelioration of growth-limiting factors in problem soils.

- Initiate investigations to understand the behavior of minor elements in marginal soils.

- Continue long-term experiments to evaluate the effects of current cultural practices on rice plant growth and the chemistry of submerged soils.

AGRICULTURAL ENGINEERING MACHINERY DEVELOPMENT AND TESTING

The objectives of the agricultural engineering program are to increase the production and incomes, and relieve the drudgery, of small rice farmers through the local manufacture and selective use of appropriate, low-cost machines. The machines should produce one or more of the following effects: increase productivity through increased yields, increase cropping intensity, improve the timing and efficiency of specific operations, alleviate resource constraints associated with power and energy-intensive operations, reduce field and postproduction losses, improve the composition of cropping patterns, and improve the quality and value of production.

Information developed by the engineering-economic systems, engineering research, and industrial liaison components of the program is used in product planning to formulate the basic design parameters for machines to be developed. In the future, the agricultural engineering program will

- Design and encourage manufacturers to produce light weight harvesting, threshing, and pest control equipment that

one to four men can carry to fields.

- Design transplanting equipment to alleviate labor needs.
- Design and evaluate farm and village-level drying, paddy processing, classification, and grading equipment.
- Compile and distribute design information on small internal combustion engines and efficient low-cost water pumps.
- Design, develop, and test fertilizer, insecticide, and herbicide placement equipment.
- Broaden industrial liaison activities to provide more training opportunities for manufacturers and technicians.
- Continue to develop and use a systematic approach in project selection and assignment of project priorities.

IRRIGATION AND WATER MANAGEMENT

The broad purpose of IRRI's research in water management is to identify and demonstrate feasible ways to bring about efficient irrigation performance. Performance is measured through water use efficiency and production. The first parameter is concerned with reducing water losses and waste so the benefits of irrigation are spread, the second is concerned with achieving high yields and cropping intensity levels. Future research activities will:

- Develop and test improved irrigation system management techniques in Philippine irrigation projects.
- Test research methodology in cooperative projects outside the Philippines.
- Continue to study water management problems in irrigation systems within and outside Philippines to broaden the scope of implementation of research findings.
- Continue to emphasize research on socioeconomic problems that limit effective use of irrigation water at farm level.
- Continue research on soil-water dynamics and climate interactions at the farm level that affect rice yield.

CONSTRAINTS TO INCREASED RICE PRODUCTION

Constraints research has two major components:

- the farm-level constraints project in the Philippines and in five other countries through a network of collaborators on a pilot basis and

- the study of regional constraints that are imposed by economic policies, regional characteristics, or institutional factors.

The first phase of a 3-year special project to study farm-level constraints in collaboration with other researchers was completed in 1977. That project developed and refined an appropriate research methodology. Assistance in the adaptation of this methodology in national programs will be a new future activity. The present methodology seems appropriate to quantify some chosen constraints, but further research is needed to develop methodology for identifying latent factors that constrain yield. The development of techniques for better understanding farmers' risk preferences and behavior will also proceed. Future activities will:

- Continue research to identify the various biophysical factors constraining rice yields in selected agroclimatic areas in the Philippines.

- Implement the methodology already developed to study farm-level constraints collaboratively with selected national research programs.

- Identify factors causing different yield responses to inputs at different locations.

- Identify the relationship of socioeconomic constraints to national policies and individual farmer characteristics.

- Identify regional water-related constraints with the collaboration of IRRI water management researchers.

- Continue studies on problems in the use of institutional credit and on the effects of land tenure on technology use.

CLIMATIC ENVIRONMENT AND ITS INFLUENCE

The objectives of the research on climatic environment and its influence are to provide a basic understanding of the relationship between climate and rice yield; to identify the factors limiting rice yield in different environments; and to

explore possible further increase in the yield potential of rice. Table 3 shows the relative emphasis on various subcomponents of the research over time. Future efforts will:

- Measure the influence of environment on spikelet number and ripening as they determine rice yield; study interactions between temperature, solar radiation, and nitrogen.

- Construct and test a productivity model to assess climatic effect on rice productivity of a particular location when relevant weather records and nitrogen input are given.

- Survey the weather characteristics of the major rice-producing areas of the world and compile accurate information on the rice-growing environments with respect to types of rice culture and weather characteristics.

CONSEQUENCES OF RICE TECHNOLOGY

The objectives of consequence research are to:

- Examine the effects of the introduction of new rice technology (or of alternative technologies being planned) on production, incomes, distribution of incomes, and employment;

- Identify the relationship between the new rice technology and the resource input, and product distribution systems -- labor, land use, water control, power sources, mechanization, purchased inputs, processing, and marketing; and

- Evaluate programs and policies designed to promote the adoption of technology in terms of their benefits and costs to various groups in society.

IRRI's long-run comparative advantage lies in the interface between constraints and consequences research -- the consequences of reducing certain constraints on production, income, income distribution, and employment. For this, *ex ante* studies of the consequences of new technology are envisioned for the future. Future efforts will:

- Develop and test methodology that can provide information on the socioeconomic changes that may result from the introduction of new rice technology for a cross-section of the rural economy.

- Coordinate a study in three countries to project the demand

Table 8. Distribution of efforts in the research area of GEU and climatic environment and its influence.

← Basic — The research continuum — Applied →				
	Knowledge generation	Methodology	Screening	Diagnosis of nutritional disorders
	Characterization of high yielding varieties	Development of Screening Technigues	Screening varieties for tolerance to adverse conditions	Diagnosis techniques survey
	Crop-environment interaction	Producing new models for high yielding varieties		
Period	% distribution			
1960s	50	10	0	40
1970s	30	10	60	0
1980s	30	20	50	0

and supply of rice and the implications for agricultural inputs and the research system.

- Determine the costs of removing the various constraints to high yield that are identified in the research on constraints.

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

Non-Regional File

OFFICE MEMORANDUM

TO: Mr. W.C. Baum (Vice President, CPS)
THRU: M. Yudelman (Director, AGR/CPS)
FROM: F.L. Hotes (Irrigation Adviser, AGR/CPS)

DATE: April 27, 1979

cc VS Agriculture

SUBJECT: Bank Research Project on Management and Organization of Irrigation Projects

1. Attached is a Brief on subject project, for which the Overseas Development Institute of London (ODI) is our principal consultant. I understand that you will be visiting ODI next week.

2. The project remains incomplete. The Final Report was due in September 1978, but we have as yet not even received an initial draft. This is the key report, without which all the preliminaries are merely background. Apparently the ODI project leader has had too many assignments of higher priority to enable our work to be completed. He has had time, though, to write some articles and arrange and attend seminars on the subject, drawing significantly upon his experiences on our project.

Attachment

FLHotes:rm

cc: Messrs. Pickering, Donaldson

BRIEF ON BANK RESEARCH PROJECT 671-34

Management and Organization of Irrigation Projects

Brief Prepared by F. L. Hotes, AGR/CPS, April 27, 1979

Project Initiated: July 17, 1975

Original Target Completion Date: September 1, 1978 (in ODI contract)

Revised Target Completion Date: March 1979 (probably delayed until September 1979)

General Description:

Benefits from irrigation projects, however well planned and constructed, cannot be maximized unless the various systems involved are well-managed and organized. Irrigation projects assisted by the World Bank around the world have many different types of organizations and system layouts. Whether they are effective and efficient, however, can be judged, at present, only in a subjective manner. Available studies on organizational frameworks, operation and maintenance procedures and principles, and costs do not provide all the information needed for a fair comparison of the various irrigation projects. The relationships and allocation of responsibilities among the overall project organization, other government agencies, and farmer groups have often been entirely neglected.

Accordingly, to assist World Bank staff in appraising and supervising such projects, and to help developing countries manage and operate existing projects more effectively and plan future ones, this study was initiated with the following three general objectives:

1. To obtain pertinent information on actual management, organization and operation of selected irrigation projects.

2. To analyze and evaluate the effectiveness of management and organizations in meeting specified objectives.

3. To develop, on the basis of these case studies, a framework for monitoring and evaluating the efficient use of resources in the management and operation of the projects.

Phase I consisted of a desk study of available data, development of tentative typologies and criteria for effective irrigation management for inclusion in questionnaires and checklists, and application of the analytical framework and evaluation criteria to one specific case. A project assisted by the World Bank in South Asia was selected for the case study, and a copy of the questionnaire was sent to the project organization. Problems of water delivery for each farm plot were given special attention.

Conclusions from Phase I provided the basis for Phase II studies which involve improvements in the typology and management criteria and the evaluation of additional cases.

Responsibility: Agriculture and Rural Development Department - Frederick L. Hotes, assisted by an advisory board comprised of H.T. Chang, Alvin C. Egbert, Tudor M. Kulatilaka, Herve L. Plusquellec, William G. Rodger and William T. Smith, and with the participation of John F. Cunningham, Enzo G. Giglioli, Ulrich Kuffner and Andreas A. Meimaris (all of the World Bank). The Overseas Development Institute (United Kingdom) has been the executing project consultant.

Estimated Cost: US$158,500

Principal Reports Received: [Note: None can be released outside the Bank because of their confidential and preliminary nature. After study completion, selected releases contemplated.]

1. Preliminary Desk Study, January 1976: Comparative Study of the Management and Organization of Irrigation Projects

2. Pilot Field Study in NW India, May 1976, with Special Reference to Chambal Project, Rajasthan

4. A Proposed Framework for Evaluation, July 1977

5. Field Study in Indonesia, August 1978 (Field work in July - August 1977)

6. Field Study in Taiwan, January 1979 (Field work in September - October 1977)

7. Field Study in Pakistan, August 1978 (Field work in November - December 1977)

Reports Still Due: Initial and Final Drafts of Final Report

8 - Agriculture

Don Pickering, AGR
Graham Donaldson, Chief, AGREP

April 26, 1979

Jim Goering, AGREP

Issues in Managing National Agricultural Production

1. At last I've read through the 3 case studies and explanatory materials. Together they appear to contain the basis for a highly useful seminar which focuses on management and policy issues.

2. The major determinant of the "success" of the seminar may well hinge on the success of CIMMYT organizers in attracting participants with (a) the proper background to utilize the wealth of material in the case studies and (b) adequate authority to begin to effect management and policy changes, as necessary, upon their return to their respective countries. The diversity of topics is wide--perhaps too wide to permit meaningful communication among participants with very different backgrounds and job responsibilities.

3. I found the case studies interesting and in general well-prepared. Perhaps the weakest was Number 1 for which I had some difficulty in identifying the possible explanatory factors of why farmers behaved as they did. To motivate seminar participants, I would urge that a more explicit set of questions be developed to accompany each case study, that the case study materials be provided well in advance of class discussion and that participants be expected to prepare answers to all questions. Of course, another critical factor determining "success" will be the lecturer. (If he can motivate/involve participants in the case studies as do, for example, the Harvard Business School staff in the Advanced Financial Management Course, this approach will be very useful to participants.)

4. This initiative on management training by CIMMYT may provide an opportunity for valuable collaboration with the Bank. Some of this case study material, perhaps amended as necessary by Bank/EDI staff, might well be the basis for similar training activities by EDI.

JG:ga

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S. Agriculture
cc ERIO - W.

Mr. Julian P. Grenfell, UN

April 26, 1979

A. Musa Ahmad, AGR

World Conference on Agrarian Reform and Rural Development

Apropos our conversation yesterday on the meeting held in New York on April 23, 1979, I am enclosing copies of the following papers:

(i) my back to office report;
(ii) Mr. Yudelman's letter to Mr. Cruz;
(iii) four copies of Annex I to my report.

You may, if you deem appropriate, informally give a copy of Annex I to Messrs. Havord and Mathiason.

You mentioned about giving a copy of this Annex to Mr. Nehemiah. We have no objection to this. He has offered to carry our formal comments with him to Rome. Would you be kind enough to hand over the letter from Mr. Yudelman to Mr. Cruz?

Attachments

cc: Messrs. M. Yudelman, AGR; L. Christoffersen, AGR; T. Davis, AGROR
Mrs. S. Boskey, IRD
AMAhmad/cc

OFFICIAL FILE COPY

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AMAhmad/cc

TD

Mr. Montague Yudelman, ACR and
Mrs. Shirley Boskey, ERD
A. Musa Ahmad, AGROR

April 25, 1979

World Conference on Agrarian Reform and Rural Development - Meeting in New York on Draft Declaration of Principles and Programme of Action - Back to Office Report

1. Mr. Grenfell and I attended a meeting on the above subject held at the FAO office in the UN on Monday, April 23, 1979. Mr. Nehemiah, coordinator, Secretariat of World Conference on Agrarian Reform and Rural Development (WCARRD/4) was in the chair. As a background for the meeting, Mr. Nehemiah reviewed the outcome of the preparatory meeting held in Rome in March of this year and emphasized the following:

(i) The draft Declaration of Principles and Programme of Action (WCARRD/4) closely conforms to the deliberations of the preparatory committee.

(ii) It was circulated to all governments and can be amended or modified only by the participants at the World Conference.

(iii) FAO has asked for comments from all participating governments and UN agencies in specific terms with drafts. Those comments which are in consonance with the minutes of the preparatory committee meeting would be incorporated before finalizing the document (WCARRD/4).

(iv) Comments must be received by April 30, 1979 to enable circulation of the final version to the delegates to the World Conference by July 2, 1979.

2. During discussions, it was suggested that representatives from concerned UN agencies should go to Rome and assist FAO to revise/modify the draft in light of the comments received from UN agencies. This suggestion was not acceptable to FAO. The major issue then raised was the manner in which FAO would take into account the comments received by them. Mr. Nehemiah stated that comments, unless of editorial nature, would be incorporated in parenthesis in the text to enable the World Conference to arrive at a decision. It was pointed out that such a course would not only be cumbersome, but would create an impression of lack of cohesion and even of conflict between UN agencies. Mr. Nehemiah skirted the issue by stating that when the comments were received, appropriate authorities in FAO would consider the ghost way to both avoid ignoring the comments and modifying the present draft. Finally, it was suggested that before the draft is put in final shape, UN agencies concerned should be informed by telex of the manner in which the comments were proposed to be dealt with by FAO. Mr. Nehemiah apparently conceded to this recommendation.

3. In view of FAO's stand to maintain the statements and recommendations in the draft in its present form, it is desirable that we confine our comments to only those which we cannot accept in their present form. There are five such issues, all of these in Section XII. Suggested substitution, modification and deletion along with the original texts are given in Annex I.

4. I read the above to Mr. Grenfell - he agreed with the report. Mr. Grenfell learned in confidence that Mr. Dadzie, Director General for International Economic Cooperation and Development, will meet with Mr. Nehemiah and impress on him that the concerns of the UN agencies with the draft (WCARRD/4) must be fully taken into account and properly incorporated in the final draft. Should Mr. Nehemiah be unable to give such an assurance, Mr. Dadzie will address the Director General of FAO on the issue.

5. I recommend that Annex I be sent to Mr. Cruz in reply to his letter of March 28 to Mr. Yudelman, through Mr. Grenfell in New York. Mr. Nehemiah will be in New York until Friday, April 27. He has agreed to carry the reply to Rome to avoid possible delay.

Cleared in substance and cc: Leif Christoffersen, AGR

Attachment

AMAhmad/cc

cc: Mr. Grenfell, UN

XII. PRO MME OF ACTION FOR FAO IN COOPERATION WITH OTHEI RGANIZATIONS OF THE UNITED NATIC FAMILY

A.	ORIGINAL DRAFT	SUBSTITUTIONS, MODIFICATIONS, DELETIONS
A.	Monitoring Agrarian Reform and Rural Development	A. Monitoring Agrarian Reform and Rural Development
	(iii) Monitor and evaluate the adequacy and terms of flows of resources, both domestic and foreign, in relation to the targets set for rural development and submit the results of these evaluations through its Governing Bodies to appropriate international fora.	(iii) Delete -- (Will duplicate collection and analysis of data by the World Food Council).
	(iv) Undertake periodic reviews with each country and with relevant international organizations in respect of their policies and programmes for the achievement of the objectives and targets outlined in this Programme of Action.	(iv) Modify as follows: Through the appropriate inter-agency machinery of the UN system undertake periodic reviews with each country for the achievement of the objectives and targets outlined in this Programme of Action.
C.	Technical Assistance Activities	C. Technical Assistance Activities
	(ii) Review and analyze, in cooperation with other organizations of the United Nations system, performance and progress in technical assistance activities and set targets for the proportion of such technical assistance which should directly serve the rural poor, and periodically evaluate whether these targets are being met.	(ii) Delete -- (Each agency should be responsible for review and analysis of its own acitivites in this and other fields. Review and analysis of this nature on an international scale is both inappropriate and unnecessarily time consuming.
D.	Assistance in Mobilizing Resources	D. Assistance in Mobilizing Resources
	(i) Act as a catalytic agent for the stimulation of investment in rural development with special regard to projects and programmes which have a significant impact on poverty alleviation, and serve as a focal point through the FAO Investment Centre for promoting the project assistance from external agencies in the field of rural development.	(i) Modify as follows: Stimulate investment in rural development with special regard to projects and programmes which have a significant impact on poverty alleviation. FAO Investment Centre should take initiative for promoting project assistance in the field of rural development.
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V S - Agriculture
cc ERIO-W

April 26, 1979

Mr. Hernan Santa Cruz
Special Representative of
the Director-General, FAO
Via delle Terme di Caracalla
00100 - Rome, ITALY

Dear Mr. Cruz:

This is in reply to your letter Number RU7/46.4 of March 28, 1979.

Mr. Nehemiah had a meeting in New York on April 23, with the representatives of some of the UN agencies on document WCARRD/4. A representative of my Department attended this meeting. Discussions focused on the manner in which comments on the document would be accommodated in the final version. Our comments are limited to some of the items in Section XII. These are incorporated in the attached Annex I.

1/att.

Sincerely yours,

Montague Yudelman
Director
Agriculture and Rural Development Department

Attachment

AMAhmad/cc

OFFICIAL FILE COPY

S. Agriculture

April 25, 1979

Mr. A. G. Taylor
Asst. Agriculture Adviser
Environmental Programs
Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield
Illinois 62706

Dear Mr. Taylor:

I appreciate very much your prompt response to my request for information on your reports on "Effects and Costs of Erosion in Illinois." While I have not yet had an opportunity to read them in detail, they appear to contain many valuable guidelines and checkpoints.

Enclosed are copies of three Bank publications. Only one focuses on environmental problems, but the others may be of general interest to you and your colleagues.

Thank you for your help.

Very truly yours,

Frederick L. Hotes
Irrigation Adviser
Agriculture and Rural
Development Department

Enclosures: (1 each)

"Environment and Development" (June 1975)
"World Bank Annual Report 1978"
"World Bank Atlas---Population, Per Capita Product and Growth Rates (1977)"

FLHotes:rm

OFFICIAL FILE COPY

S - Agriculture

cc: ERIO - W.

Mr. Montague Yudelman, AGR and
Mrs. Shirley Boskey, IRD
A. Musa Ahmad, AGROR

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Division A
For Action: Berlage

JUN 13 1979

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. D. Pickering

DATE: April 24, 1979

FROM: F. Hotes, J. Collins, and W. Peters

S-Agriculture

SUBJECT: Back to Office Report
Irrigation Suitability Land Classification: Participation in Expert Consultation on Land Evaluation for Irrigation sponsored by the United Nations Food and Agriculture Organization, February 27 to March 2, 1979 Rome, Italy

Introduction

1. The Mission represented the Bank at the Expert Consultation on Land Evaluation for specific Land Use (Irrigation) sponsored by the United Nations Food and Agriculture Organization (FAO) and held at FAO headquarters in Rome February 27 to March 2, 1979. The Consultation was convened to:

a) "bring together a wide range of experience on the criteria needed for evaluation of land suitability for different kinds of irrigation"; and

b) "draft recommendations for instigating an improved, more standardized, system of land evaluation and for the preparation of a practical manual dealing with the purpose, interpretation and use of surveys for irrigation suitability."

2. Annexed are copies of the agenda and a listing of participants (Annexes 1 and 2).

Background

3. Over a period of about ten years, FAO has been developing "A Framework of Land Evaluation." This stems from insistance by the Bank and recognition by FAO that soil surveys as traditionally made did not meet needs in assessing agricultural potential of the world and planning for development. In the Framework, land is being defined as the physical environment including soils, climate, relief, hydrology, and vegetation. The evaluations would be made in relation to specific uses with respect to specific inputs and with interdisciplinary participation of crop ecologists, agronomists, climatologists, and economists in addition to pedologists. While the evaluations of lands have been initially based on physical attributes, the developers of the Framework recognize that economic and social factors need to be taken into account. In this regard, FAO had been exploring requirements for both social and economic aspects and giving consideration to evaluation of these factors in the Framework. The importance of having a system of irrigation suitability land classification that will utilize and integrate the contributions of all requisite disciplines, particularly economics, cannot be overemphasized. Sound planning cannot proceed on the basis of missing links. Thus, incorporation of the social and economic aspects into the Framework is crucial and would constitute a big step forward in serving Bank needs as a basis for appraisal and financing of water and land projects.

JUN 26 RECD

Results of the Consultation

4. The Consultation reviewed the concepts, principles, and features of the Framework in planning for irrigation development and maintenance as set forth in the paper by Dr. M.F. Purnell (Annex 3). The principles would suffice provided the system is modified, supplemented, and clarified to accommodate prediction and appraisal of land-water-crop and economic interactions expected to prevail under future conditions, i.e. with and without project for resource modification and management. Some of the FAO staff and participants had not visualized that the future situation without project may differ from the present. Also, the future situation with project may constitute a lower level of productivity than the present situation. The consultation endorsed the necessity of this and inclusion in the Framework.

5. The Consultation emphasized the importance and need of the interdisciplinary approach to land classification and selection for irrigation and recommended that FAO continue to further develop a land classification manual and implement satisfactory surveys. The recommendations are enumerated in Annex 4.

6. The Consultation agreed that the Manual should include a checklist of Land Features which would need to be taken into account in Land Suitability Classification for Irrigation when appropriate. It further agreed with a recommendation made by the Bank delegation that priority be given to preparation of a draft of the checklist which would be published in advance of the Manual for guidance of persons and organisations wishing to institute the new procedures in studies which are ongoing or imminent. Where appropriate the Draft checklist might refer to existing guidelines for additional detail. The Bank should be prepared to allocate personnel and time to reviewing the check-off list when it becomes available.

