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REVIEW MISSION REPORT

FOR

CAF-IDRC FARM FORESTRY PROGRAM

IN P.R. CHINA

(20-29 May 1994)

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TABLE OF CONTENTS

MAIN ACRONYMS

AF	Agroforestry
CAF	The Chinese Academy of Forestry
CIFOR	Centre for International Forestry Research
FAO	Food and Agriculture Organization
FAO-APAN	FAO Asia-Pacific Agroforestry Network
FFP	Farm Forestry Program
ICRAF	International Centre for Research in Agroforestry
IDRC	International Development Research Centre
RMB	Renminbi (Chinese Yuan)

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1.0 OBJECTIVES, COMPOSITION, AND SCOPE OF REVIEW MISSION

At the invitation of the Chinese Academy of Forestry (CAF), a review mission was assembled with the following objectives:

1. Review achievements and impacts of the CAF-IDRC Farm Forestry Program (FFP) in P.R. China.
2. Identify specific areas of future collaboration during the next phase of FFP between CAF and international organizations such as IDRC, Ford Foundation, FAO, CIFOR and ICRAF.

The review mission team comprised:

- Chun K. Lai, Regional Coordinator, FAO-APAN, Bogor, Indonesia;
- Christian Cossalter, Principal Scientist, Reforestation of Degraded Lands, CIFOR, Bogor, Indonesia; and
- Nick Menzies, Program Officer, Ford Foundation, Beijing.

The mission was conducted during 20-29 May 1994, and included: consultations with FFP staff and presentations by subproject leaders at CAF, Beijing; visits to field sites in Zhejiang and Guangdong provinces; and review of selected FFP documents (see Appendix 1 for review mission itinerary; Appendix 2 for list of persons met and subprojects visited; and Appendix 3 for list of documents received).

Due to the short duration and limited scope of the mission, the team was able to visit only a few sites in the subtropical and tropical zones. No time was available to visit the warm temperate zone (North China Plain), where significant progress has been made on paulownia research and extension within the FFP framework.

The following sections, therefore, represent the team's impressions based on this brief and partial review of FFP. Nonetheless, the team hopes that some of these impressions and recommendations will be useful for farm forestry research and development in China, and specifically for the next phase of the CAF-IDRC FFP. It should be noted that the views and

opinions are expressed solely by the team members themselves, and do not necessarily represent the views and opinions of their own organizations.

2.0 ACCOMPLISHMENTS AND IMPACTS OF CAF-IDRC FARM FORESTRY PROGRAM IN CHINA

With the exception of southern China, wood production in the subtropical and tropical regions of Asia and the Pacific is essentially from natural forests. While the volume of wood extracted every year from the tropical forests of Asia and the Pacific is still increasing, it appears that this form of wood production will decline. Significant decreases in production have already been experienced in the tropical forests of other regions.

Improved standards of living and education in the Asia-Pacific region are increasing the demand for wood and wood-derived products. As in the industrialized countries, the trend in several subtropical and tropical countries is towards an increasing contribution to domestic production of these products from man-made forests. Forest plantations can also provide a range of export products. The pulp and paper industry is a sector where tropical countries have a clear comparative advantage vis-ã-vis temperate countries but not all tropical countries have an equal chance to build up a forest plantation resource which is economically competitive and ecologically and socially acceptable. Only a limited number of countries will be able to benefit from the predicted increase in consumption of wood and other forest products in the Asia- Pacific region.

In China, forest plantations are already the main source of wood in the subtropical and tropical regions as well as in the temperate areas. This achievement has been the outcome of intensive efforts by a strong system of forestry research and experimentation coupled with a unique recent history which favored collective action to address pressing problems such as deforestation and timber scarcity. The last ten years of economic and structural reform have, however, effected a profound transformation of rural production systems, marketing, and land tenure. To achieve the increased production of wood and forest products required to meet expected increases in demand, it has become necessary to investigate alternatives to the large-scale planned forestry models which prevailed in the past. The CAF-IDRC Farm Forestry program has been a significant element in this process of adjustment.

2.1 General Remarks and Impressions

During this brief mission, the team was extremely impressed by the breadth and depth of farm forestry research and extension activities carried out with support from the CAF-IDRC Farm Forestry Program (FFP). The project's technical reports and professional publications have contributed to the recognition by training and research institutions as well as by government forestry agencies that agroforestry is a legitimate form of forestry with a role to play in national forestry programs and planning. This contrasts with the situation some

ten years ago when agroforestry was often negatively perceived as a collection of unscientific folk technologies practised only by some of China's more 'backward' farmers.

FFP has mobilized a wide range of senior and younger researchers, encouraging them to apply their skills to investigate farm forestry systems. In total, more than 250 scientists and technicians from over 30 research stations and from 8 of CAF's 9 research institutes (CAF has recently expanded to 11 institutes) have worked with FFP. The members of the mission were impressed at the high level of professional competence and commitment exhibited by FFP managers and subproject leaders they met. Their professional development, skills and research capacity have been enhanced through FFP research and training activities, which is in itself a major impact of the program.

During field visits to FFP sites in Zhejiang and Guangdong provinces, the review team held discussions with specialists in different disciplines and with local political authorities. These discussions indicated that areas of subtropical and tropical China offer good to excellent conditions for an increased role for farm forestry in building up a sustainable and productive forest resource of regional importance. These favorable conditions include:

- **A strong political commitment**: At the end of 1990 the subtropical and tropical regions of China reported a plantation area of about 7 million hectares made, for a large part, of plantations established during the previous decade. Guangdong province alone accounts for 4.0 million hectares of forest plantation established between 1985 and 1990. The man-made forest resource that China is building up is steadily increasing. The current annual rate of establishment of new planting in the entire country is in the range of 1 to 1.25 million hectares of which afforestation of Chinese fir alone counts for more than 300,000 hectares.

- **A natural environment favorable to fast tree growth and efficient resource management**: Many coastal areas of southern China combine a favorable ecology (no long period of drought, reasonably fertile soils with adequate physical structure, low occurrence of parasites) and adequate geomorphological/land structure conditions (availability of large blocks of land of smooth topography allowing for the use of machinery for cultivation and wood extraction).

- **The ability to involve local people**: With a market-driven economy assuming more importance in China, there is a clear awareness among the authorities at all levels of the need to experiment with new models of farmer participation. Various forms of farmer participation are already taking place. These range from new forms of land use rights, to the reformulation of rights and responsibilities for land given to State farm employees, to free choice of land management systems on the land allocated to farmers.

- **A strong economic driving force**: Wood of all kinds is in strong demand in China. Furthermore coastal areas of southern China have easy access to important regional markets, especially Japan and Taiwan, to name only the closest.

- **Solid scientific expertise**: The subtropical and tropical regions of China are host to three specialized institutes of the Chinese Academy of Forestry (the Chinese Institute of Subtropical Forestry, the Chinese Institute of Tropical Forestry and the Research Institute of Chemical Processing and Utilization of Forest Products), several provincial research institutes and the Chinese Eucalyptus Research Centre. These institutes together employ several hundred scientists covering all disciplines of forestry. Research is already well advanced in several areas including tree improvement, and the processing and utilization of forest products. In the case of tree improvement, however, only a limited number of results have been applied on a large scale.

Against this background, research projects supported by FFP have addressed all aspects of farm forestry including tree improvement, land management systems, processing of forest products and the social and economic impacts of farm forestry systems. The CAF-IDRC program is to be commended for taking such an inclusive view of its subject, an approach which is rare in forestry research programs anywhere.

The initial programming pattern of farm forestry subprojects supported by IDRC in China during the past dozen years (with total financial contributions of CAN$ 12 million) focused on a portfolio of many single technology or single commodity subprojects adapted to China's unusual climatic and environmental diversity. The program then moved quickly from design to testing of these models. Monitoring and follow-up of test sites is building a valuable database to guide further work on farm forestry which will be a valuable resource for wider dissemination of the achievements of the program.

As the work of FFP progressed, staff became increasingly aware of the ways in which government policies and social and economic conditions impinge on the management of farm forestry systems. In recent years, the original approach of the program has evolved toward a more integrated and systems-oriented research approach. The team agrees that this integrated research approach will be more relevant and effective in addressing farmer needs, and in striking a balance between economic and ecological objectives.

