

ASIAN DEVELOPMENT BANK

TAR: CAM 36634

TECHNICAL ASSISTANCE

TO THE

KINGDOM OF CAMBODIA

FOR

CAPACITY BUILDING

OF THE

INLAND FISHERIES RESEARCH AND DEVELOPMENT INSTITUTE

December 2002

CURRENCY EQUIVALENTS

(as of 28 November 2002)

Currency Unit	–	riel (KR)
KR1.00	=	\$0.00025
\$1.00	=	KR4,008

ABBREVIATIONS

ADB	–	Asian Development Bank
DOF	–	Department of Fisheries
IFREDI	–	Inland Fisheries Research and Development Institute
MAFF	–	Ministry of Agriculture, Forestry, and Fisheries
TA	–	technical assistance
WorldFish Center	–	Formerly, International Center for Living Aquatic Resources Management

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends.
- (ii) In this Report, "\$" refers to US dollars.
- (iii) The WorldFish Center's legal name (International Center for Living Aquatic Resources Management) remains unchanged.

This Report was prepared by O. Serrat.
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I. INTRODUCTION

1. In 2002, the Government of Cambodia requested advisory technical assistance (TA) from the Asian Development Bank (ADB) to meet priority research needs for inland fisheries, in the framework of the Tonle Sap Initiative.¹ On 21–25 October 2002, an ADB Fact-Finding Mission visited Cambodia and formulated TA for Capacity Building of the Inland Fisheries Research and Development Institute, in line with the program of actions formalized in the Poverty Reduction Partnership Agreement between the Government and ADB. The TA is included in ADB's 2002 program for Cambodia.²

II. ISSUES

2. Literature on Cambodia's inland fisheries makes frequent reference to the abundance of fish in the Tonle Sap ecosystem and the expertise of the fishers who exploit this bounty.³ Without a doubt, inland fisheries are indispensable to the food security, income, and employment of the Cambodian population.⁴ Yet, attention is increasingly being drawn to the impacts of overfishing and destructive practices. King Norodom Sihanouk has warned that Cambodia faces environmental disaster if the ecosystem of the Tonle Sap is further degraded.

3. It is urgent to sustain the productivity of fisheries and to rationalize their use. Yet, basic data concerning fish populations, their environment, and their exploitation is often patchy, mostly old, and in general cannot support decision making. Original research is still scarce and reports habitually quote early works.⁵ For instance, information on the bioecology of key fish species is plainly inadequate.⁶ But it is also necessary to model flood-fish relationships in the Tonle Sap; investigate improvements in marketing, distribution, and utilization of key fish products; and circumscribe better the value of the fisheries (using market-based methods, methods based on surrogate market values, and those based on potential expenditure or willingness to pay).⁷ This calls for a substantial increase in the body of bioecological and socioeconomic knowledge. To leverage the contribution of research to sustainable management and conservation of natural resources and biodiversity, the Department of Fisheries (DOF) in the Ministry of Agriculture, Forestry, and Fisheries (MAFF) began, in April 1994, to collect primary data; to conduct studies to evaluate and modify fisheries management for optimal

¹ ADB recognizes that sustainable management and conservation of natural resources and biodiversity should be considered from the perspective of the watershed feeding the Tonle Sap. ADB's Country Strategy and Program documents for Cambodia reflect this sectorwide approach to the Tonle Sap, which ADB expects to pursue over a 10-year horizon.

² The TA first appeared in *ADB Business Opportunities* (Internet Edition) in November 2002.

³ At 110–175 kilograms per hectare per annum, the productivity of Cambodia's inland fisheries is among the highest in the world. High temperatures and periodical flooding explain this. However, the role of the flooded forest is also acknowledged: it facilitates development of microorganisms, weeds, and zooplankton; provides shelter to juveniles and specific adult species; and offers reproduction zones for other species.

⁴ Fish provide 40–70% of the protein intake of Cambodia's population, and the annual catch from the Tonle Sap represents about 75% of the national inland fish catch. Fishing and agriculture are the two main sources of livelihood for the 3 million people (25% of Cambodia's population) who live around the lake.

⁵ The first publications on aquatic ecosystems date from 1865. From then to the 1930s, numerous taxonomic descriptions appeared and remain the only scientific works in the field of ichthyology. From the perspective of fisheries, the only other scientific contributions to understanding of the Tonle Sap's physical and biological environment appeared in the 1950s and 1960s. A third series of expert opinions emerged in the early 1990s with the work of the Mekong River Commission.

⁶ This refers to fish breeding, feeding patterns and behavior, and development to adulthood, including the role of aquatic habitats and seasonal variations.

⁷ Knowing the economic values of fisheries is an important step in measuring the costs and benefits of large-scale developments, which may be potentially environmentally unsustainable, so that the right policy direction is undertaken and development options are explored.

resource utilization, in terms of production and sustainability; and to clarify the macroeconomic importance of fisheries. It also laid plans for the establishment of a research and development institute for inland fisheries to strengthen the capability to produce, adapt, and use knowledge.⁸

4. The Inland Fisheries Research and Development Institute (IFREDI) was constituted in late 2002 as a physical, legal, and organizational entity reporting to DOF. Its mission is to promote sustainable development and use of living aquatic resources based on environmentally sound management.⁹ It is comprised of a section for biological research and resource assessment, and one for socioeconomic research, and oversees two field stations for lake and bagnet fisheries.¹⁰ Its research program, to be delivered by about 30 research staff now assigned to the Project for Management of the Freshwater Capture Fisheries, has been outlined. At this early stage, the opportunity exists to establish a well functioning research system with high standards for analytic rigor and effective scientific reporting and communication. From a small base, it is important that capacity to plan and undertake research, and to extend and disseminate findings, be built.

