DISCUSSION AND INTEGRATION

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In this chapter the editors have assembled and integrated the conclusions of the speakers and the experts gathered in the two expert meetings on 26 November (›Linking policy and research‹ and ›Translating preconditions into policy recommendations‹). The chapter is organised along the lines set out by the Chairman, Prof. Dr. R. Rabbinge, in his Introduction of the objectives of the seminar (Page 21):

1. To present an overview of the role of Dutch research on tropical rain forests in an international context.
2. To identify crucial gaps in research on sustainable forest management and conservation.
3. To develop policy recommendations for improving the link between research and policy.
4. To develop recommendations for improving pre-conditions for effective research.

1. PRESENT RESEARCH CAPACITY AND OVERVIEW OF ONGOING RESEARCH

The report of Simons (1997), presented by Verhoeff, showed that there is considerable Dutch research activity in tropical rain forests. The total amount of funds involved could not be calculated precisely but may be around Nlg 50,000,000 per year; the manpower involved in this research amounted to some 220 full-time equivalents. Particularly strongly represented are research on conservation and biodiversity, sustainable forest management, sustainable land use planning and the people - forest interaction. Comparably less attention is being paid to utilisation, processing and trade; policy, the legal and institutional framework; reforestation and restoration of secondary forest and the use of their products; information, communication and extension; and climate change. In general, the natural sciences have a dominant position in Dutch research on tropical rain forests, while the social sciences are marginally represented.

According to Sayer, the comparative advantage of Dutch (*in casu* Tropenbos) research is its capacity to generate understanding of the functioning of forest ecosystems at large spatial scales and in their local social and economic context. Long-term, in-depth studies at a series of sites in the humid tropics contribute much to this advantage. He particularly emphasised the knowledge that is available about the response of forest ecosystems to human intervention. Sayer was supported by Smits, who also specifically pointed out that the long-term funding commitment to the MOF-Tropenbos-Kalimantan project of Tropenbos was instrumental in reaching the status and achievements that the project has acquired now.

Although much research is organised in large research programmes such as Tropenbos, it was noted that Dutch research efforts were scattered over 72 different institutions, raising concerns that the efforts may not be so well coordinated. Verhoeff recommended improving coherence by setting up a clearing house as a tool for improving the synergy and effectiveness of research projects.

2. PAST ACHIEVEMENTS OF DUTCH RESEARCH

One of the objectives of the seminar, reiterated by the Minister for Development Cooperation in his opening address, was to give an overview of the achievements of Dutch and Dutch-funded research efforts. What is known now that was previously not known, and to what extent did this contribute to better protection of the rain forest and improved living conditions for those people that depend on it?

The seminar provided several approaches to this question from the Minister: first, Verhoeff gave a summary of the recent report on Dutch research in tropical rain forests (Simons 1997), a study that was partly designed to answer this question. Second, some answers could be extracted from the presentations of the speakers.

Verhoeff concluded that it was very difficult to give an answer to this question, simply because even in successful research projects there is often a considerable time-lag between the conclusion of a project and the application of the results in the field. Also, research is only one of the components of applying new insights into practice. Verhoeff concluded that ›the Dutch-funded work in tropical rain forests is successful‹ and ›considering the results obtained so-far, the Netherlands does play a role‹.
The individual presentations gave additional insight, although it should be noted that the presentations were not designed to provide a complete overview of the achievements of research. The points offered have been summarised under Achievements in the boxes following each paper.

A further analysis of achievements mentioned by the speakers shows that much progress is reported from mono-disciplinary work that focuses on description, inventory, categorisation and providing technical solutions to problems, i.e. the fields where scientists traditionally excel. Examples are the steady (but admittedly too slow) progress in taxonomy and production of floras (Verhoeff), the inventory and description of indigenous social systems (Nkwi, Forte, Dijkman); of perceptions of local people on values of the forest and forest management; of traditional uses of plants (Forte, Nkwi) and animals (Hammond); the description and categorisation of ecological requirements of trees (Bongers); and the development of technical systems for the sustainable production of timber (ter Steege, van Leersum and van der Hout, Yasman).
Issues which are important for forest management and which have been raised on the international political agenda belong to a second category of achievements. Significant examples are biodiversity (Baas) and non-timber forest products (Forte, Hammond).
Thirdly, there are examples of successful integration and anchoring of research in the political, social and economic fabric of tropical countries, and the positive effects of this for the quality of life of forest-based people and the wise management and conservation of rain forests. It should be noted that for this category of achievements it may sometimes be impossible to attribute success specifically to Dutch funding or to research. Samper described the development of a national environmental authority in Colombia that is in charge of a research strategy and application of research results in policy. Smits showed that results of the Tropenbos-Indonesia programme are deeply integrated in forestry policy and guidelines in Indonesia. De Camino gave an example of the way in which research has guided the development of a forest management system by a concession holder in Brazil, and how scientific feedback mechanisms were incorporated in the forest management system. In the Philippines, improved community-based protection and conservation activities in a national park are the result of research (Araño and Persoon). However, there were also question marks put at the efficiency of research efforts for achieving these goals,

notably by Rijksen in the field of protection and a number of others on achieving social sustainability of forest management.

