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REPORT AND RECOMMENDATION OF THE PRESIDENT

TO THE EXECUTIVE BOARD ON PROPOSED

TECHNICAL ASSISTANCE GRANTS

FOR

AGRICULTURAL RESEARCH AND TRAINING

BY

CGIAR-SUPPORTED INTERNATIONAL CENTRES



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ABBREVIATIONS AND ACRONYMS

AFESD	Arab Fund for Economic and Social Development
CBSS	Community-based seed systems
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Centre for Maize and Wheat Improvement
CORAF	<i>Conférence des responsables de recherche agricole en Afrique de l'Ouest et du Centre</i>
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IITA	International Institute of Tropical Agriculture
IFPRI	International Food Policy Research Institute
IPM	Integrated Pest Management
NARES	National agricultural research and extension systems
NARS	National agricultural research systems
NGO	Non-governmental organization
PADS	Participatory Adaptive Research and Dissemination of Rice Technologies in West Africa
PEDUNE	French acronym for “Ecologically Sustainable Cowpea Plant Protection”
PRA	Participatory rural appraisal
PRB	Participatory rice breeding
PVS	Participatory varietal selection
RADORT	Research on Accelerated Diffusion Technology Programme in West Africa
RENACO	West and Central Africa Cowpea Research Network
USAID	United States Agency for International Development
WARDA	West Africa Rice Development Association



**REPORT AND RECOMMENDATION OF THE PRESIDENT OF IFAD
TO THE EXECUTIVE BOARD ON PROPOSED TECHNICAL ASSISTANCE GRANTS
FOR AGRICULTURAL RESEARCH AND TRAINING BY
CGIAR-SUPPORTED INTERNATIONAL CENTRES**

I submit the following Report and Recommendation on five proposed technical assistance (TA) grants for agricultural research and training to CGIAR-supported international centres in the amount of USD 5 370 000.

PART I - INTRODUCTION

1. This report recommends the provision of IFAD support to the research and training programmes of CGIAR-supported international centres: the International Centre for Maize and Wheat Improvement (CIMMYT), the International Centre for Agricultural Research in the Dry Areas (ICARDA), the International Centre for Research in Agroforestry (ICRAF), the International Institute of Tropical Agriculture (IITA) and the West Africa Rice Development Association (WARDA).

2. The documents of the technical assistance grants for approval by the Executive Board are contained in the annexes to this report:

- I. International Centre for Maize and Wheat Improvement (CIMMYT): Rising Demand for Maize and Intensification of Asian Upland Farming Systems: Policy Options for Productivity Enhancement, Environmental Protection and Food Security.
- II. International Centre for Agricultural Research in the Dry Areas (ICARDA): Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula – Phase II
- III. International Centre for Research in Agroforestry (ICRAF): Technical and Institutional Innovations and Implementation Support to IFAD Projects to Enhance Participatory Development of the Upland Poor in Asia
- IV. International Institute of Tropical Agriculture (IITA): Applied and Adaptive Research on Cowpea in Semi-Arid Zones of West Africa
- V. West Africa Rice Development Association (WARDA): Participatory Adaptive Research and Dissemination of Rice Technologies in West Africa

3. The objectives and the content of these applied research programmes are in line with the evolving strategic objectives of IFAD and the policy and criteria of its TA grant programme for agricultural research and training.

4. The strategic objectives of IFAD's support for technology development relate to: (a) IFAD's target groups and their household food-security strategies, specifically in remote and marginalized agro-ecological areas; (b) technologies that build on traditional knowledge systems, are gender responsive, and enhance and diversify the productive potential of resource-poor farming systems by improving productivity and addressing production bottlenecks; (c) access to productive assets (land



and water, financial services, labour and technology, including indigenous technology) and the sustainable and productive management of such resources; (d) a policy framework that provides the rural poor with an incentive to reach higher levels of productivity, thereby reducing their dependence on transfers; and (e) an institutional framework within which formal and informal, public and private-sector, local and national institutions provide services to the economically vulnerable according to their comparative advantage. Within this framework, IFAD also intends to develop commodity-based approaches to rural poverty alleviation, specifically targeting those items that are produced and consumed by the rural poor. Finally, the establishment of a consolidated network for knowledge-gathering and dissemination will enhance the Fund's capacity to establish long-term strategic linkages with its development partners and to multiply the effect of its agricultural research and training programme.

5. The TA grants proposed in this document respond to the foregoing strategic objectives. The programme to promote the sustainable intensification of maize production systems in the Asian upland farming systems focuses on objectives (a), (c) and (d) as it deals with key policy and investment opportunities for enhancing income growth and improved food security for poor maize-producing households. The programme for the Sustainable Management of Natural Resources and Improvement of Major Production Systems in the Arabian Peninsula – Phase II, which will build on the achievements of the first phase within an integrated technology-development and transfer approach, responds to objectives (a), (b), (d) and (e) as it will be structured around range/forage/livestock-based systems, with the underlying objective of the rational utilization and conservation of limited water resources, including treated sewerage wastewater, and the fragile rangelands in the region. These objectives will be supported by a capacity-building and institutional-strengthening component designed to improve participatory technology development through increased field research. The programme for Technical and Institutional Innovations and Implementation Support to IFAD Projects to Enhance Participatory Development of the Upland Poor in Asia addresses objectives (a), (b), (d) and (e), in particular, as it will involve a strategic partnership between IFAD and ICRAF to incorporate key technical and institutional agroforestry innovations into IFAD-funded loan projects in five countries of Southeast Asia through the identification, validation and dissemination of agroforestry technical innovations and institutional mechanisms to accelerate the diffusion of natural-resource-management strategies which are also economically attractive and through strengthening the capacity of communities, local and national governments and regional organizations to address these goals. The programme for Applied and Adaptive Research on Cowpea in Semi-Arid Zones of West Africa, which involves cowpea research and development in collaboration with National Agricultural Research Systems (NARS) in four West African countries, addresses strategic objectives (a), (b), (c) and (d) in aiming to increase the availability of improved varieties and integrated pest management (IPM) technologies. It will achieve this by addressing the key constraints on increasing cowpea productivity in the dry savannah zones of West Africa. It relies on a multidisciplinary research programme involving the selection and dissemination of improved cowpea varieties showing greater resistance to stress, pests and disease and the expanded availability of IPM technologies against the major pests and diseases of cowpea and through the integration of cowpea production into integrated agriculture-and-livestock-production systems in the dry savannah. The programme entitled the Participatory Adaptive Research and Dissemination of Rice Technologies in West Africa (PADS) will aim at objectives (a) through (d) by improving incomes and the nutritional well-being of rural and urban poor families by means of enhancing rice productivity and competitiveness in West Africa. This is to be accomplished through the accelerated transfer and adoption of appropriate rice technologies in upland and lowland systems using a mix of on-farm participatory research and limited on-station research. The programme will aim at the development of more stress-tolerant rice varieties for upland farming systems and more robust and higher-yielding varieties for lowland systems; the enhancement of mixed cropping in upland and lowland systems to strengthen farmer risk management and increase productivity; the development and implementation of training programmes for NARS and technical staff of non-government organizations (NGO) in



improved rice technologies and participatory techniques; and the implementation of pilot seed-multiplication schemes in selected IFAD project zones.

PART II - RECOMMENDATION

6. I recommend that the Executive Board approve the proposed technical assistance grants in terms of the following resolution:

RESOLVED: that the Fund, in order to finance, in part, the Rising Demand for Maize and Intensification of Asian Upland Farming Systems: Policy Options for Productivity Enhancement, Environmental Protection and Food Security, shall make a grant not exceeding seven hundred and fifty thousand United States dollars (USD 750 000) to the International Centre for Maize and Wheat Improvement (CIMMYT) upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board in this Report and Recommendation of the President.