5. Fisheries research can work to (i) make fish more affordable; (ii) add to the diversification of fisheries; (iii) generate employment and income for fishers; (iv) create alternative livelihoods; (v) conserve and rebuild fish stocks; (vi) provide policy advice on management arrangements for common aquatic resources, from insights into the external factors that impinge on their use; and (vii) buttress community efforts to manage aquatic resources and protect biodiversity. Research to these ends can reduce poverty and is supported by ADB's policy on fisheries,¹¹ which is guided in turn by ADB's policy on agriculture and natural resources research.¹² Within that framework, ADB seeks to enhance the capability of national research systems in the priority areas of (i) addressing socioeconomic issues relating to open access and overfishing; (ii) fishery resource studies to provide information on their present status; (iii) ecologic-economic studies to characterize and quantify interactions between the fisheries sector and other sectors, the results of which are important inputs to policy analysis; (iv) studies on nonmarket valuation and natural resource and environmental accounting to

⁸ In these endeavors, DOF received early and steady support through the Project for Management of the Freshwater Capture Fisheries, Phase I (1994–1998) and Phase II (1999–2002), for \$2.3 million and \$3.1 million, respectively, funded by the Government of Denmark and implemented by the Mekong River Commission.

⁹ IFREDI's terms of reference are to (i) identify and monitor the development of freshwater fish and other living aquatic resources that are importance to the economy, food security, and the maintenance of biodiversity; (ii) establish an inland fisheries research program and carry out research in subjects related to the ecological, biological, technical, and socioeconomic aspects of fisheries; (iii) research the impacts on living aquatic resources of dam construction, irrigation schemes, and other development activities; (iv) establish information storage systems; (v) disseminate scientific and technological information to raise awareness of conservation needs and management options; (vi) research the relationship between freshwater fisheries and aquaculture; (vii) provide training in freshwater fisheries and their management; (viii) cooperate with local, nongovernment, and international organizations; and (ix) engage in income-generating activities related to the research agenda.

¹⁰ The Biological Research and Resource Assessment Unit's terms of reference are to undertake research and advise on (i) fish biology and ecology (biodiversity, habitats, migration patterns, reproductive dynamics); (ii) impacts on fisheries of habitat degradation and environmental change; (iii) impacts on living aquatic resources of fishing activities and practices; (iv) resource management systems; and (v) the capture fisheries and aquaculture interface. The Socioeconomic Research Unit's terms of reference are to undertake research and advise on (i) resource user characteristics; (ii) fishing practices and technologies; (iii) economic valuation of fisheries; (iv) fish marketing and price formation; (v) social impacts of habitat degradation and environmental change; and (vi) governance systems.

¹¹ ADB. 1997. *The Bank's Policy on Fisheries*. Manila.

¹² ADB. 1995. *The Bank's Policy on Agriculture and Natural Resources Research*. Manila. ADB's policy identified research as an important intervention requiring ADB support to address the three critical issues of (i) reducing poverty; (ii) sustainable management of agriculture and natural resources; and (iii) increasing the productivity of agriculture in the Asian and Pacific region.

extend the conventional cost-benefit analysis, which will ensure meeting the sustainability criterion in fisheries projects; and (v) sustainable aquaculture studies. Building the capacity of IFREDI offers opportunities in each of these priority areas. Continued support for public sector research is needed, since the private sector has limited interest in nor mandate for supporting research agenda in inland fisheries.¹³

III. THE TECHNICAL ASSISTANCE

A. Purpose and Outputs

6. The goal of the TA is sustainable management and conservation of natural resources and biodiversity in the Tonle Sap basin. Its purpose is to kick-start IFREDI as an efficient, effective, and relevant research and development institute.¹⁴ Its outputs will lie in the realms of (i) institute management; (ii) research and development; (iii) technology transfer; and (iv) policy development and dialogue.¹⁵ The TA framework is in Appendix 1.¹⁶

B. Methodology and Key Activities

7. Not enough of the world's knowledge is relevant to the poor, and the TA ascribes equal importance to the production, adaptation, and use of knowledge in situ for development of policies for pro-poor sustainable growth. Activities toward the four outputs will invest in people and share skills and knowledge in Cambodia, with an accent on learning and on-the-job training.

8. **Institute Management.** To accomplish the output in management, activities under the TA will (i) conduct planning exercises, including drafting an accounts and administrative manual, the first medium-term research plan, the first annual work plan, the first human resource development plan, and the first annual budget; and (ii) report on performance.

9. **Research and Development.** To accomplish the output in research and development, activities under the TA will (i) expand knowledge of the bioecology of key fish species, focusing on species that are important to local livelihoods; (ii) model flood-fish relationships in the Tonle Sap to determine the relationship among natural fish production, flooding patterns, and environmental parameters; and initiate the development of a hydrology and land-use decision-support system to be utilized by IFREDI; (iii) investigate improvements in marketing, distribution,

¹³ The low purchasing power of poor people provides them no immediate means and incentives to invest in research that meets their long-term development needs.