The socioeconomic impacts of FFP extension on farmers were often difficult to gauge because of the current focus on area-based extension rather than farmer-based approaches. FFP has already provided basic training in social and economic research methods, but it is likely that after several years of field research during which participants have had to grapple directly with some of the issues, further training would now greatly enhance the overall impact of the program.

From the mission, some questions emerged on how best to develop effective mechanisms to build links between research, extension and farmers, and how to engender greater farmer participation in research design, implementation and evaluation. However, there is significant and concrete evidence of the extension of useful FFP research results in the field, and good examples of collaborative efforts between researchers, extension workers,

local officials and farmers. The team also appreciated that the participation process must be understood and developed within the Chinese context.

2.2 Farm Forestry Models in Subtropical and Tropical Zones

The technology- or commodity-based approach mentioned above had both advantages and disadvantages. At the early stages, it provided a broad framework of support to many institutes and scientists to conduct a wide range of subprojects for which they had comparative advantages. However, it became apparent that the range of single-dimensional farm forestry models developed for the subtropical and tropical zones often did not represent the complexities, realities and problems faced by farmers. The CAF-IDRC FFP has begun to shift the latter models and research work towards a farming systems approach, and to deal with more complex aspects such as multiple-species models, and agroforestry dynamics and products over time. This transition needs to be nurtured and supported in the next phase of FFP.

Among the farm forestry models visited in Zhejiang and Guangdong provinces, those that seem to have the greatest potential for long-term sustainability, especially from the farmers' perspective, generally possessed some of the following characteristics:

- agroforestry models where short-term products could be obtained, and intercropping patterns could evolve over time to adjust to tree-crop interactions
- diversified tree species that provide different products of short-, medium- and long-term nature
- models containing fruit trees
- easily available processing and marketing facilities
- clear contractual and incentive arrangements for farmers
- management plans for at least one or two rotations of the tree component in the system
- look into the potential for farmer organized associations/co-ops etc to take on some of the collective planning, management and marketing tasks

Not many of the models are 'Farm Forestry' as understood in the West . The focus has been on plantations and collective Forest Farms. Work on plantations and collective farms gives an environment in which it is comparatively easy to work out the technical aspects of a farm forestry model and obviates the need to deal with farmers' aversion to risk-taking at the beginning of the program. Leads though to the pursuit of solutions to problems which farmers may not consider to be significant problems. ie: it would be very interesting to conduct some work among farmers to find what their priorities for research, testing, and improvement would be. Could help guide priorities for future research and testing.

ie: Heard on several occasions that there had been problems with rapid changes in market prices. Jujube was tested in response to the collapse in price of Chinese Bayberry. There had recently been a risk of uncontrolled harvesting of Phyllostachys edulis when the price was particularly high. This appears to be a concern of farmers and of collective farm managers and argues for more investigation of how to build in diversity (ecological and economic diversification meet here...) into the systems rather than fine-tuning of productivity.

There is a rich store of AF experience in the Chinese countryside. Some of the models and the lessons being learned about AF systems have been recorded in writing, in folk memory, and have been practised on farms for generations (eg some examples from Cunninghamia taungya). In many cases, official research programs are going through a rather long process of rediscovering existing knowledge. Even AF itself is, to some extent a new recognition of the validity of some traditional practices (re 1985 reaction to NKM talk about AF systems). The CAF-IDRC could benefit by looking at some of these systems, learning from farmers why they use these systems, and then working with farmers to identify where the systems might be improved. ie. In Lin An County, Ling Long Shan Forest Farm, the Farm manager talked about local traditions of mixed Cunninghamia and bamboo systems. In An Ji County, learned about potentially significant utilization of Liquidamber fruits (burned to keep away mosquitos) by talking to the old man in charge of maintaining the test plot.

2.3 Farm Forestry Tree Improvement

2.3.1 Chinese fir

As a general impression from sites visited in Zhejiang province, silviculture of Chinese fir seems to be adequate although perfectible. This refers particularly to species/site matching, nursery techniques, site preparation, tending and thinning operations, protection of plantations.

The tree improvement program on Chinese fir involves about 100 different scientists (at the professional level) of various institutes. Research on provenance evaluation is coordinated at country level by Prof. Hong Jusen, vice president of CAF, while research on tree breeding is coordinated by Prof. Chen Yitai, deputy director of the Research Institute of Subtropical Forestry, one of the specialized institutes of CAF which is located in the Zhejiang province.

Chinese fir tree improvement is one of the most active forestry research program of China (ten references in Chinese scientific and forestry journals for 1992 alone).

A multi-station provenance trial (3 sites in subtropical and tropical China) was established in 1981. The three sites had 183 provenances in common while the trial on the

third site included an additional 46 provenances. Each provenance was made of progeny of 5 to 30 parent trees distributed at an interval of at least 100 m.

The program on progeny testing started in 1976 with parent trees selected in many sites. Presently about 300 half-sib families and about 500 full-sib families have been or are being tested.

The selection of clones started in 1978. So far, about 250 clones have been or are being tested. Another 1,250 clones have been pre-selected for further trials.

IDRC support to this program started in 1990. The IDRC contribution has permitted to complement the provenance evaluation started in 1981 with a more compressive evaluation of 12 provenances in terms of geographic variation and wood properties. This study has showed that the best construction wood comes from low altitude provenances, viz. Pubei in Guangxi, Jianghua in Hunan, Xinyiin in Guangdong, Jiangou in Fujian, Rongshui in Guangxi and Yaan Sichuan. This contribution has also permitted to intensify the progeny testing and the preselection and testing of clones.

At present much remains to be done to make improved material available at a large scale. This involves that mass propagation techniques are well in hand and a propagation strategy which match the conditions of each species can be worked out.

Strategies for mass propagation of individual species are dependent on a number of factors including: (i) **biological characteristics** (especially mode of pollination, intensity, regularity and synchronization of flowering, mating system, ability to coppice etc.); (ii) **genetic characteristics** (heritability, genetic correlations, size of base populations); (iii) **level of technology**: are tools such as floral induction, controlled pollination, grafting, rooting, air-layering, etc. well mastered?; (iv) **economic considerations** such as value of the end product, rapidity in deployment, production costs, scale of operation; (v) **tree production system**: in the context of farm forestry, individual farmers may prefer a genetic material which will grow at the lower possible risk to alternative higher yielding material such as, for example, clones which due to their higher sensitivity to diseases present the risk of losses of part or the totality of the crop.

In the case of Chinese fir the plant production strategy that CAF has developed so far is based on seed produced by open pollination in clonal seed orchards. This is a wise approach considering the high heritability for growth and wood density and the ability of the species to flower relatively early (7 to 8 years).

At present the first generation of seed orchards of which the total area is about 3,000 hectares can supply only about 30% of the seed used annually for reafforestation. 60% of the annual seed requirement comes from forest stands (mainly plantations) located in areas identified as best provenances on the basis of the results of a multi-station provenance trial (3

sites in subtropical and tropical China). 10% of the annual seed supply comes from uncontrolled collections. The situation of seed supply varies from province to province. In the case of the Zhejiang province, for example, the annual program of 20,000 hectares of Chinese fir is entirely established from seed orchard seed.

Establishing the first generation of seed orchards started in 1972. Since 1985, a second generation of seed orchards is being established with clones selected in full-sib progeny trials and provenance trials. The total area presently on the ground is 120 hectares. Due to the rapid pace of development of the Chinese fir plantations on the one hand and the relatively long and slow process involved in the establishment of seed orchards on the other hand there is no hope that the seed orchard production will "catch up" the current demand for seed.

The potential for rapid delivery of genetically improved material or in other words the possibility of increasing the genetic gain per unit time associated with clonal forestry has led CAF to work on mastering the rooted cutting technique for Chinese fir. Research on rooted cutting is underway. Encouraging results were obtained with coppices of 6 months of age produced by 10 to 12 year old trees. Plans are that, in a close future, half of the 300,000 hectares of plantations established every year with Chinese fir are clonal.

Moving to mass propagation of clonal material will inevitably involve additional direct costs in the production of plant material (nursery costs). Adoption of this technology will also impact very significantly the present institutional set up and relationship between the farmers and the Provincial Forestry Departments. Taking into account that the proposed technology is not part of the indigenous knowledge/tradition its adoption will require a rather dense network of well equipped nurseries (with mist propagation systems) under professional supervision. Forestry personnel will also have to be trained to master all aspects involve in the development of Chinese fir clonal plantations and be able to provide farmers with the necessary technical assistance. Release of clonal material will have to be closely monitored to avoid planting of large areas with a limited number of clones and allow for a turn over in the clones to be proposed every years to the farmers.