FURTHER RESOLVED: that the Fund, in order to finance, in part, the Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula – Phase II, shall make a grant not exceeding nine hundred and twenty thousand United States dollars (USD 920 000) to the International Centre for Agricultural Research in the Dry Areas (ICARDA) upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board in this Report and Recommendation of the President.

FURTHER RESOLVED: that the Fund, in order to finance, in part, the Technical and Institutional Innovations and Implementation Support to IFAD Projects to Enhance Participatory Development of the Upland Poor in Asia, shall make a grant not exceeding one million one hundred thousand United States dollars (USD 1 100 000) to the International Centre for Research in Agroforestry (ICRAF) upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board in this Report and Recommendation of the President.

FURTHER RESOLVED: that the Fund, in order to finance, in part, the Applied and Adaptive Research on Cowpea in Semi-Arid Zones of West Africa, shall make a grant not exceeding one million six hundred thousand United States dollars (USD 1 600 000) to the International Institute of Tropical Agriculture (IITA) upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board in this Report and Recommendation of the President.

FURTHER RESOLVED: that the Fund, in order to finance, in part, the Participatory Adaptive Research and Dissemination of Rice Technologies in West Africa, shall make a grant not exceeding one million United States dollars (USD 1 000 000) to the West Africa Rice Development Association (WARDA) upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board in this Report and Recommendation of the President.

Fawzi H. Al-Sultan
President



**INTERNATIONAL CENTRE FOR MAIZE AND WHEAT IMPROVEMENT
(CIMMYT): RISING DEMAND FOR MAIZE AND INTENSIFICATION OF ASIAN
UPLAND FARMING SYSTEMS: POLICY OPTIONS FOR PRODUCTIVITY
ENHANCEMENT, ENVIRONMENTAL PROTECTION AND FOOD SECURITY**

I. BACKGROUND

1. Over the next 20 years, Asian policy-makers and farmers will confront unprecedented growth in the demand for maize, coupled with radical changes in the economics of maize production. Recent projections by the International Food Policy Research Institute (IFPRI) indicate that by 2020 the demand for maize in developing countries will overtake the demand for wheat and rice, with Asia accounting for 60% of the global increase in maize consumption. Throughout much of the region, rapid economic growth and accelerating urbanization are causing notable changes in food consumption patterns. The trend is most evident in Southeast and East Asia, where traditional rice diets are becoming increasingly diversified, leading to greater consumption of fruit and vegetables, as well as of bread, meat, poultry and dairy products. Growing demand for fruit and vegetables is expected, in turn, to generate an explosion in the demand for maize, which will grow from 138 million tonnes in 1993 to 243 million tonnes in 2020 (IFPRI IMPACT, 2000). China alone is expected to witness a 94% rise in demand for maize over this period. Lingering after-effects of the recent economic crisis in some of the Southeast Asian countries could lead to a temporary slowdown in the growth of demand for feed maize, but this will be more than offset by an increase in the demand for food maize. The Asian countries most affected by the crisis have experienced sharp rises in urban and rural food prices, with the result that many of the poorest of the poor have reverted to the consumption of maize as food.

2. In some Asian countries, rising domestic demand for maize could be accompanied by rising export demand. Maize exports have become increasingly competitive following recent currency devaluations, particularly in Indonesia and Thailand. This will place additional strains on domestic production capacity.

3. The projected increases in demand for maize in Asia will have significant implications not only for current farming systems and for the sustainability of agriculture in the marginal upland environments of Asia, but also for regional food security, especially among the poorest of the poor. Throughout large parts of Asia, maize is traditionally grown in the rainfed uplands, primarily to meet the subsistence needs of the poorest households. Future rapid growth in demand for maize is expected to lead to intensification in the farming of lands already under maize and to the expansion of maize cultivation into lands that are not currently farmed. Careful planning and appropriate policies developed in the near term can do much to facilitate the region's adjustment to the new maize supply-and-demand picture. In order to plan wisely, decision-makers will require comprehensive and accurate data on the current state of upland maize farming systems, as well as information about the options available for promoting sustainable improvements in maize productivity growth.

II. RATIONALE AND RELEVANCE FOR IFAD

4. The anticipated expansion in the demand for maize, whether to meet domestic food and feed requirements or to satisfy export demand, will be achieved through the intensification and commercialization of current maize production systems. The commercialization and intensification of maize production systems are most likely to be observed in areas considered to be agriculturally disadvantaged, including eastern India, the outer islands of Indonesia, the mid-hills of Nepal, the island of Mindanao in The Philippines, northern Thailand and the Central and Northern Highlands of Viet Nam.



5. Across Asia, the expansion in maize production that has occurred during the last decade has been concentrated in the marginal uplands. In all probability, future expansion in Asian maize production will take place in these same areas. The response of these areas to future growth in the demand for maize needs to be understood in terms of changes in farming systems, income growth and environmental externalities. The need for a holistic, system-wide understanding of the changes that are likely to take place is especially important given that upland regions in Asia are frequently home to the poor rural communities, many of them ethnic minorities, for whom maize is a primary food staple. The food security implications for poor households of the rise in maize demand need to be understood and addressed.

6. The main aim of the proposed programme is to promote the sustainable intensification of maize production systems in the uplands, thereby enhancing maize supplies, while ensuring income growth and improved food security for the poor households that subsist on maize. The programme will develop in-depth knowledge of upland maize-based farming systems, identify constraints on productivity growth and anticipate potential environmental consequences likely to result from intensification. It will help IFAD and Asian governments identify priority development projects for the Asian uplands, with a particular focus on projects that enhance food security while protecting the environment and reducing poverty, by promoting sustainable improvements in maize production practices. It will develop country-specific maize technology research and development plans for the uplands and promote their implementation. Finally, the programme will organize a series of policy dialogues with senior government decision-makers, with the goal of conveying information about key investment opportunities to achieve sustainable and equitable maize productivity growth in the uplands.

III. THE PROPOSED PROGRAMME

7. The programme will be implemented through a multi-country, multi-institution collaborative effort involving China, India, Indonesia, Nepal, The Philippines, Thailand and Viet Nam. Economists from these seven countries currently form part of the Asian Maize Social Sciences Working Group that is coordinated by CIMMYT and will be actively involved in the programme. Researchers from CIMMYT, IFPRI and Stanford University will provide conceptual and methodological support. Senior officials working in the NARS and/or ministries of agriculture in these countries have already expressed strong support for the programme – support that will be tapped when it comes time to present research results and hold policy dialogues. Key programme activities fall into five main categories.

8. The first set of activities centres on the characterization of maize production systems using participatory rural appraisal (PRA) techniques. At each location where PRA methods are used, the emphasis will be on eliciting the information needed to evaluate the potential for, and the constraints on, the intensification of maize production systems, to anticipate the likely consequences of intensification (e.g. declining soil fertility, soil erosion) and to identify the technological, institutional and infrastructural constraints on the sustainable enhancement of maize productivity growth. Information will also be collected regarding maize utilization patterns (food and feed), with an eye to identifying the food security risks faced by vulnerable groups within the community. The information collected using PRA methods will be supplemented with information collected through a detailed review of the available literature. Programme teams will also assemble historical maize production statistics, disaggregated by grain type, grain colour and growth habit. Data will also be collected on land-use changes, crop substitution, changes in land-holding size, etc. These secondary data will make it possible us to scale up the conclusions derived through PRA methods from the local level to the district, regional or national levels.



9. The programme will also generate detailed information about changes in land-use patterns that are currently under way in the Asian uplands and that can be expected to accelerate with the increasing intensification of maize-based production systems. The environmental pressures resulting from intensification-induced crop substitution in upland areas will be assessed using data generated through the PRAs. The objective is to provide an assessment of the likely environmental impacts of the expansion of maize production on the major upland maize growing areas across Asia. An analysis of household food budgets by income group will also be carried out to identify the rural household groups whose food security is most at risk due to rising feed maize demand and maize prices.

