

FROM THE LOCAL TO THE GLOBAL PERSPECTIVE

Interaction of research at different scale levels

AN INTEGRATED APPROACH TO FOREST RESEARCH IN INDONESIA

Dr. W.T.M. Smits

The International Ministry of Forestry-Tropenbos-Kalimantan Project, Indonesia

1. INTRODUCTION

The Wanariset Forest Research Station falls under the jurisdiction of the Indonesian Ministry of Forestry through its Forest Research Institute Samarinda. Wanariset is located near the village of Samboja, between the cities of Balikpapan and Samarinda in the province of East-Kalimantan. It was officially established in 1978 as a field station for the Centre of Forestry Research in Bogor, but developed few activities until 1985. That year marked the start of the project 'Mycorrhizae in the Tropical Rain Forest', a joint project between the Wageningen Agricultural University of the Netherlands and the Forest Research and Development Agency of the Indonesian Ministry of Forestry.

In November 1987, a new project started at Wanariset: 'The Tropenbos-Kalimantan Project' (now called 'The International Ministry of Forestry-Tropenbos-Kalimantan Project'). This project was to continue the work of the previous project and was to extend the programme with 'Growth and Yield Studies' and 'Soil and Site Research'. The focus of the programme was on efforts to rehabilitate the forest. Its basis was a Memorandum of Understanding between the Indonesian Ministry of Forestry and the Dutch Ministry of Education. Later, Tropenbos became an independent foundation, and the state forestry enterprises, *PT. INHUTANI I and II*, were incorporated into the cooperation. Still later, the Association of Indonesian Forest Concession Holders (*APHI*) became more actively involved.

Since then, the project has run for 10 years and has undergone many changes and developments. The cooperation has been evaluated by the Ministry of Forestry (*FORDA*) as one of the best foreign cooperative endeavours. Also in terms of the Tropenbos philosophy, the Indonesian site has probably come furthest in achieving Tropenbos's goals of bringing research results into operational practice and of influencing forest policy. The project has been used as an example for many other projects, leading, for instance, to regional interest from neighbouring countries and from organisations such as the FAO Forspa Programme.

This paper will present a brief historical overview of the factors and approaches that have contributed to reaching the present situation. It will also sketch some ideas for the possible future direction of the project. The recurring theme in this overview and analysis will be integration: the integration of (i) practical aspects; (ii) developmental stages of the project; and (iii) research subjects. It is hoped that the relatively long and multi-faceted experience obtained in the project can provide other projects with valuable inputs as well.

2. DEVELOPMENT OF THE PROJECT

2.1 Infrastructure and basic facilities

In 1985, the Wanariset Forestry Research Station consisted of a few wooden buildings and a non-functioning greenhouse. There was no electricity, no water supply, virtually no staff, no communication facilities, and no means of transport. Still, because of the following considerations, this location was chosen to become the central location of the project:

- The presence of forests of various types and conditions in the research forest (within walking distance) and in nearby forest concessions and protected forests;
- A wide variety of social factors such as local people of various cultural backgrounds and with different methods of land cultivation;
- A strategic location between the city of Balikpapan - the gateway to East-Kalimantan, with its harbour and international airport - and the provincial capital of Samarinda, which guaranteed easy access for potentially interested persons and attention to the project;
- Easy logistics for supplies from the nearby city of Balikpapan.

To start a project under such conditions is not easy, and, with the very limited annual budget, careful choices had to be made in developing facilities and infrastructure, and in allocating funds to research and operation. All aspects were equally important in that no research could be done if no operational budget was available and that it was very hard to keep people motivated to do research without any facilities or operational budget. It should be mentioned that, as a positive effect of the severely limiting starting conditions, all initial research was very simple and practical, which soon started generating interest from the forestry sector in East-Kalimantan.