7. The Bank delegation also recommended and the consultation agreed that a target of May 1, 1979 be set for distribution of an outline for the manual to participants in the consultation and other interested parties and that a target of June 30, 1979 would be set for receipt of comments and suggestions. This would facilitate an early start on the detailed preparation of the Manual.

8. Because the system of land classification that is evolving will be essentially identical to that of the USDI Bureau of Reclamation, it would be advantageous that FAO engage Reclamation to assist in drafting the check-off list and the subsequent manual. Reclamation is willing to undertake this work but would have to be compensated. FAO indicated that they would solicit the services of Reclamation. The possibility of the United States Agency for International Development (USAID) financing the services of Reclamation should be investigated. In order to be in a position to influence the scope of the work to be undertaken on the manual the Bank should budget for a limited input of staff and/or consultants time and travel.

9. Members of the Bank Mission performed major roles throughout the Consultation particularly in the Session on "The Application of Land Evaluation Standards for Investment in Irrigation." Mr. Collins chaired this session. Mr. Hotes expounded the Bank's concern for relevancy and technical excellence of work and soundness in planning, implementing, operating, and maintaining irrigation projects. Mr. Peters presented the paper entitled "Views on Land Selections for Water and Land Resource Development". (Annex 5).

Annexes
cc: Mr. W. Clark , Regional Assistant Directors (Agric.)

WPeters:sj

ANNEX 1

Expert Consultation on Land Evaluation Criteria
for Specific Land Uses (Irrigation)

FAO, Rome, 27 February - 2 March 1979

PROVISIONAL AGENDA

Tuesday, 27th February 1979

Opening Session

09.00	Participants assemble in the Ethiopia Room (C-285/89)
09.30	Opening address by Dr. Dudal, Director Land and Water Development Division
10.00	Coffee break

1. Approaches and Experiences in Land Evaluation for Irrigation

10.15	The FAO approach to land evaluation for irrigation (M.F. Purnell)
11.15	Nature and relationships of diagnostic characteristics illustrated by experience from recent Land Resources Development Centre projects (A.J. Smyth)
12.30	Lunch break
14.00	Land classification for determining suitability of lands for sustained crop production under irrigation (L. Resler)
15.00	Coffee break
15.15	A systems approach to land evaluation for irrigation (K.J. Beek)
16.00	Remote sensing and criteria for land evaluation for irrigation (D.C. Nduaguba)
16.45	Criteria for irrigation suitability (D.A. Russell)
17.30	Close
18.00	Soirée by invitation of Dr. Dudal

Wednesday, 28th February 1979

2. Parameters Used for Land Evaluation for Various Irrigation Techniques

09.00	Evaluation of the physical environment for irrigation in terms of land characteristics and land qualities (C. Sys)
10.00	Coffee break
10.15	Criteria for assessing water for irrigation (D. Westcot)
11.00	Laboratory and field determinations of importance for irrigation (P. Arens)
12.00	General discussion

12.30	Lunch break
14.00	Land evaluation criteria for drip irrigation (D. Goldberg)
15.00	Coffee break
15.15	Sprinkler irrigation requirements (C. Vanzetti)
16.00	Evaluation of the hydrological regime and drainage conditions of soils for different systems of irrigation (P. Jongen)
16.45	Drainage as a criteria for irrigability (discussion) (FAO staff)
17.30	Close

Thursday, 1st March 1979

3. Land Evaluation Criteria for Specific Crops and Soils

09.00	Land evaluation criteria for irrigated sugar cane (R. Yates)
10.00	Coffee break
10.15	Criteria for irrigated Vertisols (cotton) in the Sudan (O. El Tom)
11.00	Land evaluation criteria for irrigation in India (J.C. Bhattacharjee)
11.45	Criteria for land evaluation used in Pakistan (M. Rafiq)
12.30	Lunch break

4. The Application of Land Evaluation Standards for Investment in Irrigation Development

14.00	Bank requirements in land selection for water and land resource development (W.B. Peters)
15.00	Coffee break
15.15	The economic impact of physical land suitability criteria (H. Bergman)
16.15	Physical and economic land evaluation for irrigation (N.R. Carpenter)
17.15	Close

Friday, 2nd March 1979

5. Discussion and Recommendations

09.00	Discussion (by groups). Establishment of criteria for land suitability for irrigation
10.30	Coffee break
10.45	Discussion: What form should a manual of land evaluation and classification take.
12.15	Lunch break
14.00	Recommendations for future action
15.00	Coffee break
15.15	Closing session

EXPERT CONSULTATION ON LAND EVALUATION CRITERIA FOR SPECIFIC LAND USES (IRRIGATION)

FAO, Rome, 27 February - 2 March 1979

LIST OF PARTICIPANTS

Belgium:
Dr. C. Sys
Geological Institute
Krijgslaan 271
B-9000 Ghent

France:
Dr. P. Jongen
SOGREAH
B.P. 172 - Centre de Tri
38042 Grenoble Cedex

Germany (Fed. Rep.)
Dr. H. Lüken
Bundesanstalt für Geowissenschaften und Rohstoffe
Stilleweg 2
D-3000 Hannover 51

India:
Dr. J.C. Bhattacharjee
Regional Soil Correlator
National Bureau of Soil Survey and Land Use Planning
Seminary Hills
Nagpur-440 006

Israel:
Dr. D. Goldberg
Professor of Irrigation
2801 Northeast 183rd Street, Apt. 1517
Miami Beach, Florida 33160, U.S.A.

Italy:
Prof. A. Degan
Centro Internazionale per gli Studi sulla Irrigazione
Piazza Pradaval 16 - Casella Postale 111
37100 Verona

Mexico:
Dr. G. Flores Mata
Director de Agrología
Srta. de Recursos Hidráulicos
Plaza de la Republica 31 - 4° piso
Mexico 2, D.F.

Netherlands:
Dr. F.R. Moormann
Soils Department
Rijksuniversiteit Utrecht
Princetonplein 5
Utrecht 2506

Pakistan:	Dr. M. Rafiq Director, Basic Soil Investigations Soil Survey Project P.O. Shahnoor Multan Road Lahore
Philippines:	Dr. A.C. Early Department of Irrigation and Water Management The International Rice Research Institute P.O. Box 933 Manila
Sudan:	Mr. Osman El Tom Soil Survey Administration P.O. Box 388 Wad Medani
Syria:	Dr. O. Mousli Agricultural Sector General Administration for the Development of the Euphrates Basin (G.A.D.E.B.) Raqqa
United Kingdom:	Mr. A.J. Smyth Director, Land Resources Development Centre Ministry of Overseas Development Tolworth Tower Surbiton, Surrey KT6 7DY
	Dr. R.A. Yates Director Consultancies and Research Booker Agriculture International Ltd. Bloomsbury House 74/77 Great Russell Street London WC1 3DF
U.S.A.:	Mr. Luvern Resler U.S. Bureau of Reclamation Engineering and Research Centre P.O. Box 25007 Building 67, Denver Federal Centre Denver, Colorado 80225
	Dr. F.N. Beinroth Principal Investigator Department of Agronomy and Soils College of Agricultural Sciences University of Puerto Rico Mayaguez, Puerto Rico 00708

World Bank:		~~Dr.~~ W.B. Peters Soils Specialist Agriculture and Rural Development Department
		Dr. F.L. Hotes Irrigation Adviser
		Dr. J.C. Collins Senior Agriculturist
OECD:		Dr. H. Bergmann Deputy Director European Investment Bank 2 Place de Metz Luxembourg
FAO:	AGL	Dr. R. Dudal, Director Land and Water Development Division Dr. F.W. Hauck, Chief, Soil Resources, Management and Conservation Service Dr. H.M. Horning, Chief, Water Resources, Development and Management Service Dr. J.A. Howard, Senior Officer, Remote Sensing Unit Dr. P. Arens, AGLS Mr. P.J. Dieleman, AGLW Dr. L.T. Kadry, AGLD Dr. A.J. Pécrot, AGLS Mr. M.F. Purnell, AGLS Mr. T. Vivekananthan, AGLD Mr. D. Westcot, AGLW
	AGS	Mr. N.R. Carpenter, Chief, Farm Management and Production Economics Service
	DDC	Mr. G. Perrin de Brichambaut, Deputy Director, DDC Mr. K. Snelson, DDC Mr. A. Marasovic, DDC Mr. T.R.G. Moir, DDC Mr. D. Campbell, DDC Mr. J. Chabloz, DDC

Agenda item 1

EXPERT CONSULTATION ON LAND EVALUATION CRITERIA
FOR SPECIFIC LAND USES (IRRIGATION)

FAO, Rome, 27 February - 2 March 1979

The FAO Approach to Land Evaluation and its Application to Land Classification for Irrigation

by

M.F. Purnell

SUMMARY

The main features of the FAO Framework for Land Evaluation are described. Special consideration in classifying land for irrigation suitability are outlined. Questions are raised about the appropriateness of the methods for supplying the needs of decision making for irrigation development and rehabilitation, and the orientation of a proposed practical manual of land classification for irrigation suitability.

1. BACKGROUND

FAO staff have frequently been engaged in making surveys for irrigation development. Collection of basic environmental data is followed by interpretation of this data in terms of land suitability. Usually a land classification system is developed on the spot to suit local conditions. Commonly the system is an adaptation of the system developed by the U.S. Bureau of Reclamation (1953). Attempts to standardize methodology, for rainfed as well as irrigated agriculture, led through a preparatory process of consultation over the past 10 years to the publication of the Framework for Land Evaluation (FAO, 1976). This sets out the concepts and principles of land evaluation which have been found internationally acceptable, but does not go into the details of the land characteristics which are to be used or the critical values for specific uses.

The principles of the Framework and of the USBR system are compatible. There have been considerable changes and adaptations made in the USBR system since 1953 (which this meeting will hear about). The Framework is intended to place a lesser emphasis on limitations and more on opportunities of the land resources (which is how the farmer or developer sees the problem). As the Framework treats irrigated agriculture, simply as a specific land utilisation type it makes easier the comparison of the benefits from developing land for rainfed as compared to irrigated agriculture : this can be an important advantage in situations where there is more land than water and a choice must be made as to which land is to be irrigated.

We are now concerned to know whether land evaluation and classification as it is practiced, and as recommended in the Framework, is providing the information which is needed by the people who make decisions on investment in irrigation development. We would like to know how the methodology can be improved to be more useful. What features of the environment are really important ? Is it sensible to try to develop universally applicable sets of critical values related to specific forms of irrigation ? On the other hand are land classifiers wasting time and money collecting needless information, or information in a form which cannot be used by other specialists concerned with planning irrigation projects ?

2. THE FRAMEWORK FOR LAND EVALUATION

The main concepts which are basic to the system can be summarized as follows:

1. The evaluation is of land not soil. All aspects of the environment need to be considered (climate, soil, water location etc.)

2. Land suitability must be for specific kinds of use which must be defined (i.e. in terms of crops, kind of irrigation, management level etc.).

3. Evaluation must be in terms of benefits obtained in relation to inputs needed on different types of land. This normally means that evaluation is essentially economic (though the degree of quantification depends on the data available)

4. Evaluation must be related to local physical and socio-economic conditions. Assumptions about these factors often implicit should be explicitly stated

5. Evaluation requires comparison between different kinds of use. This may be between present use and potential use after stated improvements or comparison between different crops or different irrigation methods.

6. Suitability is for use on a sustained basis. Predictions must indicate that environmental degradation will not eliminate benefits.

7 A multidisciplinary approach is required. Specialist contributions are needed, particularly from economists and irrigation specialists and engineers. In qualitative evaluation economics may provide no more than general background to evaluation of physical conditions. For quantitative economic classification the comparison of benefits and inputs requires a team of specialists to produce reliable results.

The process of evaluation of land suitability can be described in a nutshell as: description of the environmental features in the region, determination of the requirements of the land uses under consideration, and matching of the requirements to the environmental features in order to determine the land suitability for the specific use. Some of the

main features of the methodology which the Framework recommends can be briefly summarized as follows:

1. Land evaluation is a cyclic or iterative process. There must be feedback between resource surveyors, interpreters and users of the information and interpretation. The specifications of the land use types or of improvements needed may need to be changed, the environmental features studied may have to be altered, criteria for assessing suitability may need adjustment, and so on, in the light of findings of the surveys or economic analysis, in order to work towards the best solutions of land use alternatives. The lack of such interaction between the activities of the land resource surveyors and the irrigation specialists and the economists is probably one of the main failings of land classification in the developing countries.

2. The Framework recommends the use of the concept of "land qualities" to overcome the problem of the interaction and cumulative effect of individual land characteristics. Land characteristics distinguish one mapping unit from another and can be measured (or estimated), as for example soil depth, texture, rainfall, evapotranspiration. A land quality is a complex attribute of land which acts in a distinct manner in its influence on the suitability of land for a specific land use, and is used to distinguish land classes of different value. An example is "moisture availability", which results from a combination of the characteristics mentioned above. Some difficulties arise in the use of land qualities, although their use seems more rational and more likely to lead to advances in understanding of the factors that control land suitability. Part of the problem is the shortage of knowledge of the requirements of land use types - for example crop requirements or the critical factors for various forms of irrigation. The expert consultation on Land Evaluation Standards for Rainfed Agriculture (FAO, 1977) identified this as a major field in which data collection is needed if land evaluation is to be markedly improved, and some progress has been made. The need for irrigated agriculture is not less though one may hope that the information is more readily available.

3. The concept of <u>diagnostic features</u> has been found useful. They are land characteristics or qualities that have an understood influence on the output, or required inputs, of a specified land use and serve to define the limits between classification classes and to distinguish between the suitability of different tracts of land. Sets of critical values can be established to define limits between suitability classes. The extent to which it is possible to establish such diagnostic features and sets of critical values for general use in evaluating land for various kinds of irrigated agriculture is a major concern.

4. The Framework distinguishes between qualitative and quantitative classification. The latter means that the distinctions between suitability classes are made in numerical terms, usually economic, which permit objective comparisons between classes relating to different kinds of land use. Qualitative classification is all that is possible if data is inadequate or in the absence of a multidisciplinary team.

5. It is proposed that the classification should have two orders - suitable and non-suitable land - land classes which distinguish degree of suitability, sub-classes which differ in the nature of the limitations, and units which have minor differences in management or improvement requirements (and are only used in detailed on-farm work). Commonly the most important critical values to establish are those separating first class land, with few limitations and the suitable from the non-suitable land. The former limit is rather stable whereas the latter is likely to vary with economic conditions, for example crop prices, cost of fuel used in land levelling and the like.

3. SPECIAL FEATURES OF LAND CLASSIFICATION FOR IRRIGATION SUITABILITY

For evaluating land suitability for irrigation basic data must be collected on:

1. Topography - slopes, microrelief, etc.
2. Soils
3. Substratum - impermeable layers, gypsum beds, etc.
4. Water - supply quantity, quality, groundwater level and fluctuations, return flows.
5. Other features such as accessibility to markets, socio-economic conditions, etc. (which are not specific to but may have special importance for irrigation development).

The significance and complexities of these items are well known to this gathering and there is no space to elaborate on them here. A multidisciplinary team is obviously required to make a fully quantitative study and interpretation. Failing that, the soil surveyors (or equivalent) can collect useful data on all of these items, which will permit a reliable qualitative land classification to be made.

It is important to distinguish between land evaluation for land classification for irrigation and economic evaluation for project formulation. The land classification provides a set of interpretations of basic environmental data which facilitates comparisons of the advantages and disadvantages of developing diverse tracts of land in various ways. Project formulation uses the land classification but also requires different kinds of inputs from the irrigation specialists of various kinds and from the economists. The irrigation inputs (such as kind of irrigation system) and the economic parameters (such as marketing projections, amortisation periods, interest rates) may be far more important economically than the differences in land suitability. They influence the results of land suitability evaluation but are not part of it, at least as it is commonly understood by our land evaluation specialists. This point is illustrated by the OECD Guide to Economic Evaluation of Irrigation Projects (1976) in which 2 or 3 pages out of 250 are devoted to the physical resource base including land evaluation. Though the land suitability may form a minor aspect of the project formulation and of the economic variables to be considered, it may, however, be a prohibitive factor.

It is also necessary to consider the scale and intensity of the work and the phase of development which has been reached. Though the general principles may remain the same, the criteria for land suitability may differ according to whether the land evaluation is for identification of suitable irrigable areas, a feasibility study, project appraisal or project implementation.

Certain features of land evaluation may differ according to whether the evaluation is for development of new land or for rehabilitation (in a very wide sense) of existing irrigated land. The latter may be at least as important in acreage to be undertaken in the developing countries in the next decades as new irrigation projects, so it should not be forgotten in considering criteria necessary.

Land evaluation, perhaps especially for irrigation, must deal with very complex situations. The roles of systems analysis, modelling, computerization of data processing, are likely to be increasingly introduced by FAO specialists and others, and may affect the procedures and criteria used. It is unfortunate that the man who was to have presented a paper on this subject was called away at the last moment to cope with severe flooding in an irrigation project for which he has responsibility.

4. CONCLUSION

The present situation is that a methodology has been developed which seems to meet international approval. At present however land classification for irrigation in the developing countries is rarely a multidisciplinary effort as recommended. Even if the different specialists are all included in a team there is inadequate interaction in their work, and the quality of the land classification suffers.

A practical Manual of Land Suitability Classification for Irrigation would help to improve this situation. FAO has the intention to develop such a manual (in collaboration with the USBR), and the discussions and recommendations of this expert consultation have a bearing on the form it should take. It is necessary to ensure that the concepts are understood in the same way and the inputs required for reliable land evaluation are recognized by all concerned. It would help to ensure that the product of the land classifier is what the decision-makers need for decisions on irrigation development.

To end with a query to which we may recur during this meeting: is the approach outlined here, and more exhaustively treated in the documents referred to, satisfactory ? Or is something much broader dealing with economic evaluation of the whole irrigation complex wanted ? Or alternatively, would something much simpler, considering only the direct effect of physical environmental conditions, meet the needs adequately ?

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why not cite
Irrigated lands

The Consultation

1. Endorses the principles and concepts of the "Framework for Land Evaluation" in evaluating land suitability for irrigation;

2. Emphasises the importance of an interdisciplinary approach; recognises the dynamic nature of the inputs and that the classification is therefore liable to change over time; and

3. Recommends that FAO continue to propagate use of the principles through compilation of a Manual for Land Evaluation for Irrigation.

The Manual would be an interdisciplinary publication and should be addressed to all concerned with developing lands for irrigation.
The Manual should include a checklist of criteria which are relevant to land suitability classification for irrigation in different circumstances, the items in which would relate primarily to limitations and other diagnostic characteristics that experience has shown to be important, together with the identification of factors which may be advantageous.
The checklist needs to be very carefully structured at several levels of generalisation and might be published at successive approximations of detail.
The checklist would be supported by and would provide a cross reference for appendices describing experience and providing explanation or further reference to the various items.
Priority would be given to preparing a preliminary checklist to be made available in advance of publication of the Manual. The preliminary checklist might refer to existing guidelines (e.g. USBR) for more detail where appropriate as an interim measure.
A chapter in the Manual would address the relationship between land characteristics (qualities) and irrigation design data and another chapter would provide guidance on the identification of specific use conditions relevant to particular irrigation methods to assist in the selection and design of appropriate irrigation systems.
An ad hoc working group be set up, in the first instance to prepare an outline for the Manual, which would be circulated for review and comment to participants in the consultation and other interested parties in order to ensure that the scope of work on the Manual is appropriate and adequate. In order to permit an early start on drafting of the Manual, a target of May 1, 1979 should be set for circulation of the outline and June 30 1979 for receipt of comments.

4. Further recommends that:
Recognizing the dynamic nature of the parameter determining success of irrigation projects, adequate studies must be made in order to predict future conditions and that the Manual needs to draw the attention of evaluators to the range of factors, some permanent, some dynamic and some ephemerel, which must be considered in land evaluation and provide guidance in their use. The interdisciplinary land evaluation team, as part of its specific task of evaluation should recommend specific applied adaptive trials to provide groundtruth for crop requirements and adaptability to heal site conditions, such trials to be initiated through collaboration of existing national research institutions, international research centers and pilot development projects within the boundaries of proposed projects. The team should include where appropriate members who could provide necessary and sufficient support in the field of social and institutional aspects of irrigation development.

The procedures for land evaluation should be based on a system of data generation/ collection and sequential analysis and evaluation in order to identify problems and limitations and decide on appropriate further studies and tests necessary to determine their detailed nature and scale together with identification of appropriate corrective measures and their physical requirements and costs.

The utilisation of land qualities in the interpretation of suitability of lands for irrigation be encouraged. The interpretation should establish the limitation which downgrades land suitability from optimal toward marginal. Recognising that many classifiers presently are trained to evaluate in terms of characteristics rather than qualities of lands it will however be necessary to provide for a gradual transition using both qualities and characteristics though treating the two separately in arriving at the land evaluation classification.

VIEWS ON LAND SELECTION

FOR

WATER AND LAND DEVELOPMENT

by

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A paper submitted to the Expert Consultation on Land Evaluation for Irrigation sponsored by the United Nations Food and Agriculture Organization; February 27 to March 2, 1979, Rome, Italy.

Final draft, April 1979

VIEWS ON LAND SELECTION FOR WATER AND LAND DEVELOPMENT 1/ 2/

by

William B. Peters 3/

INTRODUCTION

Water on land resource development and maintenance are of paramount importance in meeting the existing food, fiber and energy crises; improving the living standard of people; and preserving the environment. This paper summarizes views on land selection to water and land development by World Bank programs to meet this challenge in the developing countries.

The paper briefly describes the requirements with respect to basic data, evaluation and product from the standpoint of an international financing agency; factors in addition to soil that need to be taken into account, kept in perspective and integrated; preferred approaches to land selection; the need for streamlining investigations; and principal deficiencies in surveys as commonly made in meeting needs. The paper emphasizes that data collection and land selection need to be approached as an interdisciplinary exercise wherein contributions are made by economists, hydrologists, drainage engineers, agronomists and others.