10. At a more aggregate level, the programme will make a special effort to assess country-specific policies within the changing global trade environment. For example, given the trends towards greater globalization and trade liberalization, macroeconomic policies (e.g. trade policy, interest rate policy, labour policy) exert a potentially strong effect on maize supply and maize prices with possible equity-related implications. The need and potential for infrastructure investments in micro-irrigation, transport, storage, and community-level seed production systems will be studied in the context of declining public-sector investment. The need for investments in adaptive research and extension efforts, including the role that could potentially be played by NGOs, will also be assessed.

11. The programme will identify and prioritize key infrastructure investment opportunities for selected upland locations. This information will be useful not only for national policy-makers, but also for IFAD country portfolio managers. A series of high-level policy dialogues will be organized involving senior government officials in the participating countries, with the goal of disseminating information on the key policy and investment options by country or region.

12. The Asian upland areas that it is planned to study through this programme include several in which IFAD currently has projects or in which it plans to have projects. CIMMYT's interests overlap with IFAD's interests in the following areas: Yunnan and Sichuan Provinces in China, Eastern and Northeastern India, the upland areas of Indonesia, particularly in Sulawesi and Kalimantan, the mid-hills of Nepal, the island of Mindanao in The Philippines, North and Northeast Thailand and the Northern and Central Highlands of Viet Nam. In each of these areas, CIMMYT will work with IFAD project managers to expand characterization and research activities to include, to the extent possible, the specific crops and objectives of existing IFAD projects. This close collaboration will help by fostering the more effective identification of priority investment opportunities. At the same time, selected IFAD staff will gain hands-on training in socio-economic characterization, ex ante and ex post impact assessment, environmental impact assessment and policy analysis.

13. During the design of this programme, IFAD will interact with CIMMYT in further developing the elements of the agronomic aspects to be covered in the research component. This will help avoid the collection of data on upland maize production systems which may be already available. IFAD wishes to follow an approach that would focus on the selection of varieties from CIMMYT's maize germ plasm for such characteristics as low total biomass (to minimize nutrient mining), good rooting characteristics (efficient at finding and taking up scarce soil nutrients), adaptation to acid soils, drought tolerance, short growing season, etc.

IV. EXPECTED OUTPUTS/EXPECTED BENEFITS

14. The major outputs of the programme will include:

- (a) Improved knowledge about Asia's upland maize farming systems, the constraints on productivity growth, and the potential environmental and equity consequences likely to result from intensification.

ANNEX I

- (b) Identification of key policy options available to Asian policy-makers in general and IFAD policy-makers and portfolio managers in particular for the sustainable intensification of maize in the uplands. Discussion of these policy options will be fostered through a series of high-level policy dialogues.
- (c) Country-specific technology research and development plans for the sustainable enhancement of maize productivity growth in the uplands in IFAD programme countries.
- (d) A network of researchers and stakeholders interested in the sustainable and equitable intensification of maize production systems in the Asian uplands.

V. IMPLEMENTATION ARRANGEMENTS

15. The programme will be implemented under the direct supervision of the director of the CIMMYT Economics Programme and coordinated by its Asia coordinator (based in Los Baños, The Philippines). Expertise in maize production technology will be provided by CIMMYT maize scientists based in CIMMYT's Regional Office in Bangkok, Thailand. In addition to technical expertise, CIMMYT will bring to the programme its strong links to NARS and its networks within Asia, especially the Asia Maize Social Sciences Working Group, and the capacity to administer the programme. IFPRI and Stanford University will provide policy-analysis input. Both these latter institutions have a long experience in conducting similar analyses in Asia. The participating NARS will contribute the services of senior economists and agronomists who have the experience and skills to implement the programme activities in their respective countries. The NARS collaborators will also have links to high-level policy-makers in their countries.

16. A startup workshop will be organized in order to define the mode of programme operation in each country and formalize the establishment of linkages and feedback mechanisms with the NARS institutions. Annual meetings will be held with all the programme participants to review the progress achieved, plan activities and implement mid-course corrections as needed.

VI. INDICATIVE PROGRAMME COSTS AND FINANCING

Cost Category	USD		
	IFAD	CIMMYT	Total
Research staff	100 000	130 000	230 000
Operating expenses	86 500	60 000	146 500
NARS collaborators	286 500	50 000	336 500
Programme network meetings	73 500	45 000	118 500
Policy dialogues	76 000	15 000	91 000
IFPRI/Stanford University	45 000	–	45 000
Overheads	82 500	–	82 500
Total	750 000	300 000	1 050 000

INTERNATIONAL CENTRE FOR AGRICULTURAL RESEARCH IN THE DRY AREAS (ICARDA): SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND IMPROVEMENT OF MAJOR PRODUCTION SYSTEMS OF THE ARABIAN PENINSULA – PHASE II

I. BACKGROUND

1. The first phase of a Programme for Strengthening Agricultural Research and Human Resource Development in the Arabian Peninsula was initiated in 1996 with financial support for three years (1997-99) from IFAD and the Arab Fund for Economic and Social Development (AFESD). The programme is coordinated by ICARDA and implemented in partnership with the NARS of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates and Yemen. Emphasis has been placed on four priority themes: (i) on-farm water-use and irrigation management; (ii) rangelands, shrubs, irrigated forages and livestock; (iii) abiotic stresses; and (iv) protected agriculture. The achievements of this phase are presented below for components (i), (ii) and (iii), for which IFAD provided financing.

2. **On-farm water-use and irrigation management component.** Most of the work has been directed towards measurements of water-use efficiency by conventional forage species under full irrigation. Preliminary results demonstrate that there is an opportunity to save water through better irrigation scheduling without adverse effects on economic performance.

3. **Rangelands, shrubs, irrigated forages and livestock component.** Activities relevant to the collection, classification and evaluation of indigenous rangeland plants and seed multiplication for further testing have been conducted. A list of 25 priority species of grasses and trees and shrubs has been drawn up. The nutritional value of five native desert grasses has been measured *in situ*. Initial results show that the nutritional value of these grasses is as high as that of the introduced forage crops. Work on the rehabilitation of rangelands has shown the important recovery potential of pasture in protected areas. Alternative methods for rehabilitating rangelands have been tested. The most promising of these methods relate to the transplanting of native shrubs in pits with initial supplementary irrigation and to reseedling using contour-furrowing or pitting to increase water infiltration.

4. **Abiotic stresses.** Work on abiotic stress has focused on the field assessment of various forage crops for their tolerance to drought, heat and salinity. Promising forages and shrubs have been screened for salinity tolerance. Promising pearl millet lines provided by International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have also been screened for tolerance to drought and heat.

II. RATIONALE FOR PHASE II

5. The results of the first phase of the programme were presented during a completion workshop held in Oman in June 1999. It was recognized then that the first phase had established a strong foundation for technology development and strengthened collaboration among countries. The aim of the second phase is to build on the achievements of the first phase within an integrated technology-development-and-transfer approach. This second phase programme is structured around two main production systems: open-field irrigated production systems and range/forage/livestock-based systems, with the underlying objective of using in a rational manner and conserving the limited water resources, including treated sewerage wastewater, and the fragile rangelands of the Arabian Peninsula. The effort would be supported by a capacity-building and institutional-strengthening component. The proposed research activities have direct linkages with the United Nations Convention to Combat



Desertification (CCD) subregional action programme for West Asia, prepared during 1999 with the assistance of the Global Mechanism.

6. Research will shift from researcher-managed on-station trials to applied and adaptive research and technology-testing in participation with the intended end-users. The programme will identify selected pilot sites within each country, where packages of the improved technologies and management practices developed through the programme will be verified at the local level. These sites will serve to demonstrate the improved systems to the farming community, as well as to national decision-makers, with a view to encouraging rapid adoption and impact.

