ADB

Technical Assistance Report

Project Number: 44144
Regional—Research and Development Technical Assistance (R-RDTA)
October 2010

Strategic Research for Sustainable Food and Nutrition Security in Asia

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
ARD	–	agricultural research for development
ANRR	–	agricultural and natural resources research
CGIAR	–	Consultative Group on International Agricultural Research
CIAT	–	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture)
DMC	–	developing member country
FAO	–	Food and Agriculture Organization of the United Nations
ha	–	hectare
ICT	–	information and communication technology
IFPRI	–	International Food Policy Research Institute
IRRI	–	International Rice Research Institute
Lao PDR	–	Lao People's Democratic Republic
NARES	–	national agriculture research and extension system
PRC	–	People's Republic of China
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Type	–	Regional—Research and development technical assistance (R-RDTA)
Targeting classification	–	Targeted intervention – Millennium Development Goal
Sector (subsectors)	–	Agriculture and natural resources (agriculture and rural sector development, industry and trade sector development)
Themes (subthemes)	–	**Capacity development** (organizational development), economic growth (widening access to markets and economic opportunities,), private sector development (policy reforms, public–private sector partnerships)
Location impact	–	Rural (high), urban (medium), national (medium), regional (medium)

NOTE

In this report, "$" refers to US dollars.

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I. INTRODUCTION

1. The Operational Plan for Sustainable Food Security in Asia and the Pacific of the Asian Development Bank (ADB) supports ADB's Strategy 2020[1] for inclusive growth through agricultural and natural resources research (ANRR). The priority ANRR agenda for Asia is ensuring sustainable and inclusive food security.[2] However, achieving this goal presents a major challenge. First, while the region is both the largest producer and consumer of the world's major food commodities,[3] Asia has only 38% of the global agriculture land and 30% of the world's renewable water. Climate change, declining food crop productivity trends, increasing population, and increasing incomes make it difficult for Asia to substantially and sustainably improve its food production, in order to feed the growing regional and global population. Second, Asia will have to aim for both food and nutrition security. A recent report[4] on food security in Asia noted the region's food insecurity situation is "full of contradictions." Asia has some of the fastest growing economies, but is also home to about 65% (or 578 million) of the world's undernourished people. The health and nutrition of the extremely poor and vulnerable groups, especially women and children, are adversely affected by volatile food prices, as shown after the 2007–2008 global food price hikes. The proposed regional research and development technical assistance (TA) will focus on improving sustainable food and nutrition security.[5] It builds on previous ANRR TA projects on improving productivity and developing integrated food supply chains and participatory priority-setting of agriculture research for development (ARD).[6] It will likewise provide concrete measures for implementing the recently forged Asia and the Pacific Regional Food Security Partnership Framework as ADB's commitment to its developing member countries (DMCs) in Asia, whose representatives in the forum strongly encouraged development organizations to expand and synergize their food security efforts. [7]

II. ISSUES

2. Reducing food and nutrition insecurity in Asia requires addressing the following binding constraints: stagnating food productivity and production, unconnected or fragmented food supply chains, and underinvestment in ARD. Pragmatic short-term solutions are needed that target small-scale farmers, who comprise the bulk of food producers in Asia; simultaneously, the foundations must be established for long-term structural measures that promote the availability, accessibility, and utility of nutritious and safe food, especially for vulnerable groups in Asia.

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[1] ADB. 2008. Strategy 2020: *The Long-Term Strategic Framework of the Asian Development Bank*. *2008–2020*. Manila.

[2] Food security exists when all people, at all times, have physical, social, and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization of the United Nations [FAO]. 1996. *World Food Summit Plan of Action*. Rome: FAO).

[3] The region accounts for 90% of the world's market for rice, 40% for cereals, 40% for meat, 80% for aquaculture products, and 70% of the overall global food and vegetable market. Asia feeds nearly 60% of the world's population and supports the rural livelihood of more than 2 billion people, including four fifths of the world's small and marginal farmers and 90% of the world's fisher folk (ADB. 2009. *Regional Consultative Process on Prioritization of Agriculture Research and Development Agenda for Asia and the Pacific*. Manila. [TA 7316-REG, June]).

[4] Asia Society and International Rice Research Institute (IRRI) Task Force Report on Food Security and Sustainability in Asia. 2010. *Never an Empty Bowl: Sustaining Food Security in Asia.* New York: Asia Society.

[5] The TA first appeared in the business opportunities section of ADB's website on 25 August 2010.

[6] ADB. 2008. *Thirteenth Agriculture and Natural Resources Research at International Agricultural Research Centers*. Manila (TA 6489-REG, September); ADB. 2010. *Addressing the Pre- and Postharvest Challenges of the Rice Supply Chain*. Manila. (TA 7493-REG, January); ADB. 2009. *Regional Consultative Process on Prioritization of Agriculture Research and Development Agenda for Asia and the Pacific*. Manila. (TA 7316-REG, June); and ADB. 2010. *Investment Forum for food Security in Asia and the Pacific*. Manila. (TA 7522-REG, April).

