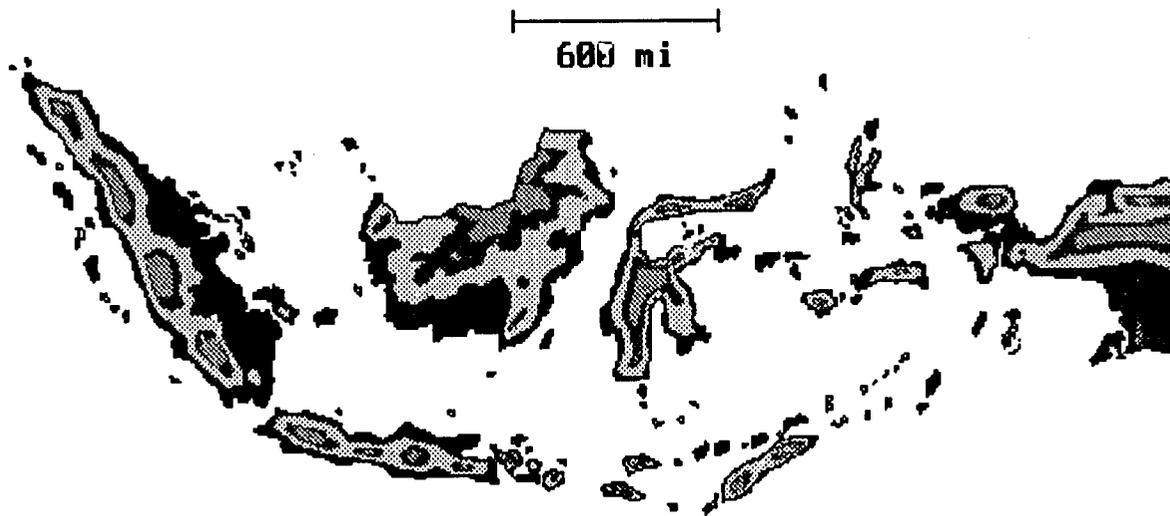


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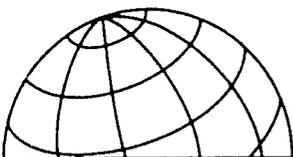
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**Fisheries Research and Development Project
Final Evaluation**



Submitted by:

**Tropical Research & Development, Inc.
August 1992**



A.I.D. EVALUATION SUMMARY - PART II

SUMMARY

J. Summary of Evaluation Findings, Conclusions and Recommendations (Try not to exceed the three (3) pages provided)

Address the following items:

- Purpose of evaluation and methodology used
- Purpose of activity(ies) evaluated
- Findings and conclusions (relate to questions)

- Principal recommendations
- Lessons learned

Mission or Office:

Indonesia

Date This Summary Prepared:

May 26, 1992

Title And Date Of Full Evaluation Report:

Report of the evaluation mission on project Fisheries Research and Development Project, Indonesia

I. SUMMARY

BACKGROUND, PURPOSE OF EVALUATION, AND METHODOLOGY

In the 1980s, the Government of Indonesia (GOI), faced with the continuing 2.2% annual growth in population, focused attention on the unexploited potential of the fisheries sector, in particular traditional marine fisheries and aquaculture which were estimated to be producing only about 20% of their capacity. In addition, increasing demands on world markets indicated exceptional opportunities for earning foreign exchange from the expansion of coastal areas into marine shrimp production, and improved technology. GOI realized to exploit these potentials it was necessary to attract private capital into the sector, and formulated new legal and fiscal incentives. It was also necessary to increase government support services to the sector, particularly to advance the management and technology resource base.

Against this background the Ministry of Agriculture (MOA) and the United States Agency for International Development (USAID) developed a Project Paper with the long-term objective of improving the technological and management resources available to both public organizations and private enterprises in the fisheries sector. In the short-term, it planned for the establishment of a national coordinated fisheries research agenda, upgraded research programs at the MOA and key universities to address priority production constraints, and for improved academic training at selected universities with mandated responsibilities for fisheries training.

The Project Paper was signed in August, 1986 with a six-year budget of US\$ 3.785 million in loan funds, and US\$ 3.320 million in grant funds. GOI would provide the Rupiah (Rp) equivalent of US\$ 1,507,000 in cash and US\$ 2,700,000 in kind. In 1988, due to a deobligation of USAID funding, with agreement of GOI, the project agreement was changed. Through Amendment No. 1, loan funding was reduced to US\$ 200,000 and grant funds to US\$ 2,610,000. Counterpart contributions were also reduced to the Rupiah equivalent of US\$ 1,025,000.

Further amendments transferred the costs of all graduate training to Project 497-0328, USAID/GOI General Participating Training II, and added US\$ 423,340 from In-country Local Support funds for further technical assistance. Under the revised FRDP, greater emphasis was to be given to policy planning, including expanding the role of the private sector, and less emphasis on institutional development. Funds were realigned to focus on the development of a national fisheries development strategy and a national fisheries research agenda, and for the development of technology packages and workshops to assist the private sector in overcoming production and marketing constraints.

The end-of-project evaluation mission, comprising three experts from Indonesia and two from the USA, visited GOI and project offices, field stations, universities, research institutes, private facilities, and farms throughout Indonesia to interview persons associated with FRDP's activities. Data from project files and interviews with 120 persons, of which 23 beneficiaries of education, training, and research grants, and 19 from the private sector, including small-scale farmers and businessmen, were analyzed to form the basis for the evaluation report.

PURPOSE OF ACTIVITIES EVALUATED

The mission evaluated all project activities to determine their effectiveness in accomplishing FRDP short and long-term objectives, namely:

- (a) upgrading staff, facilities, academic training, and research programs of seven universities and research institutions to resolve priority production, marketing, and policy and management problems,
- (b) assisting MOA and the Ministry of Education (MOE) to establish a national coordinated fisheries research agenda,
- (c) assisting MOA in evaluating the need and mechanisms to improve fisheries policy and planning to ensure optimal utilization and management of Indonesia's aquatic resources, and
- (d) improving technologies for production and marketing of commercially important fish products.

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FINDINGS AND CONCLUSIONS

The project helped development of national policy agendas through the networking of government fisheries agencies, respective fisheries organizations, and the private sector, and through the publication of proceedings of the annual forums. This process is being regarded as a model by other national sectors.

Long-term education will be lasting, as all 13 fellows have returned or are returning to the country. All are placed in positions where they can apply their new experiences immediately. This will have a multiplier effect within their respective institutions. Short-term training will also be lasting, particularly through the efforts to train trainers and involve NGOs in training and extension. The 22 competitive research grants have produced results which added to the national fisheries information base, and added to the competency of the individual grantees. The initiative to produce 25 mini-technology packages, called Pedoman Teknis, offers a speedy and effective conduit to transfer technology at field level. The process is also a model which may be used by other sectors. The production of a Paket Teknologi (Pa-Tek) has created sustainable industry in intensive culture of freshwater fish in cages of low-volume. The project's activities to link to the private sector have been most valuable at the small-scale farmer level and should provide future impact, particularly through the work with NGOs. The project has been successful in involving women at all levels, and especially in technical transfer. More emphasis on special women's programs is required to sustain these initial efforts.

In summary, the project was in the right place at the right time when Indonesia was rapidly becoming a major fisheries nation, particularly in world aquaculture. It produced valuable outputs currently being used in both the public and private sectors. The project methodology of massive and varied technical assistance organized by a small management core was highly appropriate for the project. It proved to be effective in achieving the short-term objectives, and for laying the foundation for achieving the long-term goal of a sustainable national fisheries industry.

The prime contractor, Auburn University, was effective in recruiting qualified experts to provide technical assistance to the fisheries sector. This included both marine and inland fisheries, the culture fisheries, and in post-harvest technology and marketing. The contractor exercised great flexibility in new project initiatives and achieving outputs; for example, realignment of research approaches by administering a system of competitive research grants, and the production of Pedoman Teknis to by-pass the slow structured process of producing approved technical packages. The contractor was effective in preparing and placing post-graduate fellows overseas, particularly in view of the highly competitive and diminishing opportunities at all universities in the USA. The International Center for Aquaculture at Auburn University has played a major role in the success of the long-term national investment in education. Moreover the component was highly cost-effective compared with most international education of multilateral assistance projects. The contractor produced almost all its intended outputs.

The Agricultural Agency for Research and Development (AARD), the national counterpart agency for the project, through the Center Research Institute for Fisheries (CRIFT) and its research institutes, was an effective and cooperative collaborator in the project. AARD fulfilled its obligations in the face of legal and administrative constraints, and the fact that certain components of the project were beyond its mandate.

USAID has provided fair and enthusiastic support to the project, although it is the smallest of the agency's current portfolio of assistance projects in Indonesia. It has fulfilled all its financial commitments, notably continuing to add funds to the project from other sources, and through amendments, to compensate for the sudden deobligation of some US\$ 4 million from the initial institution-building and research project which was already underway.

RECOMMENDATIONS

The mission identifies an administrative barrier between research and application in the field by farmers caused by the centralized process of preparing, evaluating, and disseminating Tek-Paks. The mission recommends GOI replaces it with a simple system for regional control, using regional research institutes, state regional universities, and provincial extension offices.

The mission commends the approach of PRDP and its Pedoman Teknis to simplify the transfer of technology to the primary producers. The mission recommends that the government continues to use Pedoman Teknis as an extension tool in the fisheries sector.

Noting the success of NGOs in the transfer of technology at the field level, the mission recommends that GOI involves NGOs in the process of technology transfer. The mission also recommends that GOI takes steps to integrate the Directorate of Agriculture Extension within AARD to facilitate closer cooperation between researchers and extension workers.

The mission perceives a general lack of associated socio-economic understanding in the process of extending technical information to the primary producers; therefore the mission recommends that the Institute of Socio-economic Studies at Bogor receives GOI financial support to create a Fisheries Department.

The mission recommends that AARD and the Directorate General of Fisheries (DGF) adopt a more flexible fishery development strategy which will allow research to respond more to regional rather than central needs, thus widening the options for the primary producers.

The mission recommends that the processes of selection and approval of young candidates for overseas education, and middle-level researchers to attend international conferences or to make study tours, should be localized and simplified so that they are immediately responsive to the timing of opportunities. The mission recommends (i) a new scientific journal for Indonesian fisheries, including aquaculture, paid for through membership in a professional fisheries society, and (ii) national and local trade papers for fishermen and farmers published by the private sector.

The mission recommends that workshops and supporting materials suitable for men and women are prepared to teach the fundamentals of hatchery management and production with the priority for floating hatcheries in the Cirata/Saguling region, and in marine areas where interest in marine fish cultivation is growing.

With regard to the project itself, the mission expresses concern that the Third Conference proposed in June does not have the broad and equitable representation which recognizes the country's regional diversity and different needs. It is recommended that the Conference extends invitations to delegates elected from the regional associations of fishermen and fish-farmers, NGO's within the region active in fisheries development, state regional universities, provincial fisheries offices, associations of professional fisheries scientists, and regional planning boards.

The mission notes that women have been represented in the activities of the PRDP. However, if funds remain at the end of the project the mission recommends that they be used for short-courses for women only, such as training in fish hatchery technology.

LESSONS LEARNED

The donor should strive for consistency and purpose in the administration of bilateral technical assistance through the life of individual projects. Mid-course changes place an unnecessary burden on the contractor and counterpart agency.

The activities expected of technical assistance projects must be within the mandates of the counterpart agency.

Technical assistance projects in support of a diverse sector, such as fisheries, focus on only one or two components and carry them out in depth, rather than undertake many superficial activities in a large number of components.

Local non-government organizations are most effective in communicating technology transfer and extension at the level of the primary producers.

Short-term technical courses should be a minimum of four weeks of effective training, emphasizing practical hands-on training rather than theory, and have follow-up.

Special seminars are not particularly valuable unless part of a formal structured plan, and also offer the students additional follow-up with personal tuition.

ATTACHMENTS

K. Attachments (List attachments submitted with this Evaluation Summary; always attach copy of full evaluation report, even if one was submitted earlier; attach studies, surveys, etc., from "on-going" evaluation, if relevant to the evaluation report.)

Evaluation Report: Report of the evaluation mission on project
Fisheries Research and Development Project, Indonesia

COMMENTS

L. Comments By Mission, AID/W Office and Borrower/Grantee On Full Report

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List of acronyms

AAETE	Agency for Agricultural Education, Training & Extension
AARD	Agricultural Agency for Research and Development
ADB	Asian Development Bank
ASA	American Soybean Association
BAPPENAS	National Development Planning Board
BKPM	Investment Coordinating Board
COP	Chief of Party
CRIFI	Center Research Institute for Fisheries
DGF	Directorate General of Fisheries
DGHE	Directorate General of Higher Education
EEZ	Exclusive economic marine zone
FAO	Food and Agriculture Organization of the United Nations
FPRP	Fisheries Policy Research and Planning Team
FRDP	Fisheries Research and Development Project
GAPPINDO	Association of Fish Merchants
GDP	Gross domestic product
GOI	Government of Indonesia
ha	Hectare
ICLARM	International Center for Living Aquatic Resource Management
IPB	Agricultural University of Bogor
ISPIKANI	Association of Fishery Scientists in Indonesia
LIPI	National Science Council
LSPW	Lembaga Studi Pengembangan Wilayah (local NGO)
MOA	Ministry of Agriculture
MOE	Ministry of Education
NGOs	Nongovernmental organizations
PM	Project Manager
PPPO	Center for Research and Development of Ocean Sciences
RICA	Research Institute for Coastal Aquaculture
RIFF	Research Institute for Freshwater Fisheries
RIMF	Research Institute for Marine Fisheries
Rp	Rupiah
t	Metric tons
UNHAS	University of Hasanuddin
UNPATTI	University of Pattimura
UNRI	University of Riau
USAID	United States Agency for International Development
WB	World Bank

Executive summary

Background, purpose of evaluation and methodology

In the 1980s, the Government of Indonesia (GOI), faced with the continuing 2.2 percent annual growth in population, focused attention on the unexploited potential of the fisheries sector, in particular traditional marine fisheries and aquaculture estimated to be producing at about 20 percent of their capacity. In addition, increasing demands on world markets indicated exceptional opportunities for earning foreign exchange from the expansion of coastal areas into marine-shrimp production and improved technology. GOI realized that exploitation of these potentials was necessary to attract private capital into the sector and thus formulated new legal and fiscal incentives. It also was necessary to increase government support services to the sector, particularly to advance the management and technology resource base.

Against this background, the Ministry of Agriculture (MOA) and the United States Agency for International Development (USAID) developed a project paper with the long-term objective of improving the technological and management resources available to both public organizations and private enterprises in the fisheries sector. In the short term, the project paper planned for the establishment of a national, coordinated fisheries-research agenda and for upgraded research programs at the MOA and at key universities. These upgraded research programs would address priority production constraints and improve academic training at selected universities with mandated responsibilities for fisheries training.

The project paper was signed in August 1986 with a six-year budget of US\$3.785 million in loan funds and US\$3.320 million in grant funds. GOI would provide the Rupiah (Rp) equivalent of US\$1,507,000 in cash and US\$2,700,000 in kind. In 1988, because of a de-obligation of USAID funding, the project agreement was changed with the agreement of GOI. Through Amendment No. 1, loan funding was reduced to US\$200,000 and grant funding to US\$2,610,000. Counterpart contributions also were reduced to the Rp equivalent of US\$1,025,000.