It is pointed out that pedologists or soil surveyors given the appropriate training, experience and facilities and through consultation with other disciplines in developing land classification survey specifications for a specific setting, followed by periodic review, can accomplish most of the data collection, mapping, delineation and classification of lands susceptible of sustained irrigation agriculture, i.e arable lands as guided by farm production economics. This would include evaluation and mapping of land productivity, land development costs, water management requirements, land drainability and interaction of water quality on soils and crops for ranges of leaching fraction but not include determining drainage requirements and designing the drainage system. The land classifier also serves an important role but to a lesser extent than some of the other disciplines, particularly engineering, economics, law and political science in the selection of those

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1/ A paper prepared for the Expert Consultation on Land Evaluation Criteria for Irrigation sponsored by the United Nations Food and Agriculture Organization, February 27 to March 2, 1979, Rome, Italy.

2/ The views expressed in this paper are those of the author and not necessarily those of the World Bank.

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lands previously classed arable to be actually served by project facilities, as guided by economics of plan formulation and other decision-making processes. Complete cooperation and coordination, along with provisions for exercising flexibility when encountering changed conditions, are required to ensure the best final plans and eliminate unnecessary and costly work in making plans.

After formulation of a project, there should be continued heavy involvement of soil scientists during the final design, post construction, development, and settlement and maintenance phases. Ways and means are suggested whereby soil surveyors may produce a better product by becoming more involved and taking an expanded role in the planning process and implementation of projects.

Also, to bring about more effectiveness and efficiency in land selection for irrigation, the paper stresses the importance and usefulness of adapting a system of soil characterization by field and laboratory methods subsequently referred to as screenable soil characterization. The system guides selection of meaningful measurements and serves to appraise soil characteristics in confirming field judgments with respect to both diagnoses and prognosis as related to land classification surveys, drainage investigations, and environmental assessments.

Background information on the World Bank concerning membership, structure, functions, operations, activities, lending procedures, and development programs relating to the context of this paper are briefly described in Annex I. The following statement from the annex summarizes the Bank's concern for relevancy and technical excellence of works and soundness in planning, implementing, operating and maintaining irrigation projects:

> "To maintain the confidence of both member governments and the international finance community and thereby enable a continued source of funds for development, the Bank carefully appraises all aspects of projects submitted to it for financing. Thus, the planning of projects and analyses must be technically and economically sound. Studies, particularly water and land resources investigations, must be relevant and of the highest quality commensurate with objectives. The Bank also periodically reviews the execution and operation of those projects which it helps finance and provides advice and assistance to the borrower in the attainment of project objectives."

Acknowledgement of the assistance given to the author in preparation of the paper is given in Annex II.

WATER AND LAND RESOURCE DEVELOPMENT

Water projects may be single or multi-purpose in concept, thereby providing for some or all of the following purposes: flood control; river regulation and control; navigation; fish propagation; hydroelectric power generation, transmission and marketing; municipal and industrial water service; water quality modification; disease control; environmental enhancement; irrigation water service; water regulation in flood plains; reclamation of marshlands and tidelands; and related uses. Therefore, financing of projects requires that studies be made and plans be developed for the regulation, conservation, management, and utilization of water and land resources along with design and construction of facilities. The scope of investigations may range from an entire basin water land resource development to small single-purpose irrigation projects, including rehabilitation of existing projects.

Approach to Water and Land Projects

The development of multi-purpose projects or single-purpose irrigation, water regulation and drainage projects involves substantial capital investments. Assurance that investments will achieve intended goals depends largely on relevancy and adequacy of investigations and soundness of the plans developed. Capital is easier to obtain when the borrowing nation can demonstrate it is capable of adequately planning, supervising and effectively operating proposed developments. Technology, particularly water and land selection, should be realistic and effective for the time and place. Formulation of plans is a complex process involving several disciplines, whether the planning be for a single project or an entire river basin comprising many projects. The team approach covering the whole range of necessary specialist expertise should be the foundation of planning for a specific project.

Water projects need to be fitted into the prevailing economic, social and cultural patterns which differ radically between countries. This imposes different conditions and constraints upon the practice of irrigation engineering. Moreover, that the often inadequate consideration given to the non-engineering phase of water project planning has been repeatedly voiced in conference proceedings, seminars, special reports, task force studies and other literature (Marr 1967; United States Panel in the World Food Problem, 1967; Reid, 1962; and the United Nations, 1951). Pertinent to this is a statement made more than 60 years ago by F.H. Newell, then Commissioner of the US Reclamation Service, who wrote:

> "Irrigation enterprises as a rule have been considered mainly from the physical or engineering side. The promoters, more concerned with the irrigation developments, have approached the subject from the standpoint of the details of building the works ... it has been a matter of surprise for them to discover, after the works are built, and are in condition for operation that the real elements of success are more dependent upon proper relations with the farmers and with the soil than those upon the works themselves." (Newell, 1916)

More recently, the Asian Agricultural Survey Team (Consultative Committee, 1968), panel assembled by the Asian Development Bank, stated:

> "The success of an irrigation project lies not in its structure of canals or drains but in the productivity of the water when applied as an input to crop production. The relation between irrigation and water use is often forgotten in the noise and excitement of constructing monuments to modern man's inventive genuis."

In financing water projects, the World Bank insists that plans may be developed that are realistic for the project setting. This is not an easy task. Much of engineering science as applied to irrigation can be readily quantified, while the social, agricultural and economic sciences that guide selection of plans are more difficult. The problem is compounded when necessary, reliable statistics and relevant research results are lacking. It is preferred to not use inference and extrapolation on a large scale. Adequate predictions of uncertainties bearing upon a plan require, above all, improved quantitative and qualitative models that can be applied with confidence to project planning in the developing countries.

Environmental Concern 4/

Much of the effort to raise the standard of living in the developing countries involves deliberately modifying the natural environment. Constructing roads, dams, airports, irrigation and sewerage systems, power plants, and industrial facilities frequently results in ecological problems because the consequences for the environment were not adequately considered in project planning or implementation or because the information necessary to forecast the eventual impact on the environment was inadequate. Also, where adverse ecological consequences are forecast, effective steps to prevent or minimize the damage may sometimes not be taken because data on cost-effective safeguards or on economically competitive project alternatives are inadequate. Although the magnitude of the loss in ecological values varies, there is a real cost to society over the long run.

In recent years, many warnings have been issued in many regions of the world--in both developed and developing countries--that deterioration in air, water, soil and other natural resources threatens the quality of the environment and of life, including human life. The urgency of such warnings is now considered by many conservation groups, scientists and government agencies to be especially acute.

International development assistance has always attempted to address problems of the human environment--the principal focus being the poverty, disease, hunger and illiteracy associated with the lack of economic development. Worldwide concern, however, has steadily mounted over other aspects of environmental problems--those which emerge as undesirable secondary effects of the very processes of development itself.

4/ Based on World Bank, June 1975 - Environment and Development.

In 1970 the World Bank Group established the post of Environmental Adviser "to review and evaluate every investment project from the standpoint of its potential effects on the environment". Protection and enhancement of environmental quality is a priority matter in all investigations in the formulation, appraisal and execution of projects. Therefore, land resource studies should encompass evaluations of ecological interrelationships within environmental systems.

WATER AND LAND RESOURCE INVESTIGATIONS

The studies made in generating, appraising, and implementing agricultural projects usually address the present social, agronomic, and economic situations with respect to food and fiber production, marketing, consumption, and means and feasibility for their modification. This includes, water, land, human resources, and institutional development. Also changes in land use for increasing production and marketing to benefit farmers and other people are considered commensurate with promoting social well-being and improving or maintaining a favorable environment. For these studies, agriculture encompasses land resources, farm enterprises, and socio economic surveys. The agriculture study might cover a diversity of needs and conditions including both rainfed and irrigated lowland or upland agriculture under either private or government ownership and management.

The studies also embrace the relationship of a potential irrigation development to surrounding areas and also long-term impacts including the broad environmental and social spectrum. It is insufficient and dangerous to consider an irrigation project in complete isolation of its surroundings. It is essential that the impacts resulting from development, land use, and management of a project on non-project lands and vice versa be addressed. Resler (1978) describes a developmental approach to accomplish this and presents in a graphic way the interrelationships among requisite disciplines in relationship to time and accomplishments during the planning effort.

Water and land resource studies serve an important role in the Bank's programs for agricultural and economic development. The investigations must integrate the activities of the several disciplines including hydrology, water quality, drainage, geology, soil science, plant science, engineering, sociology, economics, environmental science, and land and water use and management. Important in these studies is coordination of their independent activities into a meaningful framework of analyses. From the evaluations, alternative plans are developed to indicate required programming, operation, and development procedures conforming to area needs and controlling policies. Analysis is made of land use problems and opportunities associated with alternative plans, recognizing the natural and modified resource base; existing and potential land use patterns; zoning regulations, and general relationship to environmental, social, and economic aspects of the setting. All plans developed for achieving goals involve costs and benefits. In this regard, land use suitability classification, if properly structured and implemented, is a useful tool for identifying needs, establishing opportunities, and selecting lands for development.

The process is somewhat analogous to arranging for transportation at a travel office, eating at a large cafeteria or shopping at a large supermarket. The choices of items and combinations are numerous but somewhere along the line, someone has to pick up the tab and digest the bill. The final selection is based on needs, means to fulfill them, and economic analysis. The cost of investigations for planning is also very important. Someone but not the Bank, has to also bear these costs.

Land Selection

Irrigation suitability land classification is a key element in identifying, appraising, implementing, and maintaining irrigation developments. The Bank is in the process of establishing general requirements and guidelines for scope, kind, and amount of work for the various types of planning investigations and conditions encountered. The Bank is giving consideration to all known systems of soil survey and land classification particularly those used by member governments. Further, the Bank is open to and solicits suggestions from any group or persons wishing to contribute ideas and recommendations. The Bank staff participates in the many consultations held for improving and advancing land selection criteria and procedures.

In many of the developing countries, the land resource studies, particularly those of feasibility grade, are made by consulting firms. The borrower, on its own or with the assistance of advisors or consultants is expected to design and undertake suitable soil survey and land classification procedures. They are encouraged to apply techniques drawn from their experience or that of others, appropriate to the particular conditions of the project under investigation. In exceptional cases at the request of the government, the Bank may propose to the consultant standards, methods, procedures and specifications for the conduct of a specific survey.

The system of land classification should be unifying and universally applicable to irrigation of either diversified cropping or wetland rice production for all situations and ranges in water supply and control and method of irrigation including surface gravity, sprinkler, and drip. The surveys must cope with differences in the source, quality, and control of water. The land classification system should be capable of integration with all pertinent social, economic, environmental, and engineer investigations. The economics with respect to productivity, land development, flooding, and drainage are highly relevant.

Types of land classification needed for planning, implementing and maintaining water projects are usually identification, feasibility, advance planning, and post-construction. The type of land classification conducted, amount of detail, and accuracy required should be consistent with the purpose of the investigation and governed by the primary applications intended. The scope of work and factors considered should be generally the same irrespective of the type land classification. The quantity of support data, precision of delineations, and desired degree of accuracy will vary and will usually be much less in the case of identification land classification.

A feasibility grade land resource survey for irrigation development should establish the extent and degree of suitability of lands for sustained profitable irrigated agriculture. It should deal with the question of whether or not the project is worthy of construction. It should be supported with special studies in the fields of water quality, soils, topography, drainage, economics, and land use in selecting lands for irrigation. The compilation of findings and presentation of results should be accomplished by narrative reports and land classification maps and pertinent field and laboratory data. The report should cover basic data, premises, description of methods of study; discussion of results, and pertinent conclusions and recommendations relating to investment feasibility.

Bank experience in working on many projects in many countries having diverse policies, goals, and conditions have brought out some essential features. A major requirement is the necessity to fully explore and consider the controlling policies in structuring and implementing a land classification for local application. To be useful and effective a survey must avoid a rigid or fixed procedure. A survey should be structured to effectively serve the purpose of the investigation at hand and be site-specific in scope and application, i.e. it must be fitted to the specific environmental setting including economic, social, physical, and legal patterns existing in the area. It is also extremely important that a survey be accomplished at a cost that the borrower can afford to pay and be acceptable in relation to the investment foreseen for ensuring development activities. It is also important that the survey be completed within a time-frame that will facilitate planning.

So often, it is not understood that requirements of a land classification set up primarily to guide on-farm land development and settlement following initial project construction can be expected to differ from one aimed at determining engineering, economic, and agronomic feasibility in planning for a project. Both the scope and degree of detail can differ markedly.

Methodology between countries may vary according to whether the Government expects the farmer or landowner to pay for all development costs or if the Government does all of the on-farm development with no direct cost to the farmer. The matter of handling land development costs should be resolved prior to initiating a survey.

Land classification surveys or interpretations of soil surveys should express the land-water-crop and economic interactions expected to prevail after resource and management modification (Maletic and Hutchings, 1967). This involves identifying and evaluating changes anticipated to result from development or reclamation and management. The interactions should be expressed in terms of a suitable economic parameter reflecting future productivity and relating to the financial return to the farmer as well as economic return to society as a whole. The land classes should express the local ranking of land suitability for land irrigation use.

Most land factors, including soil depth, are changeable at a cost. Typical changeable factors include salinity, sodicity, titratable acidity and exchangeable aluminum, depths to water table, relief, bush and tree cover, rock cover, drainage, and flood hazard. Particle-size distribution or texture of subsoils and substrata occurring at depths not disturbed by tillage and landformng is about the only factor that may not be altered.

Some of the changes can be brought about by modifying water control measures and management. These include variation in depths to water tables and associated soil moisture, salinity, and aeration conditions affecting tillage and crop growth. Other examples are modification of slope and micro-relief by landforming; and alteration of soil profile characteristics by deep plowing, chiseling, or addition of amendments. Soil texture may be modified by sediment in water entering the soil.

The manner and magnitude of water control can effectively serve to regulate salt effect on lands, crops, social and economic conditions, and the environment. The concentration and composition of salts in the soil solution and associated exchangeable ion status on soils can be influenced by numerous factors including the composition of water applied, the rate of water application and leaching, dissolution and precipitation of soil solution constituents, and the rate and amount of drainage. Flooding of soil, as practiced under rice cultivation, sets into motion a series of physical, microbiological, and chemical processes which influence crop growth (Ponnamperuma, 1965). Soil acidity where present usually decreases upon flooding.

Whether particular characteristics will be changed usually depends upon economic considerations. The survey must deal with two aspects of this principle. Can the change be accomplished, and what degree of change is economically feasible? This is largely dependent on the climatic and economic setting of the project. For example, a large investment may be made to reclaim a saline, sodic or acid soil which after improvement will yield a farm income of US$500 per hectare. In another setting, where net income after improvement would only be US$75 per hectare, the soil having similar conditions might be regarded as non-reclaimable. In the latter case, it may be infeasible to make the change.

The establishment of the minimum land quality or maximum development cost that should comprise arable land or the service area is requisite in implementing the basic and most important decision in land selection which is the separation of lands which are suitable for development from those which are not. In doing this, recognition should be given to the fact that in fitting economics into a land selection there is a limit on the attainable precision. Thus, management levels, yield estimates, and related factors can be expected to vary in a particular area and with time. The imprecision involved needs to be accepted; otherwise, the economic principles guiding choice of land can be rather useless and the alternative would be to use arbitrary physical limits for land class determination. This usually results in poor planning for the development of a resource. When confronted with decisions to build or not build, to serve this area and not the other, and

to properly size facilities, someone needs to make a firm interpretation. Much of the data can be collected when surveys are approached as an interdisciplinary exercise.

In investigating lands consisting of highly leached and weathered soils, a strong soil characterization program should be conducted. The chemical status of such soils needs to be carefully evaluated along with observable characteristics in making sound selections of arable land. The problems confronted with these soils are usually fertility related chemical characteristics requiring special appraisal. These include degree of weathering of the clay minerals; soil acidity; charge status both negative and positive and associated ion population; soluble and exchangeable iron, aluminum, and manganese; base saturation of cation exchange capacity at relevant pH values; and nutrient status of the soils. Such characterizations identify infertile soils having limited suitability for continuous crop production because of the need for high inputs of both money and management. On other soils they indicate the type and level of production inputs required to attain specified yield levels of particular crops. Of course, other soil characteristics such as texture, structure, depth, water-holding capacity, infiltration rate, permeability, and claypans are evaluated as are water quality, climate, topography, and drainage conditions. Salinity reclamation and control can be a factor in high rainfall areas including the tropics.

It is imperative that irrigation suitability surveys be supported by laboratory and field testing and evaluation that will assure a definitive diagnosis of soil salinity and sodicity under both present and future without project conditions, and prognosis of these soil properties associated with agronomic response and economic significance under future with project conditions. This necessitates adapting and implementing meaningful procedures and studying the irrigation experience on similar lands. It is essential that land classification surveys and the drainage investigations be fully integrated and coordinated.

Drainage Investigations

Permanent successful irrigation requires drainage. Important ingredients of successful and permanent irrigation enterprises are selectivity of lands oriented to their drainability; thorough investigations of subsurface drainage characteristics; realistic predictions, before irrigation, of drainage problems and costs of correcting them; thoughtful engineering designs; rigid supervision of drain construction; constant maintenance of drains, and alert review of continuing drainage needs (Maierhofer, 1967).

Kinds of information needed include: the capacity of the soils, subsoils, and substrata to transmit water; amount, source, movement of chemical characteristics of the water that must be transmitted; and available hydraulic gradients, both natural and those that can be induded by engineering works. The studies usually should include evaluation of hydrology, geology, meteorology--particularly effective precipitation--topography, soils, and present and anticipated irrigation practices and cropping patterns; conduct of field measurements for hydraulic conductivity, and design of any required drainage.

Water Suitability

In general, evaluations of water suitability for irrigation should be approached by analysis of the environmental and economic setting of a project and if necessary areas within a project in context of predicted water use on the following basis:

(a) Determination of the anticipated quantity and chemical composition of the water supply under future (with project) conditions particularly changes in water quality over time.

(b) Prediction of the levels at which salinity, sodicity (alkali) and toxic ions will equilibrate in the soil with the applied irrigation water. This involves appraisal of climatic conditions including amount and distribution of rainfall and evapotranspiration; possible cropping systems and anticipated level of management; method of irrigation and efficiency of water management; fundamental soil properties particularly those influencing water retentivity and transmissivity; clay mineralogy; possibility of calcium dissolution or precipitation; drainage including depth to ground water table and chemical composition of groundwater; plus other essential factors especially leaching fraction.

(c) Determination of direct and indirect influences of derived equilibrium levels of salinity, sodicity, and toxic ions on crops. This evaluation requires using adaptable criteria for tolerance of crops to salinity, sodicity, and toxic ions. This also involves appraising the effects of the predicted soil solution electrolyte concentration and composition on soil physical properties.

Thus, the determination of the suitability of water involves integrating land and water factors. In this process, land classification surveys are utilized to delineate land classes that would favorably respond to a water supply of a given quality. This selection of land as a potential part of an irrigation development is then tested as to feasibility by application of plan formulation criteria.

Water quality standards or ratings and even guidelines may not be appropriate and can be misleading in appraising the usability of water for irrigation. Some of the guidelines are not universally applicable and do not fully satisfy the specific requirements in all cases. Others are good and when used as intended can satisfy needs for water suitability appraisals. The problem often times is the equivocal application of guidelines without due consideration of climate, soils, and drainage. The preferred approach is to go through the rigors embodied in applying basic principles and adapting to the specific situation.

Criteria of water suitability vary with the intended use of the water (Bower, 1974). As has been stated by Fireman (1960): "Its usability depends on what can be done with the water if applied to a given soil under a particular set of circumstances. The successful long-term use of any irrigation water depends more on rainfall leaching, irrigation water management, salt tolerance of crops, and soil management practices than upon water quality itself". Thus, the suitability of an irrigation water must be evaluated based on the specific conditions under which it will be used, including crops to be grown, soil properties, irrigation management, cultural practices, climatic conditions, and especially leaching fraction (Rhoades and Merrill, 1976).

Present Land Use

Information is usually needed on present land use in a proposed project and within impacted areas associated with the project. The land use categories to be mapped and who does the mapping need to be established in consultation with planners.

Laboratory Support

In addition to field measurements for water and salt movement and retention in soils, a certain amount of characterization by laboratory methods to appraise soil properties relating to suitability for irrigation is required in support of land selection for water and land resource development. The objective of characterizing soil is to support judgment in estimating land development reclamation potential. The laboratory analyses should be performed on an action program basis and serve a practical purpose.

A system of screenable soil characterization that guides selection of meaningful measurements should be implemented. This involves applying logical deductive reasoning in providing for specific useful data. These data are generated and evaluated sequentially as required to support decisions to soil specific problems directly and to determine additional properties. This maximizes use of data for problem quantification and degree of remedial measures necessary. It should be used to study problems and derive solutions rather than using standardized routine tests which may have little or no relevance to the particular situation being studied. It follows that application of this technique optimizes effort and reduces expenses.

There is a tendency among many laboratory activities to "over test", i.e. perform too many or unnecessary tests on certain soils at the expense of not performing essential or critical testing on particular samples. Also, some laboratory activities tend to emphasize comprehensive analyses of samples from master sites and neglect selection, sequence, and quality control in mass testing performed on a screenable basis. The latter-type testing is frequently handled as routine work utilizing the least dependable personnel and considered not worthy of competent and close supervision. Thus, too often the screenable laboratory testing becomes a liability rather than an asset in supporting surveys. Because the screenable testing represents coverage of areas involving a high sampling density, it serves as an extremely important input into

land categorization. Therefore, it should be administered for performance with respect to both quality and quantity commensurate with the goals and objectives of the investigations.

To effectively support field appraisals, all laboratory work should be closely coordinated with fieldwork. Laboratory studies should be preceded by or made concurrently with field studies. The number and type of studies should be determined by area conditions -- particularly variability, the controlling survey specifications, and needs. There should be a joint plan between field and laboratory investigations prior to taking of samples.

In implementing screenable testing, relevant evaluation parameters need to be established and measured and their interrelationships understood. In all investigational programs, care should be taken to not create a false impression of technical excellence by generating superfluous analytical data. Screenable testing tends to avoid this, provided it is properly set up, implemented, and results interpreted. Of course this type characterization program should not preclude testing on the conventional "complete analysis" basis of samples from master sites.

