

EX-POST EVALUATION STUDY

ON

THE FOREST RESEARCH PROJECT PHASE II

November 2005

JICA PAPUA NEW GUINEA OFFICE
Japan International Cooperation Agency (JICA)

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Ex-post Evaluation Report

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1. Ex-post Evaluation study

1.1 Background and purposes of the study

1.1.1 Background

In 1993, The Government of Papua New Guinea (PNG) introduced the National Forestry Development Guidelines. According to the guidelines, the functions of the Forest Research Institute (FRI) were reviewed and research activities for sustainable forest resource management were given priority. In this process, the Forest Research Project Phase I was regarded as a successful project and the PNG Government requested to the Japanese Government for the Phase II in order to enhance research activities for sustainable use of forest resources.

1.1.2 Purpose of the study

The purposes of the ex-post evaluation study of the Project “The Forest Research Project Phase II” are to:

- assess mainly the impact and sustainability of the project, feed back the lessons learned for improving the formulation of new projects and programs of JICA in the future and give recommendations.
- fulfill the accountability to the Japanese taxpayers through the production of reports.

1.2 Evaluators

Members of the evaluation study team:

Mr. Tony Ombo (Development officer, JICA PNG Office)

Mr. Kaneyasu Ida (IC Net Limited)

2 Study methods

2.1 Outline of the project

2.1.1 Framework of the project

Super Goal:

Sustainable development of forest resources by the private sector and local residents

Overall goal:

FRI's contributions to the introduction of a comprehensive management guidelines for sustainable forest resources

Outputs:

The following outputs were intended under the subjects of demonstration forest management, soil, species screening, volume tables, tree breeding and tree species database.

1. FRI staffs acquire necessary research techniques for sustainable forest resource management.
2. FRI staffs can produce research results and create database based on standardized methodologies.
3. FRI can maintain research equipment and facilities including demonstration plots.

Inputs:

The following inputs were provided for the project by both sides:

Japanese side:

Long-term Expert:	4	Equipment:	52 Million Yen
Short-term Expert:	18	Local cost:	37 Million Yen
Training in Japan:	16		

PNG side:

Counterpart personnel: 19

Other inputs provided for the project: Land (57ha), Buildings (4,160m²)

Demonstration plots (Approx. 1,000ha)

Prior to the phase II of the project, the buildings and facilities were constructed with grant aid assistance in 1989. The Phase I of the project was implemented during 1989 – 1993.

2.1.2. Results of the Forest Research Project Phase II

The terminal evaluation report (2000) shows the progress of the project as follows:

- The project has laid basis for research activities. The pilot forests as well as research equipment had been in place; thus, senior researchers are able to carry out their research activities on full scale. Adequate supervision by programme leaders and the integration of research results are two important tasks for research management.
- During the project, basic research techniques were transferred. Study on soil conditions is expected to have a good contribution for sustainable forest management.

- Basic techniques for management of planted forest were transferred. Yet, Practical methodologies for the end users should be developed. Particularly, integration of research results with analyses of soil conditions is necessary.
- Technology transfer for identification programmes has been complete. Further development of identification key by vegetative and wood anatomical characteristics, and use of genetic analysis should produce fruitful results.

2.2. Stakeholders and study methods

Data collection for the evaluation study was done mainly through interviewing to various stakeholders of the project. Questionnaire survey was also conducted to the counterpart personnel of the project in FRI as well as the PNGFA. The stakeholders interviewed included: the PNGFA, the FRI managers and researchers, Papua New Guinea University of Technology (Department of Forestry), Timber and Forestry Training College, and local NGOs. Site visits were made to the National Tree Seed Center, Reforestation Training Center and demonstration plots in Oomsis.

3. Results of Evaluation

3.1 Sustainability

3.1.1 Project purpose

The project purpose was the improved research capacity of FRI. The evaluation report of March 2000 concluded that the project purpose would be mostly achieved by the end of the project. The reasons were: facilities and equipment were available for researchers; a sufficient number of capable researchers had been trained and senior researchers were able to manage their research work in their respective fields and publish research results.

Although most of the researchers trained during the project have remained in FRI, the level of research activity anticipated at the time of evaluation is hardly sustained. Also, quite a number of equipment items provided by the project are dysfunctional or underused. Currently, the research capacity of FRI is very low. This is not because of technical reasons but mostly due to several factors originating in weak institutional capacity. The issue of the institutional capacity of FRI will be discussed in 3.1.2.

3.1.2 Outputs

Through the project, assistance was given under the subjects of demonstration forest, soil, species screening, volume tables, tree breeding and tree species database. FRI's research was carried out; data were collected and analyzed; and research scientific papers (Notes) were written by FRI researchers, supported by the Japanese experts. The Notes were also translated or simplified for the general public (stakeholders and ordinary individuals) into Bulletins and published.

(1) Sustainable Forest Management

Basic techniques were transferred and later a review was done, but still more applicable techniques for field operation has been needed so far due mainly to lack of funding from the National Forest Authority after the project.

Yet FRI maintains the monitoring of the Mogi-Busiga Project in Finschaffen District implemented in Phase II. In this undertaking, researchers carry out ecological trials such as soil quality, leaf litter collection, stand dynamics as well as the impact assessment of logging in the area.

Other research projects are undertaken, supported by external entities. FRI carries out data collection on Permanent Sample Plots (PSPs) at 120 locations nationwide with external assistance from ITTO. FRI also carries out Growth & Yield Studies with the aim to capture the growth and forest dynamics over time. This project is implemented with assistance from the Australian Centre for International Agricultural Research (ACIAR).

The Kupiano Demonstration Plot was burnt down in the 1997 drought. Thus FRI currently maintains and carries out work on the Oomsis Demonstration Plot, although at times landowner issues arise over royalty payments. The Ph.D. thesis of the current Program Leader, Dr. Edward Nir, was based on the Oomsis Demonstration Plot.

(2) Planted Forest

During the Phase II of the project, utilizing basic techniques transferred, practical

methodologies for the end users have been carried out in the following projects. After the project, five projects have been tried. One project is still under way while the other projects have been suspended.

① *Establishment of Seed Orchards (Species Screening)*

Trial Seed Orchards for *Acacia Mangium* and *Tectona Grandis* were development in 1997 on customary land. However, the *Acacia Mangium* Trial was destroyed by fire and only *Tectona Grandis* is currently monitored through the thinning process to select the best performing or superior family.

② *Tree Volume Tables of major Plantation species in PNG (Silviculture)*

Progress was made in the development of volume tables for the forest plantation species while tables for other species are currently being developed. As the responsible Officer is currently in Japan for further studies, this project shall resume after his coming back to FRI.

Insect Pests in Forest Plantation are continually monitored and field investigations are conducted whenever pest outbreaks are reported. Although pest controls are carried, the termites seem to resist these control measures and are becoming troublesome in the longer term for the industry.

③ *Vegetative Propagation (Tree Breeding)*

Here, both the micro propagation and conventional propagation methods are carried out. In the latter, a mist house was built and vegetative propagation through stem cuttings are implemented through research. However, due to a shortage of funds, this trials have been suspended.

④ *Tissue Culture (Tree Breeding)*

Although knowledge was transferred, micro propagation and further work or activities are nonexistent due mainly to the breakdown of the incubator machine. Currently, Mr. Yoshiaki Oikawa, a JICA senior volunteer, is utilizing the laboratory, working on the Orchid Culture as part of the Botanical Garden of FRI.

⑤ *High Altitude Species Trial (Species Screening)*

In May 2004, FRI started the Pinus SPP Research and Development in the Highlands and

lowland areas focusing on potential industry species screening, multi-purpose species, species for special sites and seed acquisition and storage. The progress is delay due to a deteriorated relationship with the company which provided the experimental site.

(3) Forest Biology

After identification technologies were completed, research activities are continuing but slow to further identify key developments through vegetative and wood anatomical characteristics. Such activities are further assisted by the Royal Tasmanian Botanical Garden with funds from the MacArthur Foundation to establish a website. Currently, the researchers have looked into more than 35,000 species. They can only work on 10 to 15 species per day and definitely need help.

(4) Forest Products

Although basic techniques were transferred during Phase I, this component was not included in Phase II. In Phase II, hardly any studies are done on species identification and therefore contributions to sustainable forest management are stagnant.

(5) Other activities

The following projects or activities are under way:

- Continue collection or sampling of wood for photography and testing, drafting of the book, publication of pamphlets for distribution and create a database on the Internet.
- Review the status and development of forest product industries in PNG through industrial visits with questionnaires and establish a database of the industries in PNG.
- Establish contacts with industries, government and statutory bodies in PNG and abroad to seek cooperation and assistance.
- Continue mushroom propagation studies at higher altitude regions of Morobe and Highlands.
- Continue monitoring and assess essential oil project in the Western Province.

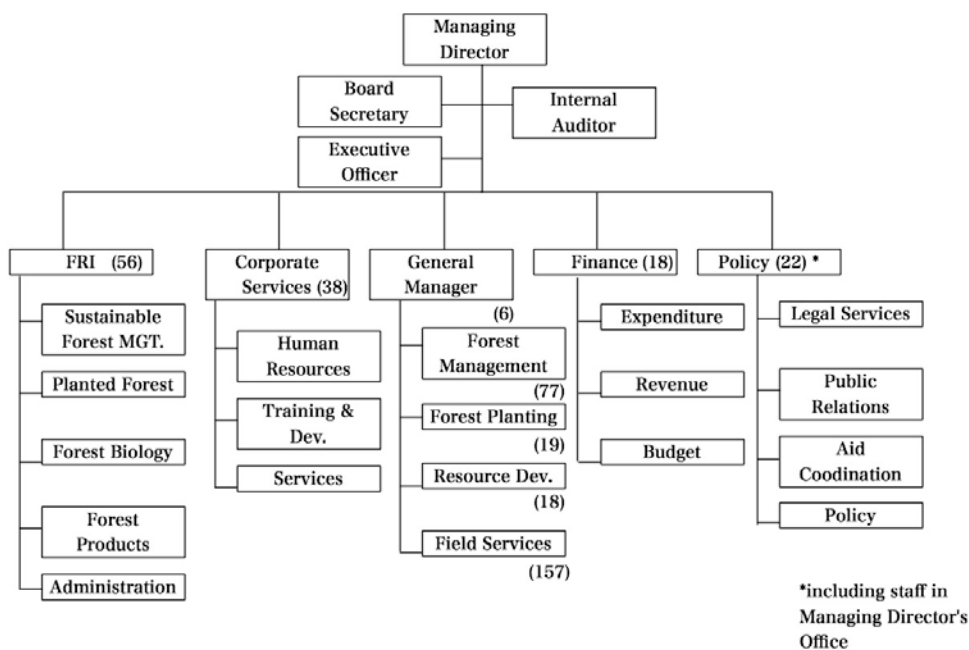
Some activities require a long time before any results can be obtained. For example, species screening of *Tectona grandis* needs a few more years until the most genetically superior families can be produced and real economic benefits are yielded. However, for other research projects, only a few of them have reached the stage where research results can be ready for publication and dissemination. Human resources development has been done generally through technology transfer by Japanese expert and counterparts training in Japan

during project period. Most of the researches projects have been either very slow in progress, suspended, or terminated due to a shortage of the budget. Therefore, sustainability of the project outputs is currently rather low.