One way of deploying quickly improved material is to use the clonal route. But cloning is not the unique solution to the problem. In view of the considerations mentioned above, careful though must be given before deciding to embark on clonal forestry.

2.3.2 Eucalyptus

As a general impression from sites visited in Leizhou peninsula (Guangdong province), both the genetic material and the techniques used in the Eucalyptus plantations were found to be far from optimal.

One million hectares of Eucalyptus planting is reported to be already in place in the Guangdong province either on collective land (forest farms run by municipalities, counties, townships and villages) or on land allocated to individual farmers.

Technological packages exist outside China which would allow to convert the existing Eucalyptus stands into a very productive resource. This know how refers to the important advances made in the field of tree improvement and clonal forestry especially in Brazil (Aracruz) and Congo (UAIC). Transferring this technology to China would permit to save a minimum of 15 to 20 years of very intensive research effort.

Because farmers are already closely involved in Eucalyptus planting and receive direct benefits from this activity a shift towards more advanced technologies and more intensive form of management would seem to involve reduced likelihood of irreconcilable conflicts.

The above strengthen the view that the Leizhou peninsula and possibly the entire coastal zone of the Guangdong province has a high potential for intensively managed plantations for industrial fuelwood and pulpwood. There are only few places in the tropics and subtropics where such a combination of favorable conditions exists.

It is important in this context that a sound development strategy is worked out. Policy decisions such as for example giving priority to transfer of technology and co-operation with foreign industrial partners have the potential for solving rapidly important bottlenecks.

2.4 Post-production Processing and Utilization

Under the CAF-IDRC FFP, seven subprojects were conducted on: wood utilization; paulownia foliage utilization; mushroom processing; bamboo shoot preservation; rattan grading and utilization; utilization of five-leaf gynostemma; and cultivation of Chinese gallnuts.

In general, these subproject addressed specific problems or constraints experienced in the processing and utilization of farm forestry products. Usually the solutions found were easily extended to farmers and local processing industries. Hence, as a group, these subprojects were very useful.

Subproject leaders provided presentations in Beijing and Hangzhou on their respective activities. However, the limited scope of the mission only allowed for close examination of the two subprojects on bamboo shoot preservation and five-leaf gynostemma utilization.

2.4.1 Bamboo Shoot Preservation

At the Research Institute of Subtropical Forestry in Hangzhou, the team was briefed on this subproject, which was conducted from April 1990 to April 1994 with CAN$ 18,630 financial support from IDRC. The rationale was to find a solution for the problem of

bamboo shoot preservation on a large scale. Traditional preservation techniques could only accommodate less than 300 kg of shoots at a time, resulting in significant amounts of bamboo that became rotten due to lack of preservation facilities. A single bamboo culm can produce 2-4 tons of shoots per year.

The subproject investigated three problem areas:

- how to develop large storage pools for bamboo preservation
- how to reduce costs
- how to assist in marketing of shoots

Results were successful and the preservation technology extended to five provinces through 8 training course that involved about 300 people. Two large storage pools of 4.6 cu m capacity were set up, and over 3,000 kg of bamboo shoots were successfully preserved for periods of over three months. An effective preservative agent, potassium sorbate, was identified that reduce this cost by half. A low-cost polythene bag (RMB 6.5 unit cost) was selected as appropriate for both farmer households and processing factories.

Future research needs include examing the nutritional differences between sympodial and monopodial bamboo shoots.

2.4.2 Utilization of Five-leaf Gynostemma

This subproject is based at CAF's Research Institute of Chemical Processing and Utilization of Forest Products in Nanjing. The subproject leader came to Hangzhou to brief the team. In the early 1980s, Japanese scientists discovered that *Gynostemma pentaphyllum* contained gynosaponins, which are similar to ginseng saponins, and are effective in reducing cholesterol. The five-leaf gynostemma is a traditional Chinese medicinal plant dating back to the Ming dynasty.

The subproject was conducted from 1990 to 1994 with IDRC support of CAN$ 30,000, of which only 60 percent was spent as local budgets were obtained. Twenty-seven provenances of gynostemma were evaluated to determine gynosaponin content. Two provenances from Zhejiang and Henan were found to have more than 10 percent gynosaponin, and were cultivated in small areas for extension purposes.

The chemical structure of gynosaponin was analyzed and a new structure discovered. A laboratory was established in Hubei province for gynosaponin extraction, with an annual production capacity of two tons. And a processing technology was developed to extract pure gynosaponins and useful by-products.

It appears that collaboration with other Asian countries could be very beneficial as gynostemma occurs in the Philippines, Malaysia, Thailand and Indonesia. Gynostemma tea

produced in Japan and China find valuable markets in places with large ethnic Chinese populations, such as Singapore.

Another prime area for international collaboration would be in non-wood forest products, where the Institute conducts research work on: gums and oils (pines); tanning products (acacias and gallnuts; essential oils; phamaceuticals; and fodder.

2.5 Socioeconomic Studies and Information

The review team heard many references to difficulties encountered in various subprojects due to socioeconomic variables such as land tenure, unexpected changes in markets for forest products, and conflicts over resources. Recognizing the significance of these issues and their close relationship to future extension of some of the technologies being tested, the FFP was designed to include subprojects addressing socioeconomic aspects of farm forestry and the related issues of extension and information dissemination. In Beijing, the team also received a paper prepared by Mr He Qun of FFP summarizing some of the key policy, economic, and social issues affecting implementation of farm forestry in China.

2.5.1 Economic and Socioeconomic Evaluation

The subproject investigating socioeconomic aspects of farm forestry selected sites in the four main agroecosystems in which FFP has operated. The mandate of this subproject was deliberately kept fairly broad since it is one of the first research projects of its kind, and little was known at the outset about the kind of socioeconomic issues which might emerge in the course of the program. An important element in the subproject was the training course in economic evaluation held in 1991 in Beijing with IDRC support which equipped participants with the analytic tools they needed to carry out the evaluations. Participate were, in turn, able to run further training courses for employees of the experimental units involved in FFP.

The results of the surveys indicated that the farm forestry models provided economic, social, and ecological benefits - in some cases quite significant economic benefits. Work on ecological and social benefits was less systematic, but also indicated a wide range of benefits from FFP, from greater resistance to natural disasters such as frost or wind to increased opportunities for employment in rural areas.

This subproject has made a good start on broadening the criteria by which forestry programs are evaluated in China. It has demonstrated that when viewed as a component of an overall farming system, farm forestry provides a wider range of benefits than purely timber-oriented management systems.

In the next stage of FFP, it would be worth refining the social and economic analyses of the program. It would be useful for example to compare results with a control plot (a comparable area without a farm forestry model), to consider longer term monitoring which would give a time series showing the scheduling of costs and benefits change over at least one rotation over the longest-lived component of the model. Other suggestions are given below in section 2.5.4.

2.5.2 Community Nutrition Studies

In order to assess the extent to which Farm Forestry contributes to overall well-being of the community, FFP included a subproject studying community nutrition status as an indicator of well-being.

The community nutrition study examined changes in the food supply which have followed the implementation of FFP, with the assumption that the program would improve access to various sources of food supply (both on-farm and purchased with increased sources of household income). One of the key discoveries of the project was that agroforestry systems appear to diversify the household's sources of food, contributing to an improved diet and nutrition structure. The subproject coordinator noted that while most of the villages surveyed (in north China) were nearly self-sufficient in food before FFP, they were remote and farmers had little knowledge of the kind of eating habits that would contribute to a good diet. The FFP program, by introducing them to ideas from outside the village therefore contributed to improved nutrition both through the information it provided and in the greater diversity of crops it introduced.

2.5.3 Bamboo Information Centre

The Bamboo Information Centre was established in December 1987 to promote the sharing of information about all aspects of bamboo research, management, and utilization. The centre collects information on bamboos in China, disseminates information within the country and abroad, organizes workshops and conferences on bamboo, and is developing a database to make information on bamboo more readily available to interested researchers.