[7] The Investment Forum for Food Security in Asia and the Pacific was held in ADB on 7–9 July 2010. The forum was jointly organized by ADB, FAO, and the International Fund for Agricultural Development. One of its major outcomes is the signing of the Asia and the Pacific Regional Food Security Partnership Framework.

3. **Addressing rice yield gaps**.[8] Rice production suffers from a yield gap of 1–2 tons per hectare (ha) in many DMCs in Asia. Declining investments in rice research and development, coupled with diminishing production due to degraded land and water resources as well as climate change impacts, have contributed to this gap. New high-yielding rice varieties that adapt to the vagaries of the environment and climate are urgently needed, but these will take at least 10–15 years to develop. The yield gap can be reduced in the interim by addressing pre- and postharvest losses, which on average translate to 10%–25% of the yield gap. Climate change and poor agronomic practices (i.e., excessive insecticide use) have caused pest diseases such as planthopper outbreaks to spread in rice-producing Asian countries. The use of ecologically based agronomic management practices can prevent major pest outbreaks, reduce the risk of pre-harvest losses, and make farms more resilient to climate variability. Proper postharvest measures can also reduce food-borne contaminations, such as mycotoxins, and reduce wastage due to poor drying.

4. **Producing food with less water.**[9] Food and nutrition security is threatened by an ensuing water crisis.[10] Asia's green revolution of intensive agriculture relied heavily on irrigation. Asia accounts for 70% of the world's irrigated land, and more than half of its water is used for agriculture. A large portion of irrigation water is sourced from surface and groundwater, which has become increasingly polluted and scarce. Climate change is increasing rainfall pattern variability. Competition for water is intensifying between food and nonfood crops, between agriculture and non-agriculture sectors, and between rural and urban users. Innovative ways are urgently needed to incentivize small-scale farmers to (i) reduce water use while increasing the efficiency and sustainability of water use, (ii) efficiently divert saved water from agriculture to non-agriculture and urban purposes, and (iii) encourage investment in technologies and practices that increase food and feed crop production and farmers' income while reducing water use.

5. **Low private sector engagement in food supply chains.** Food supply chains in DMCs are generally fragmented and uncoordinated, resulting in a limited supply of and difficulty in accessing affordable, nutritious, and safe food. The private sector can facilitate the development of efficient, adaptable, and inclusive food supply chains. However, their participation is hindered by (i) poor logistics, storage, and information and communication technology (ICT) infrastructure; (ii) limited finance for small-scale farmers and small- and medium-scale traders and processors; and (iii) lack of transparent, predictable, and accountable regulatory frameworks for investments and contracts. The private sector has the resources and expertise to spur agriculture development and rural industrialization through essential food supply chain linkages. Pooled funds that may serve as an impetus for agriculture land and food chain development in DMCs are also emerging. Private sector engagement in integrating food supply chains in the region is growing, but not well documented, especially those investments that have a significant impact on short- and long-term structural concerns. There is also a need to identify the potential for expanding innovative partnership arrangements that employ the private sector's profit-maximizing behavior in increasing national and regional food and nutrition security.

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[8] Most of the discussions about the rice production problem in Asia and the potential to bridge the yield gap through pre- and postharvest were taken from the (i) IRRI, Africa Rice and the International Center for Tropical Agriculture (CIAT) proposal to the Consultative Group of International Agricultural Centers (CGIAR). 2010. *A Global Rice Science Partnership (GRISP).* Manila: IRRI; and (ii) progress reports from ADB. 2008. *Thirteenth Agriculture and Natural Resources Research at International Agricultural Research Centers*. Manila (TA 6489-REG, September).

[9] This paragraph benefited from numerous studies, such as T. Panella. 2010. *Growing more food with less water: How can revitalizing Asia's agriculture help?* A paper prepared for the Water: Crisis and Choices – An ADB and Partners Conference. Manila. 11–15 October; International Water Management Institute and FAO. 2009. *Revitalizing Asia's Irrigation to Sustainably Meet tomorrow's Food Needs.* International Water Management Institute and FAO: Colombo.

[10] Kuroda, H. 2010. *Introductory Remarks* at the ADB's 2010 Board and Management Retreat. Manila.

6. **More focused agricultural research for development.**[11] In Asia, the key concerns for sustaining ARD are dwindling funds from traditional sources and declining human resource capacity; the need for a multistakeholder-driven and strategic ARD plan of action; and weak delivery and extension mechanisms for ARD. More than 80% of DMC ARD funds come from the public sector; the rest are from official development assistance, private sector, and producer and organization boards. Except for the People's Republic of China (PRC) and India, most Asian DMCs exhibit declining public spending and overseas development assistance for ARD, which is shifting to Sub-Saharan Africa. In 2009, an ARD agenda for Asia was presented at the seminal Global Conference for Agriculture and Rural Development held in Montpellier last March 2010. The agenda will need to be refined to (i) include views from the demand side (farmers groups, civil society, and private sector); and (ii) develop a pragmatic plan of action with measures that reduce short-term food price volatility, address long-term structural concerns, expand investment sources for ARD, encourage innovative ARD delivery, and develop results-based monitoring and feedback systems.