3.1.3 Institutional sustainability

FRI has been the only division specializing in research activities. The PNGFA underwent major organizational restructuring in 1999 and FRI was incorporated under the Forest Management Division (FMD). Nevertheless, PNGFA tried to keep the missions and functions of FRI intact. A year later, FRI was separated from FMD. Therefore, FRI has been able to maintain its research function after the termination of the project. This should be noted as an important consideration by PNGFA on FRI because any discontinuation of FRI's research activities due to such an organizational change would have spoiled the project's efforts, particularly in long-term survey and monitoring activities. Thanks to the efforts of all parties concerned of the project mainly counterparts and executive officer,, FRI has been able to maintain its research function after the termination of the project.

Organizational structure of PNGFA as of 2005



The organizational setting has been secured for the time being. However, as shown in the earlier

sections, the FRI's activity has been reduced to an alarming level. Main causes and effects can be summarized as follows:

(1) Mission and strategy:

The missions of FRI have been intact, yet the priority in the forestry sector has shifted from natural forest to planted forest in terms of economic importance. Accordingly, new strategies must be set to cope with such a change. PNGFA has not indicated a new direction on research. A lack of appropriate linkage between policy makers and FRI makes FRI has not demonstrated her role and function.

Also, linkages with the users of FRI services such as field managers in PNGFA, the private sector and NGOs have been weak. It seems that there has not been much discussion with the users on how to incorporate their needs into research agendas and set priority areas for research.

(2) Management style

In 2002, the FRI director was transferred to the headquarters of PNGFA, serving as the Acting Managing Director. FRI has been left with the Deputy Director who manages FRI as the Acting Director. FRI has no Director while the Deputy Director cannot fully represent FRI. This unusual situation seems to be weakening some functions of FRI, particularly coordination with PNGFA departments as well as other stakeholders. Stronger leadership is required for demanding and gaining support from PNGFA, seeking cooperation from other stakeholders, and setting policy direction for FRI.

(3) System

Under the current PNGFA personnel system, there is no performance evaluation of researchers, and researchers are treated the same as the other staff members in administration and field operation. Neither do researchers have an incentive scheme for seeking a more advanced academic career or contributions to academic society. The lack of result/performance-based evaluation system as well as incentive scheme adversely affects the performance of the researchers. Low staff motivation was identified one of the weaknesses of FRI at the workshop for developing a strategic plan in 2005.

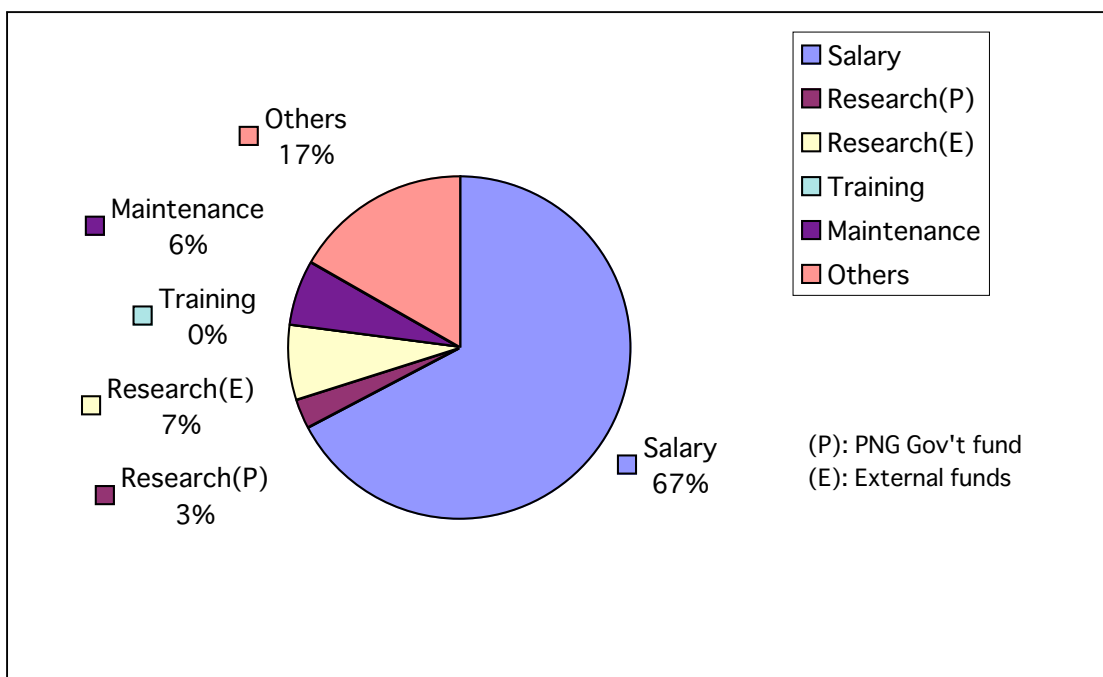
(4) Input

Unavailability of input, the financial resource in particular, is the most significant factor directly affecting the level of activities. FRI suffers from severe financial constraints in the following ways.

1. The current size of the budget is difficult for maintaining the same level of activities during the project period. During the project, PNGFA provided a matching fund for the project. When the project ended, so did this fund. The financial situation for research in particular worsened in the last two years. The annual spending of FRI for 2003 and 2004 were 2.3 million Kina and 2.75 million Kina, respectively. The averaged annual spending for research during 2003 - 2004 constitutes only 65 thousand Kina or 3% of the total spending of FRI. Much of the budget is spent on the staff salary¹ (67%) and maintenance of the buildings and facilities invested for the project (6%) and other items such as security, accommodation and utilities (17%). Only a fraction of the total budget can be used for research activities. FRI now heavily relies with external funds to keep research activities going.
2. The release of the budget from PNGFA to FRI is done in monthly installments. However, delay in releasing monthly installments is quite frequent due to bureaucratic procedures and inspections. It has severely delayed and disrupted research activities.

Total spending of FRI (during 2003 – 2004)

¹ Forty-nine officials and 60 support staff are on the payroll of FRI. The salary proportion in the FRI spending would likely expand, as wage increase is made based on the length of tenure.



The effects of this financial problem are quite conspicuous.

- Level of research activity is significantly reduced. Only a few activities seem to be maintained. This is confirmed by the results of the questionnaire survey to the researchers. Nine out of 12 of the respondents replied that their level of research activity after the project had been reduced to some extent or significantly.
- Analytical apparatus such as Photosynthesis Analyzer, Soft X-ray imaging, Atomic Absorption Spectrophotometer are still kept functional, yet underused. According to the results of the questionnaire survey to the FRI researchers, seven out of 12 replied that the equipment and facilities had not been so used.
- Publication has been completely stopped. Since the end of the project, no publication or contribution of articles to scientific journals has been done.

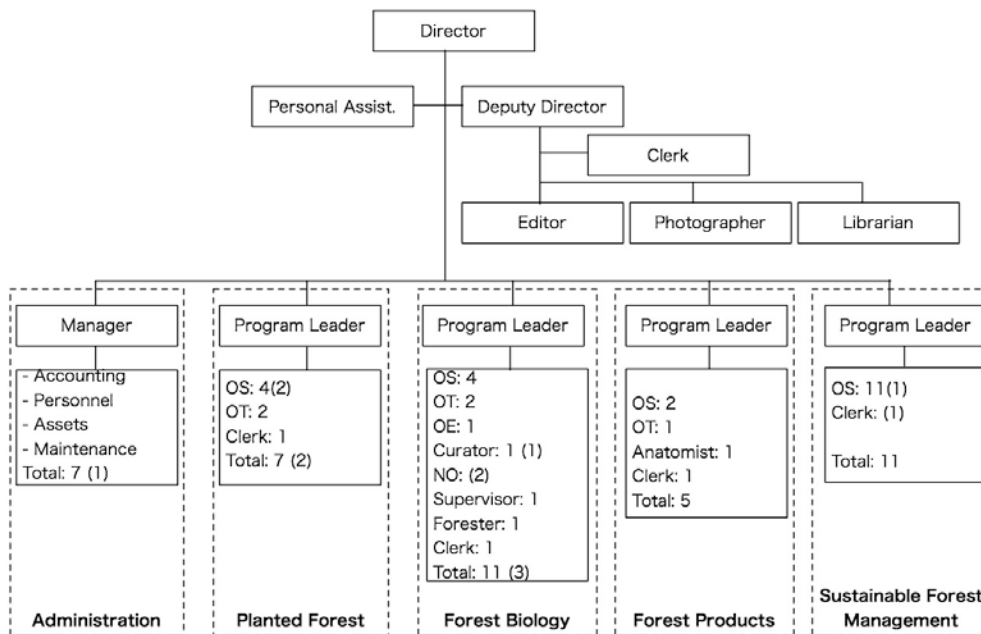
3.1.4 Other aspects

(1) Staff

There are 49 officials in FRI. The number of the staff members has not changed much since the end of the project. There are 17 scientific officers under four program leaders. Most of them have also been working under the same programs since the end of the project. The largest is the sustainable forest management program, consisting of 11 scientific officers while the smallest is the forest products program, which has only two scientific officers. This may have reflected the

priorities of the Forest Research Project Phase II, which closely worked with the researchers in the sustainable forest management, forest biology and planted forest programs.

Organizational Structure of FRI



OS: Officer Scientific, OT: Officer Technical, OE: Officer Education, NO: Nursery Officer
(): vacant

(2) Training

The Project helped some researchers upgrade their academic career. Through the project, seven

researchers were sent overseas: six of them received M.Sc. and one Ph.D. On their return, six of them have continued to work in their respective fields in FRI. This has helped FRI upgrade the level of researchers. However, such an opportunity has been limited since the end of the project.

Since the end of the project, researchers have not had many opportunities to upgrade their technical level. The results of the questionnaire survey to the researchers show that seven out of 12 have insufficient or very limited opportunities. Now, opportunities for training are provided, only when associated with donors' projects. Access to new scientific knowledge has been somehow limited as all the subscriptions to scientific journals were cancelled after the project.

3.1.5 A strategic plan

In response to the FRI review recommendations made by its executive board, FRI formulated this year its own strategic plan for 2005 – 2010. This was the first time that the FRI management, researchers and support staff worked together, analyzed their own institute and developed a strategic plan in a participatory manner. Prior to the planning, FRI distributed a questionnaire to its service users including various divisions in PNGFA, the industries and NGOs. The results of the questionnaire were used as a basis for discussion and organizational analysis. This was the very important step taken by FRI in order to set directions and revitalize its research activities. The strategic plan set 12 goals such as strengthen of relationship with relevant organization, reflection of needs to research subject from beneficiaries and action plan to achieve each goal was also developed. The action plan consists of the proposed activities, responsible person(s), performance indicators and necessary input. Once this plan is approved by PNGFA, this plan will be a basis for the new, three-year corporate plan of PNGFA in the field of forestry research.

Twelve goals set by FRI are as follows:

- Strengthen and improve FRI's organizational culture
- Strengthen communications and build long-term relationships with stakeholders in government, industry and the community.
- Improve efficiency and effectiveness of internal business processes.
- Establish and maintain user-driven research planning and priority setting processes.
- Improve germplasm of tree species for increased productivity and profitability

- Sustainable management of new and existing plantations for supply of certified quality timber for domestic and international markets.
- Conservation of PNG's unique biodiversity
- Utilization of Plantation and lesser-used species
- Efficiency of small to medium scale wood processing mills.
- Enhance economic, social and environmental benefits of natural forests on a sustainable basis
- Improve productive value of land and supply of environmental services
- Explore and develop financial benefits of NTFPs for rural communities

3.2 Impact

3.2.1 FRI's contribution at policy level

FRI's contributions to policy making are yet limited. As the Government research institute, FRI's research results and output based on scientific viewpoints are expected to be utilized for policymaking and implementation of various programs of operational divisions. The Forest Management Guidelines were established in 1993. The guidelines are expected to be reviewed every three years by the committee consisting of FNS, the Ministry of Environment and Conservation, provincial Governments, representatives from the industries, NGOs and resource owners. Yet the guidelines have not been amended since 1996. FPD or FMD represents FNS in the committee. The logging code of practice is a part of the guidelines and shows the 25 key standards that the industry should follow. The code has not been upgraded. Accordingly, FRI's contributions to policy making and administration are yet limited. Although under such circumstance, FRI advised to National Forest Plan established in 1996 from the view point of science.