III. PROGRAMME COMPONENTS AND EXPECTED OUTPUTS

7. The overall development objective of Phase II is the development of more productive and sustainable rangeland and irrigated production systems through the more efficient use of the natural resources of the Arabian Peninsula, in particular water and indigenous plant species. Programme components and expected outputs are presented below. Information on the outputs are to be compiled in a completion report that will include technical advisory notes (TANs) on technologies for rural poverty alleviation. The notes would be used by programme designers, implementers and extension staff in the Arabian Peninsula and in countries in which conditions are similar.

Programme components

8. **Management and utilization of various sources of irrigation water.** The specific objective is to improve water-use efficiency in open-field irrigated production systems. The expected outputs are:

- Improved knowledge about traditional systems based on renewable water resources.
- Appropriate irrigation, soil and crop management practices that promote the efficient use of water, economic benefits for water users, and yield security and stability.
- Irrigation guidelines that enhance water-use efficiency and economic yields for specific crops.
- Methods for the safe use of alternative water resources such as brackish water, treated sewerage and wastewater.
- Demonstrated and recommended packages for improving the efficiency of water use in field-level irrigation based on different cropping systems and water sources.

9. **Rangeland/forage/livestock-systems.** The specific objective is to develop integrated range/forage/livestock-production systems and management practices for rangeland rehabilitation. The expected outputs are:

- Germ plasm of indigenous and exotic forage and rangeland species with identified attributes and potential for utilization (a) in rangeland restoration or rehabilitation and (b) as alternative forage crops.
- Technical options for forage crop production in different agro-ecological zones and under different production systems.
- Technical options for the restoration and rehabilitation of degraded rangelands in different agro-ecologies.



- Livestock and rangeland management practices transferred and demonstrated in target areas and pilot sites.

10. **Capacity-building and institutional-strengthening.** The specific objectives are to strengthen national institutional and human-resource capacity and enhance the transfer of technology. The expected outputs are:

- Enhanced capabilities of national scientists and exchange of information and experiences through regional networking on problems of common interest.
- Sustainable research-management and technology-transfer systems.

IV. USERS AND BENEFICIARIES

11. The immediate users of the research results will be those involved in the national research and technology-transfer programmes of participating countries. The research outputs will help in designing national strategies for the more efficient use in agriculture of scarce water resources and for the improvement, management and conservation of rangelands. The main beneficiaries will be water and rangeland users in the region. In numerical numbers, the main beneficiaries of the programme will be the rural poor of Yemen, the poorest country in the region (gross national product (GNP) of USD 280 per capita (1998)) and a country in which the agricultural sector, despite the arid climate, has always been a major sector of the economy. The second major beneficiary group will be the rural people of Oman, a country in which agriculture still supports a significant proportion of the population. The benefits emerging from the marginal areas of the high-income Gulf countries would be of relevance to those in the low-income countries. Other beneficiaries will be those farmers in other countries in which the conditions are similar who derive their income from rangelands and irrigated field crop production. The NARS will benefit from the capacity-building and institutional strengthening associated with the programme.

V. IMPLEMENTATION ARRANGEMENTS

12. ICARDA will continue to be responsible for managing and coordinating the programme, including responsibility for financial management and donor reporting. The ICARDA regional coordinator in Dubai is responsible for all logistical and administrative organization and for liaison with national programmes. The regional steering committee formed during Phase I will be maintained during Phase II. In addition, a regional technical coordination meeting (RTCM) will be held annually in one of the seven Arabian Peninsula countries. During the meeting, scientists from the participating national institutions, donors financing the programme, ICARDA and other collaborating institutions will review the results achieved during the previous year and finalize plans for the coming growing season. IFAD's Near East and North Africa Division and the Technical Advisory Division will jointly supervise the programme.

VI. INDICATIVE PROGRAMME COSTS AND FINANCING

13. As shown in Table 1, the total cost of the programme amounts to about USD 6.39 million. The seven benefiting countries will contribute USD 1.55 million (24% of the total cost) to cover operational costs, and ICARDA will contribute USD 1.08 million (17%). Given the size of the programme and its importance, as well as its regional nature, a number of donors, including IFAD, AFESD, the Islamic Development Bank (IsDB) and the OPEC Fund, have been requested to support this second phase. As shown in Table 2, it is proposed that IFAD contribute USD 920 000 (14% of the total cost, or 24% of the requested financing), while the other donors (IsDB, AFESD and OPEC Fund) will contribute USD 2.84 million (45% of the total cost or 76% of the requested financing).

ANNEX II

**Table 1: Total Programme Cost
(USD)**

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Financing required from donors						
Personnel	323 000	335 000	347 000	152 000	156 000	1 314 000
Operational costs	234 000	119 000	89 000	75 000	65 000	582 000
Travel	68 000	68 000	68 000	48 000	48 000	300 000
Capacity-building: training, meetings and workshops	170 000	140 000	104 000	84 000	78 000	576 000
Capital equipment	236 000	162 000	64 000	20 000	20 000	502 000
Subtotal	1 031 000	824 000	672 000	379 000	367 000	3 274 000
ICARDA indirect costs	155 000	124 000	101 000	57 000	55 000	491 000
TOTAL financing required from donors	1 186 000	948 000	773 000	436 000	522 000	3 765 000
NARS contribution						1 546 000
ICARDA contribution						1 082 000
Total programme cost						6 393 000

**Table 2: Financing Plan
(USD)**

Cost Category	IFAD	ICARDA	NARS	Other Cofinanciers	Total
Personnel	600 000*	750 000	1 100 000	667 000	3 117 000
Operational costs	63 000	150 000	150 000	519 000	882 000
Travel	40 000			260 000	300 000
Capacity-building: training, meetings and workshops	50 000	82 000	96 000	526 000	754 000
Capital equipment		100 000	200 000	502 000	802 000
Production of TANs	47 000				47 000
ICARDA indirect costs	120 000			371 000	491 000
Total	920 000	1 082 000	1 546 000	2 845 000	6 393 000

* To finance the regional coordinator for eight months, the water irrigation specialist for two years and the rangeland specialist for three years.



**INTERNATIONAL CENTRE FOR RESEARCH IN AGROFORESTRY (ICRAF):
TECHNICAL AND INSTITUTIONAL INNOVATIONS AND IMPLEMENTATION
SUPPORT TO IFAD PROJECTS TO ENHANCE PARTICIPATORY DEVELOPMENT OF
THE UPLAND POOR IN ASIA**

I. BACKGROUND

1. There are 900 million hectares of watershed area in Asia above 8% slope. A large proportion of these sloping upper watershed lands are held in forest reserve and/or protected area status. About 65% of the region's rural population of 1.6 billion reside in these watersheds. This often precludes official recognition of land-use or tenure rights for farmers or local communities. The *de facto* managers of these lands are predominantly smallholder farmers in rural villages, who manage diversified interdependent enterprises, including crops, livestock and trees, in complex and variable environments in difficult terrain. They are constantly seeking more farm and grazing land to support their families, and they have profound effects on the land and water resources of both the uplands and the lowlands. Meanwhile, in downstream societies, environmental concern is increasingly focused on the perceived negative effects of land-use change in upper watersheds. The uplands are the source of water and hydro-power for the lowland populations. Their habitats are the reservoir of terrestrial biodiversity, and these areas are a key to future regional growth in agriculture and forestry.

2. There are a number of environmental indicators pointing to the need for profound change. The forest cover is receding at a rate of about 1% per year. In much of the region, forest resources are integral to upland agricultural systems as sources of fodder and other products. Regenerating forests in fallow fields often plays a vital role in replenishing the agricultural productivity of rotational shifting cultivation systems. The seriousness of soil erosion is suggested by the excessive rate of the flow of sediment deposits into the oceans from the major river systems of Southeast Asia: the rate is an order of magnitude higher than the rate associated with areas of comparable size anywhere else in the world.