The team was not able to visit the information centre itself, but heard a presentation from centre staff and received a report on its activities. From the report, it appears that IDRC support was important in the early stages, allowing staff to establish the centre and to begin the task of collection, organization, and dissemination of information. The workshops and conferences it has organized have also been effective in building contacts between Chinese specialists and their counterparts in the region and elsewhere. The experience of other information centres and databases in China would suggest that a key to the centre's long-term impact will be the ease of access to the bamboo database and to the information centre's collection of information on bamboo. Further support for the centre would be warranted if it can be determined that it provides a relatively free and conveniently accessible service to a wide community of interested users.

2.5.4 Assessment of FFP subprojects on socioeconomic analysis and information dissemination

As described above, the FFP subprojects have made important contributions to the overall impact of the program. They provide data which confirms that the significance of farm forestry goes beyond the production of wood products and an improved environment

and they are helping to articulate the concept of 'well-being' which is often spoken of as the objective of rural development work. Likewise, work on extension and information systems is building a foundation for further expansion of the program from experimental sites to all rural areas with potential for farm forestry.

To date, these subprojects have looked mostly at the situation following successful implementation of farm forestry models. As the program shifts to target a wider and more varied clientele, it will become important to make greater use of social and economic analysis as diagnostic tools to identify suitable models for different categories of farmers, and also to tailor extension and information systems to those different groups. It will be increasingly important to look at the different ways in which social and economic variables affect the implementation of programs and their extension. The suggestions which follow are intended to offer some guidelines on ways in which adjustments to this component of FFP would strengthen its overall contribution to the diagnosis, design, and delivery of farm forestry systems.

- **Change the basic unit of analysis**

As noted above, many of the farm forestry models visited during the review were being tested on state farms, collective forest farms, or experimental forests. Few models were being tested at the household level, and most statistics and analyses were being done on the basis of land area, not on the numbers of individuals or households involved. Research and analysis should also accord with socioeconomic realities. The same farm forestry model could be analyzed, for example, on a plantation, a collective or village farm, and with several households of varying socioeconomic status. It is likely that analysis will show that for the same model, these different categories of owners will react differently to the costs and benefits, labour requirements and harvesting schedules involved, so that adjustments would have to be made to the technology to suit them.

- **Research design and methodologies**

The art of analyzing linkages between biological, ecological, and socioeconomic variables is in its infancy - not just in China but everywhere in the world. One key aspect of this art is that all potential sources of data should be brought into play, particularly farmers who are one of the most significant sources of information. In some of the research conducted so far, it seems that the research objective could have been met by talking to farmers rather than setting up complex experiments measuring 'hard' biological or physical variables. Research methodologies such as Rapid Rural Assessment (RRA) or Participatory Rural Assessment (PRA) can be powerful tools when used in combination with more traditional forms of survey research and the measurement of physical and biological variables.

A program of socioeconomic analysis of farm forestry systems would benefit from some careful thought about what questions need to be asked. During this mission, the team heard about problems caused by shifts in land and tree tenure policy which seemed to be a significant constraint on the adoption of farm forestry systems. Little research has been conducted on the issue, however. The team also heard that collective forest farms are acceptable in Zhejiang because individual households have many alternative sources of income. It would be helpful to have a better idea of the parameters involved: who are the farmers who engage in forestry (those left behind? those who are most prosperous to begin with? those with a lot of labour available? those with very little labour available?); what is the key constraint that must be removed before they will take on a contract to do forestry (technical know-how? confidence in stable policies? the scale of operations? the availability of market outlets? marketing organizations?).

It would be worth organizing a seminar or a workshop on social sciences research in the management of forest resources to guide FFP participants in identifying the questions that need to be asked and to get a clearer idea of how a social scientist's perspective might help answer them.

- **Learning from negative examples**

It is important to look at where things go wrong as well as where they work. An understanding of failures helps avoid future problems.

An example of this concerns 'second generation' conflicts over forest resources. This term refers to the possibility that people may initially agree on a management strategy for a resource that has no value (such as 'wasteland'). In time, however, conflict may emerge as the 'worthless' resource becomes valuable (when a forest has grown on it, for example). People we met agreed that the risk of such conflicts exists but were reluctant to talk about it. One informant mentioned a case in Lin An county (Zhejiang province) where there had recently been a violent confrontation when villagers claimed that village leaders had unilaterally altered the terms of their contracts to afforested land. While such cases are understandably sensitive, when examined carefully and objectively, they can help a project such as FFP build mechanisms into its work to deal with similar conflicts in the future.

- **Strengthen research and extension on marketing**

FFP's collaboration with the Research Institute of Chemical Processing and Utilization of Forest Products at Nanjing is an excellent approach to building markets for products from agroforestry systems. China has a lot to teach other countries here in ensuring that farm forestry and agroforestry systems not only ensure survival but also enhance rural incomes - which in turn translates into improved well-being as demonstrated by the nutrition survey. While FFP has a strong record in developing commercial products from farm forestry systems, it is still weak in the area of markets and marketing.

During phase two of the program, it would be worth carrying out work on the following:

Long-term economic and market forecasting. What will happen in approximately ten years' time when large amounts of Cunninghamia timber reach the market at the same time? If white tea (currently sold at a very high price because of its rarity) is widely grown, what will happen to the market?

Links between farmers and markets. Where the forest products are coming from plantations and village collective forests, links with markets are relatively straightforward. This will not always be the case. The one farmer the team spoke to in Lin'an county (Zhejiang) had no systematic sources of market information and relied on timber merchants coming to find him. More effective information systems will be needed in the future.

Training for officials to give them a better understanding of market movements and appropriate reactions: officials still react to market changes by direct interventions to control price and output. One strategy is to restrict harvesting by specifying permissible harvests. Another is to install price controls on marketed timber. It would be worth training officials to give them a better sense of the workings of a market economy and what `macro' economic levers they can apply to guide the market.

- **Conduct more research and experimentation on extension systems.**

The strategy of combining the efforts of scientists, officials and farmers to extend results has been shown to be critical to the success of projects. At the moment, however, the emphasis is on scientists and officials combining to teach farmers, instruct them, and supervise them to make sure that they follow instructions. Multiplying the channels and targets of instruction and training may be helpful: officials would probably benefit for example from a better understanding of the workings of markets (see previous point). Scientists might also benefit from stronger training on how to involve farmers more directly in all aspects of the `diagnosis, design, and delivery' process.

It was worrying to hear of extension only in terms of land area, never in terms of numbers of households or numbers of farmers. When asked, few informants had any idea of how many farmers were involved. It is imperative to begin to design extension systems that work with farmers rather than to designate targets for areas of land to be covered. The present approach where achievement is measured by whether or not the target is reached also lends itself to false reporting or even to coercion to force farmers to adopt a new technology.

3.0 RECOMMENDATIONS FOR CAF-IDRC FARM FORESTRY PROGRAM

CAF should be supported in its transition from a program based on the design and testing of agroforestry models to a program based on the '3D approach: diagnosis, design and delivery' targeting mountain areas, arid lands, and coastal lands.

To make this transition, CAF will need to allocate more of its resources (human and financial) into the 'diagnosis' and 'delivery' components of its work, while the 'design' component will have to be more closely tied to the opportunities and constraints offered by different farming systems (large-scale forest farms, village-level collective forests, group forest farms, household woodlots), and how these farming systems fit into the larger watershed management context. Given the profound structural, economic and social changes taking place in China, a key area for research will be ways to build flexibility and adaptability into farm forestry systems. The link between ecological diversity and economic security offers a promising avenue for further research and experimentation.

To support the transition to a "3D" approach, the team offers the following recommendations for CAF consideration:

(1) **Develop institutional capacity within CAF to conduct appropriate diagnostic studies as a basis for farm forestry research design and delivery to address priority, site-specific problems of local farmers and communities.**

The project framework for "Alternative socioeconomic approaches to reclaiming degraded lands," which is proposed for the next phase of IDRC support, advocates a "3D" approach. This would go beyond the ICRAF Diagnosis and Design (D & D) methodology and focus on attaining a third "D": Delivery.

However, past FFP approaches have mainly concentrated on the middle "D": Design, and resultant models have reflected this orientation. In general, there has been little or no diagnostic work with farmers preceding the design of farm forestry models to verify that the models do in fact address priority problems. For example, fuelwood models designed may be successful from a production standpoint, but do households in the locality consider fuelwood to be a major problem or constraint? Without knowing this situation beforehand, research results may be irrelevant to farmers and, hence, "undeliverable."