The growing confidence in the project made it possible to solicit the participation of the state forestry enterprise *PT. INHUTANI I*, which provided staff (Dr. Irsyal Yasman), some facilities for transporting materials, and some additional houses for personnel. Starting with old second-hand cars and motorbikes (all of which are still the basis for operating the station, and all with an average of more than half a million kilometres of usage and an average age of 15 years), and the appointment of a mechanic to the project, the facilities for living and working at Wanariset improved. It still took another four years before some form of reliable supplies of electricity and water became available.

Then, through extra funding from Tropenbos and *APHI*, it became possible to build a herbarium - a building that included a multi-purpose room for lectures and meetings and an experimental and educational nursery, where demonstration-scale research could be performed. Through cooperation with the local police, a radio link was established with the police and Balikpapan, which greatly improved security. Other developments were made possible through increased support from the Ministry of Forestry and other parties (e.g. the Balikpapan Orang-Utan Society).

In the meantime, the Wanariset Research Station has developed into a 3-ha compound with reasonable housing and dormitory facilities, a good electricity supply, several (radio) telephone lines with access to Internet, a soon-to-be-reliable water supply, a laboratory, operational greenhouses and nurseries, a canteen, an information centre, an excellent accredited herbarium, and well-trained support staff. It has also become the centre for many new local job opportunities. One feels that it is this gradual physical development that has led to the present set-up, which is greatly enhancing the possibilities for doing research. Over the years, the number of students working at Wanariset has increased, as has the number of researchers. Also the number of outside parties asking for support from the Wanariset Station is constantly growing.

In combination with local experience and knowledge about the forest environment, the Wanariset Station has now become a prime location for doing research that is efficient both in time and in costs. This is attracting many other parties, such as researchers from abroad and from CIFOR, who come to work at Wanariset and in this way enhance the total research output. By being selective as to the type of research that receives priority for execution at Wanariset, the Ministry of Forestry of Indonesia and Tropenbos can create a multiplier effect. By operating a Programme Management Unit, the project has now set the scene for a wide range of research projects financed by various parties.

2.2 The organisational set-up of research

Problems associated with operating a station with a very mixed group of researchers and persons from different institutions consist of the standards of payment for support personnel, the various formats required for work plans, progress reports, budgeting, and so on. It is also difficult to deal with the different schedules for budgeting, reporting, etc., between the various partners in the project. Of course, there are also slightly different priorities for activities to be undertaken with the different partners, but these have proven to be minor obstacles. The yearly Work Plan meetings and the National Steering Committee meetings, where the Annual Work Plan is approved, have always been able to accommodate the different wishes in a satisfactory way.

Over the years, the Ministry of Forestry and Tropenbos have developed a very open and flexible organisation. One standard set of working conditions and rules was created according to Indonesian rules and regulations. These have become an example for many other projects. Some of the procedures have now been made the national standard in Indonesia. Through a 1995 Ministerial Decree, for instance, the financial standards for participating researchers are to be followed by all other foreign projects cooperating with the Ministry of Forestry.

Quite special is the accounting system used at the Wanariset Station. All expenditures of all partners are administered by the same Accounts Department, while allowing for the use of individual budgeting techniques and financial codes. The administration is checked by all partners in the project and twice a year by an accountant. This includes the expenditures financed by the local NGO, the Balikpapan Orang-Utan Society. This approach is extremely useful in overcoming temporary cash-flow problems, as, for instance, when Indonesian budgets are not available at the start of the financial year (delays can sometimes be up to half a year). The transparent accounting system may also help in attracting other research projects to the same location. Of course, the complexity of the system implies that the Programme Management Unit should be well-staffed and capable.

As with the infrastructure and the basic research facilities, good general organisational backing is vital in promoting research, including those activities not directly financed by the Ministry of Forestry and Tropenbos. The approach that Tropenbos has chosen to support its various sites through Programme Management Units would therefore seem to be a sound one.

3. FROM RESEARCH TO APPLICATION

All over Indonesia, the research findings of the project have been translated into large-scale application of the techniques, and into many policy decisions as laid down in Ministerial Decrees of the Indonesian Ministry of Forestry. Some of these concern the planting of Dipterocarps, inventory methodology, and Orang-Utan rehabilitation. Several components utilised in the project have contributed to this successful translation of research into application. These components are:

- Choice of partners in the project;
- Type of research subjects tackled;
- Integration of research results;
- Publication policy;
- Education and training;
- Information and feed-back from the field;
- Long-term involvement.