Fourthly, many instances were cited of training and education, both at the academic and at the vocational level; of enhancement of the capacities of local institutions to carry out research (Walcott, Smits, Nkwi); and of increasing awareness of stakeholders of the issues surrounding sustainable forest management and land use (Martínez).
Fewer successes were reported by the speakers on solving problems of a multidisciplinary nature, although many stated that progress is being made in the joint execution of research projects by scientists of different disciplines (Nkwi, Foahom, Martínez).

A somewhat different way of approaching the question whether research has achieved objectives of sustainable management and conservation of rain forests is to evaluate to what extent research objectives have aligned themselves to the policy guidelines of the Dutch government. The nine strategies of the Dutch policy paper on tropical rain forests (summarised by Verhoeff) seem to be an appropriate framework at an intermediate level of abstraction to which Dutch research efforts in the rain forest could be related. In this context, Verhoeff commented that there is a good attunement of the research projects with the defined priorities of Dutch policy on tropical rain forests. This means that policy and associated funds for research have successfully acted as instruments of direction (through conformation to national and international research agendas) and concentration (of activities at sites with integrated research objectives). Further, it has stimulated multidisciplinary and international (North-South) approaches to complex development problems. This has led to a decrease of basic research and a reduced influence of the (Dutch) research community itself on the research agenda. At the seminar it was clear that this was perceived to be different by some, showing that the process is not yet finished.

It seems justified to comment that at such a seminar there is a tendency to stress what is wrong in the management of tropical rain forests and what has gone wrong with research. The information need associated with the implementation of sustainable development systems is vast and often very specific to the locality where it is needed and to the requirements of the stakeholders. Information flows remain slow, even where mechanisms for effective communication of scientific results are in place (Martínez). The more information is being managed, the more complicated it becomes to retrieve the appropriate information at the right time and in the right place, even when it is there to be used. Further, the need for information is also a relative concept. Rarely a situation will be reached in which a user will conclude that no further information is needed. Similarly, there is a tendency for researchers to say that more information is required before definitive conclusions or recommendations can be reached.

These features may eventually prevent real advance in knowledge, and lead to misinterpretation of the real achievements of development oriented research. A more appropriate and fruitful approach to testing the impact of research is to test it against its own stated objectives. This approach encompasses the execution of a comparative impact study in the phase of project formulation and identification of objectives. This comparison evaluates the relative impacts of several scenarios of allocating funds and expertise, with at least three positive effects. The exercise will yield a clearer advance insight into the potential impact of the project; there will be a need to state the objectives in realistic and quantifiable ways (a need that was stressed by Lammerts van Bueren); and the objectives themselves will provide a suitable framework for testing the achievements at the end of the project. One scenario could be a ›null scenario‹ of investing no money and admitting autonomous developments to take place in the project area, a second scenario

could be to carry out the research programme with associated spin-off according to plan, and further scenarios could be to invest the same amount of funds in alternative projects in the same area.

3. IDENTIFY GAPS IN KNOWLEDGE AND APPROACH

One prominent issue at the seminar concerned the development of a research agenda. It is clear that there are many problems associated with the management of tropical rain forests, and many ways to organise research programmes dealing with them, but it is a challenge to develop an adequate research strategy prioritising the appropriate research questions. Jepma advocated to use a top-down approach. The problem is defined at a high level, and followed by a systematic identification of all factors that contribute to the problem. In this way a problem tree is developed, possible solutions proposed and priorities for research set. This method is not limiting, i.e. priorities for action or research may well be outside the scope of the disciplines that are presently carrying out research in the tropical rain forest, and may as well be outside the forest itself. Jepma stated that population growth contributed to deforestation to a much larger extent than many other problems identified at the seminar, and that therefore priority should be given to addressing the causes of population growth.

While this top-down approach is a useful exercise, it is also clear that researchable problems are found everywhere along the problem tree. A focus on the major problems and big issues leaves many others that are still obstacles to achieving sustainable management of tropical rain forests. An assessment of their relative importance and subsequent prioritisation would require a top-down analysis which starts at a lower level of the problem tree, viz. singling out those problems which are within the biophysical and social/socio-economical sciences.