¹⁴ The TA would complement the suite of loan and TA projects, as well as projects to be submitted to the Government of Japan for financing under the Japan Fund for Poverty Reduction, that ADB proposes in the context of the Tonle Sap Initiative.

¹⁵ The principles underpinning accomplishment of outputs will be sustainability, equity, gender and development, participation, anticipation, and systems thinking.

¹⁶ The factors that conditioned formulation of the TA included (i) a diagnostic analysis that clearly defined problems and investigated their causes; (ii) a driving need for the TA, with commitment at the highest levels of MAFF; (iii) ownership and close collaboration at the highest levels of DOF to accomplish the agreed upon objective of the TA; (iv) a focused work program that is based on a realistic objective and deliverable outputs; (v) an allocation of resources geared to the objective and deliverable outputs; (vi) a realistic time horizon that reflects the absorptive capacity of IFREDI and recognizes the complexities and time requirements of capacity building; (vii) a well-designed program of process improvement that should include transfer of skills to IFREDI staff to operate the process; (viii) the establishment of achievable measures of progress and milestones to determine the effectiveness of progress; (ix) a management actively involved in directing and leading the process; (x) effective monitoring and supervision of TA implementation and progress; and (xi) mechanisms to ensure that improvements are maintained upon completion of the TA.

and utilization of key fish products; and (iv) circumscribe better the value of fisheries to elucidate policy directions.

10. **Technology Transfer.** To accomplish the output in technology transfer, activities under the TA will (i) conduct specialized and on-the-job training; (ii) facilitate communication and disseminate information; and (iii) develop skills in planning research projects and preparing funding proposals.

11. **Policy Development and Dialogue.** To accomplish the output in policy development and dialogue, activities under the TA will (i) establish linkages between IFREDI and key fishery stakeholders; (ii) build consensus for community-based management of aquatic resources; (iii) identify and prepare pro-poor policy options in fisheries; and (iv) establish IFREDI's authority as a center of knowledge and provider of policy inputs to, for instance, the Tonle Sap Biosphere Reserve Secretariat, the Cambodia Development Council, the National Institute of Statistics, the Ministry of Planning, and the Council on Agriculture and Rural Development.

C. Cost and Financing

12. The total cost of the TA is estimated at \$1,100,000 equivalent, comprising a foreign exchange cost of \$805,000 and a local currency cost of \$295,000 equivalent. The Government has requested ADB to finance \$900,000 equivalent, including \$785,000 in foreign exchange and \$115,000 equivalent in local currency.¹⁷ The TA will be financed on a grant basis by ADB's TA funding program. The Government will finance the balance of the local currency cost, equivalent to \$180,000, largely through the provision of office accommodation and remuneration and per diem of counterpart staff. Details of the cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

13. ADB will enter into a TA agreement with the WorldFish Center, which will implement the TA over 12 months. The WorldFish Center is the most qualified and competent agency to provide the services required based on its experience, capacity, and commitment.¹⁸ The Mekong subregion is one of the WorldFish Center's priority regions and Cambodia is one of its priority countries. The WorldFish Center has also implemented, with a good track record in output delivery, several ADB-supported TAs. The WorldFish Center also has arrangements with DOF for office facilities and staff presence in Cambodia for ongoing research and training collaboration with DOF. Further, the WorldFish Center will expand its collaboration with DOF and others in Cambodia under the Water and Food Challenge Program of the Consultative Group on International Agricultural Research. Last, to complement the TA, the WorldFish Center will backstop capacity building of DOF and IFREDI staff and advise on the development of twinning arrangements between IFREDI and other research institutes.¹⁹

¹⁷ This excludes in-kind WorldFish Center financing, in the amount of \$20,000.

¹⁸ The WorldFish Center works on inland and marine fisheries in developing countries. It researches ecosystem dynamics; investigates alternative management schemes; analyzes policy, economic, and institutional constraints in fisheries and aquatic resources management; and prioritizes and improves the productivity of key fish species. This entails cooperative research with institutions in developing countries and support for information and training in national agricultural research systems. In Cambodia, the WorldFish Center has existing collaboration arrangements with DOF on issues dealing with institutional frameworks, livelihoods analysis, and economic valuation, with support from the Department for International Development of the United Kingdom and the Swedish International Development Cooperation Agency.

¹⁹ Twinning of institutions refers to a partnership between two institutions that provides close institutional support from one to the other. It is recognized as a tool that provides positive results. Commonality of interests, the scope for exchange visits, and evolving human contacts at various organizational levels are all key ingredients.

14. The TA is expected to commence in February 2003 and to be completed by January 2004. TA implementation will require (i) 35 person-months of international resource specialists, mainly in the fields of institutional development and research management, bioecology, natural resource and agricultural economics, computer modeling, marketing, policy development, and socioeconomics; and (ii) 12 person-months of short-term domestic resource specialists, mainly in the fields of bioecology, natural resource and agricultural economics, socioeconomics, policy development, database management, and human resource development and training, the composition and distribution of which will be determined as need arises, in consultation with ADB. The methodology and terms of reference for the TA are specific and clearly identified. Hence, ADB's procedures for simplified technical proposals will be used as the basis for contract negotiation with the WorldFish Center. The resource specialists will be engaged in accordance with ADB's *Guidelines on the Use of Consultants*. The team leader, who should have qualifications and experience in institutional development and research management, including organizational change, will direct their activities. The resource specialists will be based at IFREDI. Equipment will be procured in accordance with ADB's *Guidelines for Procurement*. A staffing schedule is shown in Appendix 3. Terms of reference are given in Appendix 4.