3.1 Choice of partners

Involved in the project are basic scientists (many of whom have written or are in the process of writing their PhD dissertations and are producing other scientific publications), applied researchers (for nursery trials, large field trials), end-users (*APHI* and the *INHUTANI*s), and policy makers (Ministry of Forestry).

This unique combination of partners meant that sometimes the scientific findings had already been tested on a practical scale before the scientific publication had come out. The opportunity to do large-scale trials at, for instance, the field sites of *PT. INHUTANI I* (Longnah and Batu Ampar) has the added advantage that it can convince policy makers that the research findings are feasible for large-scale application, not only by demonstrating this in the field but also by being able to provide some insight into costs and cost/benefit analyses of the techniques used.

Through cooperation with the people of the operational forestry sector (*INHUTANI I and II*, *APHI*), the team at the Wanariset Station has a good insight into the practical problems and the needs of users of forestry research. The feedback provided by these partners from field trials elsewhere is also valuable for further research planning.

3.2 Type of research subjects, publication policy, and the integration of research results

The type of research conducted has been crucial. The research started with very specific subjects (e.g. physiology and mycorrhizal surveys), but, from the start, it was always clear where the research would fit into the bigger picture. There was a publication policy in which, starting from scientific papers, the step was taken towards more practical overview papers, which eventually led to manuals for the application of the findings in operational field methods. Later, the policy papers and input in policy formulation also became important. In all project activities, the chain approach is clearly discernible.

The research first concentrated on the specific problem of the supply of good-quality planting stock for Dipterocarpaceae, but quickly combined this with studying the performance of many different tree species in a range of ecosystems and under various treatments. This especially developed under the 'Growth and Yield Studies', which, in their analysis, combined the 'Soil and Site' component. At the same time, initial efforts were made (as early as 1989) to translate the research findings into economic terms. The first example of this was the Nursery Model, a software package that enabled nursery managers to calculate the costs of producing Dipterocarp planting stock by various means of propagation. The model could also predict the practical inputs, both in terms of capital and means, that were needed to use these techniques.

The next step was to integrate the Nursery software into a new software package called the Cost Comparison Model. This Model calculates the costs of forest rehabilitation, including planting, maintenance, and harvesting. The Model has a modest possibility to adjust predictions of cost effectiveness, based upon growth and yield figures. Some of those figures can be derived from the database of long-term growth and yield plots initiated by the project, together with the English ODA:

the Clearing House for Growth and Yield Data in Samarinda.

In the Cost Comparison Model, different silvicultural systems can be designed and tested for their profitability. A different package with species-site-matching possibilities can be used to select the best species for the silvicultural system to be used. The latter programme utilises data from the Biodiversity Research Group as well as performance data from the Research Groups on the Propagation and Stand Establishment and on Growth and Yield.

The Cost Comparison Model is based upon blocks of terrain to which certain silvicultural 'options' are assigned. At present, work is under way to assign those blocks to map units in a GIS that will enable the use of remote-sensing techniques to monitor the predicted performance of the forest rehabilitation work.

The Cost Comparison Model approach is particularly suitable for forest rehabilitation and plantation establishment. Parallel to the above-mentioned work, activities were started on a better tree-position mapping methodology for natural forest, which also included detailed topographical maps. These maps are useful for detailed growth and yield plots, but the maps were originally designed to improve skid road design, which helps to reduce the impact of the logging operation on the post-logging condition of the forest. The new inventory technique (the software package named FIEPLP) provides the user with highly accurate tree-position maps that can be used to validate remote-sensing imagery, especially radar, and to determine whether harvesting has been done according to plan. FIEPLP is now widely used in Indonesia and training courses are regularly being given.