Further amendments transferred the costs of all graduate training to Project 497-0328, USAID/GOI General Participating Training II, and added US\$423,340 from in-country local support funds for further technical assistance. Under the revised Fisheries Research and Development Project (FRDP), greater emphasis was to be given to policy planning, including expanding the role of the private sector, and less emphasis was to be placed on institutional development. Funding was realigned to focus on the development of a national fisheries-development strategy and a national fisheries-research agenda and to provide for development of technology packages and workshops to assist the private sector in overcoming production and marketing constraints.

The end-of-project evaluation mission, comprising three experts from Indonesia and two from the United States (U.S.), visited GOI and project offices, field stations, universities, research institutes, private facilities and farms throughout Indonesia to interview persons associated with FRDP's activities. The evaluation report was based on an analysis of data collected from project files and interviews with 120 people, of which 23 were beneficiaries of education, training and research grants. Nineteen were representatives of the private sector, including small-scale farmers and businessmen.

Purpose of activities evaluated

The mission evaluated all project activities to determine their effectiveness in accomplishing the following FRDP short- and long-term objectives:

- (a) upgrading staff, facilities, academic training and research programs of seven universities and research institutions to resolve priority production, marketing and policy and management problems;
- (b) assisting MOA and the Ministry of Education (MOE) to establish a national, coordinated fisheries-research agenda;
- (c) assisting MOA in evaluating the need for and mechanisms to improve fisheries policy and planning to ensure optimal use and management of Indonesia's aquatic resources; and
- (d) improving technologies for production and marketing of commercially important fish products.

Findings and conclusions

Through networking government fisheries agencies, respective fisheries organizations and the private sector and through the publication of proceedings of the annual forums, the project helped to develop national policy agendas. This process is being regarded as a model by other national sectors.

The long-term effects of education will be lasting, as all 13 fellows have returned or are returning to the country. All are in positions that allow them to apply their new experiences immediately. The fellows' work will have a multiplier effect within their respective institutions. Short-term training also will have lasting effects, particularly the efforts to train trainers and to involve staffs of nongovernmental organizations (NGOs) in training and extension. The 22 competitive research grants have produced results that added to the national fisheries-information base and added to the competency of the individual grantees. The initiative to produce 25 mini-technology packages, called Pedoman Teknis, offers a speedy and effective conduit to transfer technology at field level. The process is also a model that may be used by other sectors. The production of a Paket Teknologi (Pa-Tek) has created sustainable industry in intensive culture of freshwater fish in cages of low volume. The project's activities to link to the private sector have been most valuable at the small-scale farmer level and should provide future impact, particularly through the work with NGOs. The project has been successful in involving women at all levels, especially in technology transfer. More emphasis on special women's programs is required to sustain these initial efforts.

In summary, the project took place while Indonesia was rapidly becoming a major fisheries nation, particularly in world aquaculture. It produced valuable outputs that are being used in both the public sector and the private sector. The project methodology of massive and varied technical assistance organized by a small management core was highly appropriate for the project. It proved to be effective in achieving short-term objectives and for laying the foundation for achieving the long-term goal of a sustainable, national fisheries industry.

The prime contractor, Auburn University, effectively recruited qualified experts to provide technical assistance to the fisheries sector. This technical assistance included both marine and inland fisheries, the culture fisheries and post-harvest technology and marketing. The contractor exercised great flexibility in new project initiatives and in achieving outputs. For example, to by-pass the slow, structured process of producing approved technical packages, research approaches were realigned by administering a system

of competitive research grants, and Pedoman Teknis were produced. The contractor effectively prepared and placed postgraduate fellows overseas despite highly competitive and diminishing opportunities at universities in the U.S. The International Center for Aquaculture at Auburn University played a major role in the success of the long-term national investment in education. Moreover, the education component was highly cost-effective compared with most international education of multilateral assistance projects. The contractor produced almost all its intended outputs.

The Agricultural Agency for Research and Development (AARD), the national counterpart agency for the project, was, through the Center Research Institute for Fisheries (CRIFI) and its research institutes, an effective and cooperative collaborator in the project. AARD fulfilled its obligations in the face of legal and administrative constraints even though certain components of the project were beyond its mandate.

USAID provided fair and enthusiastic support to the project although this project is the smallest of the agency's ongoing portfolio in Indonesia. USAID fulfilled its financial commitments, notably continuing to add funds to the project from other sources and, through amendments, compensated for the sudden de-obligation of some US\$4 million from the initial institution-building and research project that was already underway.

Recommendations

The evaluation team identified an administrative barrier between research and farmer application in the field. This barrier was caused by the centralized process of preparing, evaluating and disseminating Pa-Teks. The mission recommends that GOI replace this centralized system with a simple system for regional control using regional research institutes, state regional universities and provincial extension offices.

The evaluation team commended the approach of FRDP and its Pedoman Teknis to simplify the transfer of technology to the primary producers. The evaluation team recommended that the government continue to use Pedoman Teknis as an extension tool in the fisheries sector.

Noting the success of NGOs in the transfer of technology at the field level, the evaluation team recommended that GOI involve NGOs in the process of technology transfer. To facilitate closer cooperation between researchers and extension workers, the team also recommended that GOI take steps to integrate the Directorate of Agriculture Extension within AARD.

The team perceived a general lack of associated socioeconomic understanding in the process of extending technical information to the primary producers; therefore, the mission recommended that the Institute of Socioeconomic Studies at Bogor receive GOI financial support to create a Fisheries Department.

The team recommended that AARD and the Directorate General of Fisheries (DGF) adopt a more flexible fishery-development strategy that will allow research to respond more to regional rather than to central needs, thus widening the options for the primary producers.

The evaluation team recommended that the processes of selection and approval of young candidates for overseas education and for middle-level researchers to attend international conferences or make study tours should be localized and simplified so that these processes are immediately responsive to the timing of opportunities. The evaluation team recommended the following: (i) a new scientific journal for Indonesian fisheries, including aquaculture, to be paid for through membership in a professional fisheries

society and (ii) national and local trade papers for fishermen and farmers to be published by the private sector.

The team recommended that workshops and supporting materials suitable for men and women be prepared to teach the fundamentals of hatchery management and production with an emphasis on floating hatcheries in the Cirata/Saguling region and in marine areas where interest in marine-fish cultivation is growing.

With regard to the project itself, the evaluation team expressed concern that the Third Conference proposed in June did not have broad and equitable representation that recognized the country's regional diversity and different needs. It is recommended that the Conference extend invitations to delegates elected from the regional associations of fishermen and fish-farmers, NGOs within the region active in fisheries development, state regional universities, provincial fisheries offices, associations of professional fisheries scientists and regional planning boards.

The evaluation team noted that women have been represented in the activities of FRDP. However, if funds remain at the end of the project, the evaluation team recommended that they be used for short courses for women only, such as training in fish-hatchery technology.

Lessons learned

The donor should strive for consistency and purpose in administration of bilateral technical assistance through the life of individual projects. Mid-course changes place an unnecessary burden on the contractor and counterpart agency.

Activities expected of technical-assistance projects must be within the mandates of the counterpart agency.

Technical-assistance projects in support of a diverse sector, such as fisheries, focus on only one or two components and conduct them in depth, rather than undertake many superficial activities in a large number of components.

Local, nongovernment organizations are most effective in communicating technology transfer and extension at the level of the primary producers.

Short-term technical courses should be a minimum of four weeks of effective training, emphasizing practical hands-on training rather than theory, and these courses should have follow-up.

Special seminars are not particularly valuable unless part of a formal structured plan, and such seminars offer students additional follow-up with personal tuition.

1. The project paper

1.1. Background

Throughout the 1970s, the economy of Indonesia grew at a rate of almost 8 percent per annum. The significant feature of this period of remarkable economic growth was the revenues from oil exports, which enabled the Government of Indonesia (GOI) to support a variety of economic-development programs with public funds.

The early years of the 1980s saw significant changes. The general world recession, accompanied by a sharp decline in oil prices and market demand, reduced export revenues and compelled the GOI to broaden greatly the economic base of the country while continuing to focus on exports.

At that time, the fisheries sector in Indonesia was contributing about 1.6 percent to the national gross domestic product (GDP), in addition to being a major source of employment for some 3 million people, or about 5 percent of the national labor force. Although the productivity of the sector was low, only about 1.6 percent of the GDP, the foreign-exchange earnings had risen dramatically. This increase was the result of exploitation of offshore pelagic resources and spectacular growth in cultured production of marine shrimp.

Although annual growth in the fisheries sector was not consistent, the result mainly of governmental policies restricting trawling in coastal fisheries, GOI recognized the important role of fish and fishery products in the diet of the national population. Fish and fishery products contribute over 60 percent of the animal protein resources in national consumption. The fisheries sector accounted for 2.26 million metric tons (t) in 1984, of which 75 percent was from traditional marine fisheries, 12 percent was from inland fisheries, and 13 percent was from aquaculture.

Faced with the continuing 2.2 percent annual growth in population, GOI focused attention on the unexploited potential of the fisheries sector, in particular, on the traditional marine fisheries and aquaculture that were estimated to be producing at about 20 percent of their capacity. Furthermore, increasing demands for seafood throughout the world indicated exceptional opportunities for earning foreign exchange from the expansion of coastal areas into marine-shrimp production, together with improvements in technology.

GOI realized that exploitation of these increased potentials would not be an easy task. Because it was necessary to attract private capital into the sector, GOI formulated new legal and fiscal measures, promoted international joint ventures and expanded credit. However, it also was necessary to increase governmental support services to the sector, particularly to advance the management and technology resource base available to both public organizations and private enterprises.

For this reason, GOI sought bilateral technical assistance from the United States Agency for International Development (USAID) to install at the Ministry of Agriculture (MOA) and key universities viable fisheries-research programs to address significant, regional constraints on fisheries production and marketing.

1.2. Project objectives

The project paper developed by MOA and USAID between 1984 and 1985 had the long-term objective of improving the technological and management resources available to both public organizations and private enterprises in the fisheries sector. In the short term, the project paper called for establishment of a national, coordinated fisheries-research agenda, and, to address priority production constraints, it included upgraded research programs at the MOA and key universities. The paper also called for improved academic training at selected universities with mandated responsibilities in fisheries.

The proposed project, the Fisheries Research and Development Project (FRDP), had four principal components:

- (a) upgrading staff, facilities, academic training and research programs of four universities and three research institutions to resolve priority production, marketing and policy and management problems;
- (b) assisting the MOA and the Ministry of Education (MOE) in establishing a national, coordinated fisheries-research agenda;
- (c) assisting the MOA in evaluating the need and mechanisms for improving fisheries policy and planning to ensure optimal use and management of Indonesia's aquatic resources; and
- (d) improving technologies for production and marketing of commercially important fish products.

The project paper, signed in August 1986, had a budget of US\$7,105,000, of which US\$3,785,000 was in loan funds and US\$3,320,000 in grant funds. To support the project, the GOI was to provide in cash the Rupiah (Rp) equivalent of US\$1,507,000 and provide in kind US\$2,700,000. The duration of the proposed project was six years, ending in September 1992.

Project implementation and coordination responsibilities within MOA were vested in the Agency for Agricultural Research and Development (AARD) and specifically within one of its seven disciplinary centers, the Central Research Institute for Fisheries (CRIFI). A consortium of American universities was formed to manage and provide technical assistance to the project. The consortium included Auburn University, The University of Rhode Island and the University of Arkansas (Pine Bluff). A number of preparatory activities were launched, including negotiating with the prime contractor, Auburn University, for project organization and management, negotiating for the purchase of vehicles, preparing preliminary-design drawings for research-pond facilities and conducting an English course for potential recipients of education fellowships.

In 1988, as research and educational-planning and facility-design activities were underway, GOI agreed to a changed project agreement after USAID funds were de-obligated. Through Project Paper Amendment No. 1, dated April 1989, the level of loan funding was reduced to US\$200,000 and grant funding to US\$2,610,000. Counterpart contributions from GOI also were reduced to the Rp equivalent of US\$1,025,000. This reduction in government funding coincided with changes in Indonesia encouraging broader participation of the private sector in economic growth and development, and this policy was reflected in both the amendment and the proposed program of work.

A 36-month contract with Auburn University for project management and technical assistance was signed in July 1988 for the sum of US\$1,932,000. The balance, US\$2,610,000, was designated for equipment (US\$240,000), training (US\$50,000), special studies (US\$220,000) and contingency (US\$168,000). The

loan was designated for training (US\$193,000) and contingency. GOI's contribution was for training (equivalent to US\$140,000), special studies (US\$100,000), administrative and research support (US\$648,000) and contingency (US\$137,000).

In September 1988, USAID and MOA agreed to modify the extent of the project again and transferred the costs of all graduate training to Project 497-0328, USAID/GOI General Participating Training II. However, the prime contractor still worked cooperatively with the National Development Planning Board (BAPPENAS) in monitoring the program for postgraduate participants.

An amendment to the contract added approximately US\$423,340 from in-country, local support funds for technical assistance, providing for annual forums, publication of technology packages, essential commodity procurement and in-country overheads. In December 1989 and April 1991, through further amendments to the prime contractor's responsibilities, additional funds of US\$79,815 and US\$298,488 were obtained to provide more services and to hold a number of short-term training and outreach courses. These changes added US\$801,643 to project funding.

Although the overall long-term objective remained essentially the same, the short-term objectives and proposed activities changed in scope. Therefore, the revised Project Paper Amendment No. 1 of April 1989 is summarized in the following paragraphs, not the original 1986 project paper.

Under the revised FRDP, greater emphasis was to be given to policy planning, including expanding the role of the private sector, and less emphasis was to be placed on institutional development. Funding resources were therefore realigned to focus on development of a national fisheries-development strategy and a national fisheries-research agenda and to provide for development of technology packages and workshops to assist the private sector in overcoming constraints to production and marketing.

1.2.1. Project components and proposed outputs

The modified FRDP had five principal components, each with respective activities and proposed outputs. These are summarized as follows:

(a) Formulation of strategies for fisheries development and research

This component proposed two strategies: (i) a national fisheries-development strategy to identify the broad needs of the sector for the next 25 years, with five-year benchmarks, and (ii) a national fisheries-research agenda to identify and coordinate research activities in support of development. The proposed outputs were a series of information-gathering studies to assist GOI in formulating policies, programs and actions to ensure optimal balance between resources and management. The component was to be initiated through the creation of a special study team, the Fisheries Policy Research and Planning Team (FPRP), which would consist of socioeconomic and marketing specialists with the responsibility of establishing a database for systematic development of national plans. To maintain long-term continuity, the team would provide part of three man-years, assisted by part of 74 man-months from short-term specialists and by research specialists funded through the project to undertake 10 special studies in support of program development and policy formulation.

(b) Interagency communication through forums and annual planning and coordination conferences

The second component proposed interagency cooperation between MOA, through AARD, and MOE, through the Directorate General of Higher Education (DGHE). This cooperation would be initiated by a forum to evaluate the status of the fisheries sector and to identify the 10 special studies required to support the long-term development and research strategies. It was proposed that the forum would convene annually. In conjunction with these meetings, a more comprehensive fisheries-sector planning

and coordination conference was planned. The conference was to include private-sector participation with leadership provided by the project under the auspices of the forum. The purpose of these associated conferences was to provide sector-wide participation in the mandates of the project, to develop the national fisheries-development strategy and the national fisheries-research agenda. The conferences also would be focal points for donor participation and possible future financial assistance.