15. The Executing Agency for the TA will be DOF. DOF has assigned experienced staff to serve on a full-time basis as counterparts to the international and domestic resource specialists, for a total of 90 person-months. These counterpart staff will work to facilitate TA activities and to guarantee the close involvement of DOF and staff of other relevant agencies. Methodologies for this purpose will be given at the WorldFish Center. To facilitate TA implementation, DOF will provide logistical support to the specialists engaged, including adequately furnished office space and access to communications facilities. DOF will also provide copies of relevant laws, regulations, policies, and reports to the WorldFish Center and ADB, including drafts of new regulatory instruments. At the WorldFish Center's headquarters, a project coordination office headed by the program leader, Policy Research and Impact Assessment Program, and including expertise in bioecology, socioeconomics, and policy development, will be established to advise on TA implementation and coordinate with ADB. At ADB, a project officer with suitable expertise will be assigned to administer the TA and monitor the progress of the work.

16. The WorldFish Center will produce (i) an inception report within 6 weeks of the commencement of the TA; (ii) a midterm report within 20 weeks; (iii) a draft final report within 44 weeks; and (iv) a final report detailing TA outcomes and future actions. IFREDI will submit to ADB (i) a semiannual report; (ii) a semiannual financial statement accounting for the use of TA funds; and (iii) an audited final financial statement, not later than 6 months after TA completion. IFREDI will also submit to ADB a comprehensive TA completion report within 3 months of the end of the TA. DOF will, on its part, fill out a TA completion questionnaire to evaluate the TA's outputs, identify lessons learned, and suggest follow-up actions.²⁰

IV. THE PRESIDENT'S DECISION

17. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$900,000 on a grant basis to the Government of Cambodia for Capacity Building of the Inland Fisheries Research and Development Institute, and hereby reports this action to the Board.

²⁰ ADB will monitor the sustainability of TA benefits after completion, especially the implementation of recommendations agreed to during the TA. Further ADB assistance on a small scale and on a selective basis to support such an implementation program and to continue the partnership between ADB and IFREDI beyond TA completion could be a worthwhile initiative.

TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Goal			
Sustainable management and conservation of natural resources and biodiversity in the Tonle Sap basin	<ul style="list-style-type: none"> • Fisheries research is catalyzed. • Systems and the capacity for natural resource management are enhanced. • Planning and management follow integrated, cross-sector approaches to the Tonle Sap basin. • Stakeholders participate in decision making. • Rural livelihoods are sustained and improved. • Policies and institutions are pro-poor. 	<ul style="list-style-type: none"> • Government statistics • Research program publications • Policy statements • Funding for research 	
Purpose			
To kick-start the Inland Fisheries Research and Development Institute (IFREDI) as an efficient, effective, and relevant research and development institute	<ul style="list-style-type: none"> • IFREDI plans and undertakes research, and extends and disseminates findings, for sustainable management and conservation of inland fisheries. 	<ul style="list-style-type: none"> • Technical assistance (TA) framework • Final report by the WorldFish Center • TA completion questionnaire filled out by the Department of Fisheries (DOF) • TA completion report prepared by IFREDI • TA completion report prepared by the Asian Development Bank (ADB) 	<ul style="list-style-type: none"> • DOF, IFREDI, and other relevant institutions have a clear vision about the sector goal to which the TA will contribute. • Trained counterpart staff remain at IFREDI.
Outputs			
<ol style="list-style-type: none"> 1. The management framework is defined. 2. Research and development are strengthened. 3. Technology transfer capabilities are built. 4. Policy development and dialogue capabilities are established. 	<ul style="list-style-type: none"> • Manuals, plans, and budgets drafted • Research findings publicized • IFREDI staff trained on-the-job • Databases established • Communications and information exchange network established • Management options identified 	<ul style="list-style-type: none"> • TA framework • TA reports and review missions • Tripartite meetings 	<ul style="list-style-type: none"> • DOF and IFREDI understand clearly the purpose of the TA and how it is to be achieved. • TA outputs are publicized and disseminated, and lend themselves to follow-up analysis and action, including status reports and recommendations to DOF for management purposes.
Activities			
<ol style="list-style-type: none"> 1. Define the management framework. 		<ul style="list-style-type: none"> • TA framework • TA reports and review missions 	<ul style="list-style-type: none"> • Linked activities are scheduled appropriately. • All logistical and

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
▶ Conduct planning exercises.	<ul style="list-style-type: none"> • Accounts and administrative manual drafted • First medium-term research plan drafted • First annual operational plan drafted • First human resource development plan drafted • First annual budget drafted 	<ul style="list-style-type: none"> • Tripartite meetings • Research program publications • Workshop findings and recommendations • Brief monthly progress notes 	<p>administrative arrangements are understood and in place.</p> <ul style="list-style-type: none"> • The team leader of the resource specialists manages team members effectively. • The team leader of the resource specialists has client management skills. • The resource specialists establish an integrated management system comprising management tools such as hierarchy of objectives, tree analysis, work breakdown structure, bar chart, Gantt chart, organization responsibility chart, and individual task chart. • Stakeholders attend workshops and participate actively. • Appropriate counterpart staff were selected. • Monthly progress notes and TA reports are written clearly and simply.
2. Strengthen research and development.	<ul style="list-style-type: none"> • Performance monitoring reports prepared 		
▶ Expand knowledge of the bioecology of key fish species.	<ul style="list-style-type: none"> • Key fish species identified, and information about their bioecology gathered and synthesized • Bioecological monitoring program of key species initiated • A reference fish collection set up at IFREDI 		
▶ Model flood-fish relationships in the Tonle Sap.	<ul style="list-style-type: none"> • Knowledge of fishers and field officers gathered • A consensus conceptual framework built through meetings and critical parameters identified • Ecological traits of 10 key species incorporated • Computer model developed and counterpart staff trained • Model fine-tuned at 3 sites around the Tonle Sap 		
▶ Investigate for improvement marketing, distribution, and	<ul style="list-style-type: none"> • Participatory rural appraisal at 8 sites and 2 seasons • Distribution and 		