3.2.2 Impacts on the stakeholders

The beneficiary of FRI services are: other divisions of PNGFA, the industries, NGOs and resource owners and users.

PNGFA: Impacts to the PNGFA were so big that they could conduct species screening designation of species by Forest Law. However, impacts to others except PNGFA were rather small due to unprepared system and section for technology extension. Furthermore, it also limited the influence to forest industries, NGO and resource owners from the aspect of economy. Actual impacts are as follows.

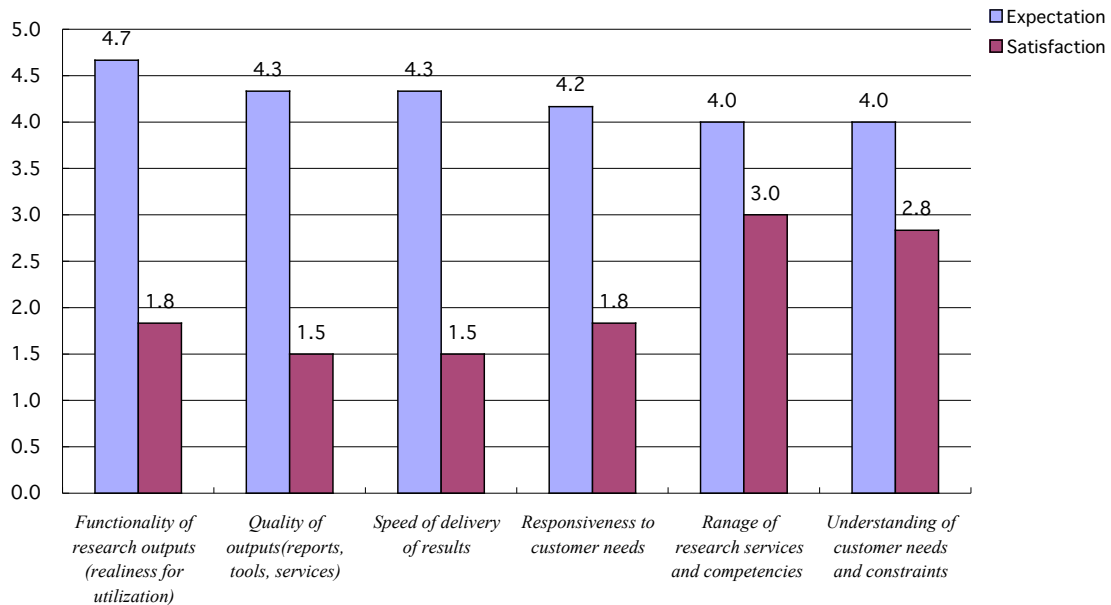
Other divisions of PNGFA are the immediate users of FRI services. Contributions of FRI are as follows:

- Copies of identification key to tree species are laminated and distributed to field offices. This helps the foresters identify the species that must be protected under the Environment Act.
- FRI researchers provide advice on plantation plans and silvicultural management and recommend species to be tried out.
- FRI researchers lecture at training courses conducted by PNGFA.

Some contributions by FRI to PNGFA should be recognized as mentioned above; however, the provincial offices of PNGFA express gaps between their expectations of FRI and their satisfaction with the current services provided by FRI. According to the questionnaire survey conducted by FRI to six provincial offices in October 2004, large gaps are recognized on the parameters such as FRI's usability of research results, quality of outputs, speed of service delivery, and responsiveness to customer needs.² The figures in the graph represent the average of the scores given by six provincial offices on a scale from one to five. In the same questionnaire, strong demands are also voiced by provincial offices for FRI's research results to be delivered and applied in their fields.

Assessment of FRI's performance by provincial offices of PNGFA

² Questionnaire was sent to ten provincial offices of PNGFA. In the questionnaire, the respondent was asked to rate 14 attributes of FRI on a scale from one to five for their importance and expectations (1: Not important, 2: Of some importance, 3: Important, 4: Very important, 5: Critically important). Then, the respondent was asked to rate the performance of FRI on the same attribute on a scale from one to five (1: Poor, 2: Inconsistent, 3: Satisfactory, 4: Good, 5: Excellent). The six offices that had directly worked with FRI responded. The above graph "Assessment of FRI's performance by provincial offices of PNGFA" was produced by the evaluation team in order to see the gap between expectation and satisfaction for the most expected six attributes. The figures in the graph represent the average of the scores given by the six provincial offices.



1) Industries

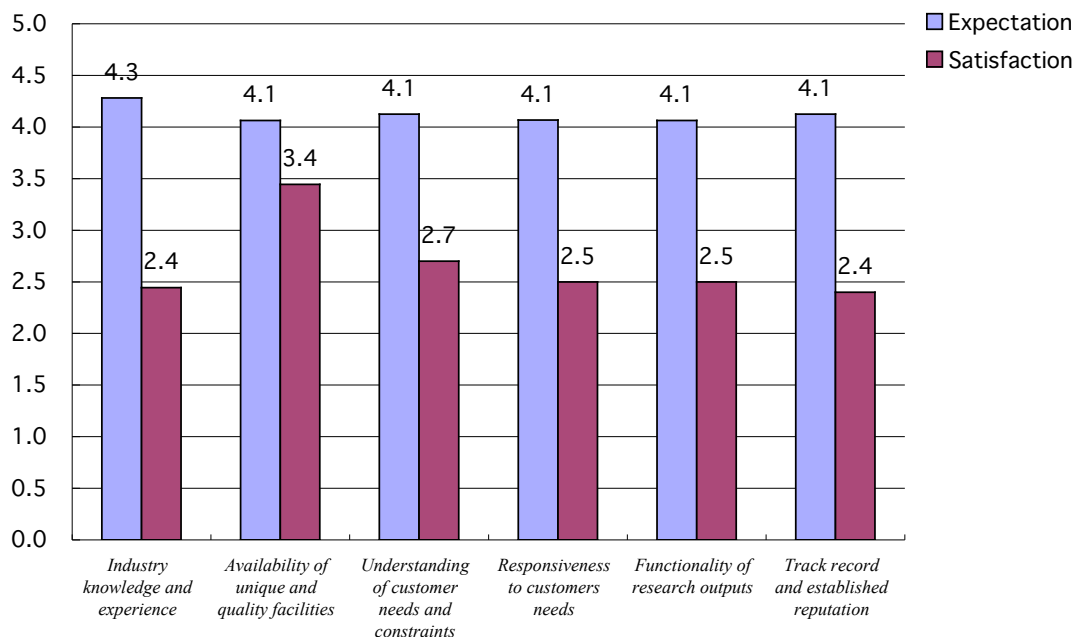
There has not been a systematic linkage established between FRI and the private sector. Relationships are mostly built with individual companies. FRI has had working relationships with some companies. Arrangements are usually made where the company provides plots and other inputs to FRI while FRI conducts research activities, provide advice, and give feedback research results to the company. For example, for the establishment of permanent sample plots for logging companies, FRI instructed how to set up plots and measurement, collect data in Makapa in 2005 and Medang in 2004. The companies that have a long-term management plan need such plots for projections.

However, such joint projects often fail and discontinue, so neither side can gain much benefit. It is difficult for the evaluation team to determine the causes, yet FRI researchers point out the shortsightedness of the companies in seeking quick return from research. Some companies mention the problem of delayed research schedule, infrequency in research and lack of reporting on progress or results.

A questionnaire survey was also conducted by FRI to 16 companies in October 2004. For the six most expected attributes of FRI, “Availability of unique and quality facilities” is above “satisfactory”, and other attributes are rated between “inconsistent” and “satisfactory”. The private sector seems to be more satisfied with FRI services than the provincial offices of

PNGFA are. However, it is necessary to take account of discounting factors. FRI provides free services to them and companies are often diplomatic with authorities.

Assessment of FRI's performance by companies



In fact, comments by companies in the questionnaire are more straightforward. All of the respondents know of FRI, but most of them do not know much about types of services or research results available from FRI. Some of them also express their aspirations that FRI would provide research results in practical, user-friendly formats and media.

2) NGOs

FRI researchers have supported some NGOs in form of providing training, and advice and consultations.

- FRI organized a Dendrology training course for environmental NGOs in 2004. 11 participants participated for 5 days. The course included the tour of herbarium, theory, self-test and wood identification sessions and field practicum. Two of the NGOs that the team interviewed expressed their need for training on scientific knowledge to their staff.
- FRI researchers provide advice and consultations to the EU supported Eco-forestry program that promote sustainable resource management and development by developing small-scale sawmills and Non-Timber Forest Produces such as coconut oil.

These types of assistance to NGOs need to be upgraded and provided on a regular basis in order

for FRI to play an effective role in the capacity development of local NGOs.

3) Resource owners and users

So far, FRI's support to resource owners and users are mostly for those who own demonstration plots and research sites. In order to raise their awareness towards sustainable use of their resources as well as enhance their socio-economic benefits, PNGFA needs to develop a clear strategy where FRI should be actively involved in disseminating scientific knowledge to the resource owners and users in a very user-friendly manner.

3.2.3 Other impacts

Other impacts recognized through the fieldwork are as follows:

(1) Utilization of the research results produced during the project period

- Throughout the project period, 18 bulletins, a few research reports and leaflets were produced by FRI. All these publications are still available at the library and copies are on sale. Each year, approximately 130 – 150 copies are sold. The library is visited by outside researchers and students on an average of around five persons a day and provide precious research chance in PNG where lack for research opportunity. Each year, approximately 130 – 150 copies are sold. The research results during the project have been disseminated and utilize in this manner. "Key to tree species" is not only used by foresters but also logging companies and NGOs for reference to identify species designated by the Environment Act for forest protection.
- The Forest Biology section has started its web site in collaboration with GBIF and the Sydney botanical garden so that browse plant data base collected by FRI through internet. It has also contributed to the "Field Guide to Palms in Papua New Guinea – with a multi-access key and notes on the genera". This book was developed by Department of Systematic Botany, University of Aarhus in collaboration with FRI and James Cook University in 2001.

(2) Contribution to neighboring countries

- The South Pacific Commission in Samoa requested FRI to help establish volume tables and one researcher was sent to assist Samoan scientists. This should be noted as a textbook example of effective extension of technology transfer.

In sum, there are some positive contributions of the project recognized by PNGFA, industries,

NGOs and universities, such contributions are on a small scale on ad hoc basis. As shown in 3.1, the sustainability of the project outputs has been low and impact of the outputs is limited accordingly. Through the interviews with other stakeholders, the evaluation team recognized strong expectations for FRI excelling research beneficial to them and research results to be delivered to them. FRI needs to work much harder to respond to their expectations.

3.3 Promoting factors

- External assistance from other donors after the project helps FRI researchers continue their research such as Growth & Yield Studies supported by Australian and Eco-forestry program supported by EU.

3.4 Inhibiting factors

- Unstable cash flow as well as shortage of research fund has been the factor most severely inhibiting the development of FRI. It is observed that this seems to create a vicious circle: research projects are delayed and postponed due to unavailability of fund, researchers are immobilized and less motivated, no results are produced and disseminated, users of FRI services question the capacity of FRI and FRI's reputation is harmed, and PNGFA is less supportive of FRI in providing research fund.
- It is often difficult to establish a good, lasting working relationship with private companies because of delayed research schedule and slow research developments on FRI side and shortsighted interest of the companies.