(c) Institutional development

The third component focused on institutional development for the three institutes of CRIFI and three universities that had overall responsibilities for project implementation. A number of education training levels were proposed, specifically 55 man-years of postgraduate education overseas in association with a program for preliminary English-language training for 20 individuals, and 64 man-months of local, short-term training in selected disciplines to fill gaps in knowledge and skills. Local training was for scientific staff from research institutes and universities, for governmental extension specialists and for the private sector. This component was in collaboration with the Agency for Agricultural Education, Training and Extension (AAETE). Women were included in this educational and training element.

In this component, FRDP also emphasized support of viable research and coordinated programs of research at selected institutions of both MOA and MOE. Between 15-20 special research studies were proposed. These studies would lead to the production of technology packages. (See item d below.) These activities would be coordinated by part of the three man-years of long-term and 74 man-months of technical assistance noted in item (a). The project component also was intended to provide direct technical-assistance grants to project institutions for the development of long-term programs of research, equipment (US\$131,000) and assistance in developing new, experimental outdoor facilities.

(d) Technology development

The FRDP proposed in this component production of 15-20 technology packages covering a wide range of subjects, particularly fish production and post-harvest technologies. The project's seven participating research centers would develop these Paket Teknologi, or Pa-Teks, whose use would be tested with farmers through cooperative trials organized by the Directorate General of Fisheries (DGF).

(e) Private-sector support

Finally, the project proposed support of the private sector through joint and cooperative efforts with national and provincial agencies and institutions. These efforts would include involvement of the private sector in all planning and coordination conferences; special studies focused on constraints to expansion of private-sector investment; central and regional technical seminars and workshops for dissemination of Pa-Teks; and cooperator trials with farmers and fishermen on their own sites using their resources. In view of the wide range of needs, the project would focus on common problems of large numbers of farmers.

1.2.2. Project organization and management

The project proposed to build on the research and development programs of selected fisheries-research institutions in the MOA and selected fisheries faculties or departments of universities in the MOE. The former would concentrate on applied aspects of production, capture and marketing, and the latter would focus on academic education and formal research. The technical assistance would address needs for marine, brackish-water and freshwater aquaculture and inland fisheries.

Within the MOA, project support was directed through AARD to CRIFI, and the three institutes under its control, the Research Institute for Freshwater Fisheries (RIFF), the Research Institute for Coastal Aquaculture (RICA) and the Research Institute for Marine Fisheries (RIMF). These three institutes,

headquartered at Bogor, Maros and Jakarta, respectively, each had three or four substations throughout the country.

Three universities within MOE were selected because of their long association with fisheries and their proximity to facilities of the institutes noted above. These universities were the Agricultural University of Bogor (IPB), the University of Hasanuddin (UNHAS) in Ujung Pandang and the University of Pattimura (UNPATTI) in Ambon.

(a) Freshwater-aquaculture activities therefore involved the RIFF stations in Bogor and Palembang and the universities of IPB and the University of Riau (UNRI).

The purpose of these activities was strengthening linkages between these institutions, increasing their technical capacity and developing and testing new production technologies. Field research would address constraints limiting production intensification and expansion.

(b) Brackish-water aquaculture linked RICA at Maros with UNHAS and had the same basic purpose.

Activities included a research-training program that would lead to a strong research program at RICA (Maros) to address priority constraints to brackish-water aquaculture and help prepare for an M.Sc. education and research program at UNHAS. Field research activities would address constraints limiting milkfish and shrimp production, particularly problems of production management, water quality and handling of post-harvest products. The work would complement the national program in brackish-water aquaculture development funded by GOI and other multilateral donors, such as the Asian Development Bank (ADB) and the World Bank (WB). For example, the WB would fund construction of the laboratory and pond facilities at Maros. The project would provide short-term technical assistance, training, research studies and equipment at the laboratory, as well as provide postgraduate training for the RICA staff.

(c) Development of fisheries in Eastern Indonesia linked the RIMF institute at Ambon with UNPATTI, as well as with provincial offices of DGF at Maluku and Irian Jaya.

Activities would address technology constraints and facilities needed to decrease costs of processing and marketing products for the domestic market. The project also would develop a database for fisheries and resource management in the region.

(d) Within this human-resource base, the project proposed to improve staff, data and management capabilities in the MOA to establish national fisheries policies, in particular, the following:

- development of a comprehensive, national fisheries-research agenda and policies to address key fisheries-production and marketing issues and
- assistance in strengthening the planning, analysis, implementation and management capabilities of the MOA in conducting its fisheries research.

Specific activities would include training, short-term technical assistance and special studies.

These goals would be achieved through linkages between CRIFI and its institutes, the four cooperating universities, DGF and the private sector. These linkages would be coordinated by the project's in-country staff and national counterparts, with additional expertise as required.

Management of FRDP technical assistance was the responsibility of USAID's prime contractor, Auburn University. The personnel would be led by a resident chief of party (COP), who would serve as liaison between the contractor's staff, visiting experts, USAID and GOI. For improvement of facilities at three

proposed sites, the COP would initially, for six man-months, be assisted by a short-term specialist in aquaculture-facility design. The COP also would be assisted by 31 man-months of visiting research specialists, specifically three specialists to work with the deans of the fisheries faculties or departments at IPB, UNHAS and UNPATTI; and four research specialists to work with directors of the CRIFI institutes at Bogor, Palembang, Maros and Ambon. The principal tasks of these specialists was to assist their respective institutions in upgrading the planning, implementation and management of their research and development programs.

In addition, 36 man-months were available for nonspecific short-term assistance for project evaluations and for an in-country management-training course for fisheries administrators and directors. Any balance would be used for special studies. Specific requirements were experts in nutrition, fish production, fish reproduction and physiology, water quality, fish diseases, general marine aquaculture, shellfish production and production of brackish-water fish.

The COP would prepare a work plan within two months of arrival and an inception report after six months, including specific programs of work for visiting experts within the next 12 months. The COP would follow these with semi-annual reports and with any interim reports as requested by USAID or GOI. These reports would be operational in nature. An annual report would provide a detailed assessment of the project in achieving its goals and recommendations for the next year's activities. The contract with the prime contractor was scheduled to end June 1991 with a final report, but subsequently a no-cost extension for 12 months moved the ending date to June 1992. The project also would be subjected to periodic evaluation.

GOI would provide the Rp equivalent of US\$1,025,000, consisting of US\$875,000 in cash and US\$150,000 in kind. This would provide salaries, per diem and travel costs of a national program manager (PM) and other counterparts to the technical advisers, operational and maintenance costs of project vehicles, in-country travel costs and per diem for short-term trainees, support of special research studies and in-country commodity procurement.

2. Project outputs and linkages

Project results are described in this section under the following six principal areas of work.

2.1. Policy agendas

One of the major goals of the amended FRDP was development of a national fisheries-development strategy and a national fisheries-research agenda. To achieve this goal, three national conferences, Forums I, II and III, were planned.

2.1.1. Fishery Forum I

The Agricultural Agency for Research and Development sponsored Forum I, which dealt with an overall assessment of progress in fisheries research. In preparation for Forum I, a two-day planning workshop organized by FRDP was held on January 27-28, 1989, in Cipanas. The workshop involved presentations by staff of IPB, CRIFI, RIMF, RICA and USAID. Following the workshop, FRDP commissioned a special study, "Towards establishing a national strategy for Indonesian fisheries development." (Bailey and Pollnac, 1989). The study identified 12 research initiatives, and 11 studies were initiated in 1989 by national scientists supported by Rp 173 million provided by FRDP (see Table 1, Annex I).

In January 1990, FRDP summarized progress in these initiatives in a report, *Aspects of progress towards developing a national strategy for Indonesian fisheries development* (Pollnac, 1990). On January 28, 1990, at a planning meeting in Cisarua, representatives of CRIFI, RIFF, RIMF, RICA, IPB, UNHAS, UNPATTI and USAID undertook further Forum I planning. On January 30, 1990, staff from CRIFI and USAID met in Jakarta to finalize plans.

The First Annual Fisheries Conference, Fisheries Forum I, was held July 19-20, 1990, in Sukabumi with a listed attendance of 112. Represented were AARD, 18 GOI agencies, six associations, the American Soybean Association (ASA) and USAID. The proceedings, "Prosiding Forum - I Perikanan" (Anon., 1990), were prepared and published by FRDP and distributed in December 1991.

2.1.2. Fishery Forum II

Forum II was jointly sponsored by AARD and DGF to set national fisheries-research priorities. A Forum II planning meeting was held in Sukabumi December 4-5, 1990, and was attended by representatives from AARD, DGF, USAID and the Food and Agriculture Organization of the United Nations (FAO). In April 1990, FRDP in *Status report on the FRDP policy component* (Bailey and Pollnac, 1990) presented a draft outline for the development of a long-term fisheries-development strategy. This draft outline was followed by a further summary by FRDP of the special studies in *Review of progress made on policy studies* (Bailey, 1991a). In February 1991, FRDP followed this summary with a proposal, "Draft agenda for Forum II" (Bailey, 1991b).

The Second National Long-term Fisheries-development Program, Fisheries Forum II, was held June 16-20, 1991, in Sukabumi and was attended by representatives of the agencies of GOI and the private sector. Proceedings of this forum were prepared by FRDP and are now in press. No copies are yet available.

2.1.3. Fishery Forum III

Planning for Forum III lagged behind the schedule set by FRDP (Bailey, 1991a). The subject of the forum was to be an overall fisheries-development strategy for Indonesia in preparation for the next Repelita five-year plan and beyond. The first planning session was held in Jakarta on July 22, 1991, and was attended by representatives of DGF and CRIFI. On August 7, 1991, DGF convened another meeting in which an interagency steering committee was formed and a working group designated to develop briefing documents before the forum. At the August meeting, representatives of DGF, CRIFI, USAID, the Investment Coordinating Board (BKPM), the Association of Fish Merchants (GAPPINDO) and the National Development Planning Board (BAPPENAS) were present.

Forum III is scheduled for June 23-25, 1992, in Sukabumi. The meeting will be called a seminar instead of a forum and will focus on a national fisheries-development strategy for Indonesia. The tentative agenda for the meeting is provided in Table 2, Annex I.

2.2. Education and training

The project identified staff development as a key component of its institution-building strategy. Development took the form of long-term postgraduate education at selected institutions overseas and short-term training courses in-country.

2.2.1. Education

Thirteen fellowships for postgraduate degrees were awarded to qualified students from the participating institutions. Recipients were selected on the basis of their national academic qualifications and their ability to pass an English-language course organized by the project. The students' postgraduate qualifica-

tions -- 2 Ph.D. and 11 M.S. degrees -- were obtained from universities in the United States. The details are provided in Table 3, Annex I.

As of May 12, 1992, five students had completed postgraduate degrees and returned to Indonesia, and eight students' postgraduate degrees remained incomplete. Average length of overseas education was 25 man-months for the master's candidates and 37 man-months for doctoral candidates. Three recipients of the postgraduate fellowships, 23.8 percent, were women who received or will receive qualifications in fisheries science, food science and fisheries technology.

As of the end of 1991, estimated cost of the postgraduate-scholarship component was US\$724,000. An estimated cost per candidate once all have completed their education is between US\$2,100-2,500 per training-month.

Six recipients were from the universities, specifically four from IPB and one each from UNHAS and UNPATTI. The others were from AARD research institutes, specifically, four from RIMF in Ambon and one each from RICA in Maros, RIFF in Bogor and RIFF in Palembang.

Each student, as part of the postgraduate degree program, specialized in a particular area of fisheries science and technology. The fields covered in their studies were the following: economics (3), marketing, post-harvest losses, processing technology, diseases, crustacean physiology, water quality, general aquaculture, fish physiology, freshwater fish production and marine biology.

2.2.2. Short-term in-country training

The Fisheries Research and Development Project has held many short-term, in-country training courses, and others are planned before the end of the project.

As part of the selection process for overseas postgraduate education, an English-language course was held for 20 potential fellowship recipients nominated by universities and government research institutes. Sixteen passed the test. Four were from UNPATTI and IPB, and two were from UNHAS. From the AARD research institutes, there were four from RIMF in Ambon, and two each from RICA in Maros, RIFF in Bogor and RIFF in Palembang. Fifteen qualified by passing the national eligibility test. Thirteen went on to postgraduate courses funded by FRDP (noted in 2.2.1. above), and two others received financial support from other donors for postgraduate education in Canada and the United Kingdom.

Between September 1988 and June 1992, the project organized and sponsored almost 100 seminars for professionals, as well as short-term courses. These efforts constituted additional manpower training. (See Table 4, Annex I). This training excludes events leading up to the three forums noted in Section 2.1. above, as well as the special technical and outreach courses for extension officers and farmers noted in Section 2.5 below.

Two one-day courses on research-policy training and instruction for preparing proposals for the Competitive Research Grants were presented at RICA in Ambon and at UNHAS in Ujung Pandang; each was attended by 20 researchers and staff members. A three-day technical workshop on soil-water chemistry in aquaculture was held at RIFF in Patra Tani and at RIFF in Palembang for 20 researchers. A 10-day short course on research methods for cage-culture practices was given in Jakarta to 15 researchers from CRIFI, RICA, RIFF and RIMF; and a half-day short course on aquaculture principles was given to four researchers at RIFF in Palembang.

The seminars, given by 30 experts since the end of 1988, have been attended by some 3,500 professionals. This equates to over 800 person-days of instruction.

Each training event has been summarized in a report and filed with FRDP. Some reports are in detail suitable for further comprehensive analysis.

2.2.3. Conferences and study tours

The project supported a few brief study tours. These were usually in support of activities relevant to participating researchers or administrators. Study tours included the following: the United States for five days, primarily to present a paper on reef habitats to a conference on continental shelves; Singapore for five days to attend a conference on coastal-zone management; Washington D.C. to present a paper on women's participation in FRDP at a conference on Women in Development; and Japan for one week to present a paper on sea turtles to the Asian Fisheries Society. The project manager and other associated national leaders also undertook a number of in-country study tours. The COP presented a paper to the World Fisheries Congress in Greece, accompanied by the director of CRIFI and the DGF director of production.

2.3. Research and research facilities

The project assisted MOA in preparing a national fisheries-research agenda, noted in Section 2.1. As part of the preparatory process, three workshops for interagency research planning were held: the workshop at Bogor addressed inland-fisheries research; the workshop at Ambon addressed Eastern Indonesian fisheries development; and the workshop at Pontianak addressed management of the Kapuas and Musi river systems. Thirty individuals participated in the first two workshops, and 75 attended the third. Also, in support of developing the background of research in the country, FRDP commissioned eight reports and proposals, as well as guidelines for a system to review research proposals.

The project began its program to improve research and research management at the institutes of CRIFI and at participating universities. The program emphasized staff training and implementation of research planning. Staff training has been described in Section 2.2. The Fisheries Research and Development Project conducted a number of planning workshops in the regions for its respective research institutions. All of them have been reported in detail. The Fisheries Research and Development Project also created a new project component for competitive research grants. A total of 22 research grants were approved and funded within a budget of Rp 166 million. (See Table 5, Annex I). Individual grants were between Rp 2.5-11.5 million. All but one of the research grants have been completed, and most of the research reports have been published and disseminated.