Usefulness of Soil Surveys

Soil surveys, particularly genetic and morphological classifications (taxonomic soil surveys) are useful in planning for water and land resource development. Invariably, there have been limitations involved with such surveys and interpretations that could be made in selecting lands for irrigation development to diversified cropping. The limitations, along with mutual support possible in substituting soil surveys for land classifications, become understandable through recognizing the unique differences in relation to specific needs for varied applications. That soil surveys may not fully satisfy requirements should not be taken as a case for indictment, drastic change, or abandonment. On the contrary, soil surveys should be used to the fullest extent possible.

In addressing the subject and trying to develop understanding of the subject over a period of many years in several countries, it is helpful to recognize the numerous types of soil surveys conducted in the world and reasons for different approaches along with the many specific requirements for varied applications involving a wide range in climatic and economic settings. Often, it is not possible when making a soil survey to foresee all future applications. Further, the demands of a soil survey even though anticipated in advance usually preclude structuring a system that will serve all purposes. It is frequently difficult to obtain participation of the requisite disciplines especially when planning for a specific use which may not materialize immediately or for several years. The cost of investigations can be a constraint on the amount of data collection. Thus, limitations in using soil surveys are inevitable.

Soil characteristics which are important in a genetic or morphological classification are normally by no means the only factors that are of major importance in land classification for certain uses, particularly irrigation. Soils are an important aspect of lands but may be overshadowed by many factors including economic circumstances, agricultural technology, resourcefullness of people, climate, topography, and drainage. It follows that the factors other than soil have to also be taken into account, kept in perspective, and integrated. Data collection and land classification for irrigation planning need to be approached as an interdisciplinary exercise, wherein contributions to the land classification are made by drainage engineers, economists, and hydrologists. Unsatisfactory land classification surveys can arise if a soil scientist works alone and concentrates almost solely on the soil mantle. Most soil survey organizations in both the developing and developed countries, being vertical rather than horizontal with respect to management, do not presently accommodate participation of other specialists.

There can also be other problems in implementing soil surveys and making interpretations for uses such as irrigated agriculture. Many workers trained in mapping natural bodies have great difficulty in initial attempts to adopt and adapt to economic land classification. The difficulty seems to be in conceptualizing the landscape under the conditions expected to prevail under the new land use regime through economic reasoning and installation of engineering works. Another difficulty concerns notions that boundaries of natural bodies will coincide with class boundaries, ranking land for use suitability. This rarely occurs because kinds of soil having natural boundaries are commonly found in contrasting economic environments or vice versa. The location, size of tract, and other economic characteristics of land are highly significant in land classification.

It can be very difficult to rely upon natural body mapping, as commonly made, for classifying a given area, particularly on complex and problem lands consisting of soils and substrata requiring extensive and intensive field and laboratory characterization. Although logical procedures can be advanced for accomplishing the required integration, experience has shown that the procedures necessary for a land classifier to establish class boundaries related to natural body mapping units can be nearly as time consuming as the conduct of a basic land classification without benefit of a soil survey. This is not to imply that soil survey are not useful. Natural soil categorizations because of this information content can provide most essential information, including bases for deriving predictions.

Principal deficiencies of most soil surveys in planning for irrigation development are: insufficient depth of soil characterization; simulation of soil moisture retention and movement in the laboratory without field confirmation; inadequate soil drainability and land drainage appraisals; and lack of definitive laboratory characterizations for soil sodicity (alkali), beneficial gypsum, and effective soil acidity. Soil profile examination to depth of 1 to 2 meters usually will not suffice in appraising economics of drainage. Soil profile examination should include depths to 3 meters and some of these need to be extended to greater depths.

There is no theoretical reason why soil surveys, if properly structured and adequately supplemented, will not meet needs in planning for water and land resource development for alternative uses. Many workers have given thought to this and some have advanced suitable procedures (largely unpublished) for accomplishing this. Often, it is not practical nor technically and economically expedient to go this route. Also, in areas having no previous soil survey and where a decision has been made to embark upon detailed investigations involving extensive coverage and intensive study, the soil survey can be the product of the land use classification rather than vice versa.

Increasing and Expanding the Role of Soil Surveyors

Soil survey organizations and soil surveyors worldwide are dedicated to having a specialized and professional product in soil survey information and interpretive evaluations and classifications, and that these be extremely valuable and relevant to needs in water and land resource development. Many workers primarily in the more developed countries are generally contending that their product is neither adequately understood nor used by planners and decision makers. Some are gravely concerned and express frustration as having an outstandingly useful product but not being able to attract logical customers and selling it to them. They are seeking ways and means by various methods and forums to bridge the gap whereby there might be generated an increased awareness for and transfer and use of soil survey information.

Certainly and unfortunately, there is validity and justification in some of the contentions. However, in some circles and too many instances, there seems to be too much crying and only posing a dilemma. Although this may serve to get needed attention, it, in being rather negative, is not likely to facilitate changing the situation. A more objective and positive approach along with more consultation and cooperation with users is needed if the problem is to be identified and solved.

It should not be the sole prerogative of the soil surveyor to determine the nature of the product and what should be marketed. The users, including farmers, planners, taxpayers, financing agencies, governments, and others, of soil survey information and interpretations that can be made also have an interest and stake in applications and have the right to be in on decisions on what can be used and is to be bought for specific needs within institutional, legal, time, and financial constraints. Therefore, the soil surveyor should seek out the users and solicit views on needs and jointly develop the product. It is essential that the process be a two way street with communications and travel going in both directions.

Soil scientists represent a basic discipline vital to planning but do not possess a monopoly on involvement and knowledge in the collection of land resource information, interpretation, and integration in planning for irrigation. As previously stated other basic and cooperating groups include agronomy, engineering, hydrology, geomorphology, environmental science,

economics, law, and sociology. The decision making discipline is political science. The soil surveyor or land classifier, after consultation with the other disciplines in developing survey specification or guidelines for a specific setting, can accomplish most of the mapping delineation, and classification of areas susceptible of sustained agriculture, i.e. arable lands as guided by farm production economics. This would include evaluation and mapping of land productivity, land development costs, water management requirements, land drainability, and interaction of water quality on soils and crops for ranges of leaching fraction. The selection of those lands classed arable to be actually served by project facilities is guided by economics of plan formulation with the other disciplines particularly engineering, economics, and law having major roles but with decision maker doing the final selection. This selection usually reflects the desire to promote socio-economic development and achieve a more equitable distribution of wealth.

Irrigation engineers, drainage specialists, and water utilization hydrologists are knowledgeable as a result of both training and experience in the importance, methods of measurement, and applications of moisture retention and movement in soils, e.g. infiltration rate, hydraulic conductivity, hydraulic head, hydraulic tradient, water table location and conditions, moisture retention at various tensions, and so-called field capacity. It is usually the soils report rather than the engineering report that fails to provide a satisfactory confirmation of a perched water table and distinguish between q and k in Darcy's law. The dam engineers and drainage specialists are usually most proficient in installing piezometers to establish the occurrence of artesion pressures and characteristics of moisture movement in slowly permeable earth material.

Enlisted personnel of many navies readily adapt to testing the quality of distilled water for usability in boilers to produce steam. This involves appraising the intensity of acidity or alkalinity, i.e. pH; salinity; and total hardness by rapid but quantitative measurements respectively for electromotive force, electrical conductivity, and calcium plus magnesium by versenate titration. The same type analyses, using a kit, can be used to rapidly field characterize soil with respect to both salinity and sodicity (alkali). In the latter regard, reliable values can be obtained for the estimated sodium adsorption ratio, gypsum requirement, and residual gypsum. These characterizations in combination, along with other innovations, are most useful in the diagnosis and prognosis of soil sodicity than only measuring for exchangeable sodium in milliequivalents per 100 grams and exchangeable sodium percentage by conventional procedures, which are time consuming, and using sophisticated laboratory equipment by flame photometry and atomic absorption spectrophometry. The procedures for rapid field testing were developed by the USDA Salinity Laboratory about 25 years ago and kits have been on the market as long. Yet, few laboratory and field soil scientists have availed themselves of this opportunity to become more effective and efficient.

The requisite level of land productivity or permissible land development cost for a specific project setting as perceived by a soil surveyor or land classifier may differ from that of an economist even if the interrelationship of their work is mutually understood and there has been close cooperation. Just as the pedologist has his tools, diagnostic criteria, and jargon, the economist also has tools and jargon but that of the latter is more standardized and universal and can be translated into and comprehended in most languages including English. Attempts at translating the Greek nomenclature of the American system of soil taxonomy into English have not been too successful.

To serve the user of soil survey information in an increased and expanded role by working more effectively with other disciplines, most soil surveyors need to become more cognizant of the role, tools, and terms of economists. Land selection for development and increasing productivity is influenced by economic evaluation in several ways. Some of the terms that need to be understood are accounting price, adjustment value, benefit-cost ratio, book value, consumptive rate of interest, discount rate, economic rate of return, net present value, externality, financial rate of return, cost effective analysis, opportunity cost of capital, shadow exchange rate, and world market price. Conversely, many economists need to develop a better understanding of soil science.

Probably the least understood and most scoffed at is the role of lawyers in land selection for irrigation. The delineation of irrigable areas and water allocations and impacts must conform to the laws of a country and international law. Water lawyers and courts are the final authority on what lands can be legally served under existing laws with irrigation and drainage facilities. Some are even knowledgeable in irrigation suitability land classification.

In the United States, the legal profession in representing the principal user, i.e. the people especially farmers through Congress wrote the paramount legislation compromising the 1924 Fact Finder's Act. This law established the type of land classification required for all Federal Reclamation Projects and defined the land classes in terms of an economic parameter, i.e. net farm income and payment capacity. This led to development by planners, economists, lawyers, engineers, hydrologists and soil scientists of the USDI Bureau of Reclamation system of land classification for systematically obtaining and interpreting resource information. Other countries do not have that specific law, but it can be expected that policies and executive orders will be in accordance with legal constraints, particularly in the many countries having laws and statutory enactments derived from English common law and Roman and French civil law.

The United Nations Food and Agriculture Organization (FAO) - Rome has been over a period of about 10 years developing "A Framework of Land Evaluation". This is being developed through international cooperation and stems from consultations with the World Bank and recognition by FAO that soils surveys as traditionally made did not meet needs in assessing agricultural

potential of the world's land resources. In this regard, the inadequacy of soil surveys in serving needs of users and some of the reasons why are eloquently presented by Dudal (1978a). In the Framework, land is being defined as the physical environment including soils, climate, relief, hydrology and vegetation. The evaluations are made in relation to specific uses with respect to specific inputs and with interdisciplinary participation of crop ecologists, agronomists, climatologists, and economists in addition to pedologists. While the evaluations of lands have been initially based on physical attributes, the developers of the framework recognize that economic and social factors need to be taken into account (Dudal, 1978b). FAO is presently exploring requirements with respect to both social and economic aspects and giving consideration to evaluation of these factors in the Framework. Incorporation of these factors into the Framework would constitute big step forward in serving Bank needs for planning irrigation projects.

The importance of having a system of irrigation suitability land classification that will utilize and integrate the contributions of all requisite disciplines, particularly economics, cannot be over emphasized. Sound planning cannot proceed in the basis of missing links.

Also, the contributions from each discipline into the classification survey need to be coordinated. As Kellogg stated about 30 years ago "It seems to me that many groups of specialists have certain contributions to make a general system of land classification. They must be mindful of their limitations and contributions of others. Each must organize his data that they may be coordinated with the data of others. To do this, each must understand the general problem and the objective of the land classification clearly, which is the only basis for successful coordination".

In advocating a system of classification for a specific use, the soil surveyor should be digging in and thinking establish how it differs and how much better it is than that of others and to the extent the user will benefit by endorsing it. Soil surveyors can be assured that the users of soil inventory information are hungry for a good product and want to know as much as possible about the product, and how it is produced, and the people and organization who produce it. Hopefully, participation by the Bank at this consultation will be construed as confirming this view and as an effort by a major user of soil survey information to seek this type of information and exchange views.

The Bank would like to be kept advised of findings and advances and looks forward to sharing experiences and views on this important work. The opportunity to participate in the consultation is appreciated.

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THE WORLD BANK: BACKGROUND 1/

Along with the International Monetary Fund (IMF), the International Bank for Reconstruction and Development (IBRD or World Bank) was founded in 1944 at the United Nations Monetary and Financial Conference of 44 governments at Bretton Woods, New Hampshire, USA. These were established as complementary, international finance institutions to meet needs of international cooperative agreements to deal with monetary and financial problems. They are intended to provide the machinery that would enable nations to work together towards world prosperity, thereby aiding political stability and fostering peace among nations.

Although the institutions have the same joint objective, their roles differ. The IMF's main concern is with monetary affairs, and IBRD's with economic development. The main activities of the Fund--the promotion of international monetary cooperation, the encouragement of expansion and balanced growth in international trade, the promotion of exchange stability, the elimination of exchange restrictions and the correction of balance of payments disequilibria--complement IBRD's efforts to promote economic growth in member countries through its loans for productive development projects. The two institutions cooperate closely on operational and analytical matters, hold joint annual meetings and are housed in neighboring buildings in Washington, D.C., USA.

Membership in IBRD is open to all members of the IMF and, by June 30, 1978, 132 countries had joined. IBRD is owned and controlled by its member governments. By a formal agreement in accordance with the United Nations (UN) Charter, it is recognized as a special agency of the UN. It began operations in June 1946.

The Bank is now a group of three institutions: IBRD, IDA (International Development Association) and IFC (International Finance Corporation). A common objective of these institutions is to help raise standards of living in developing countries by channeling financial resources from developed countries to the developing world.

1/ Based on World Bank Reports and Publications namely: World Bank/Annual Report 1978; The World Bank, December 1977; The World Bank - Questions and Answers, March 1976; World Bank - International Development Association, April 1978; The International Finance Corporation/Annual Report 1978; and The Paper by Mr. Frederick L. Hotes, World Bank Irrigation Adviser entitled: "World bank Activities in Financing International Water Resources Efforts" presented at the 1977 Annual Meeting of the University Council on Water Resources, Brookings, South Dakota, USA, July 26, 1977.

Sources of Funds

IBRD makes or guarantees loans for productive reconstruction and development projects, both from its own capital--which is provided by its member governments--and through the mobilization of private capital. IBRD's share capital is so structured that any risk involved in its operations is shared by all member governments, roughly in proportion to their economic strength. Capital subscription on June 30, 1978, aggregated the equivalent of about current US$41,016 million. Only 10% of the capital has been called and paid in; the remaining 90% is subject to call by IBRD only if and when required to meet the obligations of the Bank created by borrowing or guaranteeing loans. Thus investors, i.e. member countries who might otherwise never become involved in the financing of projects directly, are contributing to the economic growth of developing countries.

Lending operations are financed in the world capital markets, including private investors, governments and central banks. Aside from borrowings, paid-in capital subscription, and charges on its loans, IBRD has two other principal sources it can lend. Most important is the flow of repayments on previous loans. In addition, it often sells portions of its loans to other investors, chiefly commercial banks. Profit or net earnings are also used to help developing countries by placing these in reserves, which strengthen ability to borrow, and making a reserves available for lending.

To maintain the confidence of both member governments and the international finance community and, thereby, enable a continued source of funds for development, IBRD carefully appraises all aspects of projects submitted to it for financing. Thus, the planning of projects and analyses must be technically and economically sound. Studies, particularly water and land resources investigations, must be relevant and of the highest quality commensurate with objectives. IBRD also periodically reviews the execution and operation of those projects which it helps finance, and provides advice and assistance to the borrower in the attainment of project objectives.

IBRD's role as a prudent lender is directed to be in the best interests of all concerned: member governments, lenders to IBRD, and borrowers. The performance of IBRD and its borrowers in the use and repayment of the invested and borrowed capital, so far, continues to find general approval of the world financial community, as demonstrated by their continued willingness to provide needed resources to IBRD.

IBRD Loans

IBRD's charter spells out certain basic rules that govern its operations. It must lend only for productive purposes and must stimulate economic growth in the developing countries where it lends. It must pay due regard to the prospects of repayment. Each loan is made to a government or must be guaranteed by the government concerned. The use of loans cannot be restricted to purchases in any particular member country. And IBRD's decisions to lend must be based only on economic considerations.

IBRD loans generally have a grace period of 5 years and repayable over 20 years or less. They are directed towards developing countries at more advanced stages of economic and social growth. The interest rate that IBRD charges on its loans is calculated in accordance with a formula related to its cost of borrowing.

While IBRD has traditionally financed all kinds of capital infrastructure, such as roads and railways, telecommunications and ports and power facilities, its present development strategy places a greatly increased emphasis on investments that can directly affect the well being of the masses of poor people of developing countries by making them more productive and by integrating them as active partners in the developing process. This strategy is increasingly evident in the agriculture and rural development projects that IBRD and IDA help finance. It is also evident in projects for education and family planning and nutrition, and in the Bank's concern for the urban poor who benefit from projects designed to develop water supply and sewerage facilities, as well as "core" low-cost housing, and to increase the productivity of small industries.

At the same time, lending for traditional projects continues, and is being redirected to be more responsive to the new strategy of deliberately focusing on the poorest segments of society in the developing countries.

IDA

The International Development Association (IDA) was established in 1960 to provide assistance for the same purposes as IBRD, but primarily in the poorer developing countries on terms that would bear less heavily on their balance of payments than IBRD loans. IDA's assistance is, therefore, concentrated on the very poor countries--mainly those with an annual per capita gross national product of less than US$520 equivalent (in 1975 dollars). More than 50 countries are eligible under this criterion.

Membership in IDA is open to all members of IBRD, and 120 of them have joined as of June 30, 1978. The funds used by IDA, called credits to distinguish them from IBRD loans come mostly in the form of subscriptions; general replenishments from its more industrialized and developed members; special contributions by its richer members; and transfers from the net earnings of IBRD. The terms of IDA credits, which are made to governments only, are 10-year grace periods, 50-year maturities, and no interest, but an annual service charge of 0.75% on the disbursed portion of each credit. Although legally and financially distinct from IBRD, IDA is administered by the same staff.

Its standards for reviewing projects are IBRD's standards, and it lends to the same economic sectors for the same purpose as IBRD. Yet the sectoral composition of IBRD loans and IDA credits shows noteworthy differences. These differences result from the varying economic priorities of IBRD borrowers and IDA borrowers.

IFC

The International Finance Corporation (IFC) was established in 1956. Its special purpose is to promote the growth of the private sector and to assist productive private enterprises in its less-developed member countries, where such enterprises can advance economic development. IFC is an affiliate of IBRD and, as such, shares with it common objectives and policies for improving the well-being of the peoples of less-developed member countries.

Membership in IBRD is a prerequisite for membership in IFC, which totals 108 countries as of June 30, 1978. Legally and financially, IFC and IBRD are separate entities; the Corporation has its own operating and legal staff but draws upon IBRD for administration and other services. It has the same President and many of the same Executive Directors.

IFC is not limited as to the form in which it may provide financing, and its terms are flexible. Such financing normally consists of subscriptions to share-capital or long-term loans without guarantee of repayment by governments, or both. It helps mobilize other capital and technical expertise for productive ventures that contribute to economic development and meet sound investment criteria. IFC also has a responsibility to promote such ventures by identifying and bringing together investment opportunities and qualified investors.

In addition, IFC seeks to encourage the flow of private capital in the countries it assists. To this end, it supports the establishment or expansion of local capital markets and financial institutions. It also offers technical assistance to member governments in support of their efforts to create an investment climate which will encourage productive and beneficial domestic and foreign investment.

IBRD/IDA/IFC Lending

In FY78 (ending June 30, 1978), IBRD--together with its affiliates, IDA and IFC--made lending and investment commitments totaling US$8,749.1 million. One-hundred and thirty-seven IBRD loans to 46 countries totaling US$6,097.7 million. Ninety-nine IDA credits to 42 countries amounted to US$2,313.0 million. IFC made 41 investments amounting to US$338.4 million in 31 countries.

The combined IBRD and IDA lending amounted to US$8,410.7 million and was distributed by sectors, as follows:

Sector	US$ million	% of Total
Agricultural and Rural Development	3,269.7	38.9
Education	351.9	4.2
Energy	-	-
Industrial Development and Finance	909.9	10.8
Industry	391.8	4.7
Non-Project	155.0	1.8
Population and Nutrition	58.1	0.7
Power	1,146.2	13.6
Technical Assistance	20.3	0.2
Telecommunications	221.1	2.6
Tourism	50.0	0.6
Transportation	1,092.9	13.0
Urban Development	368.6	4.4
Water Supply and Sewerage	375.2	4.5
Total	8,410.7	100.0

The Bank does not fix rigid sectoral priorities; it lends on the basis of the needs of a particular country or a particular region at a particular time. The ralatively large amount lent for agriculture reflects the Bank's emphasis in recent years on agriculture development resulting in: (a) a larger proportion of total lending being donated to agriculture; (b) an increased share of agricultural lending going to the poorest countries; (c) a larger number of people benefitting from Bank-supported projects; and (d) projected increases in output by those farmers being assisted.

Assistance to small farmers to become more productive accounts for the major share of lending in this sector. The Bank considers the small farmer is a critical element as a producer of foodgrains and other food products in many major food-deficit countries. Also, improved economic and social conditions are factors of prime importance in the effort to reduce population growth rates through lower birth rates. Massive rural poverty, sustained and spurred on by an increasing rural population, limited land resources and inadequate supporting systems, is a coutinuing feature in most of the Bank's member countries. Bank programs aimed at the poverty problem include land and tenancy reform, credit, water supply systems, extension, training and research.

Approximately one third of the agricultural lending was for irrigation and drainage projects. The Bank normally finances from 30-50% of the total project costs. Hence, the loans represent a share of total project costs of more than double the figures shown. Other multilateral and bilateral sources contributed about US$3,000 million to the total project costs, with the remainder being contributed by the borrowing countries. the typical Bank-financed irrigation or drainage project can include (in addition to the

irrigation supply and distribution system) land preparation, extension and research services, rural water supply, electrification, schools, roads and health facilities, storage and marketing facilities, technical assistance and training. Some of the other agricultural projects, such as agricultural credit, include substantial amounts for irrigation facilities such as tube-wells, minor irrigation systems and improved on-farm irrigation schemes.