The FFP post-production subprojects followed more of a problem-solving research approach to address specific processing and utilization constraints related to wood, paulownia foliage, mushrooms, bamboo shoots, rattan, five-leaf gynostamma and Chinese gallnuts. Similarly, farm forestry models should be developed to solve site-specific problems and farming system constraints.

Participatory diagnostic techniques for agroforestry and community forestry applications are being developed in several Asian countries. This is one area of international collaboration, with neighboring countries as well as with organizations such as the Ford Foundation and APAN, that could greatly benefit China's FFP efforts. Collaboration possibilities include training, information exchange, and study tours to gain first-hand experience on how diagnostic techniques are applied with farmers and local communities in the field.

(2) Orient the "3D" approach towards developing and delivering integrated farm forestry systems that maximize species and product diversification, and combine higher economic benefits for farmers with ecological sustainability.

This would require sound diagnostic studies to identify farming systems problems and constraints, and also market research to anticipate farm forestry product flows and market opportunities.

An integrated approach would also require further research on developing more complex systems e.g., mixed species plantations, multiple-story intercropping, that provide greater economic and ecological stability, and hedge against market and price flucuations.

FFP should continue to move towards testing farm forestry models which are integrated into existing farming systems. Assuming that the program adopts the proposed new geographical focus on mountains, arid zones, and coastal areas, it will be essential to work closely with households, moving away from the earlier emphasis on larger scale, more easily controlled village farms, experimental forests, or state farms.

The project has already had many years of experience working with households in the paulownia program in north China and with the gallnut project in south China. To work effectively at this level, it will be necessary greatly to strengthen the diagnostic and delivery components of the program.

(3) FFP should work with different levels of land management in close geographical proximity within the same ecosystem.

In addition to designing models suited to different ecological conditions, FFP should work at different management levels such as: state-owned and managed land, collective land managed by local governments, group-managed land, and individual household-managed land. Management structures, institutional issues, incentive structures, and capacity to adopt new technologies will differ between these different forms of management. By designing farm forestry systems suited to different categories of land managers in the same area, conflicts such as those between a State Farm such as Nanhua and neighboring villagers, for example, might be minimized.

(4) Farm forestry models should be designed with the assumption that rapid changes are taking place in rural China.

Increasing the diversity of the components and structure of the models can reduce risk due to changing markets. Designing farm forestry models with different management options would allow farmers to adjust systems to suit their own circumstances (this is already being done with the gallnut subproject). Labor requirements should be examined carefully given the likelihood of significant changes in the rural labour force as migration towards urban areas continues.

Changes which would affect the management of farm forestry systems include changes in the gender and age of the labour force and in the extent to which some regions make use of hired labour from other regions.

(5) Increase networking efforts within and outside of China to maximize farm forestry demonstration, extension, diffusion and information exchange.

Within China, many diverse organizations are working on different aspects of farm forestry (see section 4.2) and FFP should seek closer collaboration with these organizations. For the specific objective of establishing a farm forestry information center and databases, collaboration should be sought with the Institute of Scientific and Technological Information, the only CAF institute that has not previously been involved with FFP.

The team appreciated the three-prong strategy for farm forestry extension in China that focuses on reaching (1) leadership, (2) technical staff and (3) farmers. This strategy should be continued and strengthened, and FFP efforts must be integrated to the maximum extent possible with national programs in farm forestry.

Farm forestry research and extension should be carried out with interdisciplinary teams. In this regard, more teamwork should be developed with agricultural (particularly farming systems), livestock, fishery and social scientists from different institutes and universities, and there should be greater involvement of farmer technicians at the grassroots level.

Internationally, there is high potential for increasing collaboration between FFP and several international networks and organizations (see section 4.3). There should be more systematic effort and support to promote relevant exchanges of information, personnel, germplasm, research results and extension methods in farm forestry throughout the Asia-Pacific region. In this regard, regional networks such as APAN and FORSPA should be fully utilized.

(6) Policy research and analysis based on imperical FFP experiences should be undertaken, and the results communicated effectively to policy-makers and leaders.

FFP is not in a position to change government policy. The program has, however, highlighted the effects of policies such as land tenure and distribution, taxation and imposition of fees, or the allocation of rights and responsibilities between different levels of government and farmers on the success or failure of farm forestry. Well-documented analysis of some of these issues would be an important contribution to the process of policy formulation.

During the next phase of the program, CAF is well-placed to carry out some of these studies. CAF is also well-placed as a 'neutral' research institute with good linkages to government agencies, to work with farmers to design and test some institutional innovations in new FFP pilot sites. These innovations could include facilitating transfers of land use rights between farmers, finding alternatives to land reallocations, or supporting farmer-organized groups and associations for technology diffusion, forest management, or marketing of forest products.

(7) The next phase of FFP should include training in social and economic analysis of resources management systems.

An intensive summer school in 1995 taught by a small group of experienced specialists who have worked in China would be one way to build capacity in this area. Topics to cover might be:

- Basic theories in the social sciences relevant to resources management
- Identification of key questions for research
- Methodologies (e.g., survey research methods; rapid assessment methodologies; economic research methodologies)
- Analysis and interpretation of data

The Ford Foundation might be willing to consider offering support for training of this kind if it could be linked to ongoing Foundation-supported programs in social and community management of forest resources.

(8) Improve the gender balance in FFP work.

There are women involved in the program but very few women are involved at a level where their voice is heard in decisions about the content and directions of the program. FPP's proposed shift to program more firmly based at the community and household level will require more contact with different groups of farmers, including women. More women on the team, with a greater role in planning and decision-making can only enhance the program's effectiveness. Therefore, there must be greater efforts to involve more women scientists, extension workers and farmers in all aspects of FFP, and gender analysis must become an integral part of diagnostic studies.

(9) FFP should count the number of farmers involved, not just the number of hectares planted.

Some economic analysis has been done on a per-household basis, but most has been done on a per-hectare basis. The evaluation of projects would be more convincing if the criteria for evaluation focused more clearly on farmers.

(10) Improve presentation, analysis and interpretation of data.

Excellent work in the field is poorly served by questionable reporting and analysis. The credibility of subprojects is often compromised by dubious conclusions drawn from limited data. This can be avoided by more rigor in the preparation of research reports.

More care is needed in how analysis is done, on presentation of results, and on conclusions drawn from the data. Many cases of dubious results. This is particularly important in the context of considering how to disseminate information and achievements domestically and abroad.

SUGGESTION: A workshop on data-crunching and presentation.

Research testing and analysis needs to be done not just on a per hectare basis, but needs to be done to accord with socioeconomic realities. The same AF model could/should be analyzed on a plantation, collective/village farm, and household basis. It is likely that the costs and benefits, availability of labour, harvesting schedules, and so on will have a different impact on these different categories of owners.

Could often achieve the same objective - or better - by talking to farmers, PRA and/or survey research methods. ie research on working conditions under AF tea plantations vs open tea plantations.

More thought needed about what questions to ask.

ie. Frequently heard about problems caused by shifts in policy w/respect to land and tree tenure. Seemed to be a significant constraint on AF systems, but no research has been done on it.

ie. Heard that collective forest farms work in Zhejiang because of alternative income possibilities for households. Becomes important then to have a better idea of the parameters involved. Who are the farmers who take on forestry (those left behind? Those who are most prosperous to begin with? Those with a lot of labour available? Those with very little labour available?) What is the key constraint that must be removed before they will take action, take on a contract, do forestry (technical know-how? Confidence in the policies? Scale of operations? Availability of market outlets? marketing organizations?)

SUGGESTION: A seminar/workshop to assess what questions need to be asked. (FF could be interested in co-operation here) More co-operation with social scientists and more direct survey work with farmers (FF might be able to help here).

(11) LEARNING FROM NEGATIVE EXAMPLES [sensitive issue maybe?]

It is important to look at where things go wrong as well as where they work. An understanding of what makes things go wrong helps avoid future problems.

ie: Second generation conflicts. Talked about it. Most people agreed that the risk is there. Discovered in Lin'An (at the village with the collective forest) that in a village in Anji there has already been a violent confrontation over forest land: from what I could gather, the wasteland had been taken over as collective forest with villagers having rights to the produce when the time came. As the trees reached maturity, the village authorities took all the decisions themselves without discussing with the so-called 'shareholders'. Led to confrontations and violence with the villagers claiming that the leaders had unilaterally altered the terms of the original contracts. When I tried to learn more about the issue, I was told that 'we are not here to talk about that kind of thing, it is being sorted out by the authorities'. We should be talking about this kind of thing though because if we can understand why it happened, we can build in ways to avoid similar conflicts in the future.