By having tree-by-tree data in the system, it also becomes possible to optimise the forest management according to the latest research findings. If, for instance, a species that was previously considered non-commercial becomes valuable, the harvesting and management of the forest can be instantly adjusted on the basis of the new values assigned to this tree species. This was the case with Ramin, which was once considered a weed species in the silvicultural manuals, but, after becoming popular in Japan, now ironically finds itself listed in CITES. It is critical, however, to have correct tree-species identifications and good species-based performance data. The Wanariset herbarium and botanists are working to produce a system for the quick and accurate identification of the most important tree species (e.g. through the production of a flora that stresses vegetative characteristics). Performance data (species-site matching, growth and yield data, etc.) can continuously be updated while research progresses. As mentioned earlier, this technology is especially suitable for natural forest management where a large number of species are found on small areas.

As can be seen from the sketchy overview above, the different types of activities in the Tropenbos-Indonesia project all come together in one forest management information system.

By focusing on the information needs for good forest management, priorities can be set for the research work. It is important that all the results can be used in an integrated way. This means that compatibility issues are very important. The present publication does not allow a discussion of all the research projects taking place at Wanariset and how they are integrated. For these, the reader is referred to the work plans and the Multi-Annual Plan.

Concerning the integration of research subjects, it is important to keep in mind the need to focus not only on ecological and economic aspects, but also on social aspects. The project has done a lot of work on understanding the interaction of people with their environment, both in traditional systems like those in the upper stream area of the Mahakam River and in areas recently encroached upon by non-

traditional shifting cultivators. As previously mentioned, this publication is not the place to enter into an exhaustive discussion of all the subjects treated in the Tropenbos-Indonesia project.

3.3 Education and training and feedback from the field

Another important factor for the success of the project has been its training and education programme. In 1996, as many as 425 people from various concession-holders and other forestry institutions followed training courses at Wanariset: on tree recognition, nursery management, forest inventory, fire-control management, and Orang-Utan handling. Many of the participants in these courses stay in touch with the staff at Wanariset after returning to their respective companies or institutions. They often provide valuable feedback from the field, which can be used to improve the research or to adjust software to specific conditions.

The Wanariset Station is also visited by many thousands of other people each year. Sometimes these visitors inform us about other problem areas as well. For instance, there are many requests from oil and mining companies in Indonesia to help them in rehabilitating their drilling and mining areas. Fertiliser companies are also interested in the Wanariset experience and want to have their products tested in East-Kalimantan. These contacts increase the potential for doing research and widening the horizon of research needs.

For the national researchers at Wanariset, one can offer some facilities to induce them to stay, but, for permanent researchers, the location of the Wanariset Station is not optimal when seen from a family point of view. Samboja is a small community, with perhaps sub-optimal opportunities for schooling in the direct vicinity of the Station, and it is far from shops and recreation facilities in town. The topping-up of salary that is provided to the Indonesian researchers is but a part of what motivates them to participate in the project. The opportunity to obtain fellowships for MSc or PhD programmes is the best motivation for the active, long-term, and dedicated participation by the researchers in the project.

The language skills of the participating researchers have also been an asset for the project, both at the project site as well as during studies in the Netherlands. Being able to solve problems in other languages is a definite advantage.

3.4 Long-term involvement

Another important factor for the success of the Tropenbos-Indonesia project is the long-term involvement of the partners. Indeed, it would be extremely difficult to build up infrastructure, qualified staff, databases, and so on, in a period of just three years, and then expect the project to be self-sufficient. Besides, it would be impossible to set up a herbarium in a matter of a few years. The development of a project of this kind must be gradual, with, over the years, a shift in the programme towards the better integration of research activities and field needs. There is a constant learning cycle, for instance with the farmers who have been involved with the project for many years and who provide valuable additional insights into field problems.

Many more concrete examples could be mentioned, but it is equally important to show that there is a joint commitment to the cause of sustainable forest management. To be able to work from a basis of mutual trust with its partners, a project has to prove its commitment to, and its understanding of, the situation. The long-term approach followed in the Tropenbos philosophy is therefore a very sound one, and not only because results in forestry tend to emerge less rapidly than in other fields.