III. THE PROPOSED TECHNICAL ASSISTANCE

7. The proposed TA will evaluate various novel approaches[12] that attempt to tackle these concerns, including by examining their impact pathways, and recommending strategic policy actions and "best bets"—innovative measures that can be expanded and replicated. Innovative measures will include those that (i) have a high impact on ensuring food and nutrition security; (ii) engage small-scale farmers; (iii) are feasible, transparent, and entail low transaction costs; (iv) can be replicated or expanded; (v) are environmentally friendly; (vi) empower women, and (vii) encourage collaboration between developing countries or regions. It is envisaged that the investment options will provide those involved with the food supply chain in Asia and ADB regional departments with food and nutrition security-related investment opportunities.

A. Impact and Outcome

8. The desired impact is improved sustainable food and nutrition security in East, South, and Southeast Asia (Appendix 1). The expected outcome is increased food and nutrition security investments by the public and private sectors and civil society in participating DMCs—Bangladesh, Cambodia, the PRC, India, Lao People's Democratic Republic (Lao PDR), Philippines, Thailand, and Viet Nam—at all stages of the agriculture and food supply chains.

B. Methodology and Key Activities

9. To achieve the outcome, the TA outputs are (i) adoption of ecologically based management methods that reduce rice pest outbreaks, and economically viable postharvest rice technologies and management by rice farmers and others in the rice sector of Cambodia, the PRC, Philippines, Thailand, and Viet Nam;[13] (ii) development and dissemination of innovations and partnership

[11] Background materials for the Asian agriculture research for development discussion include final reports of ADB's *Regional Consultative Process on Prioritization of Agriculture Research and Development Agenda for Asia and the Pacific*; *Support for the Association of Southeast Asian nations Plus Three Integrated Food Security Framework*.; Bientema, N. and H. Elliott. 2009. *Setting meaningful investment targets in agricultural research and development*. Paper prepared for the Expert Meeting on How to Feed the World in 2050. Rome: FAO; and Bientema, N. and G. Stads. 2008. *Agricultural R&D capacity and investments in the Asia-Pacific Region.* International Food Policy Research Institute Brief No. 11. Washington, D.C.: International Food Policy Research Institute.

[12] The Investment Forum for Food Security in Asia and the Pacific, held in ADB on 7–9 July 2010, showcased a variety of innovative approaches for improving productivity, resilience, finance, and connectivity. These are run successfully by the private sector, producers' organizations, nongovernment organizations, or through public–private partnerships.

[13] ADB supported these countries to pilot test pre- and postharvest technologies and practices in previous TAs. These are part of the 5-year program for pre- and post harvest of IRRI. It is envisaged that the additional support will provide the resources for accelerating expanded adoption the technologies and good practices.

investments for water-saving technologies and financing of nutritious and safe food supply chains in Bangladesh, the PRC, India, and Lao PDR;[14] and (iii) development of a demand-driven and results-based strategic action plan for ARD of Asian DMCs.

10. Output 1 will use a combined field and participatory research-based approach involving the national agriculture research and extension systems (NARES) and other local stakeholders in the pilot project sites for the trial testing, validation, and dissemination of technologies and good practices. Expansion of the scale of these innovations will be done mainly through NARES, supported by the multisector regional rice networks. Key activities include developing a monitoring system of pre-harvest pest diseases and policy advocacy and extension services, developing and disseminating business models for viable postharvest technologies, and developing a mycotoxin reduction strategy for inclusion in national agriculture sector strategies.

11. For output 2, impact pathway assessments will be undertaken of (i) business-supportive policies; (ii) investments for and innovative management of water use and water-saving techniques; and (iii) financing inclusive food supply chains, with special attention to nutrition and health. Using evidence-based ranking of investment options, a menu of the most desirable ("best bet") investment areas for sustainable water use technologies and food supply chain partnerships for innovative financing will be identified, promoted, and trialed in participating DMCs. A conference with a major theme of leveraging food supply chains for improved nutrition and health will also be conducted.

12. For output 3, focus group discussions will be held with farmers' organizations, civil society, and private sector engaged in food supply chains. Awareness of the Asian ARD will be increased through road shows and policy dialogues, and mechanisms for information sharing and cross-learning through south–south collaboration will be included in the ARD action plan. Knowledge products on novel partnerships for integrated food supply chains will be developed.

C. Cost and Financing

13. The total cost of the TA is estimated at $4,160,000 equivalent, of which $4 million equivalent will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-other sources). The International Food Policy Research Institute (IFPRI) and IRRI will finance an equivalent of $60,000 and $100,000, respectively. IFPRI and IRRI will provide in-kind contribution of staff time, office space, research operations, and administrative and support costs (Appendix 2).