II. RATIONALE AND RELEVANCE FOR IFAD

3. The search for better upland management derives from global concerns to eliminate poverty. Success will also contribute to reducing deforestation associated with climate change and the loss of biodiversity and to maintaining water flow regulation from the uplands, thereby preventing soil loss and siltation. Traditionally, watershed degradation (deforestation, erosion) has been addressed by treating the symptoms through reforestation and soil conservation. The methods used by the public sector to implement watershed management projects have tended to be top-down, whereby residents are passive recipients of external interventions, sometimes including forced relocation. There is a need to understand why degradation occurs and to address the underlying causes. Fortunately, it is now more well appreciated that smallholders can engage in farming and the management of natural forest resources in both a productive and a resource-conserving manner.

4. The development of sustainable upland farming systems that are consistent with natural resource conservation requires a different approach to problem-solving and adoption rather than the use of single technical practices that may enhance production. Land degradation can be addressed ultimately only by the users of the land. This involves reliance on complex interrelated activities. Success depends upon enhancing the inherent abilities of rural people to apply and adapt new and indigenous technologies, to involve and evolve local institutions that manage and conserve resources more effectively and to take an active role in constructive dialogue and negotiations with other stakeholders. In state forest lands and protected watersheds, success may also require reliable agreements which clearly outline responsibilities and the mechanisms to manage conflicts and assure transparency and accountability among stakeholders. In its proposed programme entitled 'Enhanced Partnership for the Future of Asia's Upland Poor', IFAD has tried to address some of these issues.



Although IFAD has already formulated and implemented projects for upland areas, they have usually focused on small-scale irrigation for foodgrain production. In contrast, the new programme focuses on regenerative agriculture and forestry, rural infrastructure development and institution building.

5. Current prescriptions for more sustainable farming systems in Asian watersheds reveal an enormous variability in conditions, and reflect a degree of technical uncertainty about the effectiveness of the solutions proposed. The direct involvement of rural people is essential in the process of identifying and applying solutions that make sense to them. The direct participation of rural people in monitoring the impact of land use on watershed services and in managing the associated conflicts among stakeholders is necessary. Often, the issues need to be tackled at a scale bigger than the individual household and jointly at community, multi-community or catchment levels. Local communities must tackle their own agricultural problems in partnership with public-sector institutions through voluntary, self-governing organizations that focus on the problem-solving resources within the community and the larger locality. The experience of Landcare Programme groups in The Philippines (over 250 groups) and in Australia (4 500 groups) suggests that such an approach can provide a means to share technical information much more efficiently, to spread the adoption of new practices, to enhance research and to foster farm and watershed planning processes.

6. The main focus of the proposed programme is to reduce poverty in upland smallholder farming communities in Southeast Asia through the identification and promotion of key technical and institutional agroforestry innovations. The proposed programme will enable IFAD and ICRAF to launch a strategic partnership to incorporate these innovations into projects covered by the Fund's Programme for the Upland Poor, particularly in Cambodia, Indonesia, Laos, The Philippines and Viet Nam.

7. The programme will define and analyse key watershed-management problems, set priorities for action and assess the impact of interventions on poverty and natural resource management in the Asian uplands. It will identify, validate and disseminate technical innovations in agroforestry that upland farmers can adopt enthusiastically, that improve productivity and income and that enhance watershed functions. The programme will assist in understanding the factors that promote (or retard) the emergence, diffusion and effective functioning of community-based, farmer-led resource-management organizations and test strategies to support these institutional innovations in order to accelerate the diffusion of appropriate technical innovations. It will assess and foster alternative approaches to the devolution and decentralization of natural resource management, identify conflict-management strategies that can be employed to improve human welfare and environmental outcomes and develop workable options to address policy problems that are major obstacles to achievement of the above objectives. Finally, it will strengthen the capacity of communities, local, provincial and national governments, and regional organizations to address sectoral goals.

III. THE PROPOSED PROGRAMME

8. ICRAF will engage in a strategic partnership with IFAD to provide technical backstopping to the Programme for the Upland Poor. The Centre will furnish a range of services and knowledge products for the projects selected for implementation under the programme. It will conduct action-research to supply technologies, institutional innovations, policy innovations and methodologies that can be used directly in programme design and in IFAD projects. It will implement a regional network to identify, test and validate improved agroforestry farming practices and conservation methods with outstanding potential to increase productivity and incomes, while enhancing and protecting watershed functions. This work will be carried out in IFAD project areas and at ICRAF's key research watersheds in the region. The programme will complement a similar programme proposed to be implemented by the International Centre on Integrated Mountain Development, which will provide implementation support for IFAD projects in six South Asian countries.



9. The programme will include research to assess the potential of technologies under the Landcare Programme, for farmers owning less than 1 ha and, in so doing, ensure that these marginal farmers fully understand the costs and benefits associated with the various adaptations of national vegetative strips. ICRAF will scout, assemble, organize and interpret indigenous knowledge that has significant utility for direct applications or promising potential for synergy with new technologies, and it will provide timely feedback to IFAD on ways in which this knowledge can be woven into the Fund's projects and shared through networks. This activity will draw upon ICRAF's extensive collaboration with institutions and national and international networks that are engaged in the development of these knowledge bases, including the Alternatives to Slash-and-Burn Programme and the ICRAF-coordinated Indigenous Fallows Management Network.

10. ICRAF will identify strategies for the devolution and decentralization of natural resource management for implementation in IFAD projects. It will review experiences with tenure policies for watershed areas and conduct pilot action-research to develop, refine and promote processes for setting policies and managing conflicts related to tenure and to the impact of land use on watershed functions in target watershed areas. ICRAF will identify successful methods of conflict management in collaboration with various interest groups, including communities and policy-makers, and disseminate these methods widely through comparative summaries, policy briefs and workshops on key issues arising from case studies and action-research. The analyses of policy problems affecting the productivity, profitability, sustainability and environmental impacts of upland land uses will assist in the identification of opportunities for intervention.

11. ICRAF will help IFAD incorporate community-based, participatory approaches in its projects so as to achieve major impacts in sustainable agriculture and natural resource management in the uplands of Asia. It will develop, test and disseminate strategies for public-sector support for community-based, farmer-led resource-management initiatives. The potential and the constraints linked with successful and promising approaches to local-government-led natural resource management will also be examined through a series of case studies in the collaborating countries. ICRAF will help IFAD and its partners take a regional approach to the analysis of current technical and institutional processes for effectively implementing participatory watershed-resource management. This work will draw upon the experience of ICRAF and its national government and non-governmental partner institutions in promoting broad-based institutional change through networks of farmer organizations and organizations involved in land-and-tree-tenure reform and conflict management.

12. ICRAF will document innovative experiences from IFAD projects and disseminate these by organizing workshops and consultations to provide feedback to policy-makers and donors for scaling-up. It will also provide feedback to IFAD on innovative initiatives in policy development for people-centred upland natural-resource management, drawing on its wide experience, demonstrated impact and strong capacity in policy research in the region. This activity will draw upon the outputs of several ongoing projects focusing on policy reform for sustainable upland development that are currently being implemented with support from other international investors. ICRAF will organize exchange visits among IFAD projects and to ICRAF research locations so that project staff and beneficiaries can exchange knowledge and assess the best practices for appropriate applications. In providing backstopping for these visits, ICRAF will benefit from its many staff and partners who are carrying out action-research in its key watersheds or who are involved in policy research along with national ministries.

13. ICRAF will support IFAD in the identification and promotion within its projects of local leadership in agriculture and agroforestry, particularly among women. Mentors will be identified in various thematic areas to provide intellectual inputs for ICRAF's work. ICRAF will analyse the level of the adoption and of the development of participatory approaches within IFAD projects and assist in the application of participatory approaches in IFAD-funded projects. This work will draw upon

ICRAF's long institutional experience in developing and employing participatory approaches in research and development in agroforestry and natural resource management.