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
utilization of key fish products.	pricing of key fish products in the Tonle Sap basin understood, and options for improvement recommended		
<ul style="list-style-type: none"> ▶ Circumscribe better the value of fisheries to elucidate policy directions. 	<ul style="list-style-type: none"> • Economic values determined and reported, using market-based methods, methods based on surrogate market values, and those methods based on potential expenditure or willingness to pay 		
3. Build technology transfer capabilities.			
<ul style="list-style-type: none"> ▶ Conduct specialized training. 	<ul style="list-style-type: none"> • Resource specialists conduct on-the-job and specialized training in marketing, natural resource and agricultural economics, bioecology, fish taxonomy, modeling, and data analysis. • Capacities in English and computer science improved by training • Training at the WorldFish Center is provided to IFREDI's librarian and fish biologists (taxonomic database). 		
<ul style="list-style-type: none"> ▶ Facilitate communication and disseminate information. 	<ul style="list-style-type: none"> • An operational documentation center and information exchange mechanisms are established. • Information resources and services are provided by the WorldFish Center. • Databases are expanded and maintained. • Workshops are organized to communicate 		

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>▶ Develop skills in planning research projects and preparing funding proposals.</p>	<p>research breakthroughs.</p> <ul style="list-style-type: none"> • Information products in the English and Khmer languages are packaged for distribution. • Resource specialists lead counterpart staff in the planning and formulation of research projects and funding proposals. • Team leader conducts on-the-job training in planning projects and formulating funding proposals. 		
<p>4. Establish policy development and dialogue capabilities.</p>	<ul style="list-style-type: none"> ▶ Establish linkages between IFREDI and key fishery stakeholders. <ul style="list-style-type: none"> • Identify and canvass key fishery stakeholders. ▶ Build consensus for community-based management of aquatic resources. <ul style="list-style-type: none"> • Concept of community-based management is promoted. ▶ Identify and prepare pro-poor policy options in fisheries. <ul style="list-style-type: none"> • Meetings are organized with stakeholders for opinion gathering and information sharing. • Pro-poor fisheries management options are identified. • Focus group discussions with local communities to understand the acceptance of policies on management • Inputs for improvement of policies on community-based management of aquatic resources are disseminated. 		

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<ul style="list-style-type: none"> ▶ Establish IFREDI's authority as a center of knowledge and provider of policy inputs. 	<ul style="list-style-type: none"> • Seminars for policy-makers are conducted. • Policy inputs are provided to the Tonle Sap Biosphere Reserve Secretariat, Cambodia Development Council, National Institute of Statistics, Ministry of Planning, and Council on Agriculture and Rural Development. 	<ul style="list-style-type: none"> • TA framework • TA reports and review missions • Tripartite meetings • Workshop findings and recommendations • Brief monthly progress notes 	<ul style="list-style-type: none"> • All logistical and administrative arrangements are understood and in place.
Inputs (ADB)	Cost Estimates (\$)		
1. Resource Specialists	752,000		
2. Equipment	30,000		
3. Workshops, Seminars, and Conferences	20,000		
4. Surveys and Fieldwork	40,000		
5. Miscellaneous Administration and Support Costs	10,000		
6. Others	5,000		
7. Contingencies	43,000		
	Total 900,000		
Inputs (DOF)			
1. Office Space and Transport	100,000		
2. Remuneration and Per Diem of Counterpart Staff	40,000		
3. Others	40,000		
	Total 180,000		
Inputs (WorldFish Center)			
1. Facilities, library services, hosting of training, workshops	Total 20,000		

COST ESTIMATES AND FINANCING PLAN
(\$)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing^a			
1. Resource Specialists			
a. Remuneration and Per Diem			
i. International Resource Specialists	525,000	0	525,000
ii. Short-Term Domestic Resource Specialists	0	18,000	18,000
iii. Per Diem	150,000	0	150,000
b. International and Local Travel	28,000	2,000	30,000
c. Reports and Communications	4,000	25,000	29,000
2. Equipment ^b	30,000	0	30,000
3. Workshops/Seminars/Conferences			
a. Facilitators	0	10,000	10,000
b. Trainings/Workshops	0	10,000	10,000
4. Surveys/Fieldwork	0	40,000	40,000
5. Miscellaneous Administration and Support Costs	5,000	5,000	10,000
6. Representative for Contract Negotiations ^c	5,000	0	5,000
7. Contingencies (5%)	38,000	5,000	43,000
Subtotal (A)	785,000	115,000	900,000
B. Cambodian Government Financing^d			
1. Office Accommodation and Transport	0	100,000	100,000
2. Remuneration and Per Diem of Counterpart Staff	0	40,000	40,000
3. Others	0	40,000	40,000
Subtotal (B)	0	180,000	180,000
C. WorldFish Center Financing^e			
Subtotal (C)	20,000	0	20,000
Total	805,000	295,000	1,100,000

^a Funded by ADB's TA funding program.