D. Implementation Arrangements

14. The TA will be implemented for about 24 months from November 2010 to December 2012. ADB, through its Regional and Sustainable Development Department (Agriculture, Rural Development, and Food Security Unit), will be the executing agency. The unit will work closely with the communities of practice on agriculture, rural development, and food security; health; water; and gender and development, as well as with ADB regional departments to ensure feedback on the lessons generated and the novel investment and partnership opportunities.

15. IRRI will be the implementing agency for the delivery of output 1, and IFPRI for outputs 2 and 3. Before starting proposed activities within a DMC, receipt of no-objection letters from the governments of Bangladesh, Cambodia, the PRC, India, Lao PDR, Philippines, Thailand, and Viet Nam will be required.

[14] Stakeholders from these subregions participated at the Investment Forum for Food Security in Asia and the Pacific (footnote 7). Country case studies in these subregions will focus on Bangladesh, the People's Republic of China, India, and the Lao People's Democratic Republic. The governments of these countries are exploring food security partnership options.

16. IRRI is the implementing agency for output 1 because of its achievements and expertise in and support infrastructure for cutting-edge rice research and technology. The TA will enable IRRI to expand the scale and application of the agronomic management practices and locally generated postharvest technology innovations that are generated from *Thirteenth Agriculture and Natural Resources Research at International Agricultural Research Centers* and *Addressing the Pre- and Postharvest Challenges of the Rice Supply Chain*. Manila. (footnote 6). IFPRI is the implementing agency for outputs 2 and 3 because of its long experience on food security, particularly water resource management, food supply chain development, food and nutrition nexus, ARD, and development of optimal ("best bet") approaches.

17. ADB will execute a memorandum of agreement with each implementing agency, describing the terms of reference and the responsibilities of the implementing agency with respect to (i) timely delivery of quality outputs, (ii) regular monitoring and evaluation of the subproject's strategic results framework, and (iii) reporting and other communications. The implementing agencies will hold an inception workshop within 2 months of the TA's approval to provide a detailed work plan and milestones for each output. They will submit the following reports to ADB: (i) inception report, (ii) midterm report, (iii) final report, (iv) semiannual financial statements, and (v) audited annual financial statements. Procurement of goods and related services will be in accordance with ADB's Procurement Guidelines (2010, as amended from time to time). Disbursements will be undertaken in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). Specifically, the amounts drawn down shall be liquidated against the statement of expenditures.

18. For output 1, IRRI will recruit about 68 person-months of international and 84 person-months of national consultant services in the fields of postharvest systems, virology, insect toxicology, taxonomy, training, postharvest, value chain and business modeling, impact pathways, policy, communications, and production and agro-industrial supply chains. For outputs 2 and 3, IFPRI will recruit about 24 person-months of international and 34 person-months of national consultant services for water resource management, innovative financing, ARD, participatory processes, and other technical expertise that may be needed for the ARD strategic action plan. Where appropriate, IFPRI will recruit technical experts from specialized international research centers and development organizations that are partners of the Asia and the Pacific Regional Food Security Partnership Framework. It will also coordinate with regional research networks like the Asia-Pacific Association of Agricultural Research Institutions The outline terms of reference for consultants is in Appendix 3. All consultants will be engaged in accordance with ADB's Guidelines on the Use of Consultants (2010, as amended from time to time).

19. ADB will implement the outreach activities in the dissemination, and where needed, startup activities for implementation of the ARD, best practices, and other knowledge products resulting from the TA. It will also implement other follow-through activities for the Asia and the Pacific Regional Food Security Partnership Framework. One international expert (2 person-months) and 4 national experts (26 person-months) will support these activities. The expertise needs are communications, regional coordination, information and communication technology, and knowledge product development. The experts will be engaged on an individual basis in accordance with ADB's Guidelines on the Use of Consultants (2010, as amended from time to time).