Operating Methods

Every project--irrespective of scope and size--financed by the Bank is considered in the light of a country's total needs, capabilities and policies. Therefore, comprehensive studies are made of the economy of the country requesting assistance. The studies include detailed analyses of individual sectors and relationships between them, which throw light on the relative importance of alternative projects in achieving the country's development goals. Chiefly, on the bases of these studies, and after consultation with the government, a program of Bank operations in the country is drawn up for a five-year period, with an updating annually. This program provides a framework for concrete proposals for action to help the country implement agreed strategy of development. Each individual project is considered within this framework. Equally, project proposals arise out of the joint efforts of government and Bank staff in their search for solutions to common problems. The project is subjected to careful analyse, and a detailed agreement is worked out with the borrower before a loan or credit is approved.

Often the Bank will recommend that consultants be hired to prepare detailed plans. Upon completion of the preparatory work, the Bank sends a staff mission to make a thorough appraisal of all aspects of the project. When agreement is reached on the details of proposed project and on financial requirements, a formal loan or credit agreement is negotiated. If this is satisfactory, the President presents the proposal to the Executive Directors, who represent all member countries, for their approval.

The approval of a loan does not end the Bank's involvement. In most cases, the borrower seeks bids on the basis of international competition for the goods and services required. The Bank releases money only as needed to meet verified expenditures on the project. Goods and services paid for by Bank loans or IDA credits may be obtained from any member country or Switzerland. The Bank pays in whatever currency is required, and the borrower repays in the currency used by the Bank.

Bank involvement continues throughout the life of the project. The borrower provides periodic progress reports, and Bank staff members visit the site from time to time, helping to anticipate and overcome difficulties and ensure that the project's intended benefits to the country are realized. This close supervision is facilitated by the fact that the borrowing country is a part owner of the Bank and shares in the control of its policies and operations. As a cooperative multinational institution, the object of the Bank is to see that each project is carried out at the least possible cost, and that it makes its full contribution to the country's development.

Technical Assistance

The provision of technical assistance, an integral part of the Bank's services to its developing member countries, has been expanding vigorously. Consultations take place between Bank staff and borrowers during project preparation and appraisal, and during country or sector reviews. Aside from this steady flow of technical information, the Bank assists its borrowers with the financing of feasibility studies, engineering, and resource surveys, and in helping build up institutions in training and the like.

Technical assistance was the exclusive purpose of one loan and two credits, for a total of US$20.3 million, during fiscal year 1978. In addition, technical assistance components were included in 151 lending operations for a total of US$230 million. Also, US$6.4 million of financing was provided by the Bank's Project Preparation Facility. The Facility makes temporary advances for studies and other forms of technical support; the borrower repays the advances by refinancing them through a Bank loan or an IDA credit for the project concerned, as soon as it becomes effective. Other forms of assistance are provided on a reimbursable basis, or under equivalent compensatory arrangements, to oil-exporting countries that do not borrow from the Bank. In FY78, this kind of assistance in the amount of US$33 million was directed to four countries.

For many years the Bank has served as executing agency for pre-investment and techncial assistance projects financed by the United Nations Development Programme (UNDP). A number of UNDP-financed, Bank-executed projects provide economic planning assistance. Typically, they call for small teams of planning advisers, supporting consultant services, and training programs for local counterpart staff. Of great significance to the developing countries is the fact that the Bank-executed, UNDP-financed projects have an operation focus that very often leads to projects suitable for Bank-financing, producing substantial investment follow-up.

The Bank maintains a staff college, the Economic Development Institute (EDI), to train officials of developing countries in the techniques of development. About 5,000 have attended EDI courses in Washington and overseas.

In addition, the Bank conducts a large, continuing program of research--both basic and applied--in virtually every aspect of development with which its members are concerned. At present, this program consists of more than 100 studies. Subjects include economic planning, agriculture and rural development, income distribution, international trade and finance, industry, labor-capital substitution, unemployment, urbanization, regional development, public utilities, transportation, financial institutions, and population and human resources.

International Cooperation

While the Bank is large in relative terms, it is only one of many institutions--national and international, public and private--that provide

financial and technical assistance to developing countries. In the public sphere alone, a dozen or more international institutions and 25 or 30 national agencies are involved in one way or another. With such a multiplicity of donors, lenders and providers of technical assistance, close cooperation and some degree of coordination are essential. Methods employed by the Bank to achieve this vary widely, depending, among other factors, on the nature and scope of each institution's program.

The largest and oldest of the Cooperative Programs concerning agriculture is that between the bank and the Food and Agriuclture Organiztion of the United Nations (FAO). During fiscal year 1978, it staffed and carried out 177 missions in 55 countries. Loans for projects prepared by the program represented about one third of the year's lending for agriculture Emphasis was on projects to benefit the rural poor and to promote close involvement of member countries in the formulation of projects.

Types of Missions

There are usually four types of Bank missions involved in generating, financing and implementing agricultural projects. The mission names are derived from the specific functions, i.e. identification, preparation, appraisal and supervision.

Identification missions go to the field to make a preliminary determination of the nature and size of potential projects and the establishment of their prima-facie priority. Preparation missions provide advice to governments on project formulation and on the planning and execution of feasibility studies. Occasionally consultants may assist these types of missions. The feasibility study may be performed by the government or by consultants from external government or international agencies or by private consultants.

Appraisal missions evaluate projects on the basis of feasibility or equivalent studies and prepare a report that provides technical, economical and financial justification of the proposed project for review by Bank management and for loan negotiations with the borrower. The appraisal report also serves as technical background and guide for project implementation. Typical types of consultants or Bank personnel used in irrigation project apraisals are: irrigation and drainage engineers, agriculturalists, agricultural economists, soil scientists, dam designers, hydrologists and financial analysts.

Supervision missions are sent during project execution, usually twice a year, to review progress in the field. Normally such missions are small and exclusively comprised of Bank staff, but occasionally a need develops for augmenting regular staff or for special expertise to review an unusual field problem. The principal role of the supervision mission is to ascertain that the project is being executed and operated as set forth in the loan documents, but borrowers frequently seek Bank advice during these phases.

The Bank has spent about US$7-8 million annually in recent years to engage the services of the individual consultants that provide special

expertise of Bank missions. In some cases, the Bank contracts with a company or an institution for the services of a specific individual expert, if this is the best way to obtain the services of the specialist. The consultant join other mission members to review in the field the project under consideration and, upon return to headquarters, is expected to prepare a complete report for his area of responsibility which can be incorporated into the mission report.

Examples of Agricultural Projects

Four examples of agricultural projects approved for IBRD and IDA assistance in FY78, that involved water and land resource studies with participation of soil scientists, are as follows:

Afghanistan: IDA - US$22 million. Some 12,000 farm families stand to benefit from a second Khanabad irrigation project, which aims to develop agriculture by rehabilitating and extending existing irrigation and drainage schemes, extending agricultural credit to farmers and by providing an efficient extension service. A malaria control program is included; so, too, is a feasibility study for a dam about 90 km above the project area. Total cost: US$28.7 million.

Indonesia: IBRD - US$140 million. Some 189,000 farm families will benefit from a 10th irrigation project designed to rehabilitate, upgrade and expand existing irrigation systems. Three construction components are included in the project, as are feasibility studies and detailed design work for a number of dams. Total cost: US$216 million.

Pakistan: IDA - US$70 million. Soil salinization will be halted and surface water deliveries increased by a project that includes canal remodeling, tubewell and drainage system construction, and credit and technical assistance to farmers living east of the Indus River in the Rahimyar Khan District of Punjab Province. Agricultural production (mainly foodgrains, seed cotton and oil seeds), employment and incomes should all increase substantially. The United Kingdom is extending a US$16 million grant, and the Kreditanstalt fur Wiederaufbau (KfW) a US$9.5 million credit, to help meet project costs.. Total cost: US$170 million.

Philippines: IBRD - US$150 million. To help finance the second stage development of a multi-purpose project on the Magat River, a loan will be made available to support a project consisting of all civil works for the main dam and appurtenant structures, reservoir area population resettlement, installed mechanical equipment and the services of consultants. Total cost: US$346 million.

ANNEX II

ACKNOWLEDGEMENTS

The author gratefully acknowledges the valuable comments and suggestions of colleagues in the Bank, namely:

George Darnell - Senior Adviser, Technical Aspects

Frederick L. Hotes - Irrigation Adviser

J. Clive Collins - Senior Agriculturist

Theodore J. Goering - Senior Agricultural Economist

(all of the Agricultural and Rural Development Department)

John C. Coulter - Scientific Adviser, Consultative Group on International Agricultural Research

George Finlinson - Irrigation Engineer, South Asia Projects Department

Jose P. Dumoulin - Irrigation Engineer, Latin America and Caribbean Projects Department

VIEWS ON LAND SELECTION

FOR

WATER AND LAND DEVELOPMENT

by

William B. Peters
Soils Specialist
Agriculture and Rural Development Department
World Bank, Washington, D.C.

A paper submitted to the Expert Consultation on Land Evaluation for Irrigation sponsored by the United Nations Food and Agriculture Organization; February 27 to March 2, 1979, Rome, Italy.

Final draft, April 1979

8-Agriculture

Pasquale Scandizzo April 24, 1979

Judith Graves

Pricing Studies

1. During the process of reflecting on guidelines for macro-pricing studies, I have come to an interesting point of view which I would like to share with you. As long as governments are committed to regulating prices, the study of pricing policy should be treated as a study of political, not neo-classical economics. This means that it is the underlying policy which matters and not the particular values assumed by a set of variables over time. Unfortunately, the Bank has traditionally emphasized numbers instead of rhetoric, and aside from the standard Marxist approach which we would certainly not opt to follow, there does not seem to be any other firmly established basis which could be used as the starting point for the political economy of pricing.

2. Undoubtedly, the evolution of a standard Bank approach to macro-pricing studies will take a considerable amount of time. At this point, I would like only to suggest a tentative framework based on the division of macro-pricing issues into three aspects, namely, specification of policy, implementation of policy and the consequences of policy.

3. Specification of the policy, such as stating that prices are designed to cover the production costs of a certain group of producers or to keep retail prices from increasing beyond a certain ceiling, need not be a straightforward task. This is not only because the real objectives pursued by the government are often obscured by political rhetoric, but also because the real objectives may often be better left unstated (such as subsidization of the middle class) or are traditionally unacceptable by Westerners (such as price stability at all costs).

4. The basis by which a policy is implemented can instrumentally affect the consequences of the policy. Even an extravagant policy, such as the subsidization of beef consumption in certain African countries, can be made considerably less extravagant by such modifications as limiting the days that cheap beef is available, reducing the quality of the subsidized beef and modernizing the marketing system. If a country is committed to uniform prices, there are ways of minimizing the adverse effects generated by the absence of transport and other differentials without actually introducing differential prices. It is interesting to note that most Eastern European countries have found a stable price level to be a desirable goal in itself, at least for key commodities, and hence have been more willing to adjust quantities than prices.

5. The major consequences of a policy and a given means of policy implementation can be defined through partial equilibrium models. Assumptions have to be specified and the various scenarios generated. However,

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only if the government defines in detail the trade-offs it is willing to make between various sets of consequences can one policy and means of implementation be selected as superior to all the others under consideration.

6. Clearly, we in CPS should play a substantial role in the shaping of pricing studies. However, we have a long way to go before we can act with any more expertise than many other intelligent, well-trained economic analysts. Hence, instead of planning to conduct a workshop, I think we should restrict our present activity to the collection and evaluation of existing studies and assistance in the preparation of ongoing and future work.

cc; G. Donaldson
W. Cuddihy

JG:vau

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S Agriculture

Mr. Graham Donaldson, Chief, AGREP April 24, 1979

Jim Goering, AGREP

Food Plans and National Plans (Mexico, Thailand and Ethiopia)

1. For the purpose of this exercise, a "general plan" is taken to mean a more or less formalized, internally-consistent, national economic development plan, including investment and production targets over the medium-term (typically 5 years) for both public and private sectors. Similarly, a "food plan" is assumed to be a formalized, medium-term document which provides detailed information on food production/consumption policies, investment and production targets and programs/projects to achieve those targets. An "agricultural sector strategy" is viewed as a more generalized policy statement which outlines in qualitative terms the major production and development objectives and the programs envisaged to achieve those objectives. It differs from national development and food plans largely in terms of its greater generality, reduced scope and absence of project content.

2. Mexico has no national development plan as defined above, although each new administration issues basic policy statements which outline development priorities and major development programs. These statements are updated periodically. Sectoral production and investment targets are indicated, although detail is generally not provided. The current government has no "food plan" in the above sense, but has stated the policy objective of self-sufficiency in basic food staples (essentially grains) by 1982. To the extent that as agricultural development strategy can be identified, it includes greater emphasis on the development of rainfed agriculture, developmnet of the agricultural potential in tropical areas and rehabilitation of irrigation projects.

3. Thailand is in its third year of the Fourth National Economic and Social Development Plan (1977-81) which includes as "strategies" (i) rapid growth of commercial agriculture to maintain export markets; and (ii) alleviation of regional disparities in income distribution. The Fourth Plan is largely indicative and does not contain a detailed set of public investment projects or specific operational guidelines. A target growth rate of 5% is indicated for agriculture. The government has no "food plan" or a well-articulated food and nutrition policy, although intervention in the rice market is designed in part to keep consumers prices low. The Division of Agricultural Economics (Ministry of Agriculture), together with an Iowa State University team, has developed a programming model of the agricultural sector which is used to some extent by RTG policy makers.

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4. The revolutionary government of Ethiopia has no national economic development plan. Basic strategies for achieving the economic and social objectives of the government were outlined in the key policy statement of April 1976, the "National Democratic Revolution Program". Other government pronouncements clearly recognize the primary importance of agriculture. Government emphasis has been on strengthening the planning framework and producing sectoral programs as dictated by short- and medium-term needs. The dominant example in agriculture is the IDA-supported Minimum Package Program to increase production on rainfed peasant farms. No formal "food plan" exists. A strategy for the agricultural sector is emerging in the "Economic Campaign" as announced in early 1979. While details are not yet available, the strategy is to increase the productivity of peasant farms, to expand output from state farms and to mount urgently-needed afforestation and soil and water conservation programs. The urgency attached by government to the economic campaign for agriculture is due in part to a growing foodgrain deficit, tentatively estimated for 1978-79 at 400-500,000 tons, equivalent to about 10% of annual grain production.

JG:ga

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S. Agriculture

Those Concerned

April 23, 1979

Graham Donaldson, Chief, AGREP

Food Plans and National Plans

1. In response to a request from Mr. Ernest Stern we are to review the national economic plans of the major food importers/EXPORTERS (see list) in the following terms:

(i) Does the country have a general plan?

(ii) Is there an agricultural sector component of such a plan?

(iii) Is there a separately stated agricultural sector strategy?

(iv) Is there a 'food plan' in any of the foregoing?

2. Individual Division members should make this review in respect of the listed countries by 10.30 a.m. Tuesday, April 24, 1979. Comments should be limited to half a page per country. If necessary consult with Country Economists.

cc: M. Yudelman

GDonaldson:mt

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Bangladesh	H. Kim
Egypt	Y. Kimaro
Ethiopia	T.J. Goering
Ghana	J. Graves
India	B. Abbai
Indonesia	G. Temple
Mozambique	Y. Kimaro
Pakistan	Y. Kimaro
Philippines	
Senegal	G. Temple
Sri Lanka	H. Kim
Viet Nam	Y. Kimaro
Yemen AR	H. Kim
Nigeria	B. Abbai
Mexico	T.J. Goering
Argentina	G. Temple
Burma	J. Graves
Thailand	T.J. Goering

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WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Assistant Directors, Agriculture

DATE: April 19, 1979

FROM: D.C. Pickering (Assistant Director, AGR/CPS)

SUBJECT: Operation and Maintenance of Irrigation Projects

1. For some time we have been concerned about the generally poor operation and maintenance (O&M) of irrigation projects which the Bank has helped finance, or is helping to finance, as well as other irrigation projects in the developing countries. This concern stems from information obtained from supervision, appraisal and completion reports, and oral communications from staff. It appears to be especially critical in countries with severe shortages of project and/or public revenues, such as Bangladesh. Inadequate O&M efforts and results occur despite the covenants appearing in all project legal documents, in which the Borrower or Project Authority agrees to maintain the work in accordance with normal engineering standards.

2. In the last issue of "Finance and Development", an article written by an IMF staffer appeared on the subject covering a wide range of project types. It is a good article. The Transportation Department of CPS has had similar concerns, and on March 12, 1979, issued an excellent report on "The Highway Maintenance Problem." Copies of the summary pages of the report are attached for perusal by you and concerned staff. While there are important differences between the specifics of highway and irrigation project maintenance, there are a remarkable number of similarities in the fundamental problems of inadequate maintenance.

3. The Irrigation Adviser believes that it may be worthwhile to consider, for some of our borrowers who have severe budgetary and personnel shortages, the feasibility of preparing a series of two or three successive five-year Irrigation Maintenance Projects on a nationwide or statewide basis, which would include equipment, training (in service, fellowships, professional and subprofessional), and cost-sharing of recurrent costs. Institution building would also be an inherent part of such projects.

4. As partial backup for such endeavors, our Economics and Policy Division intends soon to begin preparation of a background paper to set forth the economic benefits of good maintenace on irrigation projects. We are not aware of any existing writings which specifically address this question (any suggestions as to possible references will be appreciated) and believe that a demonstration of economic benefits to be gained may help convince both the borrowers and the Bank of the worth and need for good maintenance.

5. Your comments as to the feasibility and desirability of such Maintenance Projects within your Region would be appreciated.

Attachments

FLHotes:rm

cc: Messrs. van der Tak (PAS); Yudelman, Hotes, Donaldson (AGR/CPS).

THE HIGHWAY MAINTENANCE PROBLEM

Transportation Department
The World Bank
March 12, 1979

The Highway Maintenance Problem

MAJOR ISSUES

There is abundant evidence, supported by recent research, that the economic return from maintenance of existing highway infrastructure is extremely high. Yet establishing adequate maintenance has proven to be the most difficult area in highway development and the Bank's lending therefor.

The causes of poor maintenance performance are complex and interrelated:

-- Governmental authorities have erroneously viewed maintenance efforts as low priority and easily postponable so that budget allocations are often too low. (Paragraphs 2.09-11, 2.24-25, 3.06)

-- Difficulties in recruiting, training and retaining qualified and motivated staff, at both managerial and vocational levels, severely hamper maintenance activities in most countries. (Paragraphs 6.01-6.02)

-- Maintenance operations, being small scale and widely scattered, are inherently difficult to manage and prone to inefficiencies; in fact maintenance is more a managerial than an engineering problem. (Paragraphs 7.01-7.06)

-- Inadequate domestic financing mechanisms, uneven supplies of spare parts, fuel and materials, and delayed renewal of equipment frequently undermine the efficiency of operations. (Paragraphs 5.01, 5.10, 5.15)

The main steps to be taken to improve the situation are:

The Bank should broaden its efforts to disseminate information to borrowers and co-lenders on the economic priority of maintenance and foster improved attitudes and planning procedures. (Paragraphs 3.09, 4.05, 5.11-12)

The guiding principle of Bank efforts should be to develop local capacity for planning and executing comprehensive, well balanced programs with an appropriate blend of routine and periodic maintenance and capital rehabilitation and strengthening. This will imply that the Bank should:

-- Continue to seek more specific, stronger agreements with its borrowers on the financing of maintenance programs, on Action Plans to remedy operational deficiencies, and on terms of reference for technical assistance and training programs. (Paragraphs 5.23-25, 7.13-14, 9.02-03)

-- Be prepared to finance, on a declining basis, a proportion of the increments recurrent costs of an expanded maintenance program during a period of institution building in a few of the poorest countries. (Paragraphs 5.06-16)

-- Give particular attention to more effective equipment management and appropriate accounting mechanisms. (Paragraphs 5.17-21, 7.14)

-- Further increase the emphasis given to borrower's training programs and, especially, their continuity. (Paragraphs 6.02-04, 6.14-15)

Simplified management systems, emphasizing field inspection, equipment performance, and small cost improvement studies, should be encouraged. (Paragraphs 7.04-10)

Competitive tendering and contracting of maintenance activities should be considered where feasible; contractors are often more cost effective and the small scale and continuous nature of maintenance activities provides an excellent vehicle to foster local contracting industries. (Paragraphs 8.02-05, 8.12)

THE HIGHWAY MAINTENANCE PROBLEM

Table of Contents

OVERVIEW AND SUMMARY

i. Among problems in the growth of countries' highway transport systems, development of effective highway maintenance is one of the most important and the most intractable. It has increasingly come to the fore in the developing countries since the completion in the late 1960s and early 1970s of extensive additions to national trunk networks, and with the aging of earlier-built sections. Current construction of large amounts of secondary and rural roads adds to the maintenance workload. Countries are increasingly recognizing the importance of maintenance and coming to the Bank for assistance.

ii. While the Bank has long been concerned with the maintenance problem and the development of maintenance systems, its experience -- equally of projects specifically devoted to this purpose as with maintenance covenants in highway construction loans -- also shows that building up the necessary institutional capacities is much more difficult than building road networks. No maintenance development effort with which the Bank has been involved was foreseen as being more than ten years in duration. Yet none has taken less than ten years in practice.

iii. The purpose of this paper is to distill the results of the Bank's experience, and of the research that it has done over the last ten years on highway construction and maintenance economics, with a view to identifying approaches and solutions that seem to work better than others. The focus is mainly on the still unresolved problems of national highway maintenance; rural roads often require approaches mobilizing more local or regional capacities and resources, but they too can benefit from many of the measures suggested.

iv. The history of the Bank's involvement in highway maintenance is one of increasing emphasis in its highway operations on this problem area, and increasing specificity in maintenance covenants, maintenance projects and consultant terms of reference. The general conclusion of the current review is that this same trend should be further extended, in full recognition that the maintenance problem is structural and institutional. The justification for Bank financing in this area is not so much the expected physical impact of the hardware provided as the contribution such lending, and related arrangements, can make to building up the institutional framework for adequate performance of maintenance on a continuous basis.

v. Highway construction and maintenance form an integrated cycle over time that needs to be adjusted to the conditions of a particular road, its physical state and traffic growth. Earth roads need routine maintenance (i.e. operations repeated one or more times every year), such as ditch cleaning, pothole filling, grading and vegetation control. Normally it is worthwhile to construct the road to gravel standard when traffic reaches 15-40 vehicles per day. Regular routine maintenance continues to be needed, and in addition periodic maintenance (i.e. operations repeated every five to ten years) in the form of regravelling. Construction to paved standards is normally warranted at traffic volumes of 200-500

vehicles per day. Routine maintenance then includes patching of cracks, and periodic maintenance takes the form of bituminous surface dressings or seals. A further type of operation, partially substituting for maintenance but substantially improving the road, is upgrading or betterment, such as asphalt overlays and minor drainage and alignment improvements. Finally there is maintenance of the equipment used for maintenance itself.