4. Conclusion

Some research activities are still carried out, yet only a few of them have reached the stage where research results can be ready for publication and dissemination. Most of the research projects have been either very slow in progress, suspended, or terminated. The sustainability of the project outputs is currently rather low. There are some positive contributions of the project recognized by PNGFA, industries, NGOs and universities, such contributions are on a small scale on ad hoc basis. The sustainability of the project outputs has been low and impact of the outputs is limited accordingly. Therefore, FRI is tackling the strategic plan to renew the institute so as to break through present blockage. It is crucial to implement the plan absolutely.

5. Recommendations

To FRI and PNGFA

- In order to make the strategic plan of FRI workable and effective, the team suggests PNGFA and FRI to consider the following:
 - The current budget allocation system is simply not viable for FRI. PNGFA should give a budget that can be reimbursable at FRI's discretion on the condition that FRI proves to be accountable and transparent by improving its financial management and accounting system. Therefore, it is required to clear the budget estimation for research work and complete the reporting system of its expenditure. Also, the current composition of budget spending needs to be reviewed: too many staff members on the payroll of FRI, too heavy overhead cost and too little budget for research are the issues to be examined.
 - Precisely, according to the PDM of the Forest Research Project Phase II, it is an important assumption to establish a certain unit and system for technology extension that is developed by the project. However, extension of outcomes can not extend so smoothly due to the incompleteness of unit and system. It is necessary to establish such unit and system for extension work, although FRI is conducting lecture and seminar on business trip base.
 - A good monitoring and evaluation mechanism should be built in the strategic plan to ensure its progress. For this purpose, it is suggested that FRI submit a quarterly or semi-annual monitoring report to the PNGFA's executive board, and one of two program leaders present the progress of their research work.
 - Prospective users of FRI services including companies, PNGFA provincial offices, NGOs and universities have all shown a strong demand for useful research results to be interpreted in a user-friendly format or packet and delivered or made available to them. However, such an activity seems to be sidelined in the strategic plan. Delivering useful scientific knowledge to the field should be included in one of the important objectives and vigorously pursued.
 - It is a reality that PNGFA cannot allocate a large amount of budget for research activity; therefore, FRI needs to bring in external funds to sustain and enhance its research activity. This task requires a separate unit within FRI staffed by a professional, ideally, with international experience.

- PNGFA and FRI also should study the possibility of transforming FRI into an independent research institute with support of the government. This will be an option to revitalize FRI when monitoring results on the performance of FRI seems negative. In this context, the National Agricultural Research Institute (NARI)³ seems ideal as a case study. It is recommended that FRI will set up a committee to study the applicability of the NARI's case to FRI and submit their option to PNGFA. It is also recommended that senior officials of PNGFA visit the National Agricultural Research Institute and study the case from their perspective.

- So far, researchers come from science and technical backgrounds. FRI should have researchers from non-traditional fields of discipline such as social forestry, rural sociology, marketing and economics in order to be responsive to increasingly diverse, socio-economic needs of its users. A multi-disciplinary team of researchers can be particularly effective in such goals as enhancing economic, social and environmental benefits of natural forests on a sustainable basis and exploring and developing financial benefits of Non-Timber Forest Produces (NTFPs) for rural communities, two of the goals identified in the strategic plan.

- Demonstration plots are established on private lands that are collectively owned by the senior members of the clan, and any decisions made on the use of their land require consensus among the members. Whether FRI can maintain the demonstration plots established on private lands depends on the willingness of the senior members. Thus, it is recommended that a plot (or a forest) management plan would be jointly developed by FRI and the clan members and an agreement would be made on respective partners' roles and responsibilities, and benefit sharing. Such an arrangement would help ensure the availability of the demonstration plots. Also, the whole planning process could be tried out as a pilot project for joint forest management on private lands.

6. Lessons learned

³ NARI transformed itself in 1997 from an agricultural research institute under three departments of the Ministry of Agriculture to a publicly-funded statutory research organization. Sixty percent of its budget is provided by the Government while 30% from external fund and 10% generated from its activities. To date, its budget is approximately 15 million Kina, which is around seven times more than that of 1997 as its reputation is well established and an increasing number of partners invest in projects in partnership with NARI.

For planning and implementing a research project:

- This project started under the condition that extension unit and system could be established. More careful consideration is necessary for such important assumptions that provide strong influence to the outcome of the project.
- Constructing a good interface between the partner organization and its users and other stakeholders should be pursued in the course of the project. Increased interaction will make the researcher user-oriented and give him/her pressure to produce and deliver useful research output.
- In order to enhance impact, research results must be interpreted and made accessible to end-users so that they can easily understand and apply in their respective fields. This would also help establish a good reputation of the partner organization among stakeholders.
- Before the completion of the project, in-depth organizational and institutional analysis should be conducted to identify weaknesses of the partner organization and formulate a clear strategy for sustainability.

25th January 2006

**General Comments on
Ex-Post Evaluation Study of
The Forest Research Project Phase 11**

The Papua New Guinea Government through its National Forest Development Guidelines requested the Japanese Government for Technical Cooperation in which the Phase 1 was given priority to provide research activities for sustainable forest research management and the Phase 1 Project was successful in implementation.

Again the Papua New Guinea Government requested the Japanese Government and Phase 11 was implemented successfully in enhancing research activities. In both Phases 1 and 11, their goals, outputs and inputs were achieved remarkably.

Soon after the Project ended, the general overall management and administration virtually collapsed (scaled down with one division stagnant) within FRI, between FRI and end users, between FRI and NFA coupled with political interferences.

The reasons are varied (refer main report) but two main areas that cannot go unnoticed are;

- 1) The PNG Government should have requested the Japanese Government or another Donor Government, Bilateral/Multilateral Organization for the Phase 11 of the Project.
- 2) The PNG Government should have made FRI a separate Government entity (body) with increased budget allocation.

Finally, if the Papua New Guinea Government wishes to get FRI back to its previous normal stage, improve and progress further, the above-mentioned two areas must be implemented with priority. Otherwise, FRI's activities be minimized further or privatized in the years ahead.

Thank you.

JICA PNG Office

事後評価調査結果要約表

評価実施部署：パプアニューギニア事務所

1. 案件の概要	
国名：パプアニューギニア（PNG）	案件名：森林研究計画フェーズII
分野：林業・森林保全	協力形態：プロジェクト方式技術協力
所轄部署：林業水産開発協力部林業技術協力課	協力金額：8900万円 (機材費と現地業務費の合計)
協力期間	プロジェクト： 1995年4月－2000年3月 フォローアップ 2000年4月－2002年3月
他の関連協力	先方関係機関：森林研究所（FRI） 日本側協力機関：農林水産省林野庁、森林総合研究所、林木育種センター、京都大学
<p>本案件に先立ち以下の協力が実施された。</p> <p>① 無償資金協力による「国立森林研究所建設計画」で研究所と研究施設の建設（1987年/19.29億円）</p> <p>② 森林研究計画フェーズI(1989年－1993年)</p>	
<p>1-1. 協力の背景と概要</p> <p>1993年、パプアニューギニア政府は全国森林開発ガイドラインを制定した。この中で、持続可能な森林経営に関する研究活動の重要性が明記され、森林研究所の役割の見直しが行われた。パプアニューギニア政府は、この時期に終了した森林研究計画フェーズIを成功プロジェクトとして、同ガイドラインに沿った森林資源の持続的な利用に関する研究活動の一層の向上を図るため、同プロジェクトのフェーズIIを日本政府に対して要請した。</p>	
<p>1-2. 協力内容</p> <p>(1) プロジェクトの枠組み</p> <p>上位目標： ・民間セクターと周辺住民による持続的な森林資源の利用 ・森林資源の活用のための包括的な森林経営ガイドラインの導入</p> <p>プロジェクト目標： 森林研究所の調査・研究機能の向上</p> <p>成果： 実験林の管理、土壌、材積表、造林用樹種選択、材木育樹、樹種データベースの課題について、</p> <ol style="list-style-type: none"> 1. 持続的な森林経営に必要な技術レベルの習得 2. 研究手法の確立と標準的な研究システム・データベースの構築 3. 試験林・研究機材の維持管理、が達成される。 <p>投入： 日本側： 長期専門家： 4人 短期専門家： 18人 CP本邦研修： 16人 機材： 5200万円（135万キナ） ローカルコスト負担： 3700万円（96万キナ）</p> <p>パプアニューギニア側： CPの配置：19人 その他の投入：土地（57ha）、建物（4,160m²）、実験林用地（約1,000ha） (1円＝約0.026キナ)</p>	
<p>(2) 森林研究計画フェーズIIの終了時評価の概要</p> <p>終了時評価報告書（2000年）によれば、プロジェクトの進捗状況は以下の通り。</p> <ul style="list-style-type: none"> ・プロジェクトは研究活動の基盤を築いた。実験林と研究機材が整備され、シニアの研究員は彼らの研究課題について十分活動を継続することが出来る。技術移転した研究課題と植物学との連携、プログラムリーダーによる適切な指導が研究管理上の課題である。 ・プロジェクトを通して基礎的な技術の移転は完了した。土壌の研究は持続可能な森林管理のために重要な貢献が期待される。 ・人口造林分野の基礎的な技術移転も完了したが、エンドユーザーのためのより実践的な手法開発が必要である。特に土壌研究との連携が必要である。 ・樹種識別に関する技術移転は完了したが、葉・樹皮の特徴と解剖学的特徴による識別システムがさらに改善されれば、大きな効果が期待できる。 	
2. 評価調査団の概要	

調査者	トニー・オンボ (JICA パプアニューギニア事務所プログラムオフィサー) 井田光泰 (アイシーネット(株))	
調査期間	2005年10月22日～11月4日	評価種類：事後評価
3. 評価調査の概要		
3-1. 評価調査の要約		
(1) 自立発展性		
1) プロジェクト成果の自立発展性		
<p>フェーズ II では研究所の森林管理、人工林、森林生物学の部門を対象に、実験林、土壌、種のスクリーニング、材積表、育種、樹木種データベース構築等に関する協力が行われた。日本の専門家の支援を受け、研究員はデータの収集・分析、学術論文（研究ノート）の作成を行った。報告書は論文集として出版された。</p> <p>各部門別の調査・研究の現状は以下の通りである。</p> <p>持続的森林管理部門：</p> <p>基礎技術は移転され、その見直しも終了している。研究所は、フェーズ II で実施されたフィンシュハーフェン地区のモギブシガ・プロジェクトのモニタリングを継続している。この中で研究者は、同地区内の土壌、落葉の採集、林分動態、木材伐採の影響評価といった生態学的な調査を行っている。資金不足から苦勞しているが、現場に適用できる研究成果が求められている。</p> <p>その他の研究プロジェクトは、外部機関の援助を受けて実施している。研究所は国際熱帯木材機関 (ITTO) による援助を受け、全国 120 ヶ所の固定調査地 (PSPs) でデータを収集している。長期間にわたる森林の成育と動態を把握するための成育・収穫調査を実施しており、同プロジェクトは、オーストラリア国際農業研究センター (ACIAR) の援助を受けて実施されている。</p> <p>人工林部門：</p> <p>フェーズ II では、移転された基礎技術を活用して、エンド・ユーザ向けの実践的な調査研究活動が試みられた。プロジェクト終了後、5つのプロジェクトに取り組んだが、現在も行われているひとつのぞき、他の4つは中断している。</p> <p>①育苗地の確立(種のスクリーニング)</p> <p>1997年に、アカシア・マンギュームとチークの育種試験場が私有地に作られた。しかし、アカシア・マンギュームの試験場は火災のため焼失し、現在は最優良または上質の種を選別するための間引きプロセスを通じてチークのみがモニタリングされている。</p> <p>②パプアニューギニアにおける主要植林種の材積表（造林）</p> <p>植林種の数量表作成に関しては進歩が見られるが、他種の数量表については現在開発中である。担当官が現在、さらなる研究のために留学中であるため、同プロジェクトは現在中断されているが、担当官の帰国後再開されるとのことであった。</p> <p>植林地における害虫については現在モニタリング中で、害虫の発生が報告された場合には必ず、実地調査が行われている。有害生物の駆除は実施されているものの、シロアリはこの駆除方法に対して耐性を持っているようで、長期的な課題になりつつある。</p> <p>③栄養繁殖（育種）</p> <p>ここでは、マイクロプロパゲーション法と従来の繁殖法が実施されている。従来の繁殖法の場合、研究ではミストハウスを作り、枝挿しによる栄養繁殖を行っている。しかし、資金不足により実験は現在中断されている。</p>		