IV. THE PRESIDENT'S RECOMMENDATION

20. The President recommends that the Board approve the provision of technical assistance not exceeding the equivalent of $4,000,000 on a grant basis for the Strategic Research for Sustainable Food and Nutrition Security in Asia.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Improved sustainable food and nutrition security in East, South, and Southeast Asia	By 2015[a] and compared to 2008: Rice yield gap is reduced by 10% from the present 1–2 tons per ha in participating developing member countries (DMC). Nutrient-rich and safe food chain investments for the vulnerable groups increase in participating DMCs by 10% (compared to 2009). Water use by the agriculture sector in pilot countries decreases by 5% Agriculture research for development (ARD) investments in Asia increase by 5%.	Consultative Group on International Agricultural Research (CGIAR) progress reports International Food Policy Research Institute (IFPRI) and International Rice Research Institute (IRRI) data World Bank on logistics performance index ranking	**Assumption** Enabling policies and institution building for increased south–south and interregional investments for inclusive and sustainable food supply chains are implemented. **Risk** Extreme weather affects food producing economies in Asia.
Outcomes Increased food and nutrition security investments by public and private sector and civil society in participating DMCs—Bangladesh, Cambodia, the People's Republic of China (PRC), India, Lao People's Democratic Republic (Lao PDR), Philippines, Thailand, and Viet Nam—at all stages of the agriculture and food supply chains	By 2012: and compared to 2008, (i) rice farmers in project sites reduce their pre-harvest losses by 2%, and 5% for postharvest loss; and (ii) strategies to reduce mycotoxin in postharvest rice are implemented. At least two investment partnerships forged for financing nutrition-quality food supply chains or water saving techniques. Asian ARD is incorporated in the CGIAR priority agenda.	IRRI monitoring reports in its Rice Knowledge Bank, Women Rice Farming Network, and Irrigated Rice Research Consortium Reports. Project progress reports	**Assumption** Governments have the financial resources needed to provide the other essential public goods that support solutions to address food and nutrition security **Risk** Global food prices become volatile, and governments resort to restrictive food policies.
Outputs 1. Adoption of ecologically based management methods that reduce rice pest outbreaks, and economically viable	Compared with 2008: (i) at least 25% of farmers in project sites of participating DMCs use ecologically based	IRRI annual research program report and review Project progress reports	**Assumption** District and provincial governments in project sites of participating DMCs support the project.

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
post-harvest rice technologies and management by rice farmers and others involved in the rice sector of Cambodia, the PRC, Philippines, Thailand, and Viet Nam.	management methods; and (ii) at least 25% of farmers in the project sites use improved postharvest technologies and management.		**Risk** Regulatory measures exist that discourage farmers and private sector from changing their crop management and postharvest practices.
2. Development and dissemination of innovations and partnership investments for water-saving technologies and financing of nutritious and safe food supply chains in Bangladesh, the PRC, India, and Lao PDR.	At least two "best bet" investment opportunities are developed as investment projects by ADB regional departments. One conference on leveraging food supply chains for improved nutrition and health is conducted. At least two knowledge products are published	Project progress reports	**Assumption** There is general agreement that a business-as-usual approach to addressing food and nutrition insecurity will not work. **Risk** Available data for analytical assessments are incomplete or are not comparable.
3. Development of a demand-driven and results-based strategic action plan for ARD of Asian DMCs.	The strategic action plan for ARD is endorsed by major stakeholders. Members of the Asia and the Pacific Regional Food Security Partnership Framework expand and invest in ARD. At least two ARD activities for south–south collaboration are implemented.	Project progress reports	**Assumption** The national agriculture research and extension systems are receptive to private sector engagement in ARD. **Risk** Farmers' groups are risk averse.

Activities with Milestones	Inputs
1.0 Adoption of ecologically based management methods that reduce rice pest outbreaks, and economically viable postharvest rice technologies and management by rice farmers and others involved in the rice sector of Cambodia, the PRC, Philippines, Thailand, and Viet Nam. Pre-harvest 1.1 Develop and complete ecological engineering techniques, biodiversity analysis, and advanced toxicology and probit analysis of insecticide resistance (months 1–7). 1.2 Develop improved management of viral diseases (months 1–7). 1.3 Develop strategies with stakeholders for dissemination of	**ADB**: $4,000,000 **Item** — **Amount** ($'000) Consultants — 2,658 Equipment — 25 Training, seminars, and conferences — 790 Surveys — 15

Activities with Milestones	Inputs
pre-harvest innovations, commence implementation, and conduct policy dialogues (months 8–24). Postharvest 1.4 Develop business models and financing options for each technology and market (months 1–12). 1.5 Develop strategies with stakeholders for dissemination of postharvest innovations, and begin implementation (months 8–24). 1.6 Develop and commence implementation of the mycotoxin reduction strategy (months 10–24). 1.7 Implement action plan for securing sustainable operations of the multisector platforms (months 17–24). **2.0 Development and dissemination of innovations and partnership investments for water-saving technologies and financing of safe and nutritious food supply chains in Bangladesh, the PRC, India, and Lao PDR.** 2.1 Conduct "best bet" study for increasing food production while reducing water use, and identify evidence-based policy, investment and management options (months 1–12). 2.2 Conduct "best bet" studies on efficient, effective, and inclusive nutritious and safe food supply chains for innovative finance (months 1–12). 2.3 Conduct a food and nutrition security conference (months 4–7). 2.4 Develop a dissemination strategy (months 10-20). **3.0 Development of a demand-driven and results-based strategic action plan for ARD of Asian DMCs.** 3.1 Conduct e-consultations and focus group discussions with farmers' organizations, private sector, and civil society (months 8-14). 3.2 Articulate priority in the Asian ARD agenda and develop the strategic action plan (intermittent, months 14-24) **4.0 Outreach and Dissemination Activities** 4.1 Conduct road shows for Asia's ARD and "best bets" (months 13–16). 4.2 Undertake follow through activities of the Asia and the Pacific Regional Food Security Partnership Framework (months 1–18). 4.3 Produce knowledge products (intermittent, months 2–24).	Miscellaneous administration and support costs 112 Contingency 400 **IFPRI and IRRI: $160,000** **Item** **Amount** ($'000) Office accommodation and transport 30 Remuneration and per diem of counterpart staff 110 Others (office supplies, communications, etc.) 20