^b Includes provision for office equipment.

^c Includes cost of travel and per diem for a Government observer invited to contract negotiations.

^d In-kind.

^e In-kind facilities, library services, provision of information resources, hosting of training, workshops, and exchange visits.

Source: Asian Development Bank estimates.

INDICATIVE STAFFING SCHEDULE

Resource Specialists and Counterpart Staff	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Institute Management												
Project Coordinator	= = =											
Team Leader	—————											
National Project Director	—————											
Research and Development												
Fishery Biocologist and Modeling Specialist	—————			—————				—————				
Fishery Biocologist (Senior)	—————											
Computer Specialist (Senior)	—————											
Computer Modeling Student	—————											
Natural Resource and Agricultural Economist	—————						—————					
Natural Resource and Agricultural Economist (Senior)	—————											
Fish Marketing Specialist (Junior)	—————											
Technology Transfer												
Technology Transfer Specialist	—————									—————		
Librarian	—————											
Policy Development and Dialogue												
Policy Development Specialist	—————							—————				
Policy Development Specialist (Senior)	—————											
Facilitator (Junior)	—————											
Reports:	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; text-align: left;"> <p>Inception Report</p> <p>Midterm Report</p> <p>Draft Final Report</p> <p>Final Report</p> </div> <div style="width: 80%;"> <p>↑</p> <p>↑</p> <p>↑</p> <p>↑</p> </div> </div>											
Tripartite Meetings:	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"></div> <div style="width: 40%; text-align: center;">•</div> <div style="width: 40%; text-align: center;">•</div> </div>											
Workshops:	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"></div> <div style="width: 40%; text-align: center;">•</div> <div style="width: 40%; text-align: center;">•</div> </div>											
	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"></div> <div style="width: 40%; text-align: center;">Inception</div> <div style="width: 40%; text-align: center;">Final</div> </div>											

- International Resource Specialist
- Counterpart Staff
- Student
- = = = International Resource Specialist (Intermittent)

TERMS OF REFERENCE FOR RESOURCE SPECIALISTS AND COUNTERPART STAFF

A Introduction

1. The Executing Agency for the technical assistance (TA) will be the Department of Fisheries (DOF) in the Ministry of Agriculture, Forestry, and Fisheries (MAFF). DOF will assign 90 person-months of counterpart staff services to implement the TA. These counterpart staff will be assisted by 35 person-months of international resource specialist services, provided by the WorldFish Center.¹ Aside from the counterpart staff, domestic resource specialists will be engaged to provide 12 person-months of specialized services, as needed.

B. Terms of Reference for International Resource Specialists

2. The team leader of the international resource specialists will assume responsibility for TA implementation and, in particular, define the management framework for IFREDI. He/she will liaise closely with the project coordinator in the WorldFish Center's Headquarters. The terms of reference of the international resource specialists will include, but not necessarily be limited to, the following:

3. **Institutional Development and Research Management Specialist Cum Team Leader (12 person-months).**² He/she will (i) refine the terms of reference of the international resource specialists and counterpart staff to ensure quality of work; (ii) lead the resource specialists to ensure that all follow agreed time tables, processes, and methodologies; (iii) prepare a detailed operational plan for smooth implementation of TA activities; (iv) prepare a framework for priority setting exercises leading to the first medium-term plan; (v) with the support of administrative staff, operationalize the functioning of IFREDI; (vi) prepare the first annual budget; (vii) prepare the first human resource development plan; (viii) prepare an accounts and administrative manual; (ix) conduct regular meetings and supervise inputs from other resource specialists to ensure that the TA progresses as planned; (x) provide on-the-job training to counterpart staff in planning projects and formulating funding proposals; (xi) prepare the inception, mid term, draft final, and final report for the TA; (xii) consolidate the monthly progress notes prepared by the resource specialists and submit them to the project coordinator; (xiii) prepare financial progress reports and analyses, and manage TA funds; and (xiv) transmit institutional development and research management skills to ensure that these capabilities exist in IFREDI by the time his/her inputs into the TA are completed.

4. **Fishery Bioecologist and Modeling Specialist (9 person-months).** He/she will (i) identify, through literature reviews, catch sampling surveys, and questionnaires, dominant species in the various fisheries of importance to the livelihood of local communities (including commercial as well as family fisheries), and integrate seasonal variability; (ii) gather information about the bioecology of the dominant species identified, through literature reviews, field samplings (sexual stages and diet), and interviews; and synthesize information in a series of specific monographs in the English and Khmer languages; (iii) initiate a program for the continuous monitoring of these dominant species in the field, with emphasis on dry and flooding

¹ The choice of the international resource specialists should be based on technical, management, and cross-cultural skills. It should include (i) extensive reference checks of effectiveness in previous assignments; and (ii) indicated willingness to undertake cross-cultural orientation. The selection process should be participatory with the Inland Fisheries Research and Development Institute (IFREDI).