4. PRESENT TRENDS AND FUTURE DIRECTIONS

There are a number of important trends discernible in the Tropenbos-Indonesia project. One of these is the increasing geographical area being covered by the project. Initially, the project started out just at the Wanariset Station and the nearby research forest. Later, research began in the nearby ITCI concession, the Batu Ampar concession, and still later in many other places in East-Kalimantan. Examples are the Longnah Dipterocarp Planting Project, the coal mine rehabilitation in Sangata, the study on non-timber forest products in the interior of East-Kalimantan, and botanical surveys in many more areas of East-Kalimantan.

More recently, the botanical work has been extended to cover all of Kalimantan and, through the feedback from many trainees, much more information could be collected from various other production forests as well. The Orang-Utan work is now also important for application in Sumatra. Recently, at the request of the Minister of Forestry, work started in Sulawesi to propagate some tree species specific to Sulawesi (belonging to the Magnoliaceae), where the techniques developed for the Dipterocarpaceae of Kalimantan proved to be useful for the Magnoliaceae of Sulawesi.

Many people from the South-East Asian region have visited the Wanariset Station, where training in various aspects of forest management has been given to people from Malaysia, The Philippines, Brunei, Thailand, Vietnam, Bangladesh, Pakistan, India, and Nepal. The recent request for support from Vietnam, under the Forspa Programme, also indicates that the present trend towards a much wider impact of the project is likely to continue.

It is expected that the strong basis of practical knowledge within the joint project will continue to be an important asset. Undoubtedly, there are many more tree species that could be propagated better with the techniques already tested for the Dipterocarpaceae. Also, the use of nutrient-efficient ectomycorrhizae will be just as important in other soils that have experienced erosion. Many other examples could be mentioned.

Another trend that is likely to continue in the future is the focus on integrating the research results into a forest management information system to make the results ideally accessible to forest policy makers. Especially the combination of ground inventories and remote-sensing techniques using GIS systems (with the main focus on radar technologies) and economic models for evaluation is the most promising direction to follow.

A year ago, a workshop was held to discuss whether a local foundation might be set up to enhance the work of the project. The large number of trainees, for instance, takes away time and facilities from researchers. A foundation could deal with consultancies, for which many requests are received; it could organise the training, and could operate facilities such as the canteen or a nursery that could provide plants to local people and other parties wanting to use local tree species. At the same time, it could earn income to enable more research to be done by the project. Researchers involved would gain a better insight into the field problems and therefore be better able to formulate research needs. They would also benefit financially in some way, so that working with the project would be easier for them. Through the foundation, the project would be better able to cope with the many requests for support without interfering with the on-going research programme.

Some seven years ago, an Indonesian Ministerial Decree laid the legal groundwork for such a set-up. Contract research is also a worldwide trend. It will be very interesting to see if an open approach to contract research can enhance the research potential in Indonesia. A name for the foundation has already been proposed (Bornean Meranti Foundation) and a first project with a gold-mining company

offers the opportunity to do additional research that had been planned before but had to be postponed for lack of funding.

5. CONCLUSION

Valuable experience in research project management has been gained under the joint Ministry of Forestry and Tropenbos Foundation project in Indonesia. The results indicate that the Tropenbos principles of influencing policy through practical research and an integrated approach to problems of sustainable forest management are correct and hold great potential for the years to come.

AN INTEGRATED APPROACH TO FOREST RESEARCH IN INDONESIA

Achievements

- Results of a multi-faceted research programme have become extensively integrated in Indonesian policy and forest management practices.

Challenges and Problems; Information Needs

- Extra managerial expertise is required for integrated programmes involving different institutes and budget lines involved.

Points for Future Research

- Development of a forest management information system.

Conclusions

- The research programme was built up from solving specific problems, eventually developing into an integrated approach to provide solutions for forest management.
- Adequate attention for translation of research into economic terms, and training and education programmes has been an important success factor.
- A long-term funding commitment is a pre-requisite for developing integrated programmes.