vi. Many countries have tried to economize by adopting time-staging strategies for paving, i.e. starting with a relatively low-cost pavement and strengthening it over time as traffic grows. The Bank's research on alternative highway construction/maintenance strategies suggests that while this is theoretically the best approach, it can easily turn out much more costly (in terms of present worth of total costs) if subsequent maintenance does not reach the high standards and timeliness assumed. Vehicle loading much beyond legal limits is also widespread in developing countries, particularly on main roads, and can do severe damage to pavements. Thus new construction needs to take careful account of these risks of vehicle overloading and inadequate maintenance, while pavement underdesign in the past makes maintenance and overlays or other strengthening measures even more important than otherwise.

vii. The Bank lends in support of national or regional maintenance programs or parts of them -- such as routine maintenance systems, periodic gravel road maintenance, or equipment maintenance arrangements. One aspect of program formulation is to minimize the economic costs of each type of operation, for example emphasizing efficiently run, labor-intensive techniques where unskilled labor is plentiful. Another aspect is to get the best combination of the different operations on the various classes of road in the network, in principle carrying each activity to the point where it yields a marginal return equal to the opportunity cost of capital. To avoid low-priority operations hidden within a broader program, it is helpful to consider what amounts of which operations would be sacrificed in the event of, say, a 20% cutback in annual appropriations for maintenance operations, and what would be added with a 20% increase, and then to determine the returns to these decremental and incremental expenditures.

viii. The resultant savings in vehicle operating costs, particularly in vehicle maintenance and tire wear, are normally of overriding importance within the total returns to maintenance expenditures. These savings are estimates on the basis of road tests and user surveys regarding operating costs on roads in different condition, plus surveys and inventories of the state of the network and assessment of the improvements that different maintenance operations will bring about. Other important benefits are postponements of major expenditures that would otherwise become necessary for rehabilitation and reconstruction, and avoidance or reduction of road closures, for instance of unpaved roads in the wet season.

ix. Recent Bank experience shows that the estimated overall economic returns to proposed maintenance projects are very high, and higher than those for proposed road construction projects: an average of 40% or higher, for instance, over eight major maintenance schemes supported by loans in FY 1978, compared with an average of 24% for all the new construction for which the Bank made loans in that year. High returns seem actually to have been achieved too. Completed maintenance

projects show returns at ex-post audit that are sometimes several times the opportunity cost of capital and only very rarely beneath it, even in cases where physical achievements fell substantially short of forecasts. Basically the high returns reflect the great profitability of small expenditures to maintain the full service value obtainable from very large earlier investments in construction. But they also suggest that some shift of additional resources into maintenance would be worthwhile in many countries.

x. The broader purpose of the Bank projects is to enable this to be carried through effectively, and then sustained. The problems are generally much more than can be dealt with simply by a covenant requiring good maintenance or adequate funding. In a few countries one constraint -- such as insufficient budgetary allocations, inefficiency in use of available resources, or inadequate staff -- is clearly dominant. But in most the situation is much more complex. Budgetary allocations are insufficient in part because the Finance Ministry has low faith in the efficiency with which the funds will be spent. Existing inefficiency is often closely connected with poorly trained, motivated and organized staff, and diversion of their efforts to other works. These deficiencies result in part from inadequate incentive structures and shortage of financial resources. Yet it is not worthwhile -- and may not be politically possible -- to loosen the financial leash unless efficiency improves. In many countries there is at one and the same time both need for additional regular funding and scope for cost reduction.

xi. Capacity building is in some ways a better description of what needs to be done than institution-building, due to the narrow interpretation sometimes given the latter expression. Creation of legal and administrative structures and institutions, clarifying responsibilities for maintenance in general or particular parts of the task, is an area where the Bank projects have had the least difficulties. Such reorganizations have often been delayed, but they have usually been done. The problems have arisen more in filling out the new organizational structures with adequate staff, developing the necessary discipline and sense of responsibility, providing needed operating funds and reaching an effective day-to-day functioning on a countrywide basis.

xii. The main burden of this type of work within a Public Works Ministry is normally carried by a few key nationals -- whose dedication and leadership can often make the difference between success and failure -- and by the foreign consultants and technical assistance whose role has been vital in such advances as have been made in almost all Bank-supported maintenance projects. The consultant job in maintenance is difficult and delicate. It involves local attitudinal and cultural factors as much as technical ones. Also, a careful balance has to be maintained among the many resources assembled to perform maintenance, many of which, like attitudes and staff capacities, have to be developed gradually. The absorptive capacity for consultants and technical assistance can itself increase over time. Thus maintaining a good balance is partly a matter of foresight by the consultants assisting the program, and partly one of defining and structuring their terms of reference and the physical components of the project realistically -- in many cases phased over longer time periods than previously thought.

xiii. A central task in capacity-building, but one where the appropriate balance has been particularly difficult to achieve, is staff training. The Bank has been ahead of many other foreign assistance agencies in supporting such

training, through financing for physical facilities, training equipment, foreign trainers and overseas scholarships. It is continuing to deepen its involvement. Past programs have often been too small, too partial, too desk-dependent or too unrelated to the real starting point of existing staff. Proper planning has to be based on a comprehensive, forward-looking analysis of the prospective balance between changing skill requirements, at different levels and in different specialties, and prospective availabilities from existing sources; allowance has to be made for typical high losses of staff to the private sector. This requires an early appraisal and inventory of staff and their educational attainments, just as engineering works require collection of basic data on soils and hydrology.

xiv. To give it sufficient continuity, status and weight in broader policy making for the highway department, the whole function of training or staff-development, for all levels from senior engineers and managers to patrolmen and drivers, needs to be institutionalized. Training efforts have too often been seen as one-shot affairs, without allowance for the fact that 10% or more of the staff may need to be replaced each year due to retirements and losses to the private sector, and that remaining staff may need recycling.. Modern maintenance training programs supported by the Bank usually provide for at least brief training of between one-tenth and one-fifth of total staff above the grade of laborer each year. Most countries have by now set up training sections in their Highway Departments, but many of these need upgrading to higher administrative standing.

xv. Discontinuity of training efforts has been an unfortunate and frequent problem in the past. It would be highly desirable for the Bank to find administratively simple means for providing on a last-resort basis the small amount of financing sometimes required to sustain efforts between completion of one project and initiation of another. This could be through the Project Preparation Facility or other similar arrangement.

xvi. With reasonably efficient operations, the total amount of money required for maintenance of the highway network is not very great. Some 2%, or slightly less, of the road capital stock (replacement or updated original investment value) is generally sufficient to cover a year's requirements for routine and periodic operations as well as maintenance and renewal of the equipment involved. This seldom represents more than a fraction of annual government revenues from road users and, provided it is efficiently spent, almost immediately repays itself several-fold.

xvii. But the funds do need to be provided on a regular and timely basis, even in face of sharp budgetary fluctuations. If they are not, then the costs to the country — first in the form of extra operating costs (with a substantial foreign exchange component) for road users, and soon after in the form of claims on the public fisc for rehabilitation and reconstruction -- become much higher. New construction can be postponed during periods of financial stringency, but very little maintenance can be. Experience with automatic mechanisms, such as Road Funds, for channelling sufficient resources into road maintenance has not generally been good. The solution to the problem is more a matter of fiscal and administrative discipline and advance planning, and wider recognition of the economic importance of maintenance.

xviii. Sub-Saharan Africa faces special problems because of the sparseness of population relative to the large size of the countries and of the heavy dependence on foreign economic assistance. On the one hand, it is already devoting to road maintenance twice as high a proportion of national GDP as developing countries in other regions, while minimally adequate maintenance would require it devote 50% more, or three times as much as other countries. On the other hand, foreign assistance agencies working in the highways field have generally been prepared to cover about three times as high a proportion of the total costs of road construction (and reconstruction) as of road maintenance projects; this in turn creates some bias against maintenance under circumstances where foreign aid is such an important factor in total public expenditure allocations.

xix. The Bank's policy in financing of maintenance, in Africa as elsewhere, has generally been to lend for capital expenditures, roughly defined as those that yield benefits over a five-year period or longer. This has meant in practice that the Bank has lent readily for technical assistance and training, construction of workshops, procurement of maintenance equipment, rehabilitation of existing equipment, initial inventories of spare parts and any periodic maintenance operations, whether carried out by force account or by contract. It has thus been able to lend -- and in Africa has lent -- for a considerably higher proportion of the total costs of maintenance projects than most other aid-suppliers have normally done. On the other hand, like them, it has very seldom lent to cover any part of the operating costs of routine maintenance.

xx. The Bank's approach reflects the basic proposition that ultimate responsibility for maintenance, including in particular the recurrent costs of routine operations, should be that of the borrower. The Bank's reluctance to finance such recurrent costs has undoubtedly strengthened financial/administrative discipline, and resulted in increased Government support for these expenditures, in many countries.

xxi. But this policy has at times been in conflict with the basic capacity-building purpose of the Bank's lending for maintenance, and may to some extent have inhibited an appropriate Bank/borrower focus on building up routine maintenance capacity where this is the most critical need. Where budgetary constraints are as tight as in many sub-Saharan African countries, this stringency has sometimes led to personnel and equipment lying idle for long periods for lack of fuel, materials and spares. Also, in many countries, regular government funding is most critically needed for keeping spare parts inventories at a satisfactory level, but the short-run injections of spares sometimes financed by the Bank have not contributed substantially to a more permanent resolution of the problem.

xxii. Therefore, the focus of Bank lending should be on the overall objectives and priorities of maintenance programs and the build-up of local efforts and institutions to the most cost-effective combination of routine and periodic maintenance, equipment maintenance and renewal. Emphasis should be placed on the increase over time in the proportion of total maintenance outlays (capital as well as recurrent) financed domestically, but the particular application of Bank/IDA funds within the maintenance field would be chosen by reference to what would contribute most to strengthening the effectiveness of the maintenance institutions. In special cases (e.g. poor countries in Africa) where an expanded Government financial commitment is being asked for over a period of time, and there is

critical shortage of funds (e.g. for fuel and spare parts) the Bank should be prepared to finance a part of the incremental recurrent costs (normally on a declining share basis) over the build-up period. Financial covenants would reflect the great importance the Bank attaches to appropriate increases in Government shares over time.

xxiii. The problems of equipment accounting and charging and of finding regular domestic arrangements for keeping spare parts inventories at more adequate levels need greater emphasis in Bank policy. Autonomous equipment funds fed by hire charges from equipment users already exist in principle in many countries and have substantial potential advantages for improving the efficiency of equipment management and utilization. They can also facilitate the financing of renewals in those quite numerous better-off countries which should be able to finance equipment replacement out of their own resources. Such funds could be strengthened by use of more fully commercial accounting. This would be supported by having equipment portions of Bank highway loans on-lent by Government at harder commercial terms, as now sometimes done with lending destined for credit institutions. Phasing of Bank-financed equipment procurement over periods of years could also facilitate efficient management and eventual renewal. Arrangements for local provision of the small amounts of foreign exchange required to replenish spare parts inventories are critically important. They should be worked out to succeed any lending for initial spare parts inventories and reflected, as necessary, in maintenance financing covenants.

xxiv. Current rates of availability, utilization and productivity of maintenance equipment are very low in many countries and present a significant area for improvement in efficiency and for overall cost reduction. The use of autonomous funds fed by hire charges can help improve the accuracy of detailed recording and reporting systems, which are essential instruments of management in the equipment field. The Bank has begun to work out with some borrowers Action Plans detailing agreed measures to improve the efficiency of maintenance operations over the project period. The targetting and follow-up for such Action Plans are based in large part on the borrower's own internal management information system. Equipment performance is an aspect of maintenance which most needs pursuit in this manner, through Action Plans prepared with experienced mechanical engineering input.

xxv. Another significant way to improve maintenance efficiency and cut costs is by greater recourse to the private sector. Use of contractors can reduce the burden on scarce Government staff, and also bring lower costs as a result of competitive pressures to efficiency which it is hard to duplicate under civil service arrangements. An even flow of relatively small jobs, such as maintenance can provide, is moreover an ideal way of fostering nascent domestic contracting industry. Periodic maintenance is normally contracted out in many of the more advanced developing countries, as are specific jobs such as supply and transport of materials. Ways are now being found to contract out routine maintenance also.

xxvi. Many consultants appear to have placed excessive emphasis on elaborate management information systems, even in countries greatly lacking staff and facilities. Under these conditions the need seems to be more for a simple but highly disciplined inspection/supervision system for field operations, relying for written reporting largely on existing accounting and work-order practices, and

emphasizing regular and unexpected inspection visits by supervisors at each level to units under their charge. The focus would be on developing a shared concept of standards, and a strong sense of responsibility for keeping to those standards whatever the necessary effort. The next step would be creation of a small Organization and Methods section at headquarters, for ad hoc studies. Only at this stage, and provided that the equipment information system is already functioning without problem, should more elaborate field reporting systems be attempted.

xxvii. At later stages in development, and already in many of the Bank's borrowing countries better supplied with educated manpower, there can be more systematic collection of planning data and regular comparison of budget and plan against actual. But these systems should be built gradually and in response to need. For instance, regular traffic counts, using a proper sampling basis and with adequate checks, should be made first for roads with some 100-200 vehicles per day. Focussed on situations and types of data which provide scope for management choice, information systems can help significantly to get a more efficient allocation of resources by identifying problem sections in the network and showing up areas of operational inefficiency.

xxviii. Even then public attitudes and public interest will remain of great importance. They will affect both the resources allocated to maintenance and the standards of performance which the highway authorities will try to attain. They will also impinge on the treatment of roads by the road users themselves, for instance in regard to truck overloading, a problem that cannot usually be solved except by close cooperation between Government and trucker associations. The Bank could usefully help the growth of general road user associations and similar public-interest groups by such means as provision of comparative country statistics and general documentation. Also, the Bank should seek the cooperation and support of other lenders and aid agencies in meeting the maintenance objectives.

xxix. Even though borrowing countries have often fallen short on relevant loan covenants and project objectives, the Bank has played a useful role in the development of maintenance capacity and it has improved the quality of its assistance over time. It should continue and expand the emphasis it has been giving to road maintenance, both in assessment of countries' eligibility for further highway lending and in the composition of new projects. It should push for more specific action plans, training programs, budgeting arrangements and administrative systems. It should agree with Governments achievement targets and control mechanisms to judge and guide progress. The suggestions for strengthening the Bank's action in maintenance which emerge from this review are summarized in the final chapter of the report.

P. Agriculture 2 Rural Dev

FORM NO. 75
(9–78)

THE WORLD BANK

ROUTING SLIP	DATE: April 20, 1979

NAME	ROOM NO.
Mr. ffrench-Mullen	
Mr. Frank	
Mr. Merghoub	
Mr. Naylor	

	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	CLEARANCE		PER OUR CONVERSATION
XX	COMMENT		PER YOUR REQUEST
	FOR ACTION		PREPARE REPLY
	INFORMATION		RECOMMENDATION
	INITIAL		SIGNATURE
	NOTE AND FILE		URGENT

REMARKS:

Operation and Maintenance of Irrigation Projects

Please let me have your comments on the attached by May 18, 1979 cob.

FROM:	ROOM NO.:	EXTENSION:

only received

EMENA PROJECTS - EMPAI (156/10)
DATE RECEIVED MAY 18 1979

S Agriculture

April 17, 1979

Dr. Max K. Lowdermilk
Colorado State University
Engineering Research Center
Fort Collins, Colorado 80523

Dear Dr. Lowdermilk:

I received your letter of March 15 on April 16. I can not imagine the reason for the delay in the mail. Unfortunately Mr. Cernea is on mission and will not return until May 1. I am also leaving tomorrow to join Mr. Cernea in presenting a worksh op on monitoring and evaluation, which will be held in Nairobi next week.

Mr. Cernea, of course, has had close contact with you and would be the appropriate person to provide a short evaluation of Volume I of your study. I suggest you telephone him on May 2 concerning your needs. I note your time limitation, but unfortunately it is impossible for me to review the document.

I can, however, say that we are most appreciative of your assistance to the Bank in its sociological seminar program. The subject of your research in Pakistan has been very valuable in terms of identifying sociological constraints to the efficient use of irrigation water. Therefore, rest assured that we consider this an area of research and education which is crucial to the Bank's work in building and rehabilitating irrigation systems. Irrigation is the largest single component in all of the Bank's investments in agriculture and rural development, and we recognize the great disparities between actual water use efficiency and the potential for optimum utilization. These disparities, we believe, are most often the result of sociological constraints. We, therefore, wish you every success in moving your Ph.D. program in this direction.

Sincerely yours,

Ted J. Davis
Chief, Rural Operations Review and Support Unit

TJD:dc

cc: Messrs. Hotes, M. Cernea

APR 18 RECD

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S. Agriculture

April 17, 1979

Dr. A. El Bindari Hammad
Programme Area Leader
Primary Health Care & Rural Development
Division of Strengthening of Health Services
WHO
20 Avenue Appia
1211 Geneva, 27
SWITZERLAND

Dear Aleya:

I am very sorry that I could not arrange to come to Geneva this month. This is the "crunch period" at the Bank and even one or two days absence is very difficult. Bank staff are sometimes perceived as being not cooperative, but this is only because of the heavy work pressures under which they operate. We do, therefore, ask for understanding from our colleagues in other agencies.

I caused a computer search to be made from our Data BAnk on agriculture and rural development projects to locate those projects with a health component. The Data Bank covers those agriculture and rural development projects approved in FY74-78. There are health components in other projects, particularly in urban and population projects. These can be identified through the Office of Environmental and Health Affairs under Mr. James A. Lee. I will be looking into these other projects when time permits. From the enclosed computer lists it should be relatively easy to identify the appraisal reports which, I am sure, are in yourr library.

I also enclose the case studies from our projects in Tanzania, Mexico, and Colombia. These cases were prepared as part of our training program on institutional arrangements for implementing complex rural development projects. Therefore the write up does not focus particularly on health or indeed on any particular component but rather on the institutional problems.

If convenient, I could stop in Geneva for one or two days during the first week in July; perhaps July 4 could be a target date. I very much enjoyed seeing you again in Rome and again I apologize that my schedule would not permit an earlier visit.

Sincerely yours,

Ted J. Davis
Chief
Rural Operations Review and Support Unit

Encl: Blind cc: J. Lee

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S. Agriculture

Mr. Donald C. Pickering, Assistant Director, Gen. Agric. April 17, 1979

D. A. de Silva, Deputy Director, ADM

Desert Encroachment Research - Mr. Tim Symonds

As you will see from the attached memo to Mr. Lejeune (and accompanying folder), we have a problem in handling enquiries from the abovenamed.

Mr. Lejeune doesn't think CGIAR can be of help in this matter and suggests that I refer it to you.

I would appreciate it if AGR would review the attached materials and advise us on how to proceed. I would be grateful for an early response as several of the letters should be answered, in particular, the letter from FAO dated February 14. Mr. Roland Wood could answer any questions you may have. Many thanks.

Attachments

cc: Mr. Wood, Div. Chief, Cartography

DAdeS:nw

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S- Agriculture

April 10, 1979

Mr. L.R. Frederick
Snr. Soil Microbiologist
Tropical Soil and Water Management Div.
Office of Agriculture
Development Support Bureau
Department of State
Washington D.C. 20523

Dear Lloyd:

Thank you for your letter of March 28, 1979 concerning Biological Nitrogen Fixation. I believe that there is an important role for biological nitrogen in agricultural development technology - certainly in the long-run but also in the short-run.

While there seems no disagreement on the long-run potential, there is a great reluctance in many circles to see any substantial scope within less than a 10 year (or longer) time frame. This is difficult to understand. The extent of use and consequences of the use of legumes under foodgrain crops in Australia, South Africa and Israel are impressive. It is suffiently convincing to me to justify a search for a short-run approach, suitable for small farmers, based on inter-cropping with legumes.

The Bank has, in fact, included legume based nitrogen fixation technology in some 20 projects. These include projects in a wide range of countries - including Argentina, Chile, Uruguay, Morocco, Algeria, Spain, Ireland, Israel, Turkey, Thailand, Philippines, Papua New Guinea. From what I can gather, they have achieved acceptable levels of success in all but one case.

In my presentation to the SID meeting I drew on a paper prepared by Dr. Peter Dart which was published in "Development Digest". I include a copy for your interest.

I was very interested and impressed by the summary of present activities underway in AID. That seems to auger well for the future.

Perhaps one way in which we might cooperate toward making biological nitrogen more useful in developing countries, might be to hold a workshop

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on currently available options. Perhaps we could invite some of the technical people involved in your program, and some from the ~~Industrial~~ International Research Centers together with operational staff from USAID, the Bank, and other institutions? I will call you to discuss this further.

Best regards.

Yours sincerely,

Graham Donaldson
Chief
Economics & Policy Div.
Agriculture & Rural Development Dept.

Enc:

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S. Agriculture

April 16, 1979

Illinois Environmental
Protection Agency
2200 Churchill Road
Springfield
Illinois 60706

Dear Sirs:

In a recent issue of the Journal of Soil and Water Conservation, there was a summary of recent studies by your organization as to the financial burden soil erosion can place on society. Apparently, several related studies were performed---on highway maintenance costs; crop production losses; dredging costs for lakes and impoundements; and other items, some covered by "208 studies.

Would it be possible to obtain copies of those reports?

Very truly yours,

Frederick L. Hotes
Irrigation Adviser
Agriculture and Rural
Development Department

FLHotes:rm

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VS - Agriculture
cc. ERIO - W

Mrs. Shirley Boskey, IRD

April 16, 1979

Ted J. Davis, AGROR

Comments and Suggested Re-drafts on Draft Programme of Action for World Conference on Agrarian Reform and Rural Development

Attached are two papers: (1) a compilation of comments on the draft Plan of Action, and (2) my suggested modifications to the Draft document. The Secretariat for the World Conference on Agrarian Reform and Rural Development (WCARRD) has strongly requested that any comments specify explicitly the "suggested change in language" rather than qualitative comments. The second paper is an attempt to fulfill these requirements for specific language.