④組織培養 (育種)

基礎知識は移転されたが、マイクロプロパゲーションその他の活動は、主に培養器が破損したため、中断されている。現在、JICA のシニアボランティアの及川氏が研究室を利用し、植物園の一部で蘭の栽培実験を行っている。

⑤高海拔種実験 (種のスクリーニング)

2004 年 5 月、研究所は産業に発展可能性のある種のスクリーニング、多目的種、特殊地用の種及び種の採取・保存を主目的とし、高地・低地におけるマツ類の研究開発を始めた。しかし、実験サイトを提供した企業との協力関係が悪化したことにより、同実験が遅れている。

森林生物学部門：

同定技術が確立した後も、研究活動は継続している。しかし、繁殖特性及び木材解剖学の特性を通じた手法の確立に向けた活動は進んでいない。情報発信については、マッカーサー財団からの資金援助を受け、タスマニア王立植物園によるさらなる援助のもと、ウェブサイトを構築している。現在、研究者たちは 3 万 5000 以上の樹種のデータ入力作業を進めているが、1 日に処理できるのは 10~15 種のみであり、支援が切望される。

林産物部門：

フェーズ I で基礎技術は移転されたが、フェーズ II では協力対象に含まれなかったこともあり、この部門の活動は停滞している。

活動の中には、結果が得られるまで長期間を要するものもある。たとえば、チーク種のスクリーニングによって優良種が生産され、実際の経済的利益が発生するまでにはさらに数年を要する。しかし、そうしたものの以外の研究プロジェクトでも、研究結果を公表・普及させるまでにいたるのはごくわずかである。プロジェクト期間中の技術移転や CP 本邦研修を通じ人材育成はそれなりに出来上がっている。しかしながら、予算不足が主たる原因で研究プロジェクトの大部分は、進捗が非常に遅いか、あるいは中断、打ち切りに追い込まれている。このため、プロジェクト成果の自立発展性は現在のところ極めて低いと言える。

2) 組織・制度面の自立発展性

森林公社は 1999 年に大規模な組織再編成を指示され、研究所は森林管理部の下に組み込まれたが、研究機能は維持された。1 年後に研究部門は再度森林管理部から分離され、ようやく研究機関としての体制で活動を再開することができた。組織再編成によって研究所の活動が完全に中断したならば、プロジェクトの活動、特に長期的な調査モニタリング活動が損なわれた可能性があった。CP を中心としたプロジェクト関係者や森林公社の幹部が努力により研究活動の継続が維持できた。

現在、組織的な位置づけは一先ず安定したが、研究所の活動はかなり後退している。その主な理由は以下の通りである。

- 研究所の使命は変わっていないが、林業部門の優先順位が、経済的重要性という意味で自然林から人工林に移行した。したがって、このような変化に対応する新しい戦略を立てる必要があるが、森林公社は研究部門に求める新たな課題を明示できていない。政策決定者と研究部門の間に適切な関係と協力関係がないため、研究所が研究所としての役割/機能を発揮できずにいる。また、研究所と森林公社内のフィールドマネージャー、民間セクター、NGO など、研究所のサービス利用者との結びつきも弱い。ユーザーとの間で、彼らのニーズを研究事項にいかに取り入れ、研究の優先分野をどのように定めるか、に関する議論もあまり行われてこなかったようである。
- 現在の森林公社の人事査定システムの下では、研究者の業績評価は実施されておらず、研究者は管理・現業部門の他のスタッフと同等の扱いを受けている。研究者向けに、学位取得を目指したり、学会への論文発表を促すような奨励制度も用意されていない。成果ベースの人事評価システムもない。こうした状況は、研究者の意欲に悪影響を与えている。2005 年に行われた研究所の再生計画に向けた作業部会でも、研究所の弱点のひとつとして、スタッフのモチベーションの低さが指摘された。
- 投入資源、特に資金不足は、活動水準に直接影響する重大要素である。研究所は以下の点で厳しい財政的制約を受けている。

- 現在の予算規模では、プロジェクト期間中と同じ活動水準を維持することは困難である。プロジェクト期間中は、森林公社がプロジェクトに見合う資金を提供していたが、プロジェクト終了とともに資金も途絶えた。研究の財政状況は特にこの2年間で悪化し、研究所の年間支出は2003年が230万キナ、2004年は275万キナだった。2003～2004年の研究費については平均年間支出がわずかに6万5000キナで、研究所の総支出の3%にすぎない。予算の大部分は、スタッフの給与(67%)、プロジェクトのために投入された建物や設備のメンテナンス(6%)及びセキュリティ、住宅、電気水道等といったその他の項目(17%)に支出されている。総予算中、研究活動に振り分けられるのはごくわずかであり、研究所は現在、外部の資金に大きく依存して研究活動を継続している。
- 森林公社から研究所への予算支給は、月払いの形で行われている。しかし、煩雑な手続きや会計監査のため、その支給が頻繁に遅れる。このため、研究活動は深刻な遅延や中断を余儀なくされている。

こうした組織・制度上の問題は、次のような極めて顕著な結果をもたらしている。

- ・ 研究活動の水準が大幅に低下し、わずかな活動しか維持されていない。研究者を対象に行ったアンケートでも、12人の回答者中9人が、プロジェクト終了後、研究活動の水準がある程度または大幅に低下したと回答した。
- ・ 光合成分析器、軟X線画像、原子吸光度計などの分析器は今でも機能しているが、十分活用されていない。研究者を対象に行ったアンケート調査の結果によれば、12人の回答者中7人が、機材や設備はあまり活用していないと回答した。
- ・ プロジェクト終了以降、出版活動は完全に中断しており、学術誌への投稿は行われていない。

こうした問題に対処するため、研究所は今年、2005～2010年までの独自の再生計画を策定した。研究所の管理者、研究者、サポートスタッフが協力し、自分たちの組織を分析し、直接参加型の戦略計画を立案したのは、これが初めてである。これは、研究所の方向性を定め、研究活動を再活性化するために研究所がとった非常に重要な一歩である。再生計画は関係機関との関係強化、研究課題への受益者のニーズ反映など12の目標を定め、それぞれの目標を達成するための活動計画も作成した。活動計画では必要な活動、責任者、成果指標、必要な投入資金も明確にしている。森林公社の承認を得られれば、この計画は林業研究分野における森林公社の次期3年計画の基盤となる予定である。

(2) インパクト

1) 森林研究所の政策面の貢献

上位目標で掲げたように、森林研究所の研究結果や専門的な知見は、森林経営ガイドラインの改善など、政府の政策・制度面への貢献が期待された。森林研究所で開発された技術や成果を普及する組織・制度・体制が整備されていない。このため、プロジェクト終了後、全国森林経営ガイドラインの改訂は行われておらず、政策面及び行政面での森林研究所の貢献も限定的にならざるを得ない状況にある。しかしながら、1996年に制定された国家森林計画に対しては森林研究所が科学的見地からの意見具申がなされている。

2) 関係者へのインパクト

森林研究所の研究成果の裨益者は、森林公社、民間企業、NGO、森林所有者などである。森林公社へは森林法の樹種指定や適性樹種選定などが行われ技術的側面で与えたインパクトは大きい。しかしながら技術普及の制度や組織が未整備であったこともあり、森林公社以外への技術的な面でのインパクトはあまり大きくはない。また、この普及制度や組織ができなかったことは、経済的な側面で民間企業やNGO、森林所有者などへ与えた影響は限定的である。具体的なインパクトの内容は次の通りである。

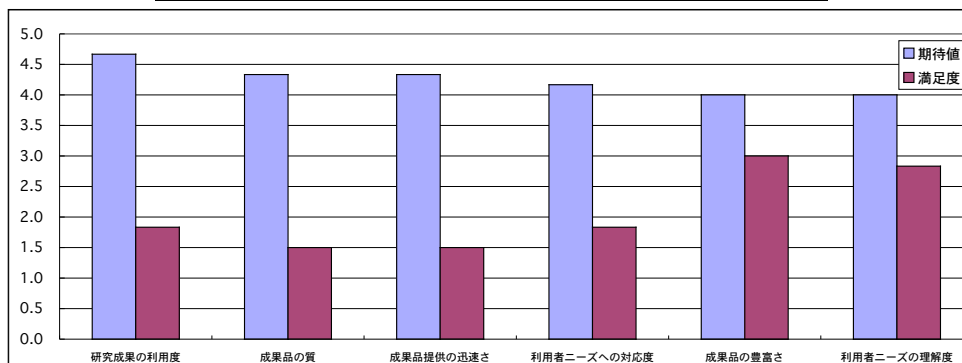
森林公社:

森林研究所によるサービスの直接の利用者は森林公社の他の部局である。評価調査を通して確認された主な便益は以下の通り。

- ・ 樹種の識別ガイドは森林公社の地方事務所と森林保安官に配布され、環境法で指定された樹種を特定するために活用されている。
- ・ 研究員は、地方事務所が策定する植林計画や育林管理計画に対する助言や適正樹種の推薦などを行っている。
- ・ 研究員は森林公社の研修コースで講師を務めている。

上記のようにいくつかの貢献が見られたが、特に現場からは、森林研究所に対する期待と現在提供されているサービスとの間に大きなギャップがあることが指摘された。森林研究所が 2004 年に 6 州の森林公社事務所に対して実施したアンケート調査によれば、森林研究所から提供されるサービスの「活用度」、「成果品の質」、「成果品の迅速な提供」、「現場ニーズへの対応度」の項目について、5 段階評価で、期待値に対して非常に低い評価点が示された。これは、現場で使える研究・調査結果の提供を望む強い声が反映されたものといえそうである。¹