[a] This is the scheduled year for the attainment of the Millennium Development Goals.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Total Cost
A. Asian Development Bank[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	1,660.00
ii. National consultants	528.00
b. International and local travel	395.00
c. Reports and communications	75.00
2. Equipment[b]	25.00
3. Trainings, seminars, and conferences	
a. Workshops[c]	630.00
b. Training program	160.00
4. Surveys	15.00
5. Miscellaneous administration and support costs	112.00
6. Contingencies	400.00
Subtotal (A)	**4,000.00**[d]
B. IFPRI	
1. Office accommodation and transport	10.00
2. Remuneration and per diem of counterpart staff	40.00
3. Others	10.00
Subtotal (B)	**60.00**
C. IRRI	
1. Office accommodation and transport	20.00
2. Remuneration and per diem of counterpart staff	70.00
3. Others	10.00
Subtotal (C)	**100.00**
Total	**4,160.00**

ADB = Asian Development Bank, IFPRI = International Food Policy Research Institute, IRRI = International Rice Research Institute.

[a] Financed by ADB's Technical Assistance Special Fund – Other sources.

[b] Equipment includes sampling devices, thermohydrographs, topical applicators, microscopes, prototype components for postharvest technologies.

[c] Includes ADB staff travel to attend the workshops as resource persons.

[d] Fund allocation for IFPRI is $1.0 million, and IRRI is $2.5 million. ADB will administer outreach activities, including dissemination of knowledge products, of $500,000.

Source: ADB estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. For the output on the adoption of pre- and post harvest management practices and technologies, the International Rice Research Institute (IRRI) will provide 68 person-months of international and 84 person-months of national consulting services in accordance with Asian Development Bank's (ADB) Guidelines on the Use of Consultants (2010, as amended from time to time). The experts will be divided into two teams, specifically a team working on the pre-harvest management practices, and a team on postharvest management practices and technologies. The outline terms of reference are discussed below.

2. **Pre-harvest team leader and insect ecologist** (international, 6 person-months). The team leader will supervise the pre-harvest work, oversee the timely conduct of the activities and development of outputs, and coordinate with the participating developing member countries (DMCs). Key tasks are to

(i) complete the ecological engineering techniques, biodiversity analysis, and ecosystem service monitoring techniques, and ensure that the identified technical assistance (TA) risks are mitigated;
(ii) ensure that the high-yielding inbreds and hybrids with field resistance to planthoppers are adopted by the national agriculture research and extension systems (NARES) in DMCs; and
(iii) ensure the scaling up of the ecologically based practices for managing the spread of viruses in farm fields, and the use of new field resistance screening method and germplasms with durable pest resistance.

3. Three international natural scientists in the fields of **virology** (6 person-months), **arthropod taxonomy** (6 person-months), and **insecticide toxicology** (8 person-months). These experts will provide technical support to the pre-harvest team leader, particularly to

(i) develop the management methods that reduce the spread of the virus;
(ii) complete the taxonomic guides;
(iii) conduct training on and develop and disseminate the training modules for the NARES in maintaining data records on planthopper-transmitted viruses, arthropod taxonomy, advanced toxicology and probit and comparative analysis of insecticide resistance, and the monitoring and evaluation methods; and
(iv) develop systems with NARES for information sharing and transfer of technical skills and knowhow.

4. Two international communications experts, who specialize in **information and communication technology (ICT)** (12 person-months), and in **policy advocacy** (4 person-months). The experts will provide the NARES innovative communication practices and tools to

(i) design, pretest and evaluate prototype communication materials;
(ii) conduct training in and develop training modules on effective communications as well as on the use of ICT in disseminating appropriate pre-harvest management practices; and
(iii) conduct policy analysis, write briefs, and support policy dialogues on measures that encourage the use of pre-harvest technologies and management practices.

5. Three national natural scientists in the fields of **entomology** (2 national, 36 person-months), and **insect taxonomy** (national, 12 person-months). The national experts will help the team leader coordinate work in DMCs through field work with and technical and logistics support for the NARES. Key tasks are to

(i) develop a system for regularly collecting, maintaining, and analyzing data on insect cultures, and other organisms using an ordered, scientific approach;

(ii) perform laboratory topical application tests and analysis of the dynamic interaction between complex insect feeding stimuli and plant responses; and
(iii) develop partnerships for the sustained maintenance of the database.

6. **Postharvest team leader** (international, 10 person-months). The consultant shall have the expertise on postharvest systems, and will supervise the postharvest work, oversee the timely conduct of the activities and development of outputs, and coordinate with the DMCs. Key tasks are to

(i) supervise the development, validation, documentation, and monitoring of the adoption and dissemination of the appropriate grain threshing, husking, cleaning, drying, and storage systems in the project sites; and
(ii) implement the replication and expansion plan for postharvest technologies and liaise with postharvest technology replication and expansion partners, including the private sector, civil society organizations, and local governments.