(12) MARKETING

Work with Nanjing Forest Products industry is an excellent approach to building markets for AF systems. China has a lot to teach other countries here in ensuring that AF systems go beyond mere subsistence. Medicinal herb processing, bamboo preservation and processing all contribute to making the AF systems a real source of income for farmers (which of course translates into improved well-being as demonstrated by the nutrition survey). Areas where there might be further improvement:

Long-term economic and market forecasting. What will happen in ten years' time when vast amounts of Cunninghamia timber hit the market? If white tea becomes widespread, what will happen to the market? Are there new market opportunities?

Links between farmers and markets. Where the forest products are coming from plantations and village collective forests, links with markets are relatively straightforward. This will not always be the case. The farmer in Li'An county had no systematic sources of market information. It will be important to develop such systems.

Understanding of market movements and appropriate reactions: officials still react to market change by direct interventions to control price and output. Specifying permissible harvests etc. It would be worth conducting training to give officials a better sense of the workings of a market economy and what the real 'macro' economic controls are.

(13) EXTENSION SYSTEMS

i) Extension strategy of combining efforts of scientists, officials, and farmers is critical to success of projects. At the moment, however, the emphasis is on scientists and officials combining to teach farmers, instruct them, and supervise them to make sure that they follow the plans. Multiplying the channels of instruction and training may be helpful: officials would probably benefit particularly from a better understanding of the workings of markets. Scientists might benefit from stronger training on socioeconomic research/questions etc.

ii) Very worrying that we hardly ever heard of extension of techniques in terms of numbers of households or numbers of farmers. When we asked, informants hardly ever had any idea. They had a number of hectares, then divided by the assumed size of landholding per farmer and came up with a number of farmers. This approach is not going to work if there is more emphasis on diversity and if the clonal approach is taken for Cunninghamia and for Phyllostachys/sympodial bamboos. It is imperative to begin to design extension systems that work with farmers rather than try to specify targets for areas of land to be covered. The present approach where achievement is measured by whether or not the target is reached also lends itself either to false reporting or to coercion to force farmers to adopt a new technology.

(14) Consolidate institutional capacity and competence to strengthen the genetic improvement programs on Chinese fir, bamboo and rattan.

The approach followed so far by the CAF-IDRC FFP was mainly focused on direct involvement and support in experimentation. The rationale for redirecting this approach are diverse and presented below.

The IDRC support to field implementation in tree breeding is only a small part of the financial resource that is devoted to the breeding programs. For the most part funding of these activities comes from CAF's budget. Although very well appreciated the complementary contribution is not vital to the functioning of the program.

The IDRC contribution could have more impact if it could be used to fund activities that CAF's budget has difficulty to provide or cannot support at all.

What is needed, as explained below, is a greater exposure of Chinese scientists to the outside world. It is proposed to operate at two levels: (1) scientific management of programs; and (2) experimentation and mastering of tree breeding tools (scientist level).

Conception and management of a tree breeding program consists of defining objectives, investments, a time schedule, and implies making certain choices on methods and techniques as well as on plant material. It also means supervision over the quality of the

scientists and to assure the best possible environment for the program. In addition to personal capacity, these diverse tasks and responsibilities require exchanges with other laboratories and scientific teams of high level.

The good execution of a tree breeding program requires well- trained scientists, who must initially have creativity, a solid basic knowledge and a good sense of experimental organization. As they progress, tree breeding programs often require readjustments of methodology, improvement in the techniques, and devising new routes.

Tree improvement tools such as statistical design and analysis, vegetative propagation techniques, etc. evolve rapidly. Thus, a team has to receive continuous, updated information on the progress of technologies being developed.

IDRC could contribute to this by:

- encouraging and facilitating collaborative agreements/ twinning arrangements between established research teams (several outstanding scientific teams would be interested by such a possibility) and Chinese teams. A number of candidate institutes can be identified;
- providing fellowships to outstanding Chinese scientists for work with lead research institutes; and
- facilitating the participation to international meetings of researches leaders.

International organizations such as CIFOR can also contribute in this domain, as well as regional networks such as FORTIP.

4.0 OTHER SUGGESTIONS FOR FUTURE WORK

4.1 Prioritization

Research funds are becoming more scarce everywhere. Funds from Chinese sources tend to be concentrated in a few areas designated as 'key areas for research by national authorities and do not often support work which is exploratory in nature or breaks from well-established technical models. Funding from outside donors can complement domestic funds as well as provide rare opportunities for more experimental or innovative work. The first phase of the CAF-IDRC Farm Forestry program has often added to ongoing national research projects while testing new areas such as the links between farm forestry and community nutrition, or simple processing technologies such as bamboo shoot preservation which are suitable for adoption by households.

While many significant research results have been achieved during the first phase of FFP, the process of developing and implementing the program has uncovered many new areas of work deserving further attention. Program staff are now faced with a number of

ongoing programs which deserve continued support as well as new topics on which little or no work has yet been done. With limited funds available, it is important to prioritize FFP's tasks during the next phase.

The review team recommends that the first step in this process should be to translate this report into Chinese and to distribute it to all FFP co-ordinators and sub-project leaders before their next meeting. One of the topics of the meeting would be to discuss the report and to determine which of its recommendations could usefully be adopted in the next phase of the FPP program. The next stage in the process would involve listing and grouping research tasks, then prioritizing them by different criteria including their significance to program goals and objectives, urgency, and potential sources of funding. Such a process would assist the program leaders in preparing a final proposal for IDRC support as well as in requesting support from other national or international sources. If it is necessary to close some sub-projects, those concerned would have a better understanding of why the decision has been made if they have been involved in the process in this way.

4.2 Collaboration with Other Chinese Institutions

The CAF-IDRC Farm Forestry Program has made unusual efforts to reach out to a wide range of research institutions, as well as working closely with government agencies where appropriate. The benefits of this approach can be seen in the important role played by institutions such as the Research Institute of Chemical Processing and Utilization of Forest Products at Nanjing which normally has little access to support from international donors. The willingness of the program coordinator to reach beyond his own group of researchers has been a key factor in the achievements of the FFP program so far, and has contributed significantly to the emergence of an active and widely spread network of researchers working on farm forestry in China.

There are perhaps three areas where FFP could usefully extend its collaborative efforts. One is to reach beyond the forestry community and invite participation from others such as the agricultural research institutions, or the system of Academies of Social Sciences which reaches from the national level to each province. Another would be to develop closer links with the Chinese Academy of Sciences system which has a number of institutes working on intercropping, indigenous land management systems, and biodiversity in agricultural ecosystems. A third area would be to involve some of the country's leading institutions for training forestry and agricultural staff. A very rapid and incomplete listing of some potential collaborating institutions would include the following:

•A small group of researchers in the Institute of Agricultural Economics (Chinese Academy of Agricultural Sciences) is working on the role played by farmers associations in introducing and popularizing technical innovation in poor areas.

- The Rural Development Institute (Chinese Academy of Social Sciences) has carried out several research projects on household economic behavior, the linkages between environmental degradation and poverty, and is now planning a project looking at the links between forest management, tree crops, and village-level development.
- The Institute of Soil Sciences (Chinese Academy of Sciences) in Nanjing has developed links with ICRAF in Nairobi and has developed a network of researchers and practitioners throughout the country interested in agroforestry. Links are developing between this group and the CAF-IDRC FFP. These moves to strengthened cooperation are welcome and deserve further support.
- The Kunming Institute of Botany (Chinese Academy of Sciences) has a group studying indigenous agroforestry systems in Yunnan province. This group may be receiving support from the MacArthur Foundation to test agroforestry systems using indigenous species in the tropical region of Yunnan. The Institute has also done extensive taxonomic research on indigenous rattan species, as well as field tests with teak and with natural riparian forest in upland agricultural systems.
- FFP already has good contacts with Beijing Forestry University which has an active group working on Paulownia agroforestry models in northern China. Other leading Forestry Universities and colleges around the country have courses on agroforestry/intercropping systems, or have staff working independently on the topic. Strengthening these links would help build sustainability in the FFP by preparing a corps of trained professionals for the future.