森林公社の州事務所による森林研究所のパフォーマンス評価

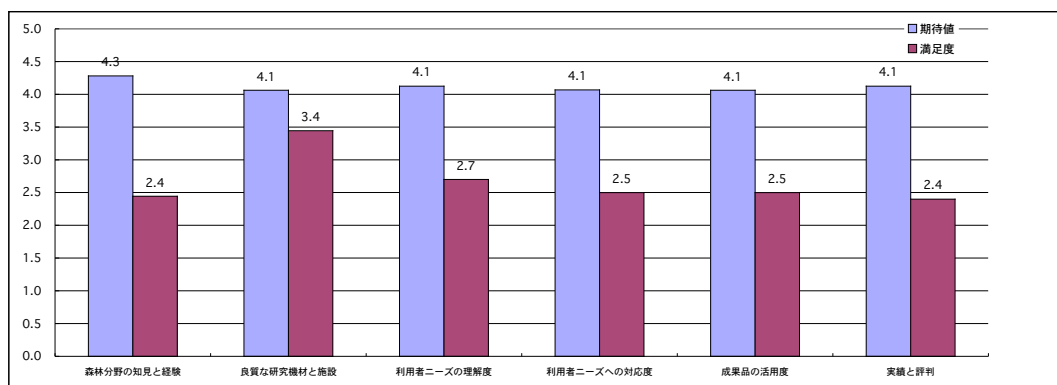


民間企業：

森林研究所と産業界の間には正式な連携関係はなく、個別企業と現場レベルでの連携が見られる。企業側が研究用の用地等を提供し、森林研究所が企業と合意した課題について研究や助言を行い、最終的には研究結果を企業に提供するという取り決めが一般的である。このような形で、2004 年にマパカとメダンで、企業が材木の伐採用の森林を提供し、森林研究所が対象地での主要な材木の成長データ収集の方法を指導した。これは、企業が長期的かつ持続的な伐採計画を立てるために不可欠な活動である。しかし、こうした個別企業との連携活動の多くが継続されず、中断している。今回の調査だけで原因を断定することは出来ないが、森林研究所の研究者は、企業側の長期的な森林経営への視点の欠如を指摘している。一方、研究所による調査・研究活動が継続的でないこと、研究結果がフィードバックされないことを中断の理由に上げる企業もあった。

2004 年のアンケート調査は、国内の主要な民間企業 16 社に対して、森林公社と同様のアンケート調査を実施した。最も期待値の高い項目のうち、「良質な機材と施設」が一定の満足度を満たしたが、「森林分野の知見と経験の提供」、「利用者ニーズの理解度」、「利用者ニーズへの対応度」、「成果品の活用度」、「実績と評判」といった項目では、不十分か不満足との評価であった。

民間企業による森林研究所のパフォーマンス評価



¹ アンケートは、森林研究所に対する期待を 15 項目挙げ、各項目を 5 段階で期待値と満足度を評価してもらったものである。

回答した企業の多くが森林研究所の存在は知っているものの、その研究成果や提供しているサービスを知っている企業はわずかだった。また、森林研究所の提供するサービスの内容を知っている企業からは、研究論文ではなく、利用者が理解でき、現場で即利用できるような形で研究結果を提供して欲しいとの要望が多かった。

NGO :

森林研究所による NGO への支援としては次の活動実績がある。

- ・ 2004 年に 11 人の環境 NGO 職員に対して 5 日間の樹木学の基礎研修コースを実施した。コース内容は、植物標本室の見学、重要樹木の特定の理論とフィールドテストなど。評価調査でインタビューした NGO は、森林環境保全に必要なこうした専門的な知識提供のための森林研究所の重要性を指摘した。
- ・ 森林研究所の研究員は、EU が支援する「環境に優しい森林プログラム」に参加する NGO へアドバイスしている。このプログラムは森林周辺の住民を支援して、零細な製材所の起業化やココナッツ油など非木材林産品の開発支援を行っている。

さらに森林研究所の役割を高めるために、地元 NGO への技術支援を恒常化させ、専門分野での彼らの能力開発を支援することが求められる。

森林所有者 :

森林研究所による森林所有者への支援は、研究所が借用している実験林の所有者に限定される。森林の所有者による持続的な森林利用への意識と森林の社会経済的な価値を高めるためには、森林公社がまず明確な方針を立て、その中で森林研究所がどのような役割を担うべきか検討されるべきである。

(3) その他のインパクト

今回の評価調査を通して次のようなインパクトが見られた。

プロジェクト期間中の研究成果の活用 :

- ・ プロジェクトを通して 18 部の論文集と研究レポートやパンフレットが出版された。これらの出版物は図書室で閲覧でき、現在でも年 130-150 部ほど販売されている。図書館は 1 日平均 5 人程度、主に学生・研究者が利用するなど、研究の場が限られた PNG において貴重な研究の場を提供するなど、プロジェクトの成果が今でも活用されている。
- ・ プロジェクトで作成された樹木のガイドブックは、森林保安官だけでなく、NGO や企業の現場関係者に利用され環境法で定められた樹種の利用に森林保護などに活用されている。
- ・ 森林生物部は、シドニー植物園と GBIF の協力を得て、ウェブサイトを立ち上げ、FRI が保有する収集植物のデータをインターネットで閲覧できるようになった。また、森林生物部は、2001 年にアーハス大学植物学部が出版した「パプアニューギニアのヤシ類—マルチアクセスによる類別方法」の作成に、ジェームズクック大学とともに協力した。

周辺国への技術協力 :

南太平洋委員会の要請により、森林研究所の研究員をサモアに派遣し、材積表作成のための技術協力を行った。これは日本による移転技術が対象国から第 3 国に普及した好事例である。

3-2. プロジェクトの促進要因

- ・ オーストラリア国際農業研究センター (ACIAR) が支援する成育・収穫調査や EU が支援する「環境に優しい森林プログラム」など、他ドナーによる森林研究所に対する支援によって、研究活動が一定維持されている。

3-3. プロジェクトの阻害要因

- ・ 予算配分の遅延と研究資金不足は、森林研究所の発展を阻害する最大の要因である。資金面の問題は、研究活動の遅延・延期→研究活動全般の停滞と研究員の意欲の低下→調査・研究成果の発表や普及の不在→研究所に対するユーザーの信頼低下→森林公社による研究所への支援鈍化、といった悪循環を生んでいるようである。
- ・ 研究所による研究活動の遅延と企業の短期的な利益を求める視野の狭さにより、両者の間に長期的な連携関係を構築することが困難であり、民間との共同研究を進める上での阻害要因となっている。

3-4. 結論

継続中の研究活動もあるが、研究結果の発表や普及の段階まで到達した課題はわずかである。多くの研究課題が遅延、中断、中止している。現時点でのプロジェクト成果の継続性は低いと言わざるを得ない。森林研究所による森林公社、民間セクター、NGO、研究機関に対する貢献も見られるが、そうした貢献はいずれもスポット的で小規模なものに留まっている。プロジェクト成果の継続性が低いと、プロジェクトのインパクトも限定的である。森林研究所はこうした現状を打開するために、研究所の再生プランを策定しており、今後、同プランの確実な実施が求められる。

3-5. 提言

森林公社と森林研究所への提言

- 森林研究所が策定した再生プランを機能させるため以下を提案する。
 - ・ 森林公社は、森林研究所が会計システムの透明性と資金管理の改善を図ることを条件に、森林研究所の資金運用について裁量権を与え、柔軟に予算を活用できるようにすべきである。このためには、研究事業に必要な予算の積算根拠の明確化と、どう使ったのかの報告制度を充実が求められる。また、肥大化している人件費と縮小傾向にある研究費については予算構成の見直しが必要である。
 - ・ 森林研究所は四半期か半年ごとに森林公社の役員会にモニタリング結果を提出し、プログラムリーダーが研究課題の進捗を発表するなど、再生プランの進捗をモニタリング・評価する仕組みが必要である。
 - ・ そもそも森林研究計画フェーズⅡがスタートした時点でのPDMでは、「森林研究所で開発された技術を普及する組織・体制が政府により整備される」という外部条件になっている。しかしながら、現実には技術普及をになう組織・体制が整備されていないために成果の普及が十分に行き渡らない状況に陥っている。森林研究所は、出張ベースのレクチャーやセミナーを行っているが普及体制というには程遠いため、研究成果の普及を担う組織・体制の整備が必要である。
 - ・ 直接の利用者である森林公社の地方事務所、民間企業、NGO、大学は、森林研究所が現場で活用出来るよう加工し、研究成果を普及することを望んでいる。しかし、再生プランには、こうしたユーザーの求める課題への対応が示されていない。現場への専門知識の情報発信を重要な課題として再生プランの中に位置づける必要がある。
 - ・ 森林公社が研究活動に大規模な予算を配分できる可能性は低いと、森林研究所は独自に外部からの資金調達を図る必要がある。そのためには、研究所内に国際機関での経験を持つ専門的な人材を配置し、外部資金の調達に努力するよう提案する。
- 再生プランのモニタリング・評価の結果、森林研究所の再生が困難との結論に達した場合、森林公社内の研究所から独立法人への移行を検討すべきである。その場合、全国農業研究所(NARI)を先行事例として研究する価値がある。² 森林研究所内に検討委員会を設け、研究所として希望する組織のあり方を森林公社に提出することを提案する。
- パプアニューギニアでは森林の多くは同族が所有する私有地であり、実験林もそうした私有地に設置される。そのため、実験林の持続的な利用は、同族内の有力者の意思決定に左右されることになる。実験林の設置にあたっては、土地貸借の関係ではなく、森林研究所と土地所有者間の共同管理事業として位置づけ、両者の役割・責任と便益配分を明確にして合意形成を図るアプローチが有効である。こうした合意形成の取り組みは、私有地での森林共同管理アプローチの試行としての意味もある。

3-6. 教訓

研究プロジェクトの効果を高めるための教訓として次の点が挙げられる。

- 本プロジェクトは、技術普及の組織と制度が確立されるという前提でスタートしている。プロジェクトの成否を作用する前提条件についてはより慎重な検討が必要とされている。
- プロジェクト期間を通して、研究機関とその成果の利用者との結びつきを構築するよう努めることが重要である。両者の交流が深まれば、研究者が利用者のニーズを理解できるし、有益な研究成果を利用者に提供しなければならないというプレッシャーや使命感を高めることになる。
- 研究成果のインパクト発現のためには、現場の利用者が活用できるように、研究成果を加工し、利用しやすく工夫することが必要である。こうした取り組みによって、利用者の研究機関に対する評価・信頼も高まる。
- プロジェクトの終了前に、実施機関の組織・制度面の分析を行い、弱点については、自立発展性を強化するために明確な戦略を策定することが必要である。

² 全国農業研究所は1997年に農業省管轄の研究所から公益法人に移行した。同研究所の予算は6割が政府、3割が外部資金、1割が事業収入からなる。公益法人化後、研究機関としての専門性を高め、外部機関の評価も高まり、直接資金を提供するドナーも増加している。予算規模も8年間で7倍となるなど、組織改革の成功例と言える。

Summary

Evaluation conducted by: JICA PNG Office

1. Outline of the Project	
Country: Papua New Guinea	Project title: The Forest Research Project Phase II
Issue/Sector: Forestry	Cooperation scheme: Technical cooperation
Section in charge : Forestry Cooperation Department	Total cost (equipment and project operation costs only): Technical cooperation project: 89 Million yen
Period of Cooperation	Technical cooperation project: April 1995 – March 2000
	Follow-up: 2000 - 2002
Partner Country's Related Organization:	Forest Research Institute (FRI)
	Supporting Organization in Japan: Ministry of Agriculture, Forestry and Fisheries, Forestry and Forest Products Research Institute (FFPRI), Forest Tree Breeding Center (FTBC), Kyoto University
Related Cooperation	Prior to the project, following assistance were extended as follows: ① Grant aid of The Establishment of the Forest Research Institute for research and related facilities in 1987 ② The Forest Research Project (1989 – 1993)
1-1. Background of the Project	
<p>In 1993, The Government of Papua New Guinea (PNG) introduced the National Forestry Development Guidelines. According to the guidelines, the functions of the Forest Research Institute (FRI) were reviewed and research activities for sustainable forest resource management were given priority. In this process, the Forest Research Project Phase I was regarded as a successful project and the PNG Government requested to the Japanese Government for the Phase II in order to enhance research activities for sustainable use of forest resources.</p>	
1-2. Project Overview	
(1) Framework of the project	
Super Goal:	
Sustainable development of forest resources by the private sector and local residents	
Overall goal:	
FRI's contributions to the introduction of a comprehensive management guidelines for sustainable forest resources	
Project Purpose: Improved research capacity of the Forest Research Institute	
Outputs:	
The following outputs were intended under the subjects of demonstration forest management, soil, species screening, volume tables, tree breeding and tree species database.	
1. FRI staffs acquire necessary research techniques for sustainable forest resource management.	
2. FRI staffs can produce research results and create database based on standardized methodologies.	
3. FRI can maintain research equipment and facilities including demonstration plots.	
Inputs:	
Japanese side:	
Long-term Expert: 4	Equipment: 52 Million Yen
Short-term Expert: 18	Local cost: 37 Million Yen
Training in Japan: 16	
PNG side:	
Counterpart personnel: 19	
Other inputs provided for the project: Land (57ha), Buildings (4,160m ²), Demonstration plots (Approx. 1,000ha)	
(2) Results of the Forest Research Project Phase II	
The terminal evaluation report (2000) shows the progress of the project as follows:	
<ul style="list-style-type: none"> The project has laid basis for research activities. The pilot forests as well as research equipment had been in place; thus, senior researchers are able to carry out their research activities on full scale. Adequate supervision by programme leaders and the integration of research results of the subjects with basic research fields such as forest botany and wood anatomy are two important tasks for research management. 	