I have been in contact with Messrs. Mathiason of the UN and Havord of UNDP. They are, this week, formulating their ownaresponses. Mr. Mathiason advised me that Mr. Nehemiah, Coordinator, WCARRD, will be visiting New York on April 23 to discuss specifically the draft Plan of Action. Mr. Mathiason indicated that the Bank would be invited to the meetings in New York on that date. We should at least wholly brief Mr. Grenfell so that he can make our suggestions available during that meeting. Since I will be away in Nairobi we need to determine whether or not we need someone from my Unit to accompany Mr. Grenfell to this meeting. If so, I would suggest Mr. Ahmad from my Unit.

I will be in touch with you concerning a briefing meeting which must be held no later than Wednesday, April 18.

Attachment

TJDavis/cc

cc: Messrs. M. Yudelman, AGR; L. Christoffersen, AGR

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8 - Agriculture

April 16, 1979

Mr. Gary Morishima
Department of Natural Resources
P.O. Box 1118
Tahola, Washington 98587

Dear Gary:

I would like to thank you for the help you provided on my field trip to the Quinault Indian Nation. I was most impressed with the progress made and the approaches you and your colleagues have adopted to develop the resources of the reservation.

Enclosed is my draft report which focuses in particular on how your ideas and approaches may be applied in many of our rural development projects. Obviously in such a short paper it is not possible to do justice to all of the developments that have taken place since your involvement in the Quinault Indian Nation. I would appreciate to receive your comments and suggestions on this report and would also appreciate to receive more specific information on the development and recurrent costs of the information system you develop, particularly as they relate to the costs of the forestry and fisheries program costs. (Of course, I would appreciate to know how you resolved the power supply problem.)

Attached is also a paper on softwood prices, which you might pass on to Alan. This is the only research so far done in the Bank. I think the cover note is self explanatory.

I'm on my way to Nairobi for a regional work shop on monitoring and evaluation, that will mainly be attended by project managers and their evaluation officers. I'm sure we'll hear a lot about data processing bottlenecks....

I am looking forward to reading your reactions to this draft report on my return from Nairobi.

With kindest regards, also to your colleagues,

Sincerely yours,

Guido J. Deboeck
Rural Operations Review and Support Unit

Enclosures

GD:dc

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F338

Mr Grimshaw
S. Agriculture and Rural Dev.

The World Bank / 1818 H Street, N.W., Washington, D.C. 20433, U.S.A. • Telephone: (202) 477-1234 • Cables: INTBAFRAD

April 16, 1979

Mr. J.R. Ryder
TPR (GB) Engineers Ltd.
30A London Road
Kingston-upon-Thames
Surrey KT2 6QR
England

Dear Mr. Ryder:

Thank you for your letter of March 21 concerning your Buffalo Mini-Tractor Project, that we had already heard about from your co-Director's exchange of correspondence with Messrs. Nottidge and Knox.

Technically we have little to add to their comments, though we would be most interested to receive a copy of the NIAE Silsoe evaluation, when it has been done. It is this type of information that is useful to our project managers and their governments, with whom lies the responsibility for tendering for suitable project equipment.

As I am sure you are well aware, any "small" tractor has to compete with the lowest horsepowered of the conventional tractors, both in its work effectiveness as well as in support and after sales service. While a "small" tractor of the Buffalo type may require less capital and be more viable on a small scale, say 25 hectare farm, than a conventional tractor, the size of the initial outlay may still prompt the prospective buyer to go for a larger tractor, which may be more versatile and have a greater work capacity, as such buyers usually anticipate additional income from contract work on neighbouring farms.

I note you are selling these tractors in Zambia, where many small scale farmers in the more agriculturally advanced Southern Province have for several years been purchasing mainly second hand conventional tractors from the commercial farming sector. So your experience in this market would be revealing. In this regard, has the tractor been evaluated at the Zambian Ministry of Agriculture's Magoye Research Station near Mazabuka, which was formerly and may still be evaluating small scale agricultural machinery?

Looking at Africa as a whole, the largest market is Nigeria, and this is where we have our greatest number of ongoing and proposed agricultural projects. We are also getting involved there in minimum tillage technology for which the "small" tractor may be particularly suited. I would have thought it well worth your while to become involved with the ongoing

./...

research program that is spearheading this work at the International Institute for Tropical Agriculture at Ibadan. They have been examining a range of different equipment in their trials and their recommendations are naturally being utilized in our regional development projects in Nigeria.

We would certainly be pleased to be kept informed of the progress of your project, and wish you well in your endeavours. If the tractor proves successful, the ability to manufacture it locally that Mr. Clapperton mentions would be an added attraction to the recipient country and should assist with price competitiveness as well as after sales support.

Yours sincerely,

D. C. Pickering

Donald C. Pickering
Assistant Director
Agricultural and Rural Development

JRussell:mam
cc: Messrs. El Darwish, Knox, Nottidge, Collins, Grimshaw, Donaldson

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ERIU - WHO
✓ cc S. Agriculture

April 16, 1979

Dear Dr. Mahler:

I refer to your letter of March 15, 1979 (Ref: B13/87/3(A)-4b), inviting the World Bank to be represented at the Meeting on Infant and Young Child Feeding, being jointly organized by the World Health Organization and the United Nations Children's Fund in Geneva from October 9 to 12, 1979.

I am pleased to inform you that the Bank will be represented by Mr. Alan D. Berg, Senior Nutrition Adviser, Agriculture and Rural Development Department. It would be appreciated if documents issued in advance of the meeting could be sent to the attention of Mr. Berg, at this address.

Sincerely yours,

Callie B. Boucher
Deputy Special Representative for
United Nations Organizations

Dr. H. Mahler
Director-General
World Health Organization
1211 Geneva 27
Switzerland

Cleared in substance & cc: Mr. Berg
" " & cc: Dr. Kanagaratnam
" " & cc: Dr. Lee
cc: Mr, Burney (Geneva)

Files with incoming letter

:mmcd

S - Agriculture

April 13, 1979

Mr. P. F. Teniere-Buchot
Directeur de l"Enseignement
CEFIGRE
B.P. 13
06560 Valbonne
France

Dear Mr. Teniere-Buchot:

I wish to express my appreciation for your thoughtfulness in sending me the document of 9 February 1979 by Mme. Ehrard-Cassegrain and M. Margat, and the comments of the Group of International Experts on that document as transmitted by your letter of 21 March 1979.

I shall continue to follow the work of CEFIGRE with interest and hope to visit your headquarters at some future date, enroute to or from a Bank assignment in Europe, Africa or the Middle East.

With very best wishes for success, I am

Very truly yours,

Frederick L. Hotes
Irrigation Adviser
Agriculture and Rural
Development Department

FLHotes:rm

cc: Mr. Rovani (EWT)

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DPA - Commodities
cc. ✓ S - Agriculture

Mr. Shamsher Singh, Chief, EPDCE — April 13, 1979.

Malcolm Hale, EPDCE

Back to Office Report - FAO Intergovernmental Group Meeting on Rice, March 20-26, 1979

1. I attended as the Bank's observer the 22nd Session of the Intergovernmental Group on Rice, FAO held in Manila, Philippines, March 20-26, 1979.

2. The group, consisting of 36 country representatives, considered the current situation and outlook for rice, trends in the world rice economy, international trade guidelines, and within the context of rice, world food security. The group concluded that the tight supply/demand situation that had developed at the end of 1977 has given way to easier conditions causing trade to diminish by 13 percent. Prices are not expected to rise over the next year given the production outlook and the increase in carryover stocks, ensuring a satisfactory world food security situation.

Production, Trade and Price

3. The 1978 world paddy harvest (mainly for trade and consumption in 1979) based on individual country submissions is estimated at 375 million tons, 4 million tons (one percent) more than in the previous year and slightly above the long run trend. The further increase in output was mainly due to another very good monsoon season over most of the Far East, as well as increased irrigation, the further spread of high yielding varieties and a higher consumption of fertilizer. Most of the increase in global production was concentrated in exporting countries where total output rose by 4 million tons (2 percent). Aggregate production of importing countries also rose.

4. Export availabilities of traditional exporting countries have increased in 1979, while import requirements are down and stock levels are up due to larger crops in traditional importing countries. Consequently trade in 1979 is expected to be around 8.6 million tons--a decrease of 0.3 million tons from 1978. In such a supply/demand situation export prices are likely to remain low in the next few months, and depending on the outcome of the main Southern Hemisphere crops, may remain low all year. Individual country details on production and trade are given in the attached Appendix.

Stocks and Food Security

5. The bumper crops in 1977 led to an increase from 22 to 24 million tons in aggregate carryover stocks (excluding China and the USSR) during the seasons ending in 1978. Apart from Japan the increase was concentrated in major importing countries. In India alone, Government stocks rose from 4.4 to 6.1 million tons. Stocks were also higher in the Republic of Korea and the Philippines, whereas they fell further in Indonesia. In exporting countries, stocks were marginally higher with the larger carryover in Japan more than offsetting declines in the US and Thailand.

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6. The outlook for 1979 is for a further increase in aggregate carryover stocks (excluding China and the USSR) to about 26 million tons which would represent 16 percent of consumption. Stocks in importing countries should rise again with another increase in stocks in India, the Republic of Korea and the Philippines and a replenishment of stocks in Indonesia. In exporting countries (excluding China) stocks are also expected to rise with increases in Japan, the US and Thailand, more than offsetting another expected decline in Brazil.

7. At the estimated level of carryover stocks in 1979 the rice security situation has further improved compared with 1973-75; total rice stocks are above usual working levels. Part of the total is held by governments with established reserve stock policies or practices. In addition, stocks of other cereals are expected to rise.

8. The recent decision by the Association of South East Asian Nations (ASEAN) to set up an emergency stock scheme, marks an important precedent in international rice stock policies. Under ASEAN's emergency reserve project, members would hold a total of 50,000 tons of rice (i.e. Indonesia 12,000 tons; Malaysia 6,000 tons; the Philippines 12,000 tons; Singapore 5,000 tons; and Thailand 15,000 tons) to be used in case of natural disasters. This quantity appears to be a very small quantity that is inadequate for the stated purpose. However, the development is an important start which may form the basis for larger emergency reserves.

9. The most notable proposal emerging from the conference is one concerning an international rice agreement. This was proposed by the Philippines, a country which is in transition from a rice importer to a rice exporter and one which stands to gain from such an arrangement. While there was considerable support for the proposal and while the Secretariat was instructed to prepare documentation on the proposal for the next (23rd) Rice Meeting, it is my opinion that an agreement will not be quickly reached. The issues that kept participants from agreement in the International Arrangement (essentially the levels of bufferstocks, where they should be held, and release and accumulation price for stocks) are likely to be similar in discussions on a rice agreement.

10. Despite these positive developments, there are still some aspects which give rise to concern. First, a large part of the current and prospective stocks is concentrated in only a few countries with Japan alone holding 20 percent and India nearly one quarter of total stocks (excluding China and the USSR). While in India, stocks only amount to about 12 percent of annual rice consumption, in Japan they exceed 50 percent and are 3 million tons more than the target. Second, many developing countries have made only slow progress in building rice reserves, owing to inadequate storage capacity and lack of financial resources. Consequently, they still remain vulnerable to crop failures.

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11. Changes in national policies affecting trade in rice, were also discussed. Details are in the attached Appendix.

Attachment.

cc: Mrs. Hughes (EPD)
Messrs. Cheetham, Chung (ZPD)
Yudelman, Coering, Donaldson (AOR)
Chernick, Surki (PPR)
Senior Economists (Regions)
Chief Economists
Resident Missions

MBale:lb

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ERIU-FAO
cc. S. Agriculture

April 13, 1979

Dear Mr. Saouma:

I refer to your communication dated April 2, 1979 (Ref: G/X/CC-702-75(b)), inviting the World Bank to be represented at the Seventy-fifth Session of the FAO Council, to be held in Rome from June 11 to 22, 1979.

I am pleased to inform you that the Bank will be represented by Mr. Marius Veraart, Programming Officer/FAO and IFAD Coordinator, Agriculture and Rural Development Department. It would be appreciated if documents issued in advance of the session could be sent to the attention of Mr. Veraart, at this address.

Sincerely yours,

Callie B. Boucher
Deputy Special Representative for
United Nations Organizations

Mr. Edouard Saouma
Director-General
Food and Agriculture Organization
of the United Nations
Via delle Terme di Caracalla
00100 Rome
Italy

cc: Mr. Veraart

Files with incoming Note

:mmcd

S. Environment
cc S. Agriculture

Mr. Charles Weiss, PAS

April 11, 1979

R. Goodland, Environmental & Health Affairs RG

Microbial Technology Paper

Herewith are the brief comments you requested on Orrego's Microbe paper.

1. I find the paper comprehensive and reliable. It is a good review of this enormously wide field, so will serve as a good source, reference or support material.

2. However, what should be done with it? It could usefully be split into possibly overlapping sections to assist staff in energy, agricultural and sewage projects, and possibly others. As it stands, it is unlikely to be read in its entirety by many project staff.

3. It may be useful to extract short guidelines or notes from it on specific aspects, the addition of which you feel the Bank projects would be improved, e.g. a 2-page note on microbial insecticides for tsetse, locust, and other insect control projects.

4. More emphasis on methanol (not mainly ethanol and methane) would help decrease the waste of non-commercial forests now promoted in our projects, such as Transmigration and Amazonian land settlement scrupulous editing and thorough indexing would make the paper more useable in its present form.

cc: Dr. Lee, OEHA
Mr. Tixhon, OEHA
Mr. Overby, OEHA

RG:OMc

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S. Agriculture

Mr. George Darnell, AGR

April 10, 1979

Jim Goering, AGREP

Alternative Approaches to Land Clearing

1. Thanks for inviting me to yesterday's discussion of alternative approaches to land clearing in the context of Indonesia Transmigration. I was impressed with the very considerable reservoir of experience and expertise in the Bank on this topic, as manifested in the individuals at the meeting. I was a bit surprised, however, by the relatively small part of the discussion that was given to economic considerations in land clearing alternatives--although I recognize that these considerations may require more location-specific information than is now available for the Indonesian situation.

2. One approach to conceptualizing the economics of alternative methods of clearing has been developed by Nelson and reported as Annex 3 in the Land Settlement Issues Paper. A copy is attached. I do not know if adequate data exist to employ the model in exploring these alternatives in the Indonesian context. The Nelson model may, nevertheless, be useful in designing the evaluation system for the proposed land clearing trials.

Cc and cleared with: Mr. G. Donaldson, Chief, AGREP

Attachment

JGoering:ga

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S. Agriculture

Mr. J. C. P. Richardson, CPSVP
(through Mr. Graham Donaldson, Chief, AGREP)
G. Temple, AGREP

April 9, 1979

Time-Sharing Problems in Computerized Project Work

1. With the growing use of APAS and CBDISPLAY in agricultural project work, we are beginning to receive numerous complaints (see attachments) concerning the reliability of the Bank's time-sharing service. Project staff complain because this service fails on average once a day and sometimes as much as five times in a single day. Once the time-sharing system goes down, it may come back up in ten minutes, but it can also stay down for more than an hour. While the system is down, no work can be accomplished; analysis begun on the computer must await the return of the system.

2. This low level of reliability results in a great deal of wasted staff time as project analysts sit at terminals not knowing when the system will return. But a more serious problem concerns the risk associated with using the Bank's time-sharing system for project work. As you know, project staff often face tight deadlines and therefore cannot afford to use unreliable tools. For example, a recent appraisal mission prepared data to be processed using CBDISPLAY for its issues paper. But because the mission experienced such difficulty gaining access to the Bank's computer over a three-day period, it reverted to pencil and paper, a method which, though slow, was reliable.

3. Project analysts continue to try APAS and CBDISPLAY, and find these programs useful in project work. However, the danger now exists that the benefits of these programs will be lost as frustrated users revert to hand methods of analysis because they cannot afford the risk of depending on the Bank's time-sharing system for project work. I propose that we meet with CAD and seek their advice on the best way to improve time-sharing services provided to Bank project staff.

Attachments

cc: Messrs Yudelman, AGR
Pickering, AGR
Goering, AGR

GTemple:oh

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S. Agriculture

Mr. D.C. Pickering (AGR/CPS) April 9, 1979

J.C. Collins (AGR/CPS)

Proposal for an International Center for Soil Conservation

1. While appreciating the need to address the problems of soil degradation and erosion worldwide, I'm somewhat sceptical whether the International Center approach proposed by Prof. Hudson would be effective. I agree with his view that the need is not so much for research but for the transfer of known technology down to the farmer level. I have the impression, however, that the existing centers, while meeting a strictly research need, are far less effective with regard to dissemination of their research results---the exceptions, of course, being the IRRI and the CYMMIT work on cereal varieties. It would be interesting to know more about how Prof. Hudson would envisage solving the technology transfer problems as good ideas in this field would have a much broader application.

2. The main reason for slow acceptance of soil conservation at the farm level would seem to stem from its apparent low benefit/cost rates. Farmers are unwilling to invest when productivity is high in order to avert a possible future decline. Where lands have already deteriorated, rehabilitation requires an appreciable investment over the short term with prospects of, at best, a slow return to more normal yields. I doubt if a center will be able to change this fact of life or the farmers' attitudes to investment.

JCCollins:rm JCC

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S. Agriculture

Mr. G. F. Donaldson, Chief, AGREP

April 3, 1979

J. D. Von Pischke, AGREP

Claims in Agricultural Project Press Releases

May I please draw your attention to the wording of portions of two attached press releases selected from a recent circulation within the Division. My purpose in doing so is to suggest that we may be doing ourselves a dis-service by making certain claims, and that this dis-service may be critical given our present heightened profile and public scrutiny

Specific examples which concern me are:

> "Farm incomes in a poor region in the Yemen Arab Republic will increase threefold as a result of an agricultural project to be carried out with the assistance of a $15 million credit from the International Development Association." (Italics mine.)

> "Irrigation and drainage networks will be constructed for 3,700 ha...."

My concern is that these statements are too specific and imply that the Bank has a crystal ball or is infallible. What project economist would possibly say that with absolute certainty farm incomes will leap threefold? Likewise, is it certain that 3,700 ha will be served by the irrigation infrastructure which is certain to be constructed?

My recommendation is that statements such as these be qualified or offered as indications of intent: "Farm incomes... are expected to increase threefold....", "The project provides finance for the construction of irrigation and drainage networks designed to serve 3,700 ha....", etc. (Emphasis added.)

Allegations such as these by the Bank strike me as particularly unfortunate from the point of view of the Bank's position as a financial institution. In the American financial market, statements of this type could in certain cases constitute grounds for legal proceedings against a company and its officers and directors making such claims. In larger terms, such claims appear to me to conflict with the spirit of the times reflected in truth in advertising and product liability actions. While we

.../2

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may not be subject to these limitations on a statutory basis, there would not appear to me to be any benefit from insensitivity to certain principles on which they are based, especially since our press releases are used by the North American press, whose readers are particularly cognizant of these matters.

I would be pleased if you would consider constructive means of communicating my concern to those who prepare Bank press releases.

cc: Mr. D. Pickering, AGR

JDVon Pischke:ga

FOR IMMEDIATE RELEASE

3 AGR&P
Chief, Economic and Policy Division
D803

World Bank

1818 H Street, N.W., Washington, D.C. 20433, U.S.A. • Telephone: (202) 477-1234

IDA NEWS RELEASE NO. 79/45 March 8, 1979

IDA TO ASSIST IRRIGATION PROJECT IN YEMEN ARAB REPUBLIC

Farm incomes in a poor region in the Yemen Arab Republic will increase threefold as a result of an agricultural project to be carried out with the assistance of a $15 million credit from the International Development Association (IDA), the soft-loan affiliate of the World Bank. An inaugural credit of $3 million from the IDA-administered European Economic Community (EEC) Special Action Account will help finance the project.

To be implemented in Wadi Mawr, the project includes the construction of diversion structures in Wadi Mawr to regulate the wadi's flow to ensure its even distribution over cultivable lands, and to prevent its escape to the sea or into adjoining salt marshes in the Tihama plain. Canals will also be constructed and existing canals will be remodelled to increase the irrigated area and to improve the efficiency of the traditional irrigation system. Agricultural credit and extension services as well as plant protection and animal health services will be provided.

Some 20 tubewells will also be installed to increase the area under groundwater irrigation. A nearby state farm will be equipped and operated as a regional agricultural research, demonstration, training, and production farm. Technical assistance in management, engineering, and agricultural practices will also be provided under the project. In addition to these agricultural components, the project will provide villages in the area with safe water, and improve or construct rural roads to link them with the national road network.

The $87.6 million project seeks to accelerate modernization of agriculture in Wadi Mawr, to raise agricultural production and farm incomes, and to improve the health of people in the area. It would introduce the use of modern inputs, increase production, and encourage a shift towards the cultivation of higher value grains, cotton, fruits and vegetables. Some 53,000 residents of the wadi, about 55% of whom are in the relative poverty group, will benefit.

The IDA credit for the Third Tihama Development Project is for 50 years, including 10 years of grace. It carries no interest but has a service charge of 3/4 of 1% per annum.

Co-financing is expected from the International Fund for Agricultural Development, the Kuwait Fund for Arab Economic Development, Kreditanstalt fuer Wiederaufbau of the Federal Republic of Germany, and the Ministry of Overseas Development (U.K.).

NOTE: Money figures are expressed in U.S. dollar equivalents.

FORM NO. 1121
(5-76)

TECHNICAL DATA

PROJECT: Third Tihama Development

COUNTRY: Yemen Arab Republic

TOTAL COST: $87.6 million

IDA FINANCING: $15 million, standard IDA terms

OTHER FINANCING: Government of Yemen Arab Republic, $34.6 million; European Economic Community (EEC) Special Action Account, $3 million; other co-financing is expected from the International Fund for Agricultural Development (IFAD), and other external co-financiers.

IMPLEMENTING ORGANIZATION: Tihama Development Authority (TDA)
P. O. Box 3792
Hodeidah, Yemen Arab Republic
CABLE: ALHAIAA
Hodeidah

PROJECT DESCRIPTION: The project consists of: (a) construction of diversion structures in Wadi Mawr for regulating the Wadi's flow; (b) construction of feeder canals and remodeling of existing canals; (c) installation of about 20 tubewells; (d) provision of agricultural credit and extension, plant protection, and animal health services; (e) provision of equipment and operation of a regional agricultural research, demonstration, and production farm in Wadi Sundud; (f) construction of 148 km of gravel access roads, water supply installations for about 103 villages or groups of villages and buildings for project headquarters, extension centers, and a research farm; (g) provision of technical assistance in management, engineering, and agricultural practices.