7. Food supply chain experts in **business modeling** (international, 10 person-months), **production and agro-industrial technology** (international, 2 person-months), and **postharvest** (national, 10 person-months). The experts will work with the private sector and small-scale farmers in the DMCs in adapting the postharvest technologies to local circumstances, and assessing their economic and social viability. Key tasks are the following:

(i) International consultants: They will (a) assist local manufacturers to improve their production technology, and develop and ensure startup of the action plans for their upgrade; (b) verify and validate the needs of local postharvest manufacturers, including policy and institutional needs; (c) develop, in consultation with the private sector, alternative business and management models that maximize linkages of small-scale rice farmers to markets; and (d) explore public and private partnerships in the provision of extension services and ensure the setup of at least one partnership scheme.
(ii) National consultant: He or she will also work closely with the NARES to (a) develop, validate, document, and disseminate appropriate postharvest systems; and (b) document and disseminate best practices in the provision and delivery of postharvest technologies.

8. **Mycology** (international, 2 person-months), and (national, 12 person-months). The experts will be food scientists who will focus in reducing postharvest losses due to harmful fungi. They will work closely with the NARES. Main tasks are the following:

(i) International consultant: He or she will (a) develop mycotoxin detection techniques that are applicable at farmers' fields, and (b) collaborate with NARES in sharing information and transfer of technical skills and knowhow.
(ii) National consultant: He or she will also work with the crop research informatics laboratory to: (a) design, plan, and manage experiments using appropriate experimental design and statistical analysis; and (b) gather baseline data by experimentation and survey in consultation with the NARES for monitoring and evaluation purposes.

9. **Training specialist** (international, 2 person-months). The expert shall have work experience on innovative advisory services for small-scale farmers. Key tasks are to

(i) conduct training and workshops for cross-country technology transfer, and
(ii) train key extension agents from the public and private sectors on postharvest technologies and new extension methodologies.

10. **Impact pathways specialist** (national, 8 person-months). The expert will provide the overall assessment of the outcomes of alternative postharvest technologies. Key tasks are to

(i) conduct impact assessments on the adoption of postharvest technologies,
(ii) conduct workshops on impact assessment methodologies, and
(iii) write research briefs for the dissemination of postharvest technologies.

11. **Communications expert** (national, 6 person-months). The expert shall have extensive ICT skills and experience on innovative communications tools. The consultant will

(i) develop country-specific communication strategies, and assist national project partners in the implementation of these strategies;
(ii) develop user-friendly communication materials for multichannel dissemination of postharvest technologies; and
(i) design and develop an appropriate and sustainable information-sharing system.

12. The International Food Policy Research Institute (IFPRI) will conduct research on (i) the "best bets" for increasing food production in conjunction with reduced, sustainable water use in agriculture; (ii) "best bets" for food supply chain finance; and (iii) demand-driven agriculture research for development (ARD) for Asia and its strategic action plan. It will provide 24 person-months of international and 34 person-months of national consulting services in accordance with the ADB's Guidelines on the Use of Consultants (2010, as amended from time to time.). The outline terms of reference are shown below.

13. **Water resources management experts** (2 international, 8 person-months; and 2 national, 6 person-months). Two types of expertise will be required. The first expert will be an international and a national specialist who have strong technical and work experience in integrated water resources development and management, hydrology engineering, or its equivalent. The other experts will be an international and a national consultant with extensive work experience in policies relating to water resources management and sustainable agricultural development. The key tasks are the following:

(i) International experts: They will (a) conduct a scoping study on water policies and property rights for water management; practices, infrastructure, and technologies on water availability and use, and barriers to adoption of water saving technologies; and governance and institutional arrangements for agriculture vis-à-vis competing uses and users in the participating DMCs; (b) use various modeling tools to assess food and sustainability outcomes of alternative policy, water saving technologies and management strategies for participating DMCs as case studies; and (c) recommend the "best-bet" options for policies, investments, and partnerships for increasing food production and farm incomes in conjunction with reduced, sustainable water use to DMCs and ADB regional departments.
(ii) National experts: They will support the international consultants to (a) gather, consolidate, and analyze the data on water resource availability and use, water management practices, infrastructure, and technologies, institutional structures and property rights, and water and other support policies; (b) conduct benefit and cost assessments on alternative water pricing, water uses and technologies and management practices; and (c) assist in the rigorous evaluations for identifying the "best-bet" options.

14. **Food chain innovative financing experts** (international, 5 person-months; and 2 national, 7 person-months). The experts shall have strong technical and work experience on rural finance and the emerging innovations in financial products and services, including the policy and institutional requisites for reducing transactions costs and risks of providing financial

services to small-scale farmers. The experts shall also have extensive work experience on food supply chain management and logistics development. Key tasks are the following:

(i) International expert: He or she will (a) review and conduct an empirical assessment of innovative financing business models for efficient and effective development of nutrient-rich and safe food supply chains; and (b) identify and recommend the "best-bet" financing investment opportunities for public–private partnerships and other business models that leverage private sector's expertise in food quality, marketing and distribution, as well as food safety standards for the development of low-cost nutritious food and for inclusive integration of small-scale farmers to food and agriculture markets.