- Basic techniques for management of planted forest were transferred. Yet, Practical methodologies for the end users should be developed. Particularly, integration of research results with analyses of soil conditions is necessary.
- Technology transfer for identification programmes has been complete. Further development of identification key by vegetative and wood anatomical characteristics, and use of genetic analysis should produce fruitful results.

2. Evaluation Team

Members of Evaluation Team	Mr. Tony Ombo (Development officer, JICA PNG Office) Mr. Kaneyasu Ida (IC Net Limited)	
Period of evaluation	October 22 – November 4, 2005	Type of Evaluation : Ex-Post Evaluation

3. Results of Evaluation

3-1. Summary of Evaluation Results

(1) Sustainability

1) The sustainability of the project's outputs

Through the project, assistance was given under the subjects of demonstration forest, soil, species screening, volume tables, tree breeding and tree species database. The Phase II of the project mainly provided support to the sustainable forest management, planted forest and forest biology divisions of FRI. FRI's research was carried out; data were collected and analyzed; and research scientific papers (Notes) were written by FRI researchers, supported by the Japanese experts. The Notes were also translated into Bulletins and published.

Sustainable Forest Management:

Basic techniques were transferred and its review was done, **but still more applicable techniques** for field operation has been **needed** so far due mainly to lack of funding after the project. FRI maintains the monitoring of the Mogi-Busiga Project in Finschaffen District implemented in Phase II. In this undertaking, researchers carry out ecological trials such as soil quality, leaf litter collection, stand dynamics as well as the impact assessment of logging in the area.

Other research projects are undertaken, supported by external entities. FRI carries out data collection on Permanent Sample Plots (PSPs) at 120 locations nationwide with external assistance from the International Tropical Timber Organization (ITTO). FRI also carries out Growth & Yield Studies with the aim to capture the growth and forest dynamics over time. This project is implemented with assistance from the Australian Centre for International Agricultural Research (ACIAR).

Planted Forest:

During the Phase II of the project, utilizing basic techniques transferred, practical methodologies for the end users have been carried out in the following projects. After the project, five projects have been tried. One project is still under way while the other projects have been suspended.

① *Tree Volume Tables of major Plantation species in PNG (Silviculture)*

Progress was made in the development of volume tables for the forest plantation species while tables for other species are currently being developed. As the responsible Officer is currently in Japan for further studies, this project shall resume after his coming back to FRI.

② *Establishment of Seed Orchards (Species Screening)*

Trial Seed Orchards for *Acacia Mangium* and *Tectona Grandis* were development in 1997 on customary land. However, the *Acacia Mangium* Trial was destroyed by fire and only *Tectona Grandis* is currently monitored through the thinning process to select the best performing or superior family.

③ *Tissue Culture (Tree Breeding)*

Although knowledge was transferred, micro propagation and further work or activities are nonexistent due mainly to the breakdown of the incubator machine. Currently, Mr. Yoshiaki Oikawa, a JICA senior volunteer, is utilizing the laboratory, working on the Orchid Culture as part of the Botanical Garden of FRI.

④ *Vegetative Propagation (Tree Breeding)*

Here, both the micro propagation and conventional propagation methods are carried out. In the latter, a mist house was built and vegetative propagation through stem cuttings are implemented through research. However, due to a shortage of funds, this trials have been suspended. .

⑤ *High Altitude Species Trial (Species Screening)*

In May 2004, FRI started the Pinus SPP Research and Development in the Highlands and lowland areas focusing on potential industry species screening, multi-purpose species, species for special sites and seed acquisition and storage. The progress is delay due to a deteriorated relationship with the company which provided the experimental site.

Forest Biology:

After identification technologies were completed, research activities are continuing but slow to further identify key developments through vegetative and wood anatomical characteristics. Such activities are further assisted by the Royal Tasmanian Botanical Garden with funds from the MacArthur Foundation to establish a website. Currently, the researchers have looked into more than 35,000 species. They can only work on 10 to 15 species per day and definitely need help.

Forest Products:

Although basic techniques were transferred during Phase I, this component was not included in Phase II. In Phase II, hardly any studies are done on species identification and therefore contributions to sustainable forest management are stagnant.

Some activities require a long time before any results can be obtained. For example, species screening of *Tectona grandis* needs a few more years until the most genetically superior families can be produced and real economic benefits are yielded. However, for other research projects, only a few of them have reached the stage where research results can be ready for publication and dissemination. Human resources development has benn done generally through technology transfer by Japanese expert and counterparts training in Japan during project period. Most of the researches projects have been either very slow in progress, suspended, or terminated due to a shortage of budget. Therefore sustainability of the project outputs is currently rather low.

2) Institutional sustainability

The Papua New Guinea Forest Authority (PNGFA) underwent major organizational restructuring in 1999 and FRI was incorporated under the Forest Management Division (FMD). Nevertheless, PNGFA tried to keep the missions and functions of FRI intact. A year later, FRI was separated from FMD. This should be noted as an important consideration by PNGFA on FRI because any discontinuation of FRI's research activities due to such an organizational change would have spoiled the project's efforts, particularly in long-term survey and monitoring activities. Thanks to the efforts of all parties concerned of the project mainly counterparts and executive officer,, FRI has been able to maintain its research function after the termination of the project.

The organizational setting has been secured for the time being. However, as shown in the earlier sections, the FRI's activity has been rather down. Main causes and effects can be summarized as follows:

- The missions of FRI have been intact, yet the priority in the forestry sector has shifted from natural forest to planted forest in terms of economic importance. Accordingly, new strategies must be set to cope with such a change. PNGFA has not indicated a new direction on research. A lack of appropriate linkage between policy makers and FRI makes FRI has not demonstrated her role and function. Also, linkages with the users of FRI services such as field managers in PNGFA, the private sector and NGOs have been weak. It seems that there has not been much discussion with the users on how to incorporate their needs into research agendas and set priority areas for research.
- Under the current PNGFA personnel system, there is no performance evaluation of researchers, and researchers are treated the same as the other staff members in administration and field operation. Neither do researchers have an incentive scheme for seeking a more advanced academic career or contributions to academic society. The lack of result/performance-based evaluation system as well as incentive scheme adversely affects the performance of the researchers. Low staff motivation was identified one of the weaknesses of FRI at the workshop for developing a strategic plan in 2005.

- Unavailability of input, the financial resource in particular, is the most significant factor directly affecting the level of activities. FRI suffers from severe financial constraints in the following ways.
 - The current size of the budget is difficult for maintaining the same level of activities during the project period. During the project, PNGFA provided a matching fund for the project. When the project ended, so did this fund. The financial situation for research in particular worsened in the last two years. The annual spending of FRI for 2003 and 2004 were 2.3 million Kina and 2.75 million Kina, respectively. The averaged annual spending for research during 2003 - 2004 constitutes only 65 thousand Kina or 3% of the total spending of FRI. Much of the budget is spent on the staff salary (67%) and maintenance of the buildings and facilities invested for the project (6%) and other items such as security, accommodation and utilities (17%). Only a fraction of the total budget can be used for research activities. FRI now heavily relies with external funds to keep research activities going.
 - The release of the budget from PNGFA to FRI is done in monthly installments. However, delay in releasing monthly installments is quite frequent due to bureaucratic procedures and inspections. It has severely delayed and disrupted research activities.

The effects of this financial problem are quite conspicuous.

- Level of research activity is significantly reduced. Only a few activities seem to be maintained. This is confirmed by the results of the questionnaire survey to the researchers. Nine out of 12 of the respondents replied that their level of research activity after the project had been reduced to some extent or significantly.
- Analytical apparatus such as Photosynthesis Analyzer, Soft X-ray imaging, Atomic Absorption Spectrophotometer are still kept functional, yet underused. According to the results of the questionnaire survey to the FRI researchers, seven out of 12 replied that the equipment and facilities had not been so used.
- Publication has been completely stopped. Since the end of the project, no publication or contribution of articles to scientific journals has been done.

In order to tackle the problems, FRI formulated this year its own strategic plan for 2005 – 2010. This was the first time that the FRI management, researchers and support staff worked together, analyzed their own institute and developed a strategic plan in a participatory manner. This was the very important step taken by FRI in order to set directions and revitalize its research activities. The strategic plan set 12 goals such as strengthen of relationship with relevant organization, reflection of needs to research subject from beneficiaries and action plan to achieve each goal was also developed. The action plan consists of the proposed activities, responsible person(s), performance indicators and necessary input. Once this plan is approved by PNGFA, this plan will be a basis for the new, three-year corporate plan of PNGFA in the field of forestry research.

(2) Impacts

1) FRI's contribution at policy level

As the Government research institute, FRI's research results and output based on scientific viewpoints are expected to be utilized for policymaking and implementation of various programs of operational divisions. However, FRI has not any section and system to extend its technologies and outcomes which developed in it. Therefore, no revision or amendment was made for the Forest Management Guidelines and the logging code of practice, and the National Forest Plan. Accordingly, FRI's contributions to policy making and administration are yet limited. Although under such circumstance, FRI advised to National Forest Plan established in 1996 from the view point of science.

2) Impacts on the stakeholders

The beneficiary of FRI services are other divisions of PNGFA, the industries, NGOs and resource owners.

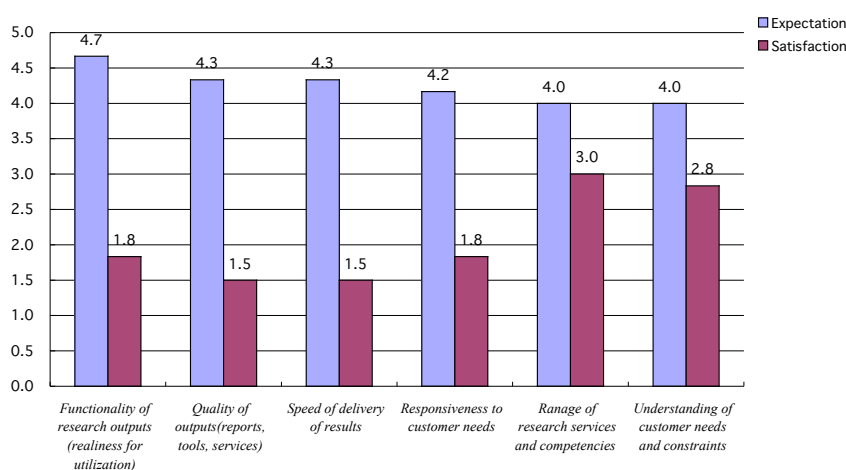
PNGFA: Impacts to the PNGFA were so big that they could conduct species screening designation of species by Forest Law. However, impacts to others except PNGFA were rather small due to unprepared system and section for technology extension. Furthermore, it also limited the influence to forest industries, NGO and resource owners from the aspect of economy. Actual impacts are as follows.