Verhoeff and Sayer approached the issue of research strategies in a slightly different way. Verhoeff raised the question whether Dutch-funded research should focus on certain themes and thus play a more specific role in the international research community on tropical rain forests? This approach is somewhat at odds with developing integrated all-encompassing research programmes that follow from a top-down approach. Verhoeff=s question is in agreement with Sayer=s (and CIFOR=s) concept of comparative advantage, which assumes that optimum benefit can be derived when organisations and persons further extend their knowledge and capacities in fields that they are best equipped for (in financial or technical means, or by virtue of their historical development). Both views acknowledge that Dutch research cannot be seen in isolation from international research, and that strong points of Dutch research institutes (and researchers) should be further developed. In his presentation, Sayer argued that the Tropenbos comparative advantage might be its capacity to predict the response of rain forest systems to a variety of management interventions.

No exercise was carried out during the seminar of systematically identifying problem areas and proposing research programmes to address them. Several authors have gone to considerable lengths to do this for their own topics, in particular Nguiffo, Martínez, de Camino, Samper, Bongers and Baas. Their analyses should yield useful frameworks for setting up coherent and strategic research programmes. In most other contributions to the seminar at least some research needs were indicated or could be inferred from the analysis of problems. In Table 1 an overview is given of the most important and most frequently mentioned problem areas and associated research needs, without attempting to be complete. The recommendations have been grouped under several headings, and in many cases their scope has been generalised to some extent, in order to avoid too much specificity. Clearly, research programmes are only meaningful in their own specific setting, and global research agendas at best reflect common denominators of research needs. The grouping is not hierarchical and not part of any conceptual framework. The reader is referred to summaries given at the end of each presentation for the underlying problem analyses and research needs.

Table 1 Developmental problems in tropical rain forests and associated research actions that are required to relieve the problems, based on the papers presented at this seminar. Not all actions necessarily refer to research.

The legal and institutional setting

Problems identified by authors:
- Inadequate institutional and legal framework (e.g. length of concession rights) for forest management;
- Overlap in jurisdiction between government agencies;
- Improper (land use; forestry) planning mechanisms;
- Bureaucracy;
- Unequal access to natural resources for different groups within the population;
- Limited capacity for monitoring and enforcement of regulations.
- Lack of a mechanism to exchange information between researchers, planners, farmers and decision-makers.

Proposed research actions:
- Improve institutional (government and NGOs) and legal framework;
- Develop methodologies for land use planning, forest management and monitoring.

Land use

Problems identified by authors:
- Conflicting rights (e.g. people in conservation areas) and conflicting land use options (e.g. infrastructural projects and national parks);
- Deterioration of the quality of forest, agricultural land and soils as a consequence of inadequate land use (e.g. shifting cultivation).

Proposed research actions:
- Develop alternative and sustainable land use options;
- Develop mechanisms for assessing and planning optimum land use for forest lands.

Biodiversity and inventory

Problems identified by authors:
- Biodiversity is poorly described;
- The function of biodiversity is little understood;
- Appropriate knowledge is disproportionally distributed over taxa;
- Taxonomists are disproportionally distributed over the world (Martínez, Baas).

Proposed research actions:
- Identify and characterise the most threatened forest ecosystems (both flora and fauna) by carrying out inventory programmes with a focus on generating distributional information;
- Determine the minimum size of conservation areas needed to guarantee the integrity and functioning of forest ecosystems;

Table 1 Developmental problems in tropical rain forests and associated research actions that are required to relieve the problems, based on the papers presented at this seminar. Not all actions necessarily refer to research. (cont'd)

- Determine the relation between biodiversity and ecosystem functioning;
- Document the uses of biodiversity by traditional communities and study their management methods;
- Prioritise biodiversity research with emphasis on taxa that are of economic potential, are threatened or can be used as indicators and on high priority areas;
- Make existing knowledge accessible by constructing databases of collections and setting up gene banks;
- Develop the functional diversity concept;
- Develop monitoring programmes for important taxa.

Biophysical sciences (excluding forestry)

Problems identified by authors:

- Limited knowledge concerning mechanisms that govern growth and survival of plants (and animals);
- Lack of ecological base-line data;
- Poor ecological underpinning of silvicultural management;
- Little attention for the importance of plant-animal relationships for forest functioning.

Proposed research actions:

- Collect base-line data and develop an understanding of mechanisms underlying the structure and functioning of the forest ecosystem;
- Develop models as a tool to predict response of forest ecosystem to intervention;
- Develop monitoring systems for biodiversity and forest ecosystem functioning;
- Increase the understanding of population dynamics in fragments (primary forest remnants in secondary forests, forest islands in cultivated landscape).

Forestry

Problems identified by authors:

- Even though feasible harvesting systems have been developed, they are not applied;
- Application of silvicultural intervention may lead to an increase of undesired species that is much higher than the increase of desired species.