Finally, in order to facilitate dissemination of the results of FFP throughout the forestry community in China, increased co-operation with the Institute of Scientific and Technological Information (ISTI) at CAF would be desirable. If the Institute is not considered to be sufficiently active in disseminating information (as opposed to collecting it), then mechanisms should be built into the next phase of FFP to encourage ISTI to become more effective. Support for regular thematic workshops and seminars bringing together FFP staff and other specialists from outside the program might be one form of assistance that could strengthen the role of ISTI and contribute to the overall impact of FFP.

4.3 Collaboration with International Organizations

China's economic transformation has not discouraged international donor interest in China, but it has prompted donors to look more closely at how their support is used. There is a sense that with increasing prosperity China is now in a position to take on a greater responsibility for some areas of her own development. International funds could then be concentrated on areas where returns may be slower, where special assistance may be needed,

or where China's problems have a direct bearing on global concerns such as the loss of biodiversity or greenhouse gas emissions.

Donors are also increasingly concentrating their support on projects which match their own program strategies. It is important therefore to be familiar with an international donor's mandate. Proposals should make it clear how the proposed project complements work already being carried out by China, how international assistance can be most effectively used, and how the project fits into the broader picture of China's own national priorities, international concerns, and the donor's mandate. As an example, an institution such as the Nanjing Forest Products Institute is carrying our excellent work with practical applications. It would be likely to attract more donor interest though if background materials introducing the institute were to put more emphasis on the its mission to find applications of its basic research in addition to statistics about the number of scientific papers and results which have been published.

4.3.1 FAO-APAN

In 1993, China became an APAN member country through the UNDP-funded FARM Program (RAS/92/078), which has seven subprograms, including the agroforestry subprogram implemented by APAN. The APAN National Coordinator is Prof. Xiong Yaoguo, Director of CAF's Research Institute of Forestry in Beijing. As Prof. Xiong is also the FFP Paulownia subproject leader, collaboration with FFP can be easily facilitated through him.

APAN activities focus on four areas: agroforestry coordination mechanisms; information and technology exchange; training; and innovative field activities.

As an example of the types of collaborative work being supported, the 1994 APAN activities in China, which are undertaken and supported with CAF and APAN resources, are presented below:

Activity	Timeframe
Establish a National APAN Secretariat at CAF with 4 staff	February
National Agroforestry Working Group meeting with 50 participants, including farmers	November
Field extension meeting at Wuyishan, Fujian province with 65 participants (scientists, technicians, extension workers and local officials	8-13 January
Agroforestry demonstration plots: 100 ha (10 ha with APAN support) at Wuyishan; 67 ha at Liuminying ecofarm	April, September
Publications: (1) report on Indonesia study tour; (2) semi-annual news about agroforestry in China in English (1,000 copies); and (3) translation of *APANews* and other material into Chinese (2,000 copies)	June, December

In addition to the above national activities, CAF will also host an international training course on farm forestry and agroforestry technologies, extension and marketing, which will be co-sponsored by APAN, IDRC and RECOFTC/FTPP. The training course will be held 19-30 September 1994, and will include a one-week tour of FFP sites in the subtropical and tropical zones. Participants from 11 Asian countries will be invited.

4.3.2 CIFOR

Areas where collaboration between CIFOR and the Chinese Academy of Forestry would match both China's needs and CIFOR's strategy were discussed, and four areas of mutual interest were identified:

(i) Long-term productivity in tropical plantations

Plantation forests in the tropics are an increasingly important resource. They are seen as one of the main strategies for alleviating deforestation of natural forest systems. Fast growth and short rotations make plantations attractive, but the sites on which there are established are often not of high fertility. Very few data exist which report yields from successive crops which might shed light on the question of plantation sustainability.

If tropical plantations continue to be promoted it is essential that evidence is obtained on whether plantation forestry in the tropics is a sustainable technology. Agricultural precedents would suggest not, but their time scales and cropping patterns are wholly different and thus largely irrelevant. It is important for forestry to establish its own evidence acrosss a range of sites and species throughout the tropics.

CIFOR propose to establish and co-ordinate a network of long-team monitoring plots in all regions of the tropics in collaboration with commercial or national forestry organizations. Plots will usually be in industrial plantations as examples of intensive management and subject to good security in the long team. Both measurational and soil data will be collected using standardized protocols.

CIFOR intend to run network over many decades, and hence rotations of trees, though the individual research inputs in any one year will often be small or even non-existent. Tree growth assessments and one soil assay are proposed per rotation.

There is a growing concern in China that declining productivity may be the most common feature of successive rotations of Chinese fir on most sites. Chinese researcher of the Academy of Forestry who were met during the mission have expressed their interest and willingness to be involved in the proposed network.

(ii) Plantation of mixed tree species.

Intuitively, both foresters and general public feel that a plantation or woodlot of mixed species will ensure a better management of often meager resources in soil moisture and nutrients. It is also currently assumed that plantations of mixed tree species will be less susceptible to pests, diseases and other hazards during its lifetime that will a mono-culture plantations. In the context of farm forestry, mixture of tree species offer the advantage of spreading labor requirements through the seasons and in certain cases (Indonesian afforests for example) of a regular source of income thanks to a wide variety of products with different period of harvest.

One indicator of the potential importance of mixed-species plantations is the several species-rich home gardens and orchards which farmers have developed over the centuries in the tropics. Timber trees nursing crops such as coffee, cacao and anti-erosion and/or wind-protection multi storeys plantations are also examples of successful mixtures of tree species However, many other experiences suggest that plantations or mixed timber species have been difficult and costly to manage. One species often becomes dominant yet does not achieve the potential of its growth in a pure stand.

CIFOR research will determine if there are sound eco-physiological reason for supporting plantations of mixed tree species. Specific studies may include:

- Effects on the dynamics of litter production (build up) , breakdown and nutrient release of mixed plantings (several species mixtures) in comparison to monocultures.
- Development of root systems in the relation to competition between species for water and nutrients.
- Scope for long-term soil productivity of silvicultural systems alternating rotations of Nitrogen-fixing tree species and rotations of species currently used in monocultures such as eucalyptus and pines.

(iii) Rehabilitation of indigenous flora into degraded lands through the catalytic effect of forest plantations.

Persistent physical, Chemical , and biological barriers, or stresses, often prevent natural forest successional processes from operating on a time scale compatible with short- or medium-term human needs. These barriers to natural forest regeneration may include one or more of the following: low propagule availability (seeds, root stocks), seed predation, non-availability of suitable microhibitats for plant establishment, low soil nutrient availability, absence of fungal or bacterial root symbionts that facilitate plant nutrient uptake, seedling predation, seasonal drought, root competition with grasses, and fire.

Observation in many sites of the tropics and subtropics have shown that forest plantations can provide a favorable environment for the rapid re-establishment, through natural regeneration, of native and/or naturalized tree species.

Preliminary studies indicate that several biophysical factors exert a significant influence on re-colonization process. These include: (i) provision of feeding, roosting , and/or roosting habitat for bird and bat seed-dispersers; (ii) distance from seed sources, critical for wind-dispersed as well as bird or bat dispersed species; (iii) understorey light environment (seed germination and seedling growth favored.by relatively thin canopy cover); and (iv) plantation stand age (related to canopy development and moderation of understorey microclimatic conditions). Preliminary observations also suggest that plantation species selection strongly influences the rate at which native species colonise the understorey due to differences in their canopy characteristics, litter accumulation and decomposition rates.

If confirmed on biological ground, the so called "catalytic effect" could add a new and decisive economic value to tree planting for land rehabilitation. For example if /whether it will be possible to reestablish, at a relatively low cost, timber species which in the medium term will replace the originally planted fast-growing species of less economic value.

Several key questions need to be investigated across numerous sites in the tropics to determine to what extent these preliminary observations can be generalized and translated into prescriptions for successful rehabilitation of native tropical forest ecosystems. These pertain to the effect of plantation species selection, the influence of local land-use history and the composition of vegetation in surrounding landscapes, the seed dispersal and regeneration requirements for desired native forest species, the role of wildlife, the importance of mycorrhizal fungi and soil fauna, local awareness of the value of native secondary forests, the dependence of villagers on understorey products and its seasonality, property and user rights.

There is only a limited number of sites where forest plantations embrace a sufficient variety of biophysical characteristics (soil fertility, composition of the surrounding vegetation, plantation distance from natural forest, plantation age, composition of plantation species, etc.), and socio economic conditions to allow for systematic and thorough investigation of the above described phenomena.

The Chinese fir plantation in China where the phenomena has observed, fulfill the basic requirements and should be considered as a potential research site.