PROCUREMENT: The procurement of civil works for canals ($16.4 million and for all IDA-financed equipment ($1 million) will be through international competitive bidding (ICB) in accordance with Bank guidelines. Items costing less than $50,000, whose aggregate value would not exceed $400,000, will be procured through local competitive bidding. A 15% preference margin of c.i.f. cost, or the prevailing customs duty, whichever is less, will be extended to local manufacturers in the evaluation of bids under ICB. Procurement under the IFAD loan will also be in accordance with Bank guidelines.

CONSULTANTS: A consultant firm will be engaged to assist TDA in the design, procurement, and construction supervision of the works and to train staff to assume responsibility for the project. A total of 460 man-months will be required for this purpose. In addition, the services of agricultural experts (340 man-months) and funds for 128 man-months of overseas training will also be provided.

ECONOMIC RATE OF RETURN: 17%

ESTIMATED COMPLETION DATE: 1984

FOR IMMEDIATE RELEASE

World Bank

1818 H Street, N.W., Washington, D.C. 20433, U.S.A. • Telephone: (202) 477-1234

IDA NEWS RELEASE NO. 79/46 March 8, 1979

MADAGASCAR RECEIVES $12 MILLION IDA CREDIT FOR AGRICULTURE

The International Development Association (IDA), the World Bank's affiliate for concessionary lending, announced today the approval of a $12 million credit to support an agricultural development project in Madagascar. This project will support the development of 3,700 hectares (ha) of new land for the production of rice and cotton and complete an irrigation system serving about 10,000 ha in the Lower Mangoky Valley.

Irrigation and drainage networks will be constructed for 3,700 ha, road infrastructure will be developed and concrete canal segments produced for tertiary and quaternary irrigation networks; detailed design studies and supervision of civil works will be carried out. The project also includes the provision of applied agricultural research for the Mangoky scheme, as well as investigational research and trials on operating problems, overseas study trips and training courses, monitoring and evaluation, and studies to prepare future projects in the Mangoky region. In addition, studies for other agricultural projects will be financed.

The project is expected to result in rice and cotton production increases of 13,000 tons and 2,000 tons, respectively, valued at $3.9 million a year. About 3,200 families or 19,000 persons will benefit directly from the project, which is expected to create new employment for 8,500 people, and raise farm incomes to an average of $800 compared with farm incomes of $220 a year on traditional farms. Six new primary schools will be constructed and some existing schools will be extended to serve migrant families settling in the project area. A new technical training school will be established, a secondary school expanded, and a dispensary enlarged to serve a larger number of people.

Measures will be taken to insure that the project development will not have an adverse environmental impact. The officials of the project implementing agency, SAMANGOKY (Development and Production Agency for the Lower Mangoky Valley), and the Ministry of Health are seeking to control schistosomiasis through treatment of infected areas.

The International Fund for Agricultural Development is providing $6.5 million to the financing of this project.

The IDA credit of $12 million is for 50 years, including 10 years of grace. It is interest free, except for a service charge of 3/4 of 1% per annum to meet IDA's administrative costs.

NOTE: Money figures are expressed in U.S. dollar equivalents.

FORM NO. 1121
(5-76)

TECHNICAL DATA

PROJECT: Mangoky Agricultural Development

COUNTRY: Democratic Republic of Madagascar

TOTAL COST: $26.4 million

IDA FINANCING: $12 million, on standard IDA terms

OTHER FINANCING: Government of Madagascar, $4.8 million; Société pour l'aménagement et la mise en valeur de la Vallée du Bas Mangoky (SAMANGOKY)/Farmers, $2.2 million; Cotton Organization/Farmers, $0.9 million; International Fund for Agricultural Development, $6.5 million.

IMPLEMENTING ORGANIZATION: SAMANGOKY c/o Ministère du Développement Rural et de Réforme Agraire, 122 Route Circulaire, Antananarivo, Madagascar

TELEX: 22339, Gouvernement
Ministère du Développement Rural et de la Réforme Agraire

PROJECT DESCRIPTION: This project will improve irrigation and agriculture in the Mangoky delta. It includes: the development of irrigation and drainage networks for 3,700 hectares (ha) and road infrastructure; development of about 3,300 ha of new land, and production of concrete canal segments for tertiary and quaternary irrigation networks; detailed design studies and supervision of civil works; incremental agricultural production costs; applied agricultural research for the Mangoky scheme; social infrastructure; investigational research and trials on operating problems, overseas study trips and training courses, monitoring and evaluation, and studies to prepare future projects for the Mangoky region; and project preparation activities for agriculture and other new development projects.

PROCUREMENT: Contracts for major civil works will be awarded following international competitive bidding in accordance with World Bank guidelines. These works will comprise extensions to the primary and secondary irrigation and drainage networks, and tertiary drainage system and road works; total value is estimated at about $7.5 million (including contingencies). On-farm developments, installation of the tertiary and quaternary irrigation networks, and manufacture of canal segments will be carried out by SAMANGOKY, on the basis of arrangements between SAMANGOKY and the government which are also satisfactory to IDA.

CONSULTANTS: The government has prepared a list of project proposals which includes promotion of several commercial/industrial crops and integrated regional development schemes; these studies will be conducted either directly by the Ministry of Rural Development and Agrarian Reform or by consultants engaged by the Ministry.

ECONOMIC RATE OF RETURN: 18%

ESTIMATED COMPLETION DATE: 1985

NRIC
S - Agriculture

Assistant Directors and Division Chiefs for
Agriculture and Rural Development
Montague Yudelman, AGR

April 2, 1979

Methodological Guidelines for Popular Participation in Project Design

One of the most difficult concepts of rural development project design is the inclusion of mechnaisms which involve project beneficiariesm in their local developmental planning process. There have been a few Bank projects which have attempted to focus squarely on this issue.

One of these is the MEXICO-PIDER Rural Development Project which is moving toward real involvement of local beneficiaries in preparing the micro-regional development plan, the investments for which are provided through the national project.

PIDER and CIDER, the research center for rural development which is the institution responsible for evaluation of the PIDER project, have developed guidelines to promote local participation, starting from assessing the sociological characteristics and economic potential of grassroot communities. The attached paper was prepared by Michael Cernea, with the assistance of Jorge Echenique (CIDER-Mexico); parts of the paper are directly summarized from the translation of CIDER documents. The guidelines contain some general principles and a step-by-step framework for engaging peasants in the programming process. We shall watch and evaluate the effectiveness of the effort.

In the meantime, I thought it of sufficient interest, that it be shared with the operating staff. Additional copies are available in RORSU.

Attachment

TJDavis:dcm

cc: Messrs: W. Baum, CPSVP; N. Ardito-Barletta, LCNVP; D. Pickering, AGR; L. Christoffersen, AGR; G. Donaldson, AGR; T.J.Davis, AGROR; M. Cernea, AGROR; F. Lethem, PAS; S. van der Meer, LCP; E. Lari, LCP; E. Lerdau, LC2

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ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

ERIL - FAO
cc S. Agriculture

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100 - ROME | Cables: FOODAGRI ROME | Telex: 61181 FOODAGRI | Telephone: 5797

Ref. G/X/CC-702-75(b)

2 April 1979

Invitation to the Seventy-Fifth Session of the FAO Council

Rome, 11-22 June 1979

The Director-General of the Food and Agriculture Organization of the United Nations has the honour to invite attendance at the Seventy-Fifth Session of the Council, which will open at FAO Headquarters, Rome, at 10.00 hours on Monday 11 June 1979.

The Provisional Agenda for the Session (CL 75/1) is attached. The Provisional Annotated Agenda will be despatched shortly. Also enclosed herewith, in accordance with the request made by the Sixtieth Session of the Council (June 1973), is a Note on the Methods of Work of the Council (G/X/CC-702-75-Appendix A), including the rules applicable to Council procedures. It is not envisaged that a Committee-of-the-Whole be established for this Session.

The Director-General would appreciate receiving as soon as possible the names, official titles and addresses of the representatives appointed to attend.

Since visas for entry into Italy are not issued on arrival, participants requiring visas should be advised to obtain them in advance from the nearest Italian Embassy or Consulate.

The President
World Bank
WASHINGTON

CL

CL 75/1
March 1979

council

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

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SEVENTY-FIFTH SESSION

Rome, 11 - 22 June 1979

PROVISIONAL AGENDA

I. INTRODUCTION - PROCEDURE OF THE SESSION

1. Adoption of the Agenda and Timetable

2. Election of Two Vice-Chairmen and Designation of Chairman and Members of Drafting Committee

3. Statement by the Director-General

II. WORLD FOOD AND AGRICULTURE SITUATION

4. Current World Food Situation

5. Report of the 4th Session of the Committee on World Food Security

III. ACTIVITIES OF FAO AND WFP

6. Report of the 5th Session of the Committee on Agriculture

7. Report of the 5th Session of the Committee on Fertilizers

8. World Food Programme:

8.1 Fourth Annual Report of the Committee on Food Aid Policies and Programmes

9. Inter-Agency Relations and Consultations on Questions of Common Interest - Including:

9.1 Recent Developments in the UN System of Interest to FAO

9.2 JIU Reports

10. Preparations for the 20th Session of the FAO Conference:

10.1 Arrangements for the Session, and Provisional Agenda

10.2 Nomination of the Chairman and Other Officers of the Conference

10.3 Date for Nominations for Independent Chairman of the Council

./.

W/G8232/c

IV. PROGRAMME, BUDGETARY, FINANCIAL AND ADMINISTRATIVE MATTERS

11. Summary Programme of Work and Budget, 1980-81

12. Report of the 36th Session of the Programme Committee, and the 43rd Session of the Finance Committee

13. Technical Cooperation Among Developing Countries

V. CONSTITUTIONAL AND LEGAL MATTERS

14. Report of the 37th Session of the CCLM

15. Other Constitutional and Legal Matters - Including:

15.1 French and Spanish Versions of the Agreement with IFAD

15.2 Change of title of the FAO Regional Office for Asia and the Far East, and of the Regional Conference for Asia and the Far East

VI. OTHER MATTERS

16. Any Other Business - Including:

16.1 Application for Membership in the Organization - Independent State of Western Samoa

16.2 Invitations to Non-Member Nations to Attend FAO Sessions

17. Date and Place of the 76th Session of the Council

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

G/X/CC-702-75 – Appendix A
March 1979

NOTE ON THE METHODS OF WORK OF THE COUNCIL

The Sixtieth Session of the Council (June 1973), having re-examined the decisions taken at its Thirty-Fifth Session (June 1961), and amended at its Forty-Third Session (October 1964), and having reviewed the recommendations of the Intergovernmental Ad Hoc Committee on the Methods of Work of the Council, set up by the Council at its Fifty-Sixth Session (June 1971), and having taken into account the detailed comments made thereon by the Council at its Fifty-Ninth Session (November 1972), adopted the following text 1/:

Functions of the Council

1. The Council should concentrate on general policy issues pertaining to the achievement of the objectives and functions, spelled out in the Preamble and Article I of the FAO Constitution.

1.1 The Council should in particular focus on those of its functions relating to the general policy of the Organization, as set out in Rule XXIV of the General Rules of the Organization (GRO), and in particular:

a) the world food and agricultural situation;
b) FAO's programme of work and budget;
c) extra-budgetary activities of the Organization, normally by means of a separate agenda item for this purpose.

1.2 The Council should periodically carry out a multidisciplinary evaluation of the activities of the Organization in each area of the Programme of Work and Budget, including the extra-budgetary activities related thereto, on the basis of reports from its appropriate subsidiary bodies.

1.3 The Council should delegate authority to the Programme and Finance Committees as might be necessary.

1.4 In reviewing the activities of its subsidiary bodies, the Council should ensure that:

a) they give the necessary attention to the matters falling within their respective mandates;

b) they do not duplicate each other's work; and

c) their discussions are not repeated in the Council, except when this is necessary to enable a decision to be reached.

1/ See CL/60/REP, paras 170 - 179 and Appendix G.

1.5 Except for the sessions which immediately follow a Conference session, the Council normally should establish a Committee-of-the-Whole to deal with administrative (including financial), constitutional and legal matters. However, on advance recommendation of the Independent Chairman, the Council may decide that such a Committee need not be established.

Facilitation of Discussion

2. The following measures should be adopted to streamline the Council's procedures, and to make the maximum use of the time at its disposal.

2.1 In addition to the provisional agenda, the Secretariat should also issue a provisional annotated agenda in which it should indicate which items are expected to be:

a) those for discussion and/or decision by the Council;

b) those for information only.

The agenda should not be splintered in such a manner as to cause overlapping of discussions.

2.2 Subject to compliance with the first sentence of Section 3 below, any Council member who wishes to open a discussion on an item presented for information only, should inform the Secretary-General as soon as possible, and in any case before the meeting at which that item is scheduled (see also para. 3.4 below).

2.3 In respect of items on which a decision is required (para. 2.1 (a) above), the Chairman, if preliminary debate indicates that there is likely to be difficulty in reaching agreement, should suspend the debate and allow for informal consultations or set up a sessional working party to examine the matter and make recommendations to the Plenary. A similar procedure should be adopted when necessary by the Chairman of the Committee-of-the-Whole, in consultation with the Chairman of the Council.

2.4 With the exception of the provisions of paragraph 2.3 above, debate on any item should normally be completed before debate on the next item begins.

Documents

3. Documents for Council sessions should be issued in sufficient time for Member Nations to examine them before the session, and in a form that shall facilitate the Council's consideration.

3.1 Unless the timing of the sessions of the bodies concerned makes it impossible, all documents (other than the summary of the proposed Programme of Work and Budget, as provided in para. 4.1 below) should be dispatched at least two months before the opening of the session in question.

3.2 Sessions of other bodies whose reports must be considered by the Council should, as far as possible, be held in sufficient time to meet the deadline in paragraph 3.1 above.

3.3 To facilitate the classification in paragraph 2.1 above, all reports of subsidiary bodies and other documents should be prefaced by a list of points requiring the Council's consideration, and where appropriate by a summary.

3.4 The points requiring the Council's decision should be divided into:

a) those where a subsidiary body has made recommendation(s) for endorsing by the Council;

b) those on which no decision has been reached, and on which a decision by the Council is required.

In respect of (a), there should be no discussion in the Council unless a member desires clarification or amendments to a subsidiary body's recommendation, in which case he should inform the Secretariat in advance of the meeting, as provided in paragraph 2.2 above.

3.5 Reports of subsidiary bodies and other documents which do not contain points requiring the Council's consideration and/or decision should be presented for information only.

3.6 Reports of subsidiary bodies should, where appropriate, include a section on FAO's extra-budgetary activities in their respective fields.

Programme of Work and Budget

4. The Council should comment more effectively on the draft Programme of Work and Budget.

4.1 A summary of the proposed Programme of Work and Budget should be circulated to Member Nations not less than three months before the opening of the first Council session in the Conference year.

4.2 Member Nations may submit comments in writing for circulation as ''limited'' documents at the beginning of the Council session. Such comments must reach the Secretariat not less than one month before the opening of the session.

4.3 The Council should discuss the summary draft Programme, taking into account the written comments of Member Nations, and should recommend to the Director-General such changes as it deems necessary.

4.4 Following the Council's discussion, the Director-General in accordance with GRO XXXVII should finalize his draft Programme of Work and Budget for presentation to the Conference. Any changes recommended by the Council, but not accepted by the Director-General should be circulated as an addendum to the draft.

Introductions

5. The summaries contained in the documents should provide adequate introductory material, and therefore oral introductions should not normally be necessary.

5.1 Secretariat introductions should be made only when important new developments have occurred since the relevant document was issued.

5.2 There should be no introductions by the Chairmen of the Programme Committee, the Finance Committee and the CCLM of their Committee's reports as a whole. At the Discretion of the Chairman of the Council, they may be invited to give introductions to major items. Where possible one introduction only should be made for items covered by the Programme and Finance Committees.

5.3 Committee Chairmen and the Secretariat should have the right of reply to the points made in the debate.

Interventions and Records

6. Lengthy and/or repetitious statements should be avoided.

6.1 Speakers should not re-state views already expressed by others, unless extended debate is required to develop a consensus. In these cases, speakers should confine themselves to indicating their agreement with a previous speaker, and not repeat what has already been said.

6.2 If observers from Member Nations not members of the Council wish to speak on any item, they should as far as possible inform the Chairman before discussion of that item begins.

6.3 Member Nations' statements should not be reproduced and circulated by the Secretariat, unless specifically decided by the Council.

6.4 Observers from international organizations may submit, before discussion of the relevant item, written statements to the Chairman, in English, French or Spanish, for circulation; oral statements (if any) should be confined to short summaries thereof.

6.5 The participants of representatives of organizations of the United Nations System in FAO sessions will continue to be governed by existing procedures and practices.

6.6 At the end of the debate on each item, the Chairman should as far as possible summarize the discussion, with a view to highlighting the main trends apparent in the debate. This summary should be taken into account by, but should not be binding on, the Drafting Committee (see para. 7.1 below).

6.7 Verbatim records shall be kept of Council Plenary meetings, but not of the meetings of the Committee-of-the-Whole.

Council Reports

7. Council reports should be as concise as possible, but include all decisions reached by the Council.

7.1 A draft report should be prepared by a Drafting Committee with Secretariat assistance.

7.2 Reports of the Council (as well as of its subsidiary bodies) should have, as far as possible, a standardized format.

7.3 Reports should carry at the beginning a list of the Council's decisions, directives and recommendations, including recommendations to the Conference of subjects for policy discussions.

7.4 Reports should provide a brief indication of the main views expressed and decisions reached on the various agenda items.

7.5 Reports should not include unsupported suggestions unless the Council has so directed.

7.6 Reports should not generally record the views of individual delegations by name. However, any Council member that so insists may have recorded in the report his reservations to any specific conclusions of the Council.

7.7 The Secretary-General should prepare, keep up to date and make available to Member Nations an Index of Decisions of the Conference and Council.

7.8 The Secretary-General should inform the Council, normally through an information document, regarding the implementation of the decisions taken at the preceding Session of the Council.

Participation

8. Every endeavour should be made to ensure effective participation at Council sessions by all members.

Adherence to the Methods of Work

9. Steps should be taken to ensure that delegates and the Secretariat are acquainted with the methods of work of the Council.

9.1 These methods of work should be printed and distributed with the provisional agenda, and should also be available to delegations during the sessions of the Council.

9.2 The Chairman should, at the beginning of each session, draw attention to these methods of work.

9.3 Appropriate sections of these methods of work should be applied to the subsidiary bodies of the Council.

ANNEX

Rules Applicable to Council Procedures

1. The main rules pertaining to the structure, functions and procedures of the Council are to be found in Article V of the FAO Constitution, in Rules XXII to XXV of the General Rules of the Organization, and in the Council's Rules of Procedure. However, other provisions of the Basic Texts of the Organization are also relevant. Therefore, a detailed list of the appropriate subject matters and relevant provisions is provide below 1/:

AGENDA	GRO XXV.7 (58); RC III (110)
AGREEMENTS AND CONVENTIONS	Const. XIV, XV (14,16); GRO XXI (47)
ALTERNATES	Const. V.1 (7)
CHAIRMAN	
- Appointment	Const. V.2 (7); GRO II.2 (c) (vii) (23); GRO X.2 (j) (30); GRO XXIII (51)
- Functions	GRO XXVI.6 (62); GRO XXVII.6 (65); RC I.2 (109)
- Nomination	GRO XXIII.1 (b) (52)
- Term of Office	GRO XXIII.1 (a) (52)
- Voting Rights	GRO XXIII.2 (52)
COMMITTEES AND COMMISSIONS	
- Sessional	GRO XXV.10 (59); RC V (111)
- Standing	Const. V.6 (8); GRO XXVI (60); GRO XXVII (63); GRO XXVIII.3 (68); GRO XXIX (69); GRO XXX (71); GRO XXXI (73); GRO XXXII (75); GRO XXXIII (78); GRO XXXIV (80)
- Other	Const. VI (8); Const. XIV.2, 3 (b) (14)
COMPETENCE OF	see FUNCTIONS
COMPOSITION	see ELECTION OF
CONVENING OF	GRO XXXVII.2 (b) (85); see also SESSIONS
CONVENTIONS	see AGREEMENTS AND CONVENTIONS
DECISIONS OF	Const. V.5 (8); see also ELECTION, PROCEDURE, VOTING
DELEGATES	see REPRESENTATIVES

1/ "Const." stands for Constitution; "GRO" for General Rules of the Organization; "RC" for Rules of Procedure of the Council; "Vol. II" for Volume II of the FAO Basic Texts. Numbers in parentheses refer to the pages in the English version of the 1978 edition of the Basic Texts.

S-Agriculture

Mr. Graham Donaldson, Chief, AGREP April 2, 1979

T. James Goering, AGREP

Participation in the International Education Workshop, Associated Colleges of Central Kansas; Back-to-Office Report.

1. Pursuant to terms of reference dated March 13, 1979, I presented the opening remarks on "Food and Nutrition Needs in Developing Countries" at the above workshop.

2. The workshop was interesting to me and, I believe, helpful to other participants, most of whom were faculty and students from the above-noted colleges. An important point for this particular audience, stressed by other speakers as well, was the limitations inherent in food aid and commercial exports in meeting the food needs of the LDC poor. Rural-oriented audiences in Kansas tend to believe that the basic solutions to the global malnutrition problem lie in that state's remarkable capacity to produce wheat at low cost!

3. An interesting discussion emerged regarding the feasibility of producing fuel alcohol from cereals. A small group of engineers and economists at Kansas State University appears to have made considerable progress in designing a small-scale solar-powered distillery which they believe can produce alcohol at a cost in the range of US$0.50/gallon. In their view, the key to the viability of the operation lies in the use of distillery by-products as livestock feeds in unprocessed form, thereby obviating the high costs of drying, packaging and transporting these by-products. In their view, it is these costs, necessitated by large-scale distillery operations, which bring into question the economic viability of grain alcohol production processes such as those in neighboring Nebraska.

cc: Messrs. M. Yudelman, Director, AGR
D. Pickering, Assistant Director, AGR

TJGoering:ga

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