Emanating from these research projects are five major research and development proposals for further funding. Other drafted proposals are for a freshwater monitoring program -- the two rivers study -- a program for monitoring shrimp health, and an outreach effort for a fish aggregating device. One proposal on cage-fish culture has received national funding, and another proposal on the use of problem soils for aquaculture has been included in the BAPPENAS Blue Book. These national proposals were presented to multilateral and bilateral donors for funding.

The Fisheries Research and Development Project organized almost 100 professional seminars on subjects relevant to fisheries research in Indonesia (see Table 3). Thirty-six dealt with aquaculture, 25 with fisheries development in general, 16 with socioeconomic aspects of fisheries development, nine with marine fisheries, six with industrial fishing, including post-harvest technology and marketing, and four with fisheries education. Visiting international experts, usually during their assignments on other project

activities, presented the seminars. Many of these specialists' assignments contributed to the build-up of the research-information base in the country. Almost 100 technical reports or papers were produced in this way.

The project assisted three national research centers -- at RIFF/Patra Tani, RIFF/Sukamandi and at the IPB/Darmaga campus -- in preparation of preliminary design documents for field research facilities, and it also designed a floating field research station. However, because USAID de-obligated funds from the original project, FRDP supported research only with the provision of a computer for each of the seven participating centers. No scientific instrumentation, technical equipment, laboratory supplies or library resources were provided. However, some personal library collections have been donated to participating organizations.

In addition to forging stronger links between the research institutions that were paired for joint-project activities, visits by international experts strengthened international links with agencies active in the region, such as the International Development and Research Centre and the International Center for Living Aquatic Resources Management.

2.4. Technology packages

One of the major tasks of the FRDP was to produce 15-20 Pa-Teks. In the fisheries sector, these Pa-Teks were produced through research under AARD and evaluated by DGF, then sometimes implemented by Dinas Perikanan, the extension service. The process is formal and lengthy.

The Fisheries Research and Development Project produced only one national Pa-Tek, for cage-fish culture. However, it produced 25 mini-technical packages, called Pedoman Teknis. These Pedoman Teknis were essentially compilations of technical information about aspects of fisheries. Some of these were the result of research and development in Indonesian research centers, and others were applications of basic aquaculture practices that had been developed and applied worldwide. The purpose of producing the Pedoman Teknis was to accelerate the transfer of information to Dinas Perikanan, and to the primary producers.

All 25 Pedoman Teknis were prepared in English: 16 have been translated into Indonesian, and the rest are in translation or in press. The full list of Pedoman Teknis is included in Table 6, Annex I. The first six titles have been printed and disseminated to about 490 institutions throughout the 27 provinces. The first distribution list and the number of copies released included the following: AARD Institutes, 10; CRIFI Institutes, 15; vocational training institutes, eight; DGF, three; provincial fisheries offices, 27; representative offices of MOA, 27; AAETE agencies, 27; Agricultural Information Institute offices, 25; National Science Council, 12; universities, 25; Province Governors' offices, 27; District Fisheries Offices, more than 120; private fisheries companies, five; and to participants of the fisheries forums and other individuals. The Fisheries Research and Development Project has received permission and support to produce 2,000 copies of future issues.

Two additional manuscripts, one on cage culture and one on water-quality management and aeration in shrimp farming, also have been professionally prepared in English, with the former also in Indonesian. These manuscripts also have been disseminated as above. The latter has not been translated because of its length, 82 pages. Nine other publications have already been drafted in English and are being translated into Indonesian. A computer to assist with desktop publishing has been purchased by FRDP and is in use.

2.5. Linkage to the private sector

Although one of the major objectives of the project was to assist in development of the country's private fisheries sector, the agencies associated with the project have limited authority and limited ability to conduct this task. To overcome this constraint, the project adopted the following strategies: first, develop and test technology; second, make the technology available for the extension agencies through workshops, seminars, literature and other means; and third, assist, if needed, these agencies with the transfer of their information and knowledge to the private sector.

The project proposed to develop 15-20 Pa-Teks. However, as noted in Section 2.4, it produced 25 Pedoman Teknis to assist the private sector. It also conducted two seminars in Wonogiri and Lamongan and two workshops in Parepare, Sulawesi, which were attended by a total of 236 individuals from several government agencies and the private sector. Project staff also conducted a one-day workshop in Parapat, which was attended by 47 individuals, including 33 from the private sector; and a three-day short course on cage-fish culture technology and outreach to five members of the local nongovernment organization (NGO), Lembaga Studi Pengembangan Wilayah (LSPW), which was involved in aquaculture development around Lake Toba, Sumatra.

The Fisheries Research and Development Project, in association with government agencies, also conducted a number of other training and outreach courses for the private sector. For example, a two-week short course on pre-harvest shrimp quality was given for 25 participants, 13 from DGF and 12 from the private sector; two three-day outreach courses on rice-paddy fish cultivation were given for 120 participants from Dinas Perikanan and from five government agencies, in addition to 60 participants from the private sector; a three-week outreach course on the principles and practices of cage culture was given for 20 participants from eight GOI agencies and the private sector.

The project produced a number of materials related to the needs of the private sector. These materials included the following: all materials for one Pa-Tek on cage-fish culture, including how-to instructions and a documentary set of slides; a 20-page article to be published in the *Indonesian Journal of Agricultural Research and Development* and addressing how to advance fish production in Indonesia using low-volume, high-density cage-culture technology; publication of a 114-page manual, "Cage culture - a method of fish production in Indonesia"; a seven-page brochure, "Indonesia's shrimp industry status and development - executive summary report"; and a 17-page bulletin, "Role of women in development and poverty alleviation in the fisheries sector."

Finally, for the last months of the project in 1992, a short course was scheduled on seafood quality control, to be held in mid-May, and one on eastern Indonesian fisheries was scheduled for the end of May.

2.6. Project management

2.6.1. Management of the project

The project paper was authorized in August 1986, and the same month, a signed grant agreement was made between the Department of Agriculture and the U.S. Embassy in Indonesia. A number of activities were initiated by the consortium until 1988, when Project Paper Amendment 1 was made and subsequently signed in April 1989. On July 1, 1988, a three-year contract for the amended project implementation was made with Auburn University. In July 1991, this contract was extended for twelve months.

The project-management unit was accommodated in the offices of CRIFI in Jakarta. The first COP was resident for 31 man-months, from mid-July 1988 until he retired in February 1991. A person was appointed, but after five months he was recalled by his university. Thus, the position of COP from August 1991 was filled by a series of short-term, non-resident COPs until the end of the project, June 30, 1992. In all, five individuals from Auburn University, including the first COP again, occupied the position temporarily for eight terms, which were for periods ranging from 13 days to 86 days. These visits covered the 11 months remaining in the contract, with the exception of one period of 22 days, when there was no COP on site.

The management unit included a permanent, national project manager and a secretary. Between 1986 to 1992, the project had three managers, the last of whom served for three years.

The project-paper amendment proposed that a specialist in aquaculture-facility design be included in the unit to complete the preliminary design studies that had been initiated since 1986. Two such individuals provided 6.3 man-months of support through five visits between 1988 and 1991. The visits ranged from 28-51 days. The specialists completed studies for the renovation and expansion of facilities and ponds at RIFF at Palembang (10 ha), IPB (4 ha) and UNHAS (20 ha) and prepared preliminary designs of a pond complex at the new freshwater-fisheries station for RIFF at Sukamandi.

Management of project training activities was by committee. The COP invited administrators of the respective participating agencies to choose topics for the short-term training courses, identify the location and establish course criteria. All non-research-related courses were held under the auspices of DGF at either DGF or at CRIFI stations or substations, and all research-related courses under AARD (CRIFI) were held at the participating universities or their research centers. These lead agencies notified their resources in the provinces to nominate candidates. The committee made the final selection of candidates and selected the instructors, who were frequently consultants, proposed by the COP and project manager. In addition to appropriate staff members of the respective participating institutions, the trainees included members of the private sector, nongovernment organizations, municipal officers and staff of other government departments.

Management of planning activities, special studies in support of planning and the competitive research projects also was by committee. These inter-agency selection committees frequently were aided by consultants. Between these committees and project training activities, the COP drew on the assistance of almost 80 consultant visits for more than 1,700 consultant days. These visits varied in length from two -102 days.

As part of the management process, the COP produced an inception report in July 1989 and a mid-term report in January 1990. For general information, a newsletter occasionally was prepared and circulated.

2.6.2. Monitoring of the project

The Fisheries Research and Development Project was monitored financially through quarterly contract-file-control sheets, and quarterly activities and outputs were published in biannual reports prepared by the COP.

Project officers from the USAID Mission attended many of FRDP's events, and a mission director's implementation review of FRDP was conducted in August 1989. An independent four-week evaluation was conducted in-country in May 1992.

3. Findings

3.1. Effects of the project

3.1.1. Policy agendas

Opinions of administrators, researchers and fishermen varied greatly in terms of the merit and usefulness of the first two fisheries forums. In general, those administrators who attended the forums said that the meetings were informative and useful. They expressed appreciation for the opportunity to hear the exchange of ideas and proposals regarding the national focus on research and policy planning. Other administrators were dissatisfied at having been invited to attend only as observers. They expressed a concern that all participants should be allowed to participate in the discussion and to present a short paper if desired. One administrator invited as an observer did not attend because he did not wish to listen if he could not be heard.

Some administrators, many researchers and most fishermen had not heard about the two previous forums or plans for a third one. When told about the substance and intent of the forums, some expressed disappointment that they had not been given the opportunity to participate while others seemed indifferent and suggested that such proceedings usually were dominated by national agency officials.

The most frequent and strongest concern expressed by most people interviewed was the need for equitable regional representation at all sector levels at any fisheries forum. Indonesia is a vast country with 27 regions covering some 2 million square kilometers of land mass, plus the adjacent, exclusive economic marine zone (EEZ). While fisheries' needs vary greatly between the principal land masses of Sumatra, Java, Kalimantan, Sulawesi, Bali and Nusa Tenggara Barat, together with the islands of Maluku and Irian Jaya, fisheries' needs can vary just as greatly between regions within any one of these land masses.

Many were critical of the planning process for Forums I and II because they were organized from the top down rather than from the bottom up. Specifically, the concern was that the needs of the more distant and less populous regions would suffer because of pressures from the more populous regions closer to Jakarta. Those who were critical wanted a planning process that began in each region where representatives from the fishing, research and university levels of the sector could meet to exchange ideas on physical, financial and policy needs. Ideally, each region would use a consensus to develop prioritized lists of needs according to a prearranged reporting system. Each region then would elect its representative(s) not only to attend the Annual Fisheries Forum and present the regional needs, but to report back to the region the needs of other regions, actions taken and policies adopted at the Forum.

The evaluation team was encouraged by the contents of the draft agenda for Fisheries Forum III. Many but not all of the concerns expressed above were addressed in the draft. The inclusion of representatives from the various research institutes, universities and the private sector, as well as governmental and international organizations should provide a strong cross-section for working-group discussions. However, broad representation that would recognize the country's regional diversity and different needs seems to be lacking. Organizers should extend invitations to delegates elected from regional associations of fishermen and fish-farmers, from NGO's within the region active in fisheries development, state regional universities, provincial fisheries offices, associations of professional fisheries scientists and from regional planning boards. This system for invitation would in part offset some of the imbalance of administrators over the private sector and encourage bottom-up planning, rather than the top-down planning approach, which was used for Forums I and II.

The four working groups of integrated marine fisheries resource development and management, integrated inland water fisheries resource development and management, private sector human resource development and institution and technical development present a powerful set of topics to help guide formulation of national fisheries policy.

Fisheries Forum III will be conducted in English, with DGF and CRIFI providing the secretariat and publishing the proceedings. The evaluation team reviewed the proceedings from Forum I and was impressed by its detail and completeness. In personal interviews around the country, the evaluation team met few individuals who had seen or read the document. Most were curious about its content. To alleviate this problem, the team urged that consideration be given to publishing a condensation of Fisheries Forums I, II and III in the form of a Pa-Tek for broad distribution to the various regional fishing entities.

3.1.2. Education and training

(a) Education

Only five recipients of the 13 postgraduate fellowships were interviewed during the evaluation. The others had not yet returned to Indonesia, even though some had completed their courses.

The reports of the five recipients about their educational experience were highly favorable. The qualifications received were directly applicable to their working responsibilities. Although one recipient would have preferred postgraduate education in diseases of marine organisms, he received the applicability of his education of freshwater fish diseases, and another, while overseas, changed from food science and nutrition to resource economics.

The recipients who had returned had little time to report that their education was being used to the fullest extent. However, all indicated that they had been placed in positions where their newfound knowledge would be used, and some were appointed coordinators for research in their institutes. One had been promoted.

The preliminary English-language training was useful. However, as the 3-7 month training course had been given in 1987, and the students did not leave until 1989 and 1990, the time interval was too great. The students had to wait anywhere from 15-33 months before going overseas. Moreover, the course was not given by the prime contractor but by a small subcontractor, and obtaining teaching materials and audio-cassettes typically was delayed.

All the interviewed recipients were under 30 years of age at the time of departure from Indonesia; therefore, the investment in education for the future educational needs of the country was long-term and properly made. Three women qualified to be included in the group.

The range of fisheries fields selected by FRDP for project postgraduate education was diverse; target universities in the U.S. were fully applicable; and most of the students conducted research projects relevant to Indonesian problems.

Organization for the recipients' departure was poor although this may have been the result of the lengthy and complicated national process rather than poor management by FRDP. Some students called to Jakarta had to wait a month before finally obtaining air tickets and permission to leave, and even then their air tickets were from Jakarta and not from their home base. Once in-country, problems were few, and only one student failed to receive a living allowance for his final three-month extension.

At the time of the evaluation, FRDP appeared to have had little follow-up with the returnees and did not plan to use them in other events. For example, the student who received an M.S. degree in food technology and nutrition was not invited to teach or translate at the workshop of seafood processing although FRDP paid for her to present a paper on her research at a meeting of national food technology in Jakarta.

(b) Training

Some 13 individuals who had attended short-term technical courses and professional seminars were interviewed. All considered the training to be relevant to their particular needs, and most have had the opportunity to use the knowledge gained in their work and area of responsibility.

The courses were well planned at the administrative level and adequately organized for the recipients. Most trainees received about one month's notice in advance, but there were several exceptions, even to one day's notice. The instruction was well prepared, and materials were provided in all courses, but mostly in English. As most of the instructors spoke only English, interpreters were provided.

In general, the trainees thought the courses were too short. Each course of 21-24 days had only about 17-20 effective days, some days being lost to the inclusion of set national instruction. This reduced time meant that more time had to be given to theory, whereas the trainees were more interested in practical work. Most thought that a minimum of four weeks could have been devoted to each course.

Some trainees thought that the courses were too technical. Those responsible for extension, for example, had little equipment and field apparatus for water quality and soil testing and would have liked the course to include low-technology techniques.

The composition of trainees in each course was well controlled, with all research institutes fairly represented. Some courses might have been increased in size or repeated to involve more participants. For example, usually three individuals are responsible for water quality and soil chemistry at the research institutes of CRIFI, but each institute could nominate only one participant. In most cases, attendees passed on experience and photo-copied course materials for the benefit of their colleagues who could not attend.