IV. EXPECTED OUTPUTS/EXPECTED BENEFITS

14. The major outputs of the programme will include:
 - (a) The development, adaptation and reinforcement of prospective innovative land-use practices and institutional innovations that enhance the effectiveness of watershed-resource management through farmer-led organizations, local-government-led natural-resource-management bodies and watershed management networks.
 - (b) The enhancement of national capacity for research and the implementation of participatory watershed management through a variety of mechanisms.
 - (c) The establishment of linkages with the Alternatives to Slash-and-Burn System-Wide Programme, which has been highly successful in interdisciplinary work (combining biophysical and social science disciplines) and in its strong collaborative ties with national partners.
 - (d) The promotion of greater collaboration with the Managing Soil Erosion Consortium, a network of Asian countries that is a component of the CGIAR system-wide research programme on soil, water and nutrient management.

15. It is believed that the eventual outputs of this programme could be replicated in other regions and that the lessons learned could be widely shared within IFAD.

V. IMPLEMENTATION ARRANGEMENTS

16. ICRAF's Southeast Asian Regional Research Programme Office in Bogor, Indonesia, will be the executing agency for the grant, with support from ICRAF branch and field offices in Lampung, Sumatra and Mindanao and the global headquarters in Nairobi, Kenya. The programme will be implemented by a partnership involving the Southeast Asian Regional Programme of ICRAF and governmental, non-governmental and community institutions in each of the participating countries. ICRAF has agreements with a wide range of institutions in each of the countries where it is currently working in the region. New agreements will be formalized whenever it appears useful to bring additional organizations into the programme.

17. A consultative and planning workshop will be held during the first quarter of the programme to develop a mutually agreed programme of work and to determine the roles and responsibilities of the collaborating partners. The selection of research and scaling-up areas will be finalized at the meeting.

18. The regular monitoring of the programme will be documented in annual progress reports for ICRAF management and IFAD. In implementing this programme, ICRAF will coordinate its activities with, and provide feedback to, the United Nations Office for Project Services' project supervision in programme countries, so that important complementarities are generated for the effective implementation of IFAD projects. The feedback will be incorporated in agreements and in aides-mémoire for follow-up activities.

**VI. INDICATIVE PROGRAMME COSTS AND FINANCING**

Cost Category	USD				
	IFAD	ICRAF	NARES	NGOs	Total
Staff cost (incremental)	250 000	350 000	-	-	600 000
Action research/technical assistance support	300 000	200 000	100 000	75 000	675 000
Training/workshop	200 000	200 000	-	-	400 000
Operational costs	200 000	200 000	-	-	400 000
Collaborating NARS/NGOs	150 000	-	100 000	100 000	350 000
Total	1 100 000	950 000	200 000	175 000	2 425 000

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA): APPLIED AND ADAPTIVE RESEARCH ON COWPEA IN SEMI-ARID ZONES OF WEST AFRICA

I. BACKGROUND

1. It is estimated that the global area devoted to cowpea production is 12.5 million hectares, of which not less than two thirds is in West and Central Africa. Cowpea is the most important food legume in West and Central Africa. Cowpea grains contain about 25% protein and 50-67% starch. The importance of cowpea in nutrition for rural and urban consumers is high. It is environmentally friendly and has beneficial effects on soil fertility due to its good soil cover and through its decaying root and shoot residues left in fields after harvest. As a legume, cowpea is able to fix between 70 and 350 kg of nitrogen per hectare and contributes 40-80 kg of nitrogen per hectare to the soil. In addition, some cowpea varieties cause the suicidal germination of the seeds of *Striga hermonthica*, a parasitic plant which commonly infests cereals, often with devastating effects. Cowpea stalks, leaves and empty dry pods are prized as livestock fodder, and in some instances these residues are an important source of income in their own right.

2. Millions of subsistence farmers in the dry savannahs of West and Central Africa, where soils are less fertile and rainfall is limited and highly variable, practise complex intercropping techniques involving various combinations of cowpea, millet, sorghum and groundnut. In recent years, farmers in the southern part of the dry savannahs of Burkina Faso, Ghana, Mali, Nigeria and Togo have started producing soybean as both a food and a cash crop. These systems have evolved over centuries of experimentation among farmers to maximize the use of limited rainfall, minimize the risk of crop failure and ensure sustainable yields with little or no purchased inputs. Because cowpea is indigenous to the region and has evolved from the native wild types, its genetic diversity is greater than that of any other crop grown in the dry savannah.

II. RATIONALE AND RELEVANCE FOR IFAD

3. Cowpea belongs to the group of crops referred to as 'orphan crops' that are important in the farming systems of the rural poor. There is little doubt that cowpea should be classified in this way. This means that there should be a strong commitment from donors in support of research aimed at the improvement of cowpea productivity. Presently, the productivity of cowpea is low and variable due to susceptibility to various diseases, insect pests and drought. There is, however, some potential for greatly increasing the present level of productivity in cowpea. Constraints on cowpea development occur in three broad areas:

- Abiotic: unpredictable, erratic rainfall; high soil temperatures; low soil fertility; and degraded fragile soils.
- Biotic: insect pests (aphids, thrips, bruchids, pod-sucking bugs, pod borers); parasitic flowering plants; diseases induced by fungi, bacteria, viruses, nematodes; and weed infestations.
- Socio-economic: resource-poor farmers are extremely risk-averse; farmer capacity to produce inputs is limited; and input delivery systems function poorly.

4. To date, cowpea research in the region has been carried out by the West and Central Africa Cowpea Research Network (RENACO), with coordination provided by IITA. Funding was provided by the United States Agency for International Development (USAID) through the Semi-Arid Foodgrain Research and Development in Africa Project. Despite two very positive evaluations of RENACO's work which lauded its accomplishments in the face of very limited funding, USAID was forced in 1998 to abandon its support for RENACO due to major cutbacks in agency support for agriculture in general. However, USAID support for collaborative research among United States universities, IITA and selected NARS will continue through the Bean/Cowpea Cooperative Research Support Project.



5. There is also a cowpea research project that places priority on the development and dissemination of IPM technologies for cowpea. This project is being implemented by IITA and NARS and is called PEDUNE (the French acronym for 'Ecologically Sustainable Cowpea Plant Protection') and is funded by the Swiss Development Cooperation.

III. THE PROPOSED PROGRAMME

6. The key objectives of this programme are to increase the availability of improved cowpea varieties and improved cropping systems so as to reduce the major constraints (outlined above) on raising cowpea productivity in the dry savannah zones of West and Central Africa. Constraints will be addressed in a multidisciplinary fashion in order to suit technologies to the farming systems prevalent in the subregion. Where climatic conditions are appropriate, another objective will be to introduce improved soybean varieties in cropping systems, along with appropriate household-level utilization methods. Concretely, this implies a strong focus on the needs of risk-averse resource-poor farmers.

7. Proposed priority research areas will involve:

- (a) Using participatory methods, introducing and disseminating among farmers technologies such as improved cowpea varieties which show greater resistance to diseases, insects, drought, heat and parasitic weeds and which are adaptable to soils with low fertility.
- (b) Developing and disseminating to farmers improved cropping systems, integrated production packages (including IPM technologies developed by PEDUNE), with an emphasis on cowpea. However, soybean will be included where climatic and soil conditions are appropriate. This activity is aimed at maximizing the benefits of minimum inputs and reducing the level of yield losses due to pests and disease.
- (c) Improving the insect and disease resistance of adapted local or traditional cowpea varieties.
- (d) Improving the 'total' crop-livestock farming system in the dry savannahs in collaboration with the International Livestock Research Institute and ICRISAT.
- (e) Developing improved cowpea varieties which are resistant to major parasitic weeds such as *Striga gesnerioides* and *Alectra vogelii*.
- (f) Seed multiplication and the diffusion of improved cowpea and soybean varieties by NARS, farmers and groups of farmers.
- (g) Disseminating appropriate household-level soybean processing and utilization methods among interested communities.