(ii) National experts: They will assist the international expert to (a) gather, document, and analyze innovative financing investment models in participating DMCs; (b) assess the bottlenecks and opportunities for innovative financing linking small-scale farmers to markets and for the development of nutritious and safe quality food in DMCs; and (c) undertake rigorous assessment methodologies for identifying the suite of "best-bet" options.

15. **Agriculture research and development experts** (2 international, 6 person-months). The experts shall have extensive knowledge of the ARD landscape in East, South and Southeast Asia, and have conducted rigorous impact pathway assessments. Key tasks are to

(i) validate and assess the ARD priorities for Asia as presented at the Global Conference on Agriculture for Development in Montpellier, and in the context of the CGIAR mega-programs, in terms of ensuring regional food and nutrition security;

(ii) in collaboration with the regional ARD in Asia, design the consultations through use of electronic consultation techniques and dialogue;

(iii) develop the impact pathway assessments;

(iv) promote active participation of NARES in emerging economies (the People's Republic of China and India) in supporting innovative ARD capacities and investments in Asia; and

(v) develop the strategy and action plan for the Asian ARD on sustainable food and nutrition security, including the investment plan.

16. **Participatory expert for agriculture research for development** (international, 2 person-months). The specialist shall have extensive work experience in participatory approaches and innovative communication tools. Key tasks are to

(i) conduct a stakeholder analysis of private sector and civil society engaged in Asian food-supply chains, including risk assessments; and

(ii) design participatory consultations and focus group dialogues that will maximize engagement of the private sector and civil society through ICT.

17. **Agriculture research and development experts** (4 national, 16 person-months). The experts shall have extensive work experience at country levels on ARD, impact pathway assessments, and participatory processes. Specific tasks are to

(i) assist in the implementation of the participatory consultations, especially the logistical arrangements for the e-consultations and dialogue, and conduct and analyze rapid appraisals;

(ii) prepare background papers**,** and conduct impact pathways assessments; and

(iii) develop the framework and database for the monitoring and evaluation of the ARD strategic action plan.

18. **Resource persons** (international, 3 person-months; national, 5 person-months). There may be a need for technical experts in developing the strategic action plan for ARD. The scope of work will be determined during the formulation phase of the ARD strategic action, specifically:

(i) International resource person. The scope of work may include developing the investment and financing options and budget, providing peer external review of the reports, and developing short policy or issue papers on emerging concerns on food and nutrition security for enhanced south–south cooperation.
(ii) National resource person. The tasks are to gather, consolidate, and descriptively analyze data, and undertake gender and risk assessments, and capacity and institutional needs assessments.

19. ADB will implement the outreach for and other activities related to the implementation of the Asia and the Pacific Regional Food Security Partnership Framework, a joint activity of ADB, Food and Agriculture Organization of the United Nations, and the International Fund for Agricultural Development. It will engage 2 person-months of international expert services, and about 22 person-months of national expert services in accordance with the ADB's Guidelines on the Use of Consultants (2010, amended from time to time). Terms of reference are shown below.

20. **Communications expert** (international, 2 person-months). The specialist will design an appropriate and cost-efficient communications plan for the dissemination of the TA outputs and findings to ADB regional departments and DMCs. Key tasks are to

(i) design the roadshows, policy dialogues for the ARD Strategic Action Plan, and other knowledge products, and
(ii) design a strategic communication plan for the Asia and the Pacific Regional Food Security Partnership Framework.

21. **Regional coordinator** (national, 12 person-months). The expert, who will be based in ADB, will oversee the implementation of the communications plan. Other tasks are to

(i) provide support on the follow-through activities of the Asia and the Pacific Regional Food Security Partnership Framework; and
(ii) provide the logistics, research, and administrative support for the monitoring and evaluation of the TA outputs and outcomes

22. **Information and communication technology expert** (national, 4 person-months). The expert shall have extensive experience on ICT for knowledge sharing and participatory consultations. The consultant will work closely with the regional coordinator and the communication expert. Key tasks are to

(i) assess the ICT needs for and the ICT systems that are available and suitable for the conduct of e-consultations among relevant stakeholders in the region; and
(ii) develop the appropriate ICT modality for the exchange of information and cross learning for outreach.

23. **Knowledge product coordinator** (national, 6 person-months). The expert shall have extensive technical and work experience in developmental writing for international development organizations. Key tasks are to

(i) review reports and edit into appropriate knowledge products (working papers, policy briefs, news releases, source references, etc.);
(ii) together with the ICT expert, design the ICT modality for dissemination of papers; and
(iii) produce articles and other media forms for information sharing on food and nutrition security in Asia.