No professional socioeconomics courses were organized. Extension officers interviewed in the field had little or no idea of the economics and social suitability of the production systems they were expected to recommend to the farmers. Similarly, no special courses, such as technical training for hatchery operators, were offered for professional women.

All individuals who attended workshops and professional seminars acknowledged that the events were too short. Moreover, almost all reported that they had received from their superiors only a few days' notice about the event. Consequently, they did not know that the courses were organized by FRDP, or that USAID was providing the technical assistance. Frequently, hand-outs and personal help or guidance were lacking.

Certain seminars that provided specific instruction, such as grant-proposal writing or research planning, should have been longer, with attendees being given the opportunity to write proposals and research plans, and to discuss them individually. Some attendees' competitive grant proposals reviewed by the evaluation team obviously were inadequate; therefore, the seminar produced little benefit.

(c) Conferences and study tours

The evaluation team interviewed two recipients of funds for attending conferences and study tours abroad. In summary, these educational investments had merit, but the return on the investment was small. Study tours are a highly effective means of training and, as the expense of air fare had been committed, more time should have been allotted to the recipient for the study tour. For example, one recipient who traveled to Florida, a marine fisheries scientist, did not visit either UNRI or Auburn University, the prime contractor.

However, conferences and study tours were not an initial objective of the project, but FRDP was correct in supporting these events.

(d) Linkages

The team found that, in general, informal linkages at the level of the professional researchers were good. Because of financial constraints in forging broader linkages, the researchers' linkages were regional in nature, particularly where institutes were located close together, such as those around Bogor and those in Ambon. Contradictory reports about more formal linkages between research institutions were frequent. For example, many university administrators described the use of all qualified professionals in the region to supplement classroom instruction, as well as to serve on committees for students' theses. This use of professionals frequently was denied by researchers outside the universities and flatly denied by capable and qualified individuals in the private sector. Follow-up linkages for classroom teaching were less evident, and the universities as yet have made little or no use of the newly returned fellows for lecturing and tutorials.

3.1.3. Research and research facilities

In the first two years, research-planning workshops and information gathering dominated FRDP activities. This emphasis was necessary in view of the project goal to assist in the preparation of a national fisheries-research agenda, subsequently held in July 1990. As noted in Section 2.1.1. and 3.1.1., research institutions were well represented at preparatory meetings and at Forum I, and the evaluation team found the reaction in the field to be highly favorable towards the process and the results achieved so far.

The most valuable activity of the research component concerns competitive research grants. This activity was not planned by the project. Originally, the project intended that three experts should be assigned to each of the regional research units: RIFF, Bogor and IPB; RICA, Maros and UNHAS; and RIMF, Ambon and UNPATTI. But, the management unit quickly observed that this was not effective or productive. Consequently, FRDP stimulated action by offering relatively small grants, up to Rp 10 million, for research. These grants were based on competitive proposals. As part of the process, the COP conducted instructional workshops on proposal preparation and research planning. The 22 funded projects produced a series of competent research reports, many of which have already been printed and distributed. Research activities were predominantly information-gathering and comparative studies, rather than scientific experimentation. However, this is acceptable in view of time constraints and the relatively small amount of funding for each project. Two projects, one by IPB and one by RIMF, have not been completed because the final reports were not received.

Because of the competitive nature of the grants, distribution among research institutions was not equal. Seventeen grants were awarded to CRIFI research institutes, seven to RIFF, seven to RICA, and three to RIMF, including their substations. Only five were awarded to the universities: three to IPB and two to UNPATTI. UNHAS failed to receive any grants, perhaps because proposals were not prepared and submitted in a timely manner, and because individuals applied. The other universities submitted cooperative proposals, often under the auspices of senior staff members. The research institutes of CRIFI

were obviously more responsive, probably because their time is solely devoted to research and not to teaching.

One weakness of the competitive grant process developed by FRDP was the lack of feedback to those whose proposals were rejected. Some rejected proposals seen by the evaluation team were obviously weak, but researchers did not receive help in improving their proposal-writing skills. Moreover, the proposals had to be written in English. The process was lengthy, and the team found that, after a year, some researchers had not had any response. In some cases, the lack of communication was internal.

The 11 special research information studies in support of the policy agendas were conducted as planned. Many of these have also been published in final form. The universities played a greater role in these studies, receiving five commissions (three with UNHAS and two with IPB) and one joint commission between UNPATTI with RIMF. The CRIFI institutes received four commissions: one with RICA, two with RIMF, one with CRIFI and one shared. The other project was conducted by FAO.

The Center for Research and Development of Ocean Sciences (PPPO) did not take part in any of the FRDP special studies. The Center for Research and Development of Ocean Sciences has large research facilities at Ancol (Jakarta) and Ambon, and much of its work is related to commercial fisheries. At Ambon, in particular, about 30 percent of PPPO's work is applied, rather than basic in nature, and concerns marine aquaculture. Although representatives of PPPO attended the two fisheries forums, the team found that an opportunity was lost to further the linkages between all national research institutions, particularly at the researcher level.

The evaluation team perceived a number of issues in the national process of research planning and funding. The principal funding agency is BAPPENAS, which appears to be exercising more power over what research is conducted. For example, PPPO, essentially created to conduct fundamental research, already carries out applied research and is being encouraged to conduct more, possibly up to 50 percent at Ambon. Furthermore, the majority of research is directed toward commodities selected by the central administrations in Jakarta, rather than relying on the regional research institutions to respond to the needs of the region.

It was also apparent to the team that aquaculture received a disproportionate share of research attention and support. Aquaculture development is identified as important in the national policy, but so is marine fisheries, which received little support by comparison. This discrepancy appears to be the result of a lack of funding. Marine fisheries research, such as conducting resource surveys and gear technology improvement, is costly and largely neglected. The research that is being conducted is on post-harvest technology and marketing studies and is relatively inexpensive.

Development of research facilities through the project's preparation of preliminary design drawings has made a valuable contribution to the three centers. The WB funded construction of the RIFF center at Sukamandi, and the facilities at IPB Darmaga campus will be funded by the Japanese government.

3.1.4. Technical packages

For the fisheries sector, DGF has the mandate for implementing Pa-Teks through extension training courses and policy development. Therefore, to avoid confusing its technical package outputs with the official GOI Pa-Teks, FRDP has called them Pedoman Teknis, or bulletins that bridge the gap between research and experience information and extension. Although drafted in English, FRDP Pedoman Teknis are being translated into Indonesian. The topics were decided by committee to address fisheries-development programs. The purpose was to increase the number of fish farmers, improve the incomes

of fishermen, increase fish consumption and increase exports. In developing these publications, FRDP has exceeded expectations.

Most Pedoman Teknis were prepared on topics to promote fish production through aquaculture, especially freshwater aquaculture. Fish-cage production and *Tilapia niloticus* were the principal topics and species addressed, respectively. Little attention was given to topics dealing with pre- and post-harvest activities. However, cage culture involves several problems that need attention: (i) the availability of seed, particularly of carp, and safe methods to transport fry; and (ii) methods to prevent damage to net cages by parrot fish and crabs. Such problems as these have made some farmers reluctant to adopt the new technology.

Many farmers also reported that the Pedoman Teknis, although intended for DGF extension personnel, were more theoretical than practical. They realized that the technology was introduced from another country and was not directly applicable to brackish-water and marine production, as needed in areas such as South Sulawesi and Ambon. There, farmers wanted more relevant guides, emphasizing a more practical approach, in simple language.

Ideally, materials that assist in the transfer of technology to the primary producers should meet certain criteria. Specifically they should provide means to use available resources effectively, efficiently and safely; diversify fisheries commodities and products; adapt to changing climates and environments; be capital extensive and provide means to develop all enterprises, such as small-, medium-, and large-scale fisheries, in using resources; and be compatible and not in competition with other production systems and preferably complementary, such as rice-paddy production of fingerlings to be used subsequently in cage culture. The technology should be simple, productive and efficient and economically and technologically available to all levels of society, including the uneducated and impoverished small operators. Finally, it should be more adaptable than conventional methods to match production to market demands, whether local or export.

To benefit society, the technologies should be transferred directly to the end users. Effective means of technology transfer may be conducted through on-farm research, farming-systems research and field-day demonstrations. Linkages between research, extension and users of technology should be well established. Legal aspects of technology development also should be considered in the use of resources.

Three additional manuscripts addressing cage culture, shrimp industries and water-quality management and aeration in shrimp farming also have been professionally prepared in English, with the first also in Indonesian. These manuscripts also have been disseminated as above. The manuscript on water-quality management and aeration in shrimp farming has not been translated because of its length, 82 pages. Nine other publications were drafted in English and are being translated into Indonesian. The Fisheries Research and Development Project produced four full-color posters of Indonesian aquarium, freshwater and marine fishes and invertebrates. These posters have received wide distribution and prominent display. The Fisheries Research and Development Project has purchased and is using a computer to assist with desktop publishing.

3.1.5. Private sector development

One major question encountered in the field was how to assist the private sector in participating in various short courses and training organized by DGF and sponsored financially by FRDP. Training private-sector representatives in these courses would help to achieve the training objectives of the project, i.e., to train trainers. The evaluation team considers the private sector in two categories: the businessman involved in fisheries-business activities and farmers who operate small-scale fisheries-production activities.

In each of the regions visited, particularly in South Sulawesi and Ambon, the evaluation team interviewed the regional chairmen of GAPPINDO but found that this important regional association was not aware of the fisheries forums or the other events of FRDP. The short courses and the selection of candidates to attend them were in the hands of DGF. The centralized management of events and selection of participants generated the possibility that only those near the decision maker will benefit from events provided by FRDP.

The evaluation team encountered a different situation in the Lake Toba region, where a strong linkage was evident between FRDP and farmers living in the area. Working closely with LSPW, FRDP launched a training program to introduce cage-fish culture. The results of this training have been positive. The first 33 trainees who attended the one-day workshop went back to their individual villages and began to train other villagers. At the time of the evaluation, more than 235 households around Lake Toba had adopted the cage-fish culture technology and developed fishing activities as their principal source of income.

Several factors contributed to the Lake Toba success. First, by involving an NGO in the training management, FRDP was able to by-pass administrative hurdles in the process of selecting participants. Selection criteria became more objective since NGOs selected participants who met the necessary criteria to become trainees in individual villages. One criterion was the trainees's willingness to help others. Lembaga Studi Pengembangan Wilayah, given the rapid spread of technology among villages, used the criteria effectively in selecting the right people to attend the training.

Second, LSPW provided a small amount of money to the farmers to build a cage and a raft and to obtain fry and feed. Sociologically, this support was important, as it helped each farmer establish a farm that functioned as a demonstration plot for others. Providing financial support to farmer/innovators to establish a demonstration is cheaper financially and sociologically more effective than establishing an experimental station. Farmer-operated demonstration pilots provided more opportunity for farmers to get relevant technology and allowed them to evaluate it more critically.

Third, based on research of the Lake Toba farming system, LSPW knew that women had a significant role in local agriculture production. Therefore, LSPW decided to include women in the aquaculture-training programs.

Fourth, the success of LSPW in disseminating cage-culture technology among the Lake Toba farmers depended on the capability of LSPW staff to establish close and regular contact with LSPW clients. Staff of LSPW were provided transportation via a motor boat and pick-up truck, which facilitated their contact with clients. Moreover, LSPW staff were well trained in cage-fish culture so that they could provide reliable information to farmers.

It is unfortunate that the success of LSPW is diminishing, and farmers find it difficult to get new fry for their cages.

The team's findings in Lake Toba indicated an urgent need for a short course and training for farmers and hatchery owners to be exposed to better technology for fry transportation. However, looking at the short courses/training that was conducted by the project, topics selected seemed to cater to DGF's fisheries-development priorities rather than to the needs of the private sector, in particular the farmers. Farmers in South Sulawesi commented strongly on the training activities conducted by DGF by saying that "their eyes got sore from continuously looking at the blackboard." The farmers felt that the training was not relevant to their needs, and that the information was too theoretical and difficult to follow. South

Sulawesi farmers also complained that training had not been followed by provision of credit facilities to allow them to implement the technology.

Government fisheries development oftentimes becomes an impediment for farmers adopting new technology or for a local fisheries agency initiating new programs within the region. DGF had decided that the South Sulawesi Fishery Agency must put high priority on development of shrimp and seaweed. Efforts to develop other commodities outside shrimp and seaweed will not receive any support. Thus, when farmers complained that the price of seaweed continued to drop, nobody in the local fishery agency dared take the initiative to provide alternatives for the farmers. The agency staff feared that their actions might violate government policy.

The commodity approach in fisheries in South Sulawesi also affected the scientific motivation of the researcher to supply local farmers with new technology. The motivation for a researcher to seek new technology alternatives is basic for meeting farmers' needs and widening their technological choices. In complex, diverse and risk-prone fishing activities, the needs of both fish farmers and fishermen often differ from the simplified, centrally planned priorities.

Linkages between a research center and clients such as the local fishery agency, the private sector and the farmer are essential for successful development of the regional fisheries sector. Based on findings of the team in the field, such linkages generally do not exist. Exceptions seem to occur in South Sulawesi. For example, the head of the regional fishery agency, the head of the Fishery Research Station at Maros, the head of the Fishery Department of the University of Hasanuddin and the chairman of the local branch of the Association of Fishery Scientists in Indonesia (ISPIKANI) had monthly directors' meetings. The purpose of the meetings was to discuss the emerging fishery problems in the region and to find solutions.

The seemingly weak linkage between the research station and its clients generated certain problems. For instance, the research station could not exploit potential financial resources in the private sector by receiving contract research, which would have minimized its funding dependency on the government.

Women and their role in the development of the fisheries sector had been an objective of the project. The team noted that the project brought this issue to the attention of policy-makers in AARD as well as DGF. The project, through its special studies projects, funded research on women's role in development and poverty alleviation in the fisheries sector. This ultimately will stimulate other researchers, particularly among Indonesian scientists, to conduct similar research.

Also, equal opportunity was provided for men and women to attend training sessions. However, at the field level, the team heard strong criticism that, until the project reached its phasing-out stage, not a single workshop or training for women in development in the fisheries sector had been offered by the project. Both women researchers and extension workers eager to facilitate their work in the field have demanded such courses.

3.1.6. Project management

On the whole, project management by Auburn University was good. Although the Amendment to the original project paper proposed a reduction in the scope of work, this reduction has not occurred. From a large project of over US\$7 million, which focussed on institution building within the fisheries section of AARD, the project was reduced to a grant of US\$2.6 million, plus a component for education and training funded from another source. Although institution building was de-emphasized on paper, it was not in practice, and the activities described in the amended project remained largely institution building

for the first three years through linkages between AARD and the research institutes of CRIFI. The amendment also added prime components of policy-making and working with the private sector, both responsibilities of DGF and not AARD. Consequently, FRDP was charged with conducting activities that involved either AARD or DGF or both.

Two funded amendments to the contract provided for special outreach-training courses to be organized with DGF and selected private-sector organizations, as well as an improved understanding between the director generals of both AARD and DGF. Nonetheless, the management unit of FRDP should be complimented on its achievements and diplomatic handling of many components of the project, particularly the three planning conferences, which required close cooperation of both agencies. In many countries, this cooperation would have been untenable.