8. The programme will not address the upstream component of these topics, but, as in the past, team members will focus on adaptive research using participatory methods with farmers. With the exception of (b) above, support will be supplied for activities that have already been initiated, albeit at very low levels due to severe funding constraints.

IV. EXPECTED OUTPUTS/EXPECTED BENEFITS

9. The implementation of the above activities by selected national research institutes, with IITA's technical backstopping and in partnership with other national collaborators (including IFAD project staff to the greatest extent possible) and farmers' groups, will result in the following outputs: (a) an expanded programme for the selection and dissemination of improved cowpea varieties with greater



resistance to abiotic stress, pests and disease. When these improved varieties are grown by farmers using the same cropping methods they have used in the past, they will boost the farmers' cowpea grain and fodder production while at least maintaining their present level of cereal production; (b) expanded availability of improved cropping systems and production packages. When the environmentally friendly technologies are implemented along with the improved varieties, grain yields will be further increased; (c) development and dissemination of improved technologies for integrating cowpea production into integrated agriculture-and-livestock production systems in the dry savannah. Farmers who implement these improved crop-livestock technologies will enjoy higher cowpea and cereal grain yields, as well as increases in milk and meat production. It is also expected that the improved farming methods will lead to improved soil fertility and ensure sustained income and well-being among rural people; and (d) dissemination of improved soybean varieties, where climatic conditions are appropriate, and of household-level utilization methods. Farm families that adopt soybean production and utilization will enjoy improved nutrition and, consequently, better health, particularly among their children.

V. IMPLEMENTATION ARRANGEMENTS

10. IITA will coordinate the implementation of the programme. It already has solid working relationships with national agricultural research and extension systems (NARES) and a number of NGOs in the region via the RENACO programme, and these will be relied upon during programme implementation. The programme will be implemented under the policy umbrella afforded by the regional research coordinating body CORAF (*Conférence des responsables de recherche agricole en Afrique de l'Ouest et du Centre*). A steering committee composed of NARS scientists, CORAF officials, IITA scientific coordinators and one IFAD representative (with observer status) will be constituted to discuss programme issues affecting the programme and to approve budgets based on annual workplans.

11. NARS in participating countries will carry the main responsibility for the day-to-day implementation of the programme. Links will be established with relevant projects and public and private-sector organizations in the subregion. Agreements will be signed between this programme and such agencies whenever necessary to ensure the efficiency and effectiveness of the cooperative effort. During design, a final decision will be taken on the countries to be included in the programme. Based on the strength of past performance under RENACO, as lead-centres on specific technical issues, Burkina Faso, Mali, Niger and Nigeria have been selected for the programme because Cameroon, Ghana and Senegal are already covered by the Bean/Cowpea Cooperative Research Support Project.

VI. INDICATIVE PROGRAMME COSTS AND FINANCING

12. The total cost of the three-year programme is estimated at USD 3.25 million. IITA will contribute USD 650 000, primarily in the form of professional and administrative staff time. NARS of the four countries and in-country collaborators will contribute USD 1.00 million. NARS will provide expertise in various disciplines, land, germ plasm, and laboratory and office space as necessary in order to facilitate programme activities. The breakdown of financing by source of funds is summarized in Table 1. IFAD's proposed contribution is USD 1.60 million, to be allocated as outlined in Table 2.

**Table 1: Financing Plan
(USD '000)**

Item	Source of Funds			Total
	IFAD	IITA	NARS and Collaborators	
Personnel costs, related expenses and staff time	390	500	500	1 390
Capital items	124	50	150	324
Research materials, equipment and operating costs	651	50	100	801
Germ plasm (in-kind)		50	200	250
NARS fellowships and training	180			180
Workshops and monitoring	60			60
Administrative support	195		50	245
Total	1 600	650	1 000	3 250

* The Swiss Development Cooperation will also be contributing USD 1.2 million over three years in ongoing support for IPM activities.

**Table 2: Proposed Budget for IFAD Funds
(USD '000)**

Item	Estimated Cost			Total
	Year 1	Year 2	Year 3	
IITA coordination	130	130	130	390
IITA technical backstopping	90	90	70	250
Subtotal	220	220	200	640
IITA overhead*	41	41	38	120
Workshops and monitoring	20	20	20	60
NARS research operations	131	135	135	401
NARS fellowships and training	20	80	80	180
NARS capital items	124			124
Subtotal	295	235	235	765
IITA overhead*	10	8	8	26
IFAD technical backstopping	16	16	16	48
Total**	582	520	497	1 600

* IITA overheads are calculated at 18.8% for coordination and technical backstopping; 3.4% for other line items (excluding IFAD technical backstopping).

** Any discrepancies in totals are due to rounding-up of figures.



WEST AFRICA RICE DEVELOPMENT ASSOCIATION (WARDA): PARTICIPATORY ADAPTIVE RESEARCH AND DISSEMINATION OF RICE TECHNOLOGIES IN WEST AFRICA

I. BACKGROUND

1. In sub-Saharan Africa, demand is growing more quickly for rice than it is for any other major food staple, and rice consumption is increasing among all social groups, including the poor. This pattern is especially pronounced in West Africa, where the substitution of rice for coarse grains and roots and tubers has led to demand growth in the range of 5.6% per annum between 1961 and 1992. As consumption has outstripped production growth, imports have risen at an annual rate of 8% since 1961 and now stand at 2.6 million tonnes annually, costing West African countries about USD 750 million.

2. In light of continued urbanization in West Africa and changes in consumer preferences, the Food and Agriculture Organization of the United Nations projects that this trend will continue, especially among the urban poor. In a number of West African countries, the share of cereal-based calories obtained from rice is larger among the poorest urban households than it is among higher income households, and rice purchases represent a greater share of the total cash expenditures of the poorest urban households. In short, rice availability and rice price levels have a direct impact on the welfare of the poorest African consumers.

3. Fortunately, in a number of countries, the potential exists to expand production in ways fully consistent with comparative advantage. This is particularly the case for rice cultivated in upland rainfed areas and in lowlands. Although comparative advantage exists through certain large Sahelian irrigation schemes such as the *Office du Niger* in Mali, experience with large-scale rice irrigation in West Africa has shown that they are very costly and have achieved only poor results. Moreover, higher proportions of relatively poor farmers can be found in the upland and lowland zones than in areas with large-scale irrigation operations.

II. RATIONALE AND RELEVANCE FOR IFAD

4. In April 1996, WARDA – with assistance from Winrock International – launched the Research on Accelerated Diffusion Technology Programme in West Africa (RADORT) with IFAD funding. The overall objective of this three-year programme was to conduct research on innovative participatory approaches to technology dissemination in rice-based farming systems. With a strong accent on the use of multidisciplinary participatory research approaches, programme outputs in the countries targeted included the identification of major constraints blocking technology dissemination; an inventory of promising rice technologies and rice development stakeholders in the various countries; improved inter-agency collaboration (national research institutes, farmers' organizations) to test new rice technologies; the evaluation and dissemination of promising rice technologies in accord with location-specific conditions; and the identification of best-practice guidelines to improve technology dissemination and acceptability.

5. Through RADORT, strong functional linkages were established between government organizations and NGOs to carry out participatory multi-location on-farm research trials and studies on innovative approaches to technology dissemination. With the full establishment of the Systems Development and Technology Transfer Programme at WARDA, in-country linkages, as well as participatory research methods, will be even more fully incorporated into the WARDA workplan.