(iv) Policy research

CIFOR's program in this includes:

Policies and incentives to ensure the sustainable development of natural forests and to encourage reforestation of degraded lands.

- Systems for equitable distribution of the benefits and costs of forest goods and services.
- Analysis of the process of policy change.
- Policies to optimize employment and income from forests.
- Application of information on location and types of global and national forest resource to satisfy future demands for goods and services.

(v) Products and Markets-activities on Non Wood Forest Products

Forests offer a large amount of wood and non-wood products (NWFP), as well as several key environmental services. Communities living in or near forests have traditionally benefited from many of those products, that frequently represent a significant par of their home consumption and cash income. Nevertheless, the attention on the production capabilities of forests, and particular of tropical forests, has centred on timber, leaving aside the present and potential role of NWFP as well as the environmental services.

In recent years, a new view of the issue has emerged that tries to value NWFPs and to understand what they represent in people's views, in the market and in forest economy as a whole. This new view has been supported and even triggered by an increasing amount of research and literature that has been produced for more than two decades. A very wide range of environments from almost every tropical country have been studied with different focuses and professional backgrounds. However, the differences in methodology, scopes, range of interest and depth of research have prevented a global view of the evolutionary trends in this very complex and dynamic sector. This overview is particularly important in the present moment when rapid action is required, and could play a major role in guiding the development of new techniques and policy proposals.

The first attempts to get a global picture have followed a "commodity focus, catalog approach", listing products and their uses from different parts of the world. This is admittedly a first, basic step to build upon. However, it is clearly insufficient to understand the complex relationship between people and products and their evolutionary trends. This reduces their value to technology and policy proposals with the ultimate aim of improving the chances of sustainable development of the people, usually poor segments of the rural populations, depending on those resources. It is also insufficient to enlarge the still narrow focus in assessing the conservation values of forests that can offer a sustainable yield of products and environmental services.

"Products and Markets" will concentrate its efforts at this stage on trying to develop a methodology and to estimate joint research activities aimed at getting a global picture of the dynamic forces/evolutionary trends within the very complex sector of NWFPs.

The 4 main activities, in sequential order, envisaged for the next 2 years are:

1. To develop a conceptual model that can be applied to analyse the production, distribution and use of NWFPs at a global level and from a broad perspective.
2. To develop a research protocol aimed at data collection and comparative analysis.
3. To collect field information and to analyse it to feed back the global model.
4. To provide practical guidance on policy reform and techniques that can improve the social benefits from the use of NWFPs without degrading the forest resources.

Given the importance of NWFPs in China and the extensive experience on traditional and modern techniques developed for these products, we could envisage areas of potential interest for co-operation, like fibres, resins, food and medicinal plants.

4.3.3 Ford Foundation

The Ford Foundation's program in Rural Poverty and Resources is shifting from broad support for China's poverty alleviation effort to a sharper focus on the links between poverty and the management of forest resources. The Foundation is supporting experimental social forestry projects in Yunnan and Sichuan provinces and is beginning to look at the possibility of developing professional training capacities in key forestry training institutions in southwestern China. The Ford Foundation and the CAF-IDRC FFP program have been in close contact since 1989 although there have not, so far, been any joint activities.

Areas of possible future co-operation might involve support for training to build capacity in socioeconomic analysis of forest resources management systems, and for innovative approaches to extension and dissemination of information (the Foundation already supports a network and newsletter on 'Forestry and Society' managed by the Institute of Scientific and Technological Information at CAF).

4.3.4 Other Organizations

ICRAF: exchange of information and databases (including ones to record agroforestry experimental data); international training opportunities

FORSPA: farm forestry research grants; international meetings for forestry researchers; information exchange

RECOFTC/FTPP: training in community forestry, extension, marketing of non-timber forest products

INBAR: information exchange and support for bamboo and rattan research

FORTIP: networking and research support for tree improvement of plantation species

Foundations (other than Ford Foundation): The area of greatest interest to non-governmental donors such as Foundations is currently the maintenance of biodiversity, and the broader theme of 'Environment and Development' as discussed at the UNCED coference in Rio de Janeiro in 1992. Foundations tend to focus their work on improving

people's livelihoods rather than on basic research. Although most Foundations have limited funds, they can be a useful resource because they are more flexible than bilateral and multilateral donors, and are often interested in supporting innovative, 'cutting edge' work which larger donors may initially be reluctant to support.

Although it does not have an office in China, the MacArthur Foundation is already supporting research on agroforestry systems with indigenous species in Xishuangbanna and has a commitment to continue working with China in the immediate future. The Rockefeller Foundation (no office in China) has supported several projects in China with a focus on agricultural research (including a gene bank at the Chinese Academy of Agricultural Sciences, and surveys of agricultural soils in China). The Rockefeller Brothers Fund (also no office in China) supports a small program on sustainable agricultural systems which has some potential areas of overlap with the FPP program. Germany's Naumann and Ebert Foundations both have offices in China and are active in the field of rural development.

APPENDICES

1. Itinerary of Review Mission

May 19 Arriving in Beijing

May 20 AM Briefing of FFP in Beijing, Review relevant documents and past reports, meet subproject leaders based in Beijing, and progress reports by individual subproject leaders.
PM Visit farm forestry models in the suburb of Beijing

May 21 AM Continuous progress reports by subproject leaders
PM Discussion on review framework and outline of review mission report

22 May AM Beijing - Hanzhou (Flight CA1509 8:20 - 10:50)
PM Meet subproject leaders for bamboo improvement, bamboo shoot preservation, subtropical farm forestry models, and Chinese fir.

23 - 24 May Visit hilly slopping agroforestry in Lin'an County and Bamboo Arboretum in Anji County.

25 May Hanzhou - Guangzhou (Flight SF351 13:20 - 15:15)

26 May Guangzhou _ Xinhui - guangzhou (car) Visit various types of farmland protective forest networks in Zhujiang River Delta.
Evening: Guangzhou - Zhanjiang (Flight CZ3921)

27 May Zhanjiang - Nanhua - Zhanjiang (minibus) Visit various rubber plantation-based agroforestry models in Nanhua State Farm.
Evening: Zhanjiang - Guangzhou (Flight 3922)

28 May Progress report by individual subproject leaders (fuelwood, rattan and tropical farm forestry models) and visit bamboo propagation in Guangdong Provincial Forestry Institute.

29 May Draft the review mission report.

30 May Depature.

2. List of Persons Met and Subprojects Visited

Project Titlte		Sites Visited	Persons Met
Farm Forestry Models	Warm Temperate Area	no	Lu Xinyu*, Liu Jianlong
	Subtropical Area	Lin'an, Zhejiang Province	Fu Maoyi*, Fu Jinhe
	Tropical Area	Nanhua State Farm, Guangdong Province	Zheng Haishui*, Yin Guangtian
Farm Forestry Tree Improvement	Paulownia	no	Xiong Yaoguo*, Zhao Danling
	Chinese Fir	no	Cheng Yitai*, Cheng Baiwang, Zi Jiwei
	Sympodial Bamboo	Anji, Zhejiang Province and Guangzhou, guangdong Province	Fu Maoyi*, Zhang Guangchu
	Rattan	Nanhua State Farm, Guangdong Province	Xu Huangcan*
	Fuelwood	no	Zheng Haishui*, Wong Qijie
Post Production	Utilization of Paulownia Foliage	no	Wang Boying*
	Mushroom Drying	no	
	Wood Utilization	no	Zhu Huanming*
	Bamboo Shoot Preservation	Zhejiang Povince	Shi Quantai*
	Rattan Grading	no	Xu Huangcan*
	Utilization of Gynostemma	no	Sheng Zhaobang*
	Chinese Gallnut Production	no	Lai Yinqi*
Information and Socio-economics	Bamboo Information Centre	no	Zhu Shilin*
	Community Nutrition Evaluation	no	Xie Yiming*
	Farm Forestry Extension	no	Zhu Zhaohua*, Cai Mantang
	Scoioeconomic Evaluation	no	Zhong Maogong*, He Qun
Coordination Office			Zhu Zhaohua, Cai Mantang, Jiang Chunqian

3. List of Documents Received

1) Project Proposal: Integrated Research on Farm Forestry in China (Farm Forestry (China) Program)

2) Technial Report of FFP (1990 - 1993) (2 volumes)

3) Summary Technical Report (1990 - 1994)