Although national participants in the original project paper were reduced to only seven, the activities proposed in the amendment for the vast archipelago of Indonesia still included all areas of fisheries production, including freshwater, brackish-water and marine fisheries production, as well as post-harvest technology. Consequently, the management of FRDP, essentially the COP and PM, was thinly spread and had to rely on the support of a large number of technical experts to undertake more than 100 activities. This management system counters a national criticism that a large proportion of the project funds were used outside the country.

The Fisheries Research and Development Project's flexibility was demonstrated by the initiation of competitive research grants to replace the initial activity of research specialists working closely with the administrators of fisheries departments of selected universities, which proved to be ineffective. The competitive research grants, on the other hand, produced many positive results.

At times, FRDP management appeared lacking in good communication. For example, the team heard that experts were sent to agencies with little idea of what they had to do, and many cooperating organizations had little advance notice of events, particularly seminars. Communications diminished farther away from Jakarta. The lack of communication may have been within the cooperating agency, between administrators and actual field participants.

Finally, FRDP appeared to have been weak on publicity. The evaluation team was made aware repeatedly that many individuals had little idea about the role of FRDP and USAID in many events and activities in which the staff had taken part. Many publications produced under the auspices of the project do not acknowledge either FRDP or USAID. One particularly useful publicity tool used by FRDP was production of the informative wall charts of Indonesian fish. These charts were highly visible in almost every center the team visited. Although the management unit was expected to produce a newsletter, this production of the newsletter was never regularly or professionally conducted. A quarterly newsletter would have been the ideal tool for bringing the work of the project before the professionals and the private sector and for providing a record of past and future events that the project was supporting.

3.2. Achievement of objectives

3.2.1. Short-term objectives

In the short term, FRDP planned to establish a national, coordinated fisheries-research agenda and to upgrade research programs at the MOA and key universities. The agenda was to address priority production constraints and to improve academic training at selected universities with mandated responsibilities for fisheries training.

The Fisheries Research and Development Project had four principal components, and the achievements of each are described below.

(a) Upgrading staff, facilities, academic training and research programs of seven universities and research institutions to resolve priority production, marketing and policy and management problems
The Fisheries Research and Development Project achieved most of these elements, but to varying degrees. Academic training was successfully advanced with the help of supplemental funds from outside the project. The cost-effectiveness of overseas education was excellent (about US\$2,000 per man-month), which compared with United Nations estimates for fisheries training (almost US\$5,000 per man-month). Technical training of the staff at the principal fisheries research institutes also was successfully upgraded through a variety of short-term courses for many participants. The level of success could have been increased further by closer contact with many visiting experts who gave the courses. For example, few of the technical sessions were given by nationals who would have gained confidence from this exposure.

Research programs at participating institutes were as a whole not greatly advanced. Although the competitive research-grant element of the project was excellent, the research was mostly information gathering and comparative assessments and not scientific research, which might advance the general methodologies of science throughout the institutes. The period of the grants was too brief, and the financial support too limited, to allow this scientific research.

Researchers also undertook many special studies commissioned by FRDP. These studies led to authored publications. However, FRDP also commissioned many special studies by technical-assistance specialists to develop basic information for the three forums. These special studies also were valuable, but all these studies should have been a team effort of one or two nationals supported by the specialists, with the names of nationals appearing as senior or junior authors of the publications. Only a few researchers were fortunate enough to work on these studies and have their names associated as coauthors.

The amended project did not include the improvement of capital facilities for research, such as laboratories and experimental ponds. However, FRDP did complete preliminary design drawings for facilities at three research centers that have been or would be funded by other multilateral or bilateral donors. Neither did the project include the provision of scientific apparatus and laboratory equipment for participating research institutes. The nontechnical equipment, such as vehicles, computers and printers, typewriters and in some cases a photocopier were provided and well used but have not upgraded research resources of the institutes.

(b) Assisting the MOA and the MOE in establishing a nationally coordinated fisheries-research agenda

The Fisheries Policy Research and Planning Team has greatly assisted MOA and MOE in producing a national fisheries-research agenda. There has been a great deal of collective planning, many people have been involved and a number of significant base-line papers have been prepared. Thus, FRDP has provided a vehicle for dialogue, which is the foundation of a national agenda. However, the team has not been able to evaluate the progress of a national agenda without a copy of the proceedings of Forum II. The National Science Council (LIPI), the agency mandated to coordinate research, so far has not been involved in development of such an agenda.

(c) Assisting the MOA in evaluating the need and mechanisms to improve fisheries policy and planning to ensure optimal use and management of Indonesia's aquatic resources

The Fisheries Policy Research and Planning Team has greatly assisted MOA in ensuring optimal use and management of national aquatic resources. Again, FRDP provided the vehicle for dialogue and

discussion as the information base for Forum III, held in June 1992. The evaluation team commended particularly the structure proposed for the forum, with regional representation and total participation through working groups. The Fisheries Research and Planning Team also will be an active participant and secretariat of the forum and will publish the proceedings.

(d) Improving technologies for production and marketing of commercially important fish products
The Fisheries Research and Planning Team has achieved some success in improving technologies for production and marketing of important species. Accomplishments have been achieved more naturally in culture fisheries, where investment is considerably less, than in capture. Some 25 mini-technical packages, Pedoman Teknis, have been produced, and one important Pa-Tek on high-density, small-scale cage-fish production; many courses have been offered to the private sector; and special studies have been commissioned. Many of the mini-technical packages are, however, suitable only for the district extension officers of Dinas Perikanan, and further work is necessary to prepare material for the farmers. Moreover, many of the proposed technologies have not been analyzed economically or socially for the different regions, and most are for freshwater production, whereas the greatest need is in brackish-water and marine production.

Although studies were conducted in support of the marine-capture fisheries industry, research in fishing gear technology and resource surveys is lacking because of the high cost.

3.2.2. Long-term objective

The long-term objective of FRDP was to improve the technological and management resources available to both public organizations and private enterprises in the fisheries sector.

The extremely large number of project outputs is being used, all to varying degrees. However, it was too soon to determine if these outputs will produce impacts in the future. The impact is expected to be small, predominantly because these outputs covered all aspects of fisheries in the country and did not focus on only two or three components, which were then studied in depth. Nonetheless, long-term benefits of FRDP are unquestionably useful, particularly in terms of better organization for planning both fisheries policy and research, a nucleus of better-educated and better-trained technical personnel and a productive system of cage-farming of freshwater fish by primary producers. In addition, GOI may be able to organize and manage the sector by streamlining a number of internal processes.

3.3. Unanticipated results

A highly significant and unanticipated result of the project was that other sectors were evaluating and probably going to implement the process that brought together all the fisheries organizations and institutions in the country to discuss policy agendas, especially the preparatory activities that led to the three fisheries forums and to the forums themselves. Thus, FRDP may have created a model for effective interagency cooperation to develop national policy and to deal with important issues.

Another important and unanticipated result of the project was the effectiveness of an NGO in development, encouraged by good technical information and a modest level of direct financial backing, not credit. However, the latter is obviously most important for subsequent expansion and sustainability. The example provided by the project is the LSPW organization at Lake Toba by which FRDP successfully launched the production of cage culture. This program of training trainees and lead farmers subsequently involved 235 farmers.

The project produced rewarding results through its system of competitive research grants. These grants were valuable not only for the end products, but also for the self-confidence of the researchers. In view of the modest investment, about Rp 163 million for 22 projects in this component, the returns were highly cost-effective. However, at this low level of individual grant funding, a maximum of Rp 10 million, such a program would not support scientific studies.

The project did not set out to produce its series of Pedoman Teknis, or small technology packages. However, in view of the protracted process for producing the official Pa-Teks that were originally planned, FRDP changed its target to meet its own needs and also to accelerate the transfer of technology to the primary producers. Some of the information included in the Pedoman Teknis was general in nature and had been developed and used outside Indonesia. In one or two cases, this information was not necessarily useful, but the idea of Pedoman Teknis probably will be continued after the project ends.

Good publicity for FRDP and technical assistance provided by USAID was obtained very effectively through the unplanned publication of colored wall-charts of commercial and tropical fish. In general, however, familiarity with the project and its donor was poor throughout the country.

Finally, careful budget management of the project enabled a no-cost extension of twelve additional months. This extension enabled the project to produce more outputs than anticipated and to focus more attention on assisting policy development in Forum III and working more realistically with the private sector than could have been expected at the start.

4. Conclusions

4.1. Effectiveness of technical assistance

The purpose of the technical assistance provided by USAID to GOI was to upgrade the capacity of Indonesia's public sector and private sector to lead and support sustainable fisheries development.

The project assisted in development of national policy agendas through networking government fisheries agencies, respective fisheries organizations and the private sector and through publication of proceedings of annual forums. This process is being regarded as a model by other national sectors. Effectiveness in this regard could be improved further by more regional interest-group representation.

A cost-effective investment in long-term education will be lasting, as all fellows have returned or are returning to the country. All are placed in positions where they can apply their new experiences immediately, which will have a multiplier effect within their respective institutions. Short-term training also will be lasting, particularly through efforts to train trainers and involve NGOs in training and extension at the field level.

Research has developed a number of strong proposals to multilateral and bilateral donors. Competitive research grants provided by the project have produced results that added to the national fisheries-information base and to the competency of individual grantees. However, research effectiveness is modest because of budget constraints imposed.

The initiative to produce mini-technology packages, called Pedoman Teknis, offers a speedy and effective conduit for transferring technology at the field level. Twenty-five Pedoman Teknis produced by the project offer continuing benefits to both small-scale and commercial farmers. The process is also a model

that may be used by other sectors. Production of an approved Pa-Tek has created an active industry in intensive culture of freshwater fish in cages of low volume.

The project's activities to link to the private sector have been most valuable at the small-scale-farmer level and should provide future impact, particularly through work with NGOs. The project has been less effective at the commercial level because of restricted communication.

The project was successful in involving women at all levels, especially in technical transfer, but more emphasis on special women's programs is required to sustain these initial efforts.

The project timing was especially valuable. The project occurred when Indonesia was rapidly becoming a major fisheries nation, particularly in world aquaculture. The project produced valuable results that are in use in both the public and private sectors. Many of these results are direct investments in the future of fisheries themselves, and others are related to more effective processes in organization and management. Collectively, the project results anticipate future impact.

4.2. Effectiveness of project methodology

In view of the many demands of a growing national fisheries sector, the methodology adopted by the project was for many short-term technical-assistance activities at all levels of the sector, backed by a long-term investment in postgraduate education overseas. Assistance was coordinated by a small management core. This approach was probably the only effective way to achieve the desired project outputs and fulfill the project terms of reference in the three years available, a period subsequently extended to four years.

As the initial emphases of the project were institution building and research, the project was placed within AARD, an agency responsible for research and human-resource development. However, with emphasis toward the end of the project on activities in fisheries planning, extension and farm-level production, the project would have been better placed within DGF, which had such mandates. Assisted by the growing mood of interagency cooperation within the country, and by the work of the project leaders, this potential problem did not, however, prove to be detrimental to the project's success.

The technical assistance might have been more effective if national counterparts had been designated to each activity. Such an arrangement could have led to coauthored professional publications. Many project activities were undertaken by visiting experts alone. Similarly, the short-term training courses could have involved national experts. Some courses might have been planned around the new qualifications and experiences of the returning fellowship recipients, even though this would have proved to be impractical because of the deferred timing of their education. Also, some visits by overseas experts were too brief to be of real value for all parties, as were a number of overseas conference/study tours funded by the project for national leaders.

The evaluation team concluded that the project methodology of massive and varied technical assistance organized by a small management core was highly appropriate for the project. The project methodology proved to be effective in achieving short-term objectives and for laying the foundation for achieving the long-term goal of a sustainable national fisheries industry.

4.3. Effectiveness of project management

(a) The prime contractor

The prime contractor, Auburn University, was most effective in recruiting qualified experts to provide technical assistance to the fisheries sector. Technical assistance included both marine and inland fisheries, the culture fisheries and post-harvest technology and marketing. The contractor exercised great flexibility in new project initiatives and achieving outputs; for example, research approaches were realigned by administering a system of competitive research grants, and Pedoman Teknis were produced to by-pass the slow, structured process of producing approved technical packages.

It should be noted that working effectively with so many entities has presented formidable management challenges. The bureaucratic and changing demands from all sides necessarily consumed considerable energy from the project. One example involved obtaining travel authority for one of the long-scheduled consultants to come to Indonesia. At least 10 different offices were involved before approval was finally obtained. Although it is not in the scope of our evaluation mandate, it should be clear that more efficient ways need to be found to administer USAID assistance projects.

The contractor was particularly effective in preparing and placing postgraduate fellows overseas, especially in view of highly competitive and diminishing opportunities at all universities in the U.S. The International Center for Aquaculture at Auburn University, geared to the special needs of overseas students and supported by USAID for that purpose, played a major role in the success of the long-term national investment in education by complementing the difficult task of managing this component. Moreover, the education component was highly cost-effective compared to most international education of multilateral-assistance projects.

The contractor produced almost all its intended outputs, with the exception of the fisheries database and production of a quarterly newsletter. In many elements, the contractor greatly exceeded project goals. The database idea was abandoned because DGF was developing a similar database with ICLARM support. Instead of a newsletter, FRDP is compiling a 200-page book of the most relevant special studies. The book will serve as a resource for policy decisions. A special synopsis of the shrimp background studies also was printed by FRDP.

The project was monitored by regular reports and a mid-term director's review. The contractor exercised good budget control, extending the work for a fourth year at no cost, by which time almost all funds will have been spent.

(b) The national counterpart agency

The Agency for Agricultural Research and Development, the national counterpart agency for the project, through CRIFI and its fisheries research institutes, was an effective and cooperative collaborator in the project. The Agency for Agricultural Research and Development fulfilled its obligations despite legal and administrative constraints, and certain components of the project were beyond its mandate. The Agency for Agricultural Research and Development encouraged valuable cooperation between the national fisheries research institutes and the fisheries faculties or departments at their adjacent universities.

The evaluation team was not able to confirm that AARD had fulfilled its commitment of the Rp equivalent of US\$1,025,000, much of which was in-kind contributions in staff facilities and equipment.

(c) The bilateral donor

The United States Agency for International Development, the bilateral donor, provided fair and enthusiastic support to the project, although this project is the smallest of the agency's current portfolio of assistance projects in Indonesia. The United States Agency for International Development fulfilled all the amended financial commitments, notably continuing to add funds to the project from other sources, and through amendments compensating for the sudden de-obligation of some US\$4 million from the initial institution-building and research project that was already underway.

Although short-term objectives of the amended project have been largely met, the team observed that USAID took a serious but calculated risk in continuing with the project on the strength of an amendment hastily put together at a reduced budget level. The project was expanded in response to new USAID policies to work with the private sector and to assist in the formulation of national policies. This vacillation of purpose and objectives was counter-productive to the prime contractor since the prime contractor was required to redirect its focus and efforts mid-course. Attendant changes in program planning and staffing unnecessarily consumed energies in process, rather than in program products.

The added components took the project out of the areas of responsibility of the national counterpart agency and put the project in jeopardy. Furthermore, the amended project did not include a methodology for monitoring the project or establishing standard criteria by which the success and achievements of the project could be measured. The United States Agency for International Development has a reputation among donor agencies and contract recipients for being particular, if not over-demanding, that any project paper should include a methodology for monitoring the project and standard criteria by which the success and achievements of the project can be measured.