² The team leader should have expertise in organizational change. Capacity building is directed at implementing change. Producing an outline of a solution is reasonably simple, but making it work in an organizational context is often difficult because it requires overcoming barriers.

seasons, set up logistical means (including survey boats, fishing gears, etc.), identify sites for regular sampling around the Tonle Sap, explore samplings at 3 sites during two seasons, and define a realistic protocol for long-term monitoring of abundance and sizes; (iv) set up a reference collection of the fish of the Tonle Sap for repository at IFREDI; (v) gather information from fishers, fisheries officers, and literature about the known relationships between fish production, water regime, and floodplain environment; and synthesize this information; (vi) build, through meetings and workshops, a consensual model of this relationship for the Tonle Sap; (vii) model this relationship, applied to the species groups dominant in fisheries and to three sites around the Tonle Sap; (viii) provide management guidelines drawn from the model developed; (ix) initiate a decision-support system for water and land management in relation to fish production; (x) conduct training courses in bioecology, fish taxonomy, and data analysis at IFREDI, open to DOF staff and, on a case-by-case basis, to other interested parties;³ (xi) provide on-the-job training to counterpart staff in the field of bioecology (sampling principles, protocol design, monitoring, and reporting); (xii) provide on-the-job training to counterpart staff in the field of modeling (principles, protocol design, computer science, and reporting); (xiii) submit monthly progress notes to the team leader; (xiv) transmit bioecology and modeling skills to ensure that these capabilities exist in IFREDI by the time his/her inputs into the TA are completed; and (xv) prepare an end-of-assignment report providing input-output indicators and making recommendations.

5. Natural Resource and Agricultural Economist (6 person-months). He/she will (i) provide methodologies and framework for circumscribing the value of aquatic resources and for investigation of marketing and utilization of fish products; (ii) provide technical advice on sampling and data collection; (iii) collect primary and secondary information on economic values of inland fisheries, and on marketing and utilization of fish products; (iv) supervise data collection and provide necessary on-the-job training to counterpart staff; (v) analyze primary and secondary data; (vi) establish a relationship among the abundance, distribution, and pricing of fish products in the Tonle Sap basin; and make recommendations for improvements; (vii) prepare technical reports on marketing of key fish products and economic valuation of fisheries; (viii) conduct on-the-job training to counterpart staff in the fields of marketing and natural resource and agricultural economics (footnote 3); (ix) submit monthly progress notes to the team leader; (x) transmit natural resource and agricultural economics and marketing skills to ensure that these capabilities exist in IFREDI by the time his/her inputs into the TA are completed; and (xi) prepare an end-of-assignment report providing input-output indicators and making recommendations.

6. Technology Transfer Specialist (2 person-months). He/she will (i) review existing mechanisms for the transfer, dissemination, and utilization of the technology menus and integrated technology packages that have been tested and adopted and make recommendation for improvements, including, for instance, participatory demonstration, use of extension services, publications, and audiovisual support materials; (ii) prepare technical reports on technology transfer; (iii) elaborate technology transfer approaches, paying particular attention to cost-efficient methods, to ensure that the general public has open and easy access to the results of IFREDI's research; (iv) promote institutional stability at IFREDI based on principles of full cost recovery for the services provided; (v) submit monthly progress notes to the team leader; (vi) transmit technology transfer skills to ensure that these capabilities exist in IFREDI by the time his/her inputs into the TA are completed; and (vii) prepare an end-of-assignment report providing input-output indicators and making recommendations.

³ Training will be conducted in consultation with the Department of Personnel and Human Resource Development in MAFF, with an eye to meeting the continuing training requirements of IFREDI after TA completion.

7. **Policy Development Specialist (5 person-months).** He/she will (i) review relevant institutions at the central and provincial levels for their efficiency, effectiveness, and relevance regarding inland fisheries; (ii) review existing policies, laws, decrees, regulations, and circulars (including drafts of new regulatory instruments) for their efficiency, effectiveness, and relevance regarding inland fisheries; (iii) conduct discussions with key fishery stakeholders and assess their roles and interests; (iv) develop and submit to DOF a set of strategic policy options addressing priority issues in inland fisheries; (v) contribute to developing IFREDI as a vehicle that facilitates communication and information dissemination; (vi) contribute to establishing IFREDI's authority as a center of knowledge and provider of policy inputs to, for instance, the Tonle Sap Biosphere Reserve Secretariat, the Cambodia Development Council, the National Institute of Statistics, the Ministry of Planning, the Mekong River Commission, and the Council on Agriculture and Rural Development; (vii) conduct on-the-job training to counterpart staff in the field of policy development; (viii) submit monthly progress notes to the team leader; (ix) transmit policy development skills to ensure that these capabilities exist in IFREDI by the time his/her inputs into the TA are completed; and (x) prepare an end-of-assignment report providing input-output indicators and making recommendations.

8. **Project Coordinator (1 person-month, at the WorldFish Center, intermittent).** He/she will (i) liaise closely with the team leader and advise on TA implementation; (ii) formulate the IFREDI backstopping program at the WorldFish Center; (iii) promote twinning arrangements between IFREDI and other research institutes, including hosting of training, library services, hosting of training, workshops, and exchange visits; and (iv) coordinate with the Asian Development Bank vis-à-vis TA implementation and technical and financial reporting.