Other divisions of PNGFA are the immediate users of FRI services. Contributions of FRI are as follows:

- Copies of identification key to tree species are laminated and distributed to field offices. This helps the foresters identify the species that must be protected under the Environment Act.
- FRI researchers provide advice on plantation plans and silvicultural management and recommend species to be tried out.
- FRI researchers lecture at training courses conducted by PNGFA.

Some contributions by FRI to PNGFA should be recognized as mentioned above; however, the provincial offices of PNGFA express gaps between their expectations of FRI and their satisfaction with the current services provided by FRI. According to the questionnaire survey conducted by FRI to six provincial offices in October 2004, large gaps are recognized on the parameters such as FRI's usability of research results, quality of outputs, speed of service delivery, and responsiveness to customer needs.¹ The figures in the graph represent the average of the scores given by six provincial offices on a scale from one to five. In the same questionnaire, strong demands are also voiced by provincial offices for FRI's research results to be delivered and applied in their fields.

Assessment of FRI's performance by provincial offices of PNGFA



Industries:

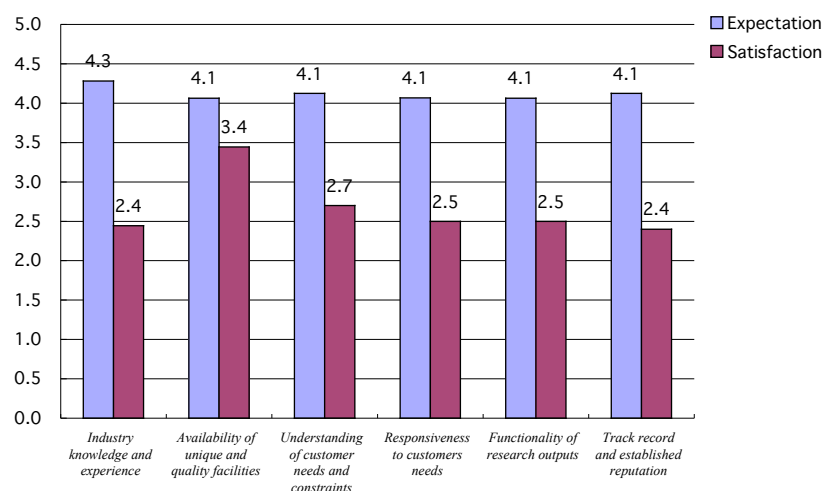
There has not been a systematic linkage established between FRI and the private sector. Relationships are mostly built with individual companies. FRI has had working relationships with some companies. Arrangements are usually made where the company provides plots and other inputs to FRI while FRI conducts research activities, provide advice, and give feedback research results to the company. For example, for the establishment of permanent sample plots for logging companies, FRI instructed how to set up plots and measurement, collect data in Makapa in 2005 and Medang in 2004. The companies that have a long-term management plan need such plots for projections.

However, such joint projects often fail and discontinue, so neither side can gain much benefit. It is difficult for the evaluation team to determine the causes, yet FRI researchers point out the shortsightedness of the companies in seeking quick return from research. Some companies mention the problem of delayed research schedule, infrequency in research and lack of reporting on progress or results.

A questionnaire survey was also conducted by FRI to 16 companies in October 2004. For the six most expected attributes of FRI, "Availability of unique and quality facilities" is above "satisfactory", and other attributes are rated between "inconsistent" and "satisfactory". All of the respondents know of FRI, but most of them do not know much about types of services or research results available from FRI. Some of them also express their aspirations that FRI would provide research results in practical, user-friendly formats and media.

¹ Questionnaire was sent to ten provincial offices of PNGFA. In the questionnaire, the respondent was asked to rate 14 attributes of FRI on a scale from one to five for their importance and expectations (1: Not important, 2: Of some importance, 3: Important, 4: Very important, 5: Critically important). Then, the respondent was asked to rate the performance of FRI on the same attribute on a scale from one to five (1: Poor, 2: Inconsistent, 3: Satisfactory, 4: Good, 5: Excellent). The six offices that had directly worked with FRI responded. The above graph "Assessment of FRI's performance by provincial offices of PNGFA" was produced by the evaluation team in order to see the gap between expectation and satisfaction for the most expected six attributes. The figures in the graph represent the average of the scores given by the six provincial offices.

Assessment of FRI's performance by companies



NGOs:

FRI researchers have supported some NGOs in form of providing training, and advice and consultations.

- FRI organized a Dendrology training course for environmental NGOs in 2004. Eleven participants participated for five days. The course included the tour of herbarium, theory, self-test and wood identification sessions and field practicum. Two of the NGOs that the team interviewed expressed their need for training on scientific knowledge to their staff.
- FRI researchers provide advice and consultations to EU supported Eco-forestry program that promote sustainable resource management and development by developing small-scale sawmills and Non-Timber Forest Produces such as coconut oil.

These types of assistance to NGOs need to be upgraded and provided on a regular basis in order for FRI to play an effective role in the capacity development of local NGOs.

Resource owners and users:

So far, FRI's support to resource owners and users are mostly for those who own demonstration plots and research sites. In order to raise their awareness towards sustainable use of their resources as well as enhance their socio-economic benefits, PNGFA needs to develop a clear strategy where FRI should be actively involved in disseminating scientific knowledge to the resource owners and users in a very user-friendly manner.

(3) Other impacts

Other impacts recognized through the fieldwork are as follows:

1) Utilization of the research results produced during the project period

- Throughout the project period, 18 bulletins, a few research reports and leaflets were produced by FRI. All these publications are still available at the library and copies are on sale. Each year, approximately 130 – 150 copies are sold. The library is visited by outside researchers and students on an average of around five persons a day and provide precious research chance in PNG where lack for research opportunity. The research results during the project have been disseminated and utilize in this manner. "Key to tree species" is not only used by foresters but also logging companies and NGOs for reference to identify species designated by the Environment Act for forest protection.
- The Forest Biology section has started its web site in collaboration with GBIF and the Sydney botanical garden so that browse plant data base collected by FRI through internet. It has also contributed to the "Field Guide to Palms in Papua New Guinea – with a multi-access key and notes on the genera". This book was developed by Department of Systematic Botany, University of Aarhus in collaboration with FRI and James Cook University in 2001.

2) Contribution to neighboring countries:

The South Pacific Commission in Samoa requested FRI to help establish volume tables and one researcher was sent to assist Samoan scientists. This should be noted as a textbook example of effective extension of technology transfer.

3-2. Promoting factors

- External assistance from other donors after the project helps FRI researchers continue their research such as Growth & Yield Studies supported by Australian and Eco-forestry program supported by EU.

3-3. Inhibiting factors

- Unstable cash flow as well as shortage of research fund has been the factor most severely inhibiting the development of FRI. It is observed that this seems to create a vicious circle: research projects are delayed and postponed due to unavailability of fund, researchers are immobilized and less motivated, no results are produced and disseminated, users of FRI services question the capacity of FRI and FRI's reputation is harmed, and PNGFA is less supportive of FRI in providing research fund.
- It is often difficult to establish a good, lasting working relationship with private companies because of delayed research schedule and slow research developments on FRI side and shortsighted interest of the companies.

3-4. Conclusion

Some research activities are still carried out, yet only a few of them have reached the stage where research results can be ready for publication and dissemination. Most of the research projects have been either very slow in progress, suspended, or terminated. The sustainability of the project outputs is currently rather low. There are some positive contributions of the project recognized by PNGFA, industries, NGOs and universities, such contributions are on a small scale on ad hoc basis. The sustainability of the project outputs has been low and impact of the outputs is limited accordingly. Therefore, FRI is tackling the strategic plan to renew the institute so as to break through present blockage. It is crucial to implement the plan absolutely.

3-5. Recommendations

For FRI and PNGFA

- In order to make the strategic plan of FRI workable and effective, the team suggests PNGFA and FRI to consider the following:
 - The current budget allocation system is simply not viable for FRI. PNGFA should give a budget that can be reimbursable at FRI's discretion on the condition that FRI proves to be accountable and transparent by improving its financial management and accounting system. Therefore, it is required to clear the budget estimation for research work and complete the reporting system of its expenditure. Also, the current composition of budget spending needs to be reviewed: too many staff members on the payroll of FRI, too heavy overhead cost and too little budget for research are the issues to be examined.
 - Precisely, according to the PDM of the Forest Research Project Phase II, it is an important assumption to establish a certain unit and system for technology extension that is developed by the project. However, extension of outcomes can not extend so smoothly due to the incompleteness of unit and system. It is necessary to establish such unit and system for extension work, although FRI is conducting lecture and seminar on business trip base.
 - A good monitoring and evaluation mechanism should be built in the strategic plan to ensure its progress. For this purpose, it is suggested that FRI submit a quarterly or semi-annual monitoring report to the PNGFA's executive board, and one of two program leaders present the progress of their research work.
 - Prospective users of FRI services including companies, PNGFA provincial offices, NGOs and universities have all shown a strong demand for useful research results to be interpreted in a user-friendly format or packet and delivered or made available to them. However, such an activity seems to be sidelined in the strategic plan. Delivering useful scientific knowledge to the field should be included in one of the important objectives and vigorously pursued.
 - It is a reality that PNGFA cannot allocate a large amount of budget for research activity; therefore, FRI needs to bring in external funds to sustain and enhance its research activity. This task requires a separate unit within FRI staffed by a professional, ideally, with international experience.
- PNGFA and FRI also should study the possibility of transforming FRI into an independent research institute with support of the government. This will be an option to revitalize FRI when monitoring results on the performance of FRI seems negative. In this context, the National Agricultural Research Institute (NARI)² seems ideal as a case study. It is recommended that FRI will set up a committee to study the applicability of the NARI's case to FRI and submit their option to PNGFA.

² NARI transformed itself in 1997 from an agricultural research institute under three departments of the Ministry of Agriculture to a publicly-funded statutory research organization. Sixty percent of its budget is provided by the

- Demonstration plots are established on private lands that are collectively owned by the senior members of the clan, and any decisions made on the use of their land require consensus among the members. Whether FRI can maintain the demonstration plots established on private lands depends on the willingness of the senior members. Thus, it is recommended that a plot (or a forest) management plan would be jointly developed by FRI and the clan members and an agreement would be made on respective partners' roles and responsibilities, and benefit sharing. Such an arrangement would help ensure the availability of the demonstration plots. Also, the whole planning process could be tried out as a pilot project for joint forest management on private lands.

3-6. Lessons learnt

For planning and implementing a research project:

- This project started under the condition that extension unit and system could be established. More careful consideration is necessary for such important assumptions that provide strong influence to the outcome of the project.
- Constructing a good interface between the partner organization and its users and other stakeholders should be pursued in the course of the project. Increased interaction will make the researcher user-oriented and give him/her pressure to produce and deliver useful research output.
- In order to enhance impact, research results must be interpreted and made accessible to end-users so that they can easily understand and apply in their respective fields. This would also help establish a good reputation of the partner organization among stakeholders.
- Before the completion of the project, in-depth organizational and institutional analysis should be conducted to identify weaknesses of the partner organization and formulate a clear strategy for sustainability.

Government while 30% from external fund and 10% generated from its activities. To date, its budget is approximately 15 million Kina, which is around seven times more than that of 1997 as its reputation is well established and an increasing number of partners invest in projects in partnership with NARI.