The evaluation team commended USAID, AARD and Auburn University for encouraging a great deal of the individual effort given to interagency collaboration and cooperation that helped the project transcend the potential problem of its counterpart location within GOI and produce results that could be used immediately.

4.4. Lessons learned

A number of lessons were learned from the implementation of the project, among which are the following:

(a) The donor should strive for consistency and purpose in the administration of bilateral technical assistance through the life of individual projects.

The team found that the mid-course changes in the original purpose and proposed activities of the project -- changes that occurred as a result of the de-obligation of over half the original budget -- placed an unnecessary burden on the contractor and on the counterpart agency and increased rather than decreased their work load.

(b) Activities expected of technical assistance projects must be within the mandates of the counterpart agency.

The team recognized the difficulties of FRDP, which was charged with assisting in the development of a national fisheries policy and working directly with the private sector while being placed within an agency responsible only for national fisheries research. The Fisheries Research and Development Project's success can be attributed to the working relationship between the directors of MOA and MOE.

(c) Technical-assistance projects in support of a diverse sector, such as fisheries, should focus on only one or two components and carry them out in depth rather than undertake many superficial activities in a large number of components.

The team noted that FRDP was responsible to some degree for all components of the fisheries sector, freshwater, brackish-water and marine production, as well as post-harvest technology. The Fisheries Research and Development Project undertook more than 100 activities at all levels of the sector, from the primary levels, which included marketing and production, to all four secondary levels, which include local infrastructure, national infrastructure and organization and management. This level of responsibility was extraordinarily excessive, particularly for a project-management unit consisting of two individuals.

(d) Local, nongovernment organizations are most effective in communicating technology transfer and extension at the level of the primary producers.

The team commended the approach of FRDP to introduce through LPSW, a local NGO, small-scale intensive cage culture of fish in Lake Toba. By training trainers selected by LPSW for certain skills, the lake region rapidly built up a critical nucleus of more than 235 farmers.

(e) Short-term technical courses should be a minimum of four weeks of effective training, emphasize practical, hands-on training, rather than theory, and have follow-up.

The evaluation team observed a lack of effectiveness of certain short-term courses. This lack was because days were lost each week, and most courses emphasized theory. Short-term technical courses should emphasize practical exercises and hands-on instruction, with a minimum of theory. Moreover, instructors should attempt to use the apparatus and instruments available to the trainees in their own facilities, rather than to describe methods of advanced instrumentation. The courses also should provide a mechanism for follow-up with refresher materials or courses.

(f) Special seminars are not particularly valuable unless they are a part of a formal, structured plan and offer students additional follow-up with personal tuition.

The team noted that the students benefitted little from brief seminars by visiting specialists who were not particularly familiar with the students, their work and their resources. For example, courses that provided planning and guidance required personal tuition for applying the information to the students' particular needs and circumstances.

5. Recommendations

5.1. Recommendations for the fisheries sector

(a) With regard to extension, the evaluation team identified an administrative barrier between research and field application by farmers.

The barrier was caused by the centralized process of preparing, evaluating and disseminating Pa-Teks. The team recommended that GOI replace this process with a simple system for regional control using regional research institutes, state regional universities and provincial extension offices, which would be responsible for producing extension information and conducting training courses in response to local, and not central, needs.

The team commended the approach of FRDP and its Pedoman Teknis in simplifying the transfer of technology to primary producers. The team recommended that the government continue to use Pedoman Teknis as an extension tool in the fisheries sector since the Pa-Teks can be photocopied as leaflets and used directly in the field.

Furthermore, noting the success of NGOs in the transfer of technology at the field level, the team recommended that GOI involve NGOs in the process of technology transfer. The team also recommended that GOI take steps to integrate the directorate of agriculture extension within AARD to facilitate closer cooperation between researchers and extension workers.

The team perceived a general lack of socioeconomic understanding in the process of extending technical information to the primary producers. Therefore, the team recommended that the Institute of Socioeconomic Studies at Bogor receive GOI financial support to create a fisheries department.

(b) With regard to national research, the team believes that the commodity-oriented approach to fisheries development practiced by DGF may become a hurdle to fisheries research.

The team recommended that AARD and DGF adopt a more flexible fishery development strategy that will allow research to respond more to regional rather than central needs, thus widening the options for primary producers.

The team also identified administrative barriers in the process of selecting and approving young candidates for overseas education and middle-level researchers to attend international conferences or to go on valuable study tours. Again, the team recommended that the process of selection and approval should be localized and simplified so that it is immediately responsive to the timing of opportunities.

A need remains for more printed information available to researchers and to all levels of the sector. The team recommended the introduction of a scientific journal for Indonesian fisheries, including aquaculture, to be paid for through membership in a professional fisheries society, and the introduction of national and local trade papers for fishermen and farmers to be published by the private sector.

(c) With regard to increasing fisheries production and the national problem of seed shortage for freshwater fisheries, the evaluation team recommended that women be advanced in this sector.

In particular, workshops and supporting materials should be prepared to teach women the fundamentals of hatchery management and production, especially in terms of floating hatcheries in the Cirata/Saguling region and in marine areas where interest in marine fish cultivation is growing.

5.2. Project-related recommendations

(a) The team was concerned that the third conference proposed in June does not have the broad and equitable representation that recognizes the country's regional diversity and different needs.

It is recommended that the conference extend invitations to the following groups: delegates elected from the regional associations of fishermen and fish-farmers, NGOs within the region active in fisheries development, state regional universities, provincial fisheries offices, associations of professional fisheries scientists and regional planning boards. This broad representation will help offset some of the imbalance of administrators over the private sector and encourage bottom-up planning, rather than top-down planning, which has been evident.

(b) Although many of the research studies commissioned by FRDP were published in mimeograph form, the team recommended that FRDP encourage publication of the studies as technical manuscripts in peer-reviewed national and international journals.

(c) Although women have been represented in the activities of FRDP, the team recommended that USAID look for opportunities to fund short courses for women only, such as training in fish-hatchery technology.

Annex I: Supporting Data of Outputs

Tables 1-6

Table 1.	FRDP special studies projects
Table 2.	Fisheries Forum III
Table 3.	Scholarship recipients nominated by FRDP
Table 4.	Seminars presented by FRDP consultants
Table 5.	FRDP competitive research projects
Table 6.	Status of FRDP Pedoman Teknis

TABLE 1, ANNEX 1

FRDP SPECIAL STUDIES PROJECTS
By FRDP Agencies (Local Support Funds)

Project		Agency	Period		Amount (Rp)		Status ⁴ (1 Aug 91)
No.	Title		From	To	Committed	Disbursed	
1.	Assessment of Fisheries Cooperatives	UNHAS	Sep	Mar 90	(\$ 25,000) ¹	0	C
2.	Fisheries Manpower Assessment	IPB	Sep 89	-	21,000,000	21,028,000	C
3.	Relationship ... Shrimp Processors- Producers	UNHAS	Mar	Aug 90	15,180,000	15,213,000 ²	C
4.	Marketing and Credit -- Small-scale Fishermen	UNHAS	Mar	Nov 90	14,600,000	10,972,000	C
5.	Socio-economic Impact of Intensive Shrimp	RICA/Maros	Mar	Jan 91	21,130,000	17,492,000	C
6.	Inter-Insular Trade	RIMF- UNPATTI	May	Dec 90	22,100,000	21,263,050	C
7.	Eval. Cendrawasih Bay Coops	FAO	Jun	Sep 90	2,700,000 (+ \$25,000) ²	2,700,000 ³	C
8.	Enhancing Sul-Sel Shrimp	RIMF	Jun	Mar 91	15,310,000	11,820,000	C
9.	Evaluation of Tuna Resources	RIMF	Aug	Jan 91	36,000,000	33,522,000	C
10.	Nucleus Estates	IPB	Sep	May 91	25,000,000	28,837,000 ²	C
11.	WID	CRIFI	Apr	Jun 91	-	3,212,150	C
Total, FRDP					173,020,000		
					(\$ 93,500)		
Other					92,000,000		
					259,020,000		
					(\$ 140,000)		

¹ Funded under separate USAID-assisted project.

² Primary funding and direct monitoring by FAO/CBIADP; Project leader is M. Sembiring, USAID-sponsored M.S. candidate at Auburn University from Indonesia Ministry of Cooperative.

³ Includes international airfare and other costs at Auburn.

⁴ Status code: C = Completed; N = Not completed; S = On schedule

8. Programme and Schedule

AGENDA OF THE SEMINAR

THE ROLE OF FISHERIES IN THE SECOND LONG-TERM DEVELOPMENT PLAN

SUKABUMI: 23 - 25 June 1992

Monday, 22 June 1992

Afternoon : Arrival of Participants
14.00 : Check in at Hotel

Tuesday, 23 June 1992

08.00 - 09.00 : Registration
09.00 - 09.15 : Report by the Chairman of the
Organizing Committee
09.15 - 09.45 : Keynote Address and Opening of the Seminar
by the Minister of Agriculture
09.45 - 10.15 : Coffee break
10.15 - 11.15 : Fisheries Sector Development Review
11.15 - 13.00 : Future Challenges
13.00 - 14.00 : Lunch
14.00 - 14.45 : Discussion (Continue)
14.45 - 16.15 : Inlandwater and Marine Fisheries Resource
Development
16.15 - 16.30 : Coffee break
16.30 - 17.30 : Discussion (Continue)
19.00 - 20.00 : Dinner
20.00 - 22.30 : Human Resource Development in Fisheries

Wednesday, 24 June 1992

08.00 - 10.30 : Meeting the Needs of Smallholders
10.30 - 10.45 : Coffee break
10.45 - 13.15 : Private Sector Participation in Fisheries
Development
13.15 - 14.15 : Lunch
14.15 - 16.15 : Working Group Session
16.15 - 16.30 : Coffee break
16.30 - 18.00 : Working Group Session (continue)
19.00 - 20.00 : Dinner
20.00 - 22.00 : Working Group Session

Thursday, 25 June 1992

08.00 - 11.00 : Report of Working Groups
11.15 - 11.30 : Coffee break
11.30 - 13.00 : Drafting Committee
13.00 - 14.00 : Lunch
14.00 - 16.00 : Report of the Seminar and Adoption
of the Report.
16.00 - : Closing

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List of Participants

Ministry of Agriculture

1. Director General of Fisheries
2. Director General of AARD
3. Director, Agriculture Education
4. Head, Bureau of Planning, MOA
5. Head, Bureau of Foreign Cooperation, MOA
6. Secretary, Directorate General of Fisheries
7. Director of Programme
8. Director of Production Development
9. Director of Resource Management
10. Director of Fisheries Enterprise
11. Director of Infrastructure
12. Director of Fisheries Extension
13. Director of Planning, AARD
14. Director of CRIFI
15. Director of Social Economic, AARD
16. Chief, CRIFI - RIMF
17. Chief, CRIFI - RIFF
18. Chief, CRIFI - RICA
19. Dwiponggo, CRIFI - RIMF
20. Director, Academy of Fisheries

BAPPENAS

21. Head, Bureau of Agriculture and Irrigation

Institution Concerned

22. Director of Swamp, Directorate General of Water Resource Dev.
23. Director, Agriculture Marketing Development, NAFED/BPEN
24. Head, Bureau of Planning non-Industry Investment, Foreign Investment Board / BKPM
25. Director of Programme, Directorate General Multivarious Industry
26. Directorate General of Forest Conservation PHPA
27. Director, Resettlement Preparation, Dept. of Transmigration
28. Director, Standardization and Quality Control, Directorate General of Foreign Trade
29. Director, Foreign Investment, Directorate General of Monetary
30. National Institute of Science
31. Ministry of Environment and Population
32. National Land Board
33. Bank of Indonesia
34. State National Bank
35. Chairman, Commission IV Parliament

TABLE 3, ANNEX 1

Scholarship recipients nominated by FRDP from member institutions funded for fisheries study in USA under USAID General Participant Training Program.

No.	Name (Last)	Name (First)	Institution	Sex	Training Objective	Training Institution	Starting Date	Finish Date
1.	Atmomarsono	Muharjadi	RICA	M	MS-Aquaculture	Auburn University	09/13/89	08/31/91
2.	Badawing	Dewi	Univ. Hasanudin	F	MS-Fisheries Sci.	Oregon State University	06/19/90	06/15/92
3.	Bustaman	Sjahrul	RIMF/Ambon	M	MS-Fisheries Sci.	Oregon State University	09/07/89	12/31/91
4.	Hariyadi	Sigid	IPB	M	MS-Aquaculture	Auburn University	03/24/89	06/24/91
5.	Irianto	Banbang	RIMF	M	MS-Agr/Res. Econ.	Univ. of Hawaii	08/07/90	07/30/92
6.	Kristanto	Anang	RIFF/Palembang	M	MS-Fresh. Fish.	Auburn University	06/16/89	07/16/91
7.	Kusumastanto	Tridoyo	IPB	M	Ph.D.-Agr. Econ.	Auburn University	09/18/90	04/30/93
8.	Muluk	Chairul	IPB	M	Ph.D.-Aquaculture	Auburn University	03/24/89	11/30/92
9.	Prihadi	Triheru	RIFF	M	MS-Fisheries	Auburn University	06/16/89	12/31/91
10.	Trilaksani	Wini	IPB	F	MS-Food Science	Univ. of Hawaii	08/07/90	07/30/92
11.	Chasanah	Ekowati	RIMF/Ambon	F	MS-Food Nutrition	Univ. of Rhode Island	08/27/89	12/31/91
12.	Hiariey	Johanis	UNPATTI	M	MS-Agr. Econ.	Auburn University	03/31/90	03/31/92
13.	Purnomo	Agus	RIMF/Ambon	M	MS-Res. Econ.	Univ. of Rhode Island	08/27/89	12/31/91

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No.	Consultant	Date	Time (H:M)	Location	Subject	Audience	
						No.	Representing
16.	J. Cobb	16 Jan	2:30	UNPATTI	Research and ... experiences Lobster biology	30	UNPATTI
17.	J. Cobb	16 Jan	1:30	RIMF/Ambon	Lobster biology	15	RIMF
18.	K. Simpson	17 Jan	2:00	RICA/Gondol	Artemia quality	25	RICA
19.	N. Dholakia	17 Jan	2:00	RIFF/Bogor	Marketing and innovation	12	RIFF
20.	N. Dholakia	18 Jan	2:00	CRIFI	Marketing and innovation	34	CRIFI, RIMF
21.	K. Simpson	20 Jan	2:00	CRIFI	Blue shrimp problem	25	CRIFI
22.	L. Lovshin	25 Jan	2:30	RIFF/Bogor	Channel catfish culture .. Fish transport	15	RIFF
23.	R. Pollnac	10 Feb	2:00	CRIFI	Conflicts in ... development	50	CRIFI, RIMF, RIFF, UNHAS, USAID
24.	R. Pollnac	17 Feb	1:30	UNHAS	Problems with ... cooperatives	100	Dinas, BAPPEDA
25.	C. Boyd	25 Mar	1:45	RICA/Maros	Water quality in ...	65	RICA, UNHAS, private sector
26.	C. Boyd	6 Apr	2:00	CRIFI	Water and soil management ...	45	CRIFI, DGF
27.	J. Grover	13 May	2:00	UNHAS	Fisheries education ...	20	UNHAS