C. Terms of Reference for Counterpart Staff

9. DOF will assign counterpart staff on a full-time basis to firm up IFREDI's institutional base. The national project director, in collaboration with the team leader, will assume responsibility for TA implementation and, in particular, define the management framework for IFREDI. The terms of reference of these counterpart staff will include, but not necessarily be limited to, the following:

10. **National Project Director (12 person-months).** He/she will (i) assist in refining the terms of reference of the international resource specialists and counterpart staff to ensure quality of work; (ii) assist in preparing a detailed operational plan for smooth implementation of TA activities; (iii) assist in preparing a framework for priority-setting exercises leading to the first medium-term plan; (iv) with the support of administrative staff, operationalize the functioning of IFREDI; (v) assist in preparing the first annual budget; (vi) assist in preparing the first human resource development plan; (vii) assist in preparing an accounts and administrative manual; (viii) secure from DOF the in-kind financing necessary to TA implementation; (ix) conduct regular meetings and supervise inputs from other resource specialists to ensure that the TA progresses as planned; and (x) report monthly to the Director of DOF on progress in TA implementation.

11. **Fishery Bioecologist (12 person-months).** He/she will (i) conduct fieldwork and assist in the identification of key species that are important for local livelihoods in the various fisheries, and facilitate information gathering among fishers and fisheries officers; (ii) assist in the characterization of the bioecology of these key species with emphasis on reproduction, migration patterns, and habitat; (iii) assist in the setting up of a regular fish monitoring program (logistics, site identification, etc.); (iv) assist in the setting up of a reference fish collection at

IFREDI; (v) supervise the fish biology data entry, storage, and manipulation in computers; (vi) assist in the identification of key hydrological and environmental parameters driving fishery production, and assist in the collection of information on these parameters; (vii) assist in the building of a conceptual model of the flood-fish-environment relationship; (viii) assist in the making of suggestions for management regimes based on the biology of key species important for the livelihood of the local communities; and (ix) assist in the preparation of technical reports on fishery ecology and biology.

12. **Computer Specialist (6 person-months).** He/she will (i) assist in the building of a conceptual model of the flood-fish-environment relationship; (ii) assist in the development of a computer model of this relationship; (iii) assist in the preparation of management guidelines drawn from the model developed; (iv) assist in the preliminary development of a decision-support system for water and land management in relation to fish production; and (v) assist in the preparation of technical reports on fish-flood modeling.

13. **Natural Resource and Agricultural Economist (12 person-months).** He/she will (i) facilitate household surveys and data collection in the field; (ii) assist in the analysis of the primary and secondary data to circumscribe the economic values of inland fisheries; (iii) assist in establishing a relationship among the abundance, distribution, and pricing of fish products in the Tonle Sap basin and making recommendations for improvements; and (iv) assist in the preparation of technical reports on marketing of key fish products and economic valuation of fisheries.

14. **Fish Marketing Specialist (12 person-months).** He/she will (i) assist in the formulation of methodologies and a framework for investigating the marketing and utilization of fish products; (ii) assist in the data collection for primary and secondary information on marketing and utilization of fish products; (iii) assist in the formulation of a relationship between the abundance, distribution and pricing of fish products in the Tonle Sap basin; and (iv) assist in the preparation of technical reports on marketing and utilization aspects of fisheries.

15. **Librarian (12 person-months).** He/she will (i) maintain the information or database of collections in the Information Center at IFREDI; (ii) ensure that IFREDI's communication technology skills keep the general public informed about fisheries and fishery sector activities and concerns; (iii) advise on technological options for knowledge management; and (iv) develop proactive systems and procedures for disseminating research findings to the general public.

16. **Policy Development Specialist (12 person-months).** He/she will (i) assist in reviewing relevant institutions at the central and provincial levels for their efficiency, effectiveness, and relevance regarding inland fisheries; (ii) assist in reviewing existing policies, laws, decrees, regulations, and circulars (including drafts of new regulatory instruments) for their efficiency, effectiveness, and relevance regarding inland fisheries; (iii) assist in conducting discussions with key fishery stakeholders and assessing their roles and interests; (iv) assist in developing and submitting to DOF a set of strategic policy options addressing priority issues in inland fisheries; (v) contribute to developing IFREDI as a vehicle that facilitates communication and information dissemination; (vi) contribute to establishing IFREDI's authority as a center of knowledge and provider of policy inputs to, for instance, the Tonle Sap Biosphere Reserve Secretariat, the Cambodia Development Council, the National Institute of Statistics, the Ministry of Planning, the Mekong River Commission, and the Council on Agriculture and Rural Development; and (vii) assist in establishing IFREDI's authority as a center of knowledge and provider of policy inputs to, for instance, the Tonle Sap Biosphere Reserve Secretariat, the Cambodia Development

Council, the National Institute of Statistics, the Ministry of Planning, the Mekong River Commission, and the Council on Agriculture and Rural Development.

17. **Facilitator (12 person-months).** He/she will (i) organize workshops; (ii) assist in the creation of networks and contribute to workshops for the development of IFREDI as a vehicle that facilitates communication and information dissemination among members; and (iii) assist in the organization of training sessions.

D. Terms of Reference for Domestic Resource Specialists

18. Domestic Resource Specialists. They will (i) in collaboration with the international resource specialists and counterpart staff, collect, review, and analyze relevant bioecology, modeling, natural resource and agricultural economics, marketing, technology transfer, and policy development information pertaining to their respective areas; (ii) in collaboration with the international resource specialists and counterpart staff, organize national workshops; (iii) in collaboration with the international resource specialists and counterpart staff, contribute as necessary to the production of the inception, mid term, draft final, and final reports for the TA; and (iv) prepare technical papers for presentation at the national workshops.