6. While the proposed programme will build on RADORT foundations (in particular, the development of participatory farm research methods), it will be substantially different in that the focus will be squarely on technology development and dissemination, as opposed to the development of



research methods. One major priority will be to promote the expansion of rice production based on a new generation of improved varieties that combine the enhanced yield characteristics of Green Revolution Asian varieties with the stress tolerance and weed resistance of indigenous African varieties. The new crosses have the potential to double or triple current yields.

III. THE PROPOSED PROGRAMME

7. Under the PADS programme, adaptive farm-level participatory research will be carried out in four countries: Côte d'Ivoire, The Gambia, Ghana and Guinea. The overall goal of PADS is to contribute to poverty alleviation and the nutritional well-being of poor rural and urban families by enhancing rice productivity and competitiveness in West Africa through the accelerated transfer and adoption of appropriate rice technologies in upland and lowland systems. The programme purpose is to work with national and local partners jointly to develop, validate and disseminate improved rice technologies, while using participatory field-research methods.

8. The programme will comprise three key elements: (a) the evaluation, adaptation and diffusion of new technologies with farmer participation; (b) partnership formation and capacity-building among organizations and individuals; and (c) the use of a process-based approach to programme design and implementation. Guided by the results of WARDA's own research and by the findings of its collaborative research activities across the region, a range of 'best bet' technologies and approaches can be suggested *a priori* that hold particular promise for generating significant on-farm impacts. Based on assessments of local constraints and opportunities, farmers and other partners will make selections from a technical basket of technologies available from WARDA, NARS and other partners. To facilitate the implementation of a programme of widespread on-farm evaluation and to ensure the adequate scaling-up of local results, investments will be provided to strengthen partnerships and enhance the capacities of individual collaborators and their organizations. Experience shows that the effective use of a participatory partnership mode requires a flexible stepwise approach to programme design and implementation in order to develop the sense of joint ownership and sincere commitment to shared goals that is essential to successful partnership activities.

9. To ensure that the research agenda remains demand driven, the activities to be undertaken in each targeted country will be selected and developed through joint planning with the respective national research and development programmes, selected NGOs, farmer organizations and other major stakeholder groups. Participating partner organizations will be identified during a round of institutional assessments to be carried out at programme start-up. The close involvement of all partner groups in the planning phase is critical in guaranteeing that the technologies recommended for on-farm trials are based on demand and have a high probability of achieving the desired effect. Discussions on the overall structure and content of the programme in each country will take place during annual in-country workshops. During these workshops, results will be reviewed, annual workplans drafted, the responsibilities of each participating organization clarified and an implementation calendar established. Care will be taken to see that local knowledge, traditions of experimentation, and social communication networks are incorporated to benefit fully from the synergistic effects of local-external collaboration.

IV. EXPECTED OUTPUTS, EXPECTED BENEFITS

10. The implementation of the above activities by selected national research institutes, with WARDA technical backstopping and in partnership with other national collaborators (including IFAD project staff and their field-level collaborators) and farmers' groups, will result in the following outputs: the development of more stress-tolerant rice varieties for upland farming systems and more robust and higher yielding varieties for lowland systems; the enhancement of mixed-cropping upland and lowland systems to strengthen farmer risk management and increase productivity; the development and implementation of training programmes for NARS and NGO technical staff in



improved rice technologies and participatory techniques; and the implementation of pilot seed-multiplication schemes in selected IFAD project zones.

11. **PADS in the rainfed uplands.** To address the dominant constraints of the multiple biotic and abiotic stresses endemic to upland rice systems, established participatory approaches will be used in the on-farm demonstration, evaluation and adaptation of ‘best-bet’ low-cost technical options, including:

- Participatory rice breeding (PRB) with farmers and national research partners to accelerate the development of the next generation of hearty, higher-producing, stress-tolerant upland varieties.
- Participatory varietal selection (PVS) with farmers, national extension services and other development organizations to match farmer preferences with new inter-specific and other varieties.
- Design and support the implementation of pilot Community-based seed systems (CBSS) that build upon farmers’ seed-conservation practices and existing exchange networks to multiply and diffuse varieties selected by farmers through PVS.
- Field evaluation and adaptation of seed priming techniques, legume fallow systems and other companion technologies (with farmers, research and extension) that build on farmers’ knowledge and practices in helping farmers to combat weeds and improve soil fertility.
- Other technologies to be identified by and with programme partners.

12. **PADS in the rainfed lowlands.** For lowland ecosystems, where the potential for productivity gains is greatest, participatory technology development and communication principles will be employed to conduct and exchange experiences in on-farm demonstrations, evaluations and adaptation of more robust, stress-tolerant and higher-yielding varieties, low-cost water and fertility management options, and mixed farming systems (including vegetables). Specific activities may include:

- The use of PRB, PVS and CBSS approaches to develop, select and disseminate superior varieties.
- The identification of alternative methods of low-cost water management; adaptation of the *Diagnostic rapide de pré-aménagement* approach to water-management development to conditions found in the southern savannah and northern forest zones.
- The development of cost-effective strategies for micro-dose fertilizer application (organic and inorganic, natural rock phosphate) and the comparative advantage of these over alternative investments, such as various weed-control measures (manual, mechanical, chemical and biological) typical of farmers’ resource levels.
- Experimentation with profitable integrated rice-vegetable production systems.
- The use of other technologies to be identified by and with programme partners.

V. IMPLEMENTATION ARRANGEMENTS

13. WARDA is unique among the 16 international research centres funded by CGIAR in that it is the only centre with an intergovernmental structure. As a direct consequence, WARDA has put collaboration with institutions in its 17 member states at the heart of its operations. As an association

of West African states, WARDA has privileged access to national agricultural research systems and a particular responsibility to serve the NARS which represent its principal client group. The programme will be implemented under the policy umbrella afforded by the regional research coordinating body, CORAF. A steering committee composed of NARS scientists, CORAF officials, WARDA scientific coordinators and an IFAD representative (with observer status) will be constituted to discuss programme issues affecting the programme and to approve budgets based on annual workplans.

14. Building on the strong working relationships established under RADORT, national research institutes and selected NGOs in participating countries will carry the main responsibility for the day-to-day implementation of the programme. Links will also be established with relevant IFAD projects in each country.

15. WARDA research staff will provide technical backstopping which will be coordinated by the principal programme scientist. Inputs will be sought during the establishment of annual workplans and, where possible, through short field visits of individual staff members. Data from ongoing field trials will be used by WARDA's production economist in determining the profitability of the most promising technical options being tested through the programme. Social analysis will also be carried out by WARDA staff.

VI. INDICATIVE PROGRAMME COSTS AND FINANCING

16. The total cost of the three-year programme is estimated at USD 1.61 million. WARDA will contribute USD 267 000, primarily in the form of professional and administrative staff time. The NARS of the four countries and in-country collaborators will contribute USD 347 000. The NARS will provide expertise in various disciplines, land, and laboratory and office space, as necessary, to facilitate programme activities. The breakdown of financing by source of funds is summarized in Table 1. IFAD's proposed contribution is USD 1.00 million, which is to be allocated as outlined in Table 2.

**Table 1: Financing Plan
(USD '000)**

Item	Source of Funds			Total
	IFAD	WARDA	NARSs	
Personnel costs	432	218	180	830
Travel and lodging	40	4		44
In-country costs and procurement	391	33	-	424
Overhead and management	137	12	167	316
Total**	1 000	267	347	1 614

**Table 2: Proposed Budget for IFAD Funds
(USD '000)**

Item	Year 1	Year 2	Year 3	Total
Scientific staff	144	144	144	432
Equipment	11	6	6	23
Operating costs	21	17	17	55
Field-research support	80	80	80	240
Capacity-building	25	25	19	68
Research support	20	8	18	45
IFAD technical backstopping	11	11	11	34
WARDA overheads*	36	33	34	104
Total**	348	324	328	1 000

* WARDA overheads are calculated at 12% for all items, excluding IFAD technical backstopping.

** Any discrepancies in totals are due to rounding-up of figures.