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No.	Consultant	Date	Time (H:M)	Location	Subject	Audience	
						No.	Representing
43.	S. Constantinides	24 Oct	2:00	UNHAS	Marine food utilization ...	90	RICA, UNHAS
44.	K. Simpson	26 Oct	2:00	UNHAS	Marine pigments	35	UNHAS, RICA
45.	K. Simpson	3 Nov	2:00	RICA/Gondol	Marine pigments	35	RICA
1990							
46.	N. Dholakia	16 Jan	1:00	RICA/Maros	Marketing challenge - shrimp	35	RICA, UNHAS
47.	J. Gates	16 Jan	1:00	RICA/Maros	Aquaculture economic hypotheses	35	RICA, UNHAS
48.	D. Lightner	17 Jan	2:00	BIOTROP/Bogor	Shrimp diseases, prevent-control	80	BIOTROP, GOI, private sector
49.	J. Gates	30 Jan	0:45	CRIFI	Economic implications - policy	38	CRIFI+
50.	R. Pollnac	30 Jan	1:00	CRIFI	Sociocultural factors - aquaculture	38	CRIFI+
51.	N. Dholakia	30 Jan	0:45	CRIFI	Marketing challenges - aquaculture	38	CRIFI+
52.	R. Schmittou	6 Feb	3:00	Wonogiri	Principles cage culture	21	Dinas
53.	R. Schmittou	7 Feb	2:30	Lamongan	Principles cage culture	34	Dinas
54.	W. Rogers	7 Mar	3:00	Bogor	Quarantine issues	7	GOI Quarantine
55.	W. Rogers	15 Mar	2:30	RIFF/Bogor	Fish health management	49	GOI depts (17)
56.	R. Schmittou	17 Mar	4:00	LSPW/Parapat	Cage Fish Culture ...	47	Dinas, Priv. Sec.+

No.	Consultant	Date	Time (H:M)	Location	Subject	Audience	
						No.	Representing
72.	R. Rosati	8 Aug	2:00	CRIFI	Oxygen & ammonia in aquaculture	26	CRIFI, RIFF, DGF
73.	J. Mevel	10 Sep	1:00	CRIFI	Resh. station design ...	36	CRIFI, RIFF ...
74.	L. Lovshin	10 Sep	1:00	CRIFI	Floating hatchery ...	36	CRIFI, RIFF ...
75.	R. Phelps	6 Nov	2:00	RIFF/Bogor	Tilapia sex reversal	15	RIFF
76.	J. Plumb	15 Nov	3:00	CRIFI	Fish health management	30	CRIFI, RIFF, RICA
77.	R. Phelps	19 Nov	2:00	RIFF/Palembang	Tilapia sex reversal	10	RIFF
78.	R. Phelps	20 Nov	1:00	RIFF/Palembang	Tilapia fry feeding	10	RIFF
79.	J. Grover	N/A	N/A	IPB/Bogor	Research methods	N/A	N/A
1991							
80.	N. Dholakia	19 Jan	3:00	RICA/Maros	Shrimp marketing	20	RICA
81.	C. Bailey	22 Jan	2:00	RIMF/Slipi	Sociology in fisheries development	25	RIMF
82.	S. Constantinides	31 Jan	2:00	RICA/Maros	Seafood quality issues	40	RICA, UNHAS
83.	S. Malvestuto	12 Mar	2:00	Pontianak	Kapuas River management	75	DGF, CRIFI
84.	R. Pollnac	13 Mar	1:00	Pontianak	Kapuas River management	75	DGF, CRIFI
85.	M. Upton	29 May	2:00	South Sulawesi	WID	35	RICA
86.	M. Upton	14 Jun	2:00	Jakarta	WID	8	USAID
87.	C. Bailey	19 Jun	1:00	Sukabumi	Traditional Fisheries Management	85	Forum II

TABLE 5, ANNEX 1

FRDP COMPETITIVE RESEARCH PROJECTS

Project		Agency	Amount disbursed (Rp)
No.	Title		
1.	Production Performance of Lele	RIFI/Depok	6,008,500
2.	Cage Culture of Fishes in Oligotrophic Lake	Cooperator	0
3.	Cage Culture in Ikan Mas and Nila in Mesotrophic Reservoir	RIFI/Jatiluhur	11,619,300
4.	Acidification of Freshwater Swamp Soils	RIFI/Palembang	5,516,000
5.	Cage Culture of Jelawat in Oxbow Lake	RIFI/Palembang	4,142,000
6.	Live Fish Transport (no final report, Rp 2 million obligated by FRDP to Kusman)	IPB	7,000,000
7.	Sand Goby Hatchery and Nursery	IPB	7,000,000
8.	Mass Production of Rotifers	IPB	9,022,000
9.	Cage Fish Culture in Shrimp Tambak	RICA/Maras	2,435,500
10.	Blue Shrimp Prevention and Control	RICA/Maras	9,000,000
11.	Artemia Culture Using Agricultural Wastes	RICA/Maras	9,000,000
12.	Low-cost Shrimp Feed	RICA/Maras	8,011,000
13.	Factors in Baitfish Mortality	RIME/Ambon	6,761,000
14.	Utilization of Shark Meat	RIME/Ambon	6,600,000
15.	Utilization of Sea Cucumber	UNIPATTI	9,022,000
16.	Lebster Fishery Resource	UNIPATTI	9,011,000
17.	Luminescent Bacteria	RICA-RIFI/Bogor	9,022,000
18.	Ich Control	RIFI/Bogor	9,022,000
19.	Pangasius Feed	RIFI/Palembang	4,500,000
20.	Grouper Feed	RICA/Bojonegara	8,011,000
21.	Handling Tuna	RIME	4,111,000
22.	Freshwater Swamp	RIFI/Palembang	9,033,000
23.	Semi-intensive shrimp (BRAP/ASA)	RICA	9,064,000
			162,911,300
			(\$.)

Annex II: Reference Documents

1. General documents

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- Zerner, C. 1991. Sharing the catch in Mandar: changes in the Indonesian raft fishery, 1970-1989.

Annex III: Persons Interviewed

1. General personnel

Ministry of Agriculture (MOA)

Agency for Agricultural Research and Development (AARD)

Dr. Soetatwo Hadiwigeno, DG, AARD, Jakarta
Dr. Fuad Cholik, director, CRIFI, Jakarta
Dr. Sofyan Ilias (rtd.), ex-director, CRIFI, Jakarta
Dr. Pasril Wahid, AARD, Bogor
Dr. Fatuchri Sukadi, director, RIFF, Bogor
Dr. Nurzali Naamin, director, RIMF, Jakarta
Drs. Chairul, technologist, RIMF, Ancol
Zainal Arifin, M.Sc., director, RIFF, Palembang
Ir. Husnah, RIFF, Palembang
Drs. Krismono, director, RIFF, Jatiluhur
Mrs. Andriani Sri Nastiti, researcher, RIFF, Jatiluhur
Ningrum Suhenda, researcher, RIFF, Bogor
Ms. S.N. Aida, RIFF, Palembang
Ir. Ateng Gurnia Jagatraya, head, IFA, Sukabumi
Ir. Djati Widagdo, staff member, IFA, Sukabumi
Ir. Tonny Sarwono, staff member, IFA, Sukabumi
M. Abduh, administrator, IFA, Sukabumi
Ir. T.A.R. Hanafiah, M.S., head, RIMF, Ambon
Ir. Heri Purnomo, RIMF, Ambon
Ir. Brata Pantjara, researcher, RICA, Maros
Ir. Nur Amsari, researcher, RICA, Maros

Directorate General of Fisheries (DGF)

Ir. D.H. Jusuf, chief, sub-directorate, aquaculture production, Jakarta
Drs. Alwinur, director, Information Division, Jakarta
Ir. S. Muranto, director, Fisheries Extension Division, Jakarta
Dr. Sunarya, head, National Center for Fish Quality Control, Jakarta

Dinas Perikanan (DP)

Ir. M. Natsir Razak, Pangkep, Sulawesi
Ir. Hasunaddin Atjo, Barru, Sulawesi
Ir. Abdullah Samad, Parepare, Sulawesi
Drs. Sopandi, Cianjur
Effendi, Cirata and Saguling
Ir. Husni Mangga Barani, head of fisheries planning, South Sulawesi
Sri Alam, Maros
Rais, Maros
Ir. Husni, South Sulawesi
Ir. Soekirno, head, Maluku

Ir. Fachruddin Nur, chief of extension, Pangkep
Marwah, Pangkep
Sarnawiyah, Pangkep
Hasanuddin, Pangkep
Marwah Nampo, Pangkep
Ridwan, Pangkep
Achmad Abidin, Pangkep
Mahmud, Pangkep
Ir. Muri Jafri, extension specialist, Pangkep

Ministry of Education and Culture (MOE)

Research and Community Service Development (RCSD)

Dr. Jajah Koswara, director, Research and Development

Bogor Agricultural University, Faculty of Fisheries (IPB)

Dr. Ismudi Muchsin, dean

Dr. Ir. Kadarwan Soewardi, vice-dean

University of Hasanuddin, Faculty of Animal Husbandry (UNHAS)

Ir. M. Baso Ronda, vice-dean

Dr. H.M. Natsir Nessa, Fisheries Department, staff member

Dr. Radjuddin, staff member

Dr. Ishak Andarias, staff member

Ir. H.I. Nengah Sutika, staff member

Ir. Alexander Rantetondok, staff member

Ir. Syamsu Alam Ali, staff member

Ir. H. Achmad Sadarang, staff member

Ir. Aspari Rachman, staff member

Ir. Najamuddin, staff member

Ir. M. Rijal Idrus, staff member

Ir. Arifuddin, staff member

Ir. Haryati, staff member

University of Pattimura, Faculty of Fisheries (UNPATTI)

Ir. J.M. Nanlohy, dean

Drs. J.J. Wenno, M.Sc., vice-dean

National Science Council (LIPI)

Center for Research and Development of Ocean Sciences (PPPO)

Dr. Kasijan Romimohtarto, director, Ancol

Dr. Burhanuddin, staff member, Ancol

Dr. Harsono, staff member, Ancol

Ir. Kurnaen Sumadhiharga, M.Sc., director, Ambon
Ir. L.F. Wenno, oceanographer, Ambon

Other organizations

Saudara Sihombing, site manager, LSPW, Lake Toba
Veronika J. Brzeski, biologist, Proyek EMDI
Sanusi, chairman, GAPPINDO, South Sulawesi

U.S. Agency for International Development (USAID)

Juanita A. Darmono, Office of Program and Project Support
Dr. Edward H. Greeley, Office of Program and Project Support
Wilbur Scarborough, Office of Program and Project Support

Fisheries Research and Development Project (FRDP)

Dr. John Grover, chief of party
Alie Poernomo, project manager
Wahyu Widodo, secretary

FRDP special studies experts

Dr. R. Pollnac, University of Rhode Island, USA
Charles Zerner, fellow, Woodrow Wilson Center, Washington D.C., USA

2. Beneficiaries

Trainees at short courses, workshops and seminars

Sofi Hanif, DGF, Sukabumi
Yade Sukmajaya, DGF, Sukabumi
Ms. Ningrum Suhenda, RIFF, Bogor
Ms. Ani Widiyati, RIFF, Bogor
Wahyu Hidayat, RIFF, Bogor
Krismono, RIFF, Jatiluhur
Ir. Husnah, RIFF, Palembang
Ms. S.N. Aida, RIFF, Palembang
Ms. Sri Ismawati, RICA, Maros
Brata Pantjara, RICA, Maros
Akhmad Mustafa, RICA, Maros
A. Sri Alam, Dinas Perikanan, Maros
A.M. Rais, Dinas Perikanan, Maros

Fellowship recipients

Tri Heru Prihadi, M.Sc., RIFF, Bogor
Muharijadi Atmomarsono, M.Sc., RICA, Maros
Ms. Ekowati Chasanah, M.Sc., RIMF, Ambon

Agus Heri Purnomo, M.Sc., RIMF, Ambon
Anang Hari Kristanto, M.Sc., RIFF, Palembang

Study tours

Dr. Nurzali Naamin, director, RIMF, Jakarta
Dr. Ir. Ismudi Muchsin, dean, Faculty of Fisheries, IPB

Competitive research grantees

Dr. Rusdian Lubis, director, Environmental Study Center, UNHAS (two grants)
Ir. Arifuddin Tompo, RICA, Maros
Ir. Naftali Kabangga, M.S., researcher, RICA
Ir. J.M. Nanlohy, dean, Faculty of Fisheries, UNPATTI
Dr. J.J. Wenno, M.Sc., vice-dean, Faculty of Fisheries, UNPATTI
Ir. Husnah, RIFF, Palembang
Zainal Arifin, M.Sc., director, RIFF, Palembang

The private sector

(a) Farmers

Haji Aziz, Sukabumi
Berlin Gurning, Lake Toba
Sinaga, Balige
Mrs. Sinaga, Balige
Harbo, Lake Toba
Bakarah, Lake Toba
Asril Djunaidi, Tolehu, Ambon
Raismin Kodda, Tolehu, Ambon
Safruddin Lesdahutu, Tolehu, Ambon
Yahya Kodda, Tolehu, Ambon
Bodda, Fisherman, Pare-pare
Mrs. Bodda, Chairman, Village Fishermen's Wives Association

(b) Businesspersons

B.H. Poesposoetjipto, manager, P.T. Mina Kartika Fishing Company, Ambon
Hadi Budoyo, director, P.T. Mina Kartika Fishing Company, Ambon
H. Sanusi Husen, head, GAPPINDO, South Sulawesi
Hadi Budoyo, head, GAPPINDO, Ambon
Abdurachman, director, P.T. Thamasindo Pratama, Jakarta

Annex IV: The Evaluation Mission Team and Itinerary

1. The evaluation mission team

Howard F. Horton (team leader), Oregon State University, Corvallis, USA
Dulmi'ad Iriana, University of Pajajaran, Bandung
Lachmuddin Sya'rani, Diponegoro University, Semarang
Loekman Soetrisno, Gajah Mada University, Jogjakarta
Colin E. Nash, consultant, Seattle, Washington, USA

2. Itinerary

Date	Mission Base/Field Visit	Agencies Visited
May 1	Jakarta	USAID, FRDP (CRIFI)
2	Jakarta	FRDP (CRIFI)
3	Bogor	-
4	Bogor	RIFF, AARD, IPB
5	Bogor/Jatiluhur	Private sector
6	Bogor	Private sector, FRDP
7	Bogor/Palembang	FRDP/DHEC/RIFF
8	Bogor/Sukabumi	DGF/Private sector
9	Bogor/Ujung Pandang	DGF/CORD/Private sector
10	Bogor	-
11	Bogor/Jakarta	DGF/CORD/FRDP (CRIFI)
12	Ujung Pandang	UNHAS
13	Ujung Pandang	UNHAS
14	Ujung Pandang	RICA
15	Ujung Pandang	Private sector
16	Ambon	Private sector
17	Ambon	RIMF/Private sector
18	Ambon	UNPATTI
19	Bogor/Jakarta	-
20	Bogor/Jakarta	-
21	Bogor/Jakarta	CRIFI
May 22	Bogor/Jakarta	US AID/CRIFI
23	Bogor	
24	Bogor	
25	Bogor	
26	Bogor	
27	Bogor	Review of draft/FRDP/USAID
28	Bogor	
29	Bogor	
30	Bogor	Seminar
31	Bogor	End of mission