Proposed research actions:

- Design inventory techniques that improve estimation of volumes, defects;
- Optimise present best practices: inventory, planning, organisation, techniques for damage reduction;
- Incorporate biodiversity (and specifically plant-animal relations) and future silvicultural objectives in design of logging;
- Further develop various silvicultural treatments: compatibility with ecological requirements of species; natural regeneration; species choice; specificity of application; logging cycle; methods of tree elimination; effects of second felling; rehabilitation of logged-over and degraded forests; optimise replanting techniques;
- Carry out demonstration projects that show the applicability of improved forestry techniques.

Table 1 Developmental problems in tropical rain forests and associated research actions that are required to relieve the problems, based on the papers presented at this seminar. Not all actions necessarily refer to research. (cont'd)

- Develop cheap and reliable criteria and indicators for sound forest management; use these for monitoring forest practices;
- Develop models in the fields of ecology, forestry and forest economics, preferably on the basis of a GIS and at an individual tree level, leading to a forest expert system.

Economy
Problems identified by authors:
Limited information about
- The economical value of the forest, of biodiversity and of conservation;
- The contribution of indigenous economies to the national economy;
- The value of (lesser known, certified) timber and non-timber forest products on international markets;
- The costs and benefits of sustainable management systems.

Proposed research actions:
- Carry out studies addressing these issues.

Socio-economics
Problems identified by authors:
- Discordance between forest law and social organisation patterns of indigenous people;
- Different (and insufficiently known) perceptions of different actors on forest and forest management;
- Limited participation of indigenous communities in forest management and planning;
- Population increase.

Proposed research actions:
- Empowerment of various social units in order to stimulate meaningful input in forest use planning;
- Map spatial claims of various actors and determine zones of conflict about resources.

Methods and techniques
Proposed research actions:
- Compile and develop information on
- Properties of lesser known timber species;
- Safety aspects of logging;
- Improved sawmilling and drying techniques;
- Small-scale processing of forest products;
- Land-use planning techniques;
- GIS;
- Forest models.

3.1 Level of detail of research needs

It appears from Table 1 and the contributions during the seminar that for those problems that most require a multidisciplinary approach (here under the headings of institutional setting and socio-economics), the problem analysis and research agenda seems to be least concrete. This may reflect the complexity of the problems, and the number of parties involved in analysing and recognising the problem and setting the research agenda. In contrast, although monodisciplinary research (the

biophysical sciences, forest research) may sometimes incorrectly ignore its social and economic setting, the analysis of the problems and the research needs appear to be more concrete, which means that there is a better perspective for substantial progress in knowledge.

3.2 The need for models

The need to develop models in ecology, forestry, economy and other fields does not feature prominently on this list, although some contributions highlighted the importance of developing models as tools for the planning of management and predicting the effects of human intervention. This is remarkable for several reasons. First, the benefits of two scientific revolutions have started to become widespread, even in technologically less advanced countries: the computer revolution and, related to this, the statistical revolution. This means that advanced data analysis and modelling have become feasible.
Both forestry research in mega-diverse tropical rain forests, and multidisciplinary research with its multitude of criteria and sometimes incompatible research approaches require computer power and highly sophisticated statistical methods for making sufficient progress, if at all. The same is true for ›science that operates at the scale of landscapes, and that optimises the use of multiple products‹, as was advocated by Sayer.
One example: many silvicultural systems find their origin in research that was carried out in the first half of this century, aided by relatively simple analytical tools. Blanket analysis leads to blanket silviculture. One major conclusion of this seminar was that many of these systems do not work as they were intended to (because landscapes and species are not ›blanket‹), and a plea was made for a more individually based approach to forestry (Smits, Bongers, ter Steege, Yasman). This has a cost: a very large knowledge requirement. This can only be obtained from highly sophisticated analysis of very large datasets. A major trend in forest modelling is the development of improved individually-based growth models. At this moment such models only exist for the simpler forest communities of temperate regions, but there is much benefit to be had from developing such models for tropical forests.

Second, models provide an excellent means of structuring information needs and underpinning research priorities. This is alluded to Martínez for GIS-based land use models. What is more, this approach avoids the setting of research priorities without taking appropriate decisions for low-priority but still ›needed‹ research.

A third reason for emphasising the need for models is their potential for generalisation. Research, and particularly highly applied research, tends to respond to local problems, and produces local solutions. Ideally, it should be avoided to carry out similar studies in other, similarly local places. A modelling approach requires that underlying processes of the problems at stake are studied, and these are often of a more general nature. Models based on a mechanistic understanding of processes will have a much wider applicability than just the locality where they were built and calibrated, and this is a powerful means of avoiding unnecessary duplication of efforts.

3.3 Tropical rain forests are dynamical systems

Many biological (e.g., Bongers) and social (e.g., Dijkman) systems are of an inherently dynamic nature, not only on short time scales (such as El Niño effects on climate and fire regimes in Indonesia, Beek), but also on long time scales such as gradual changes in species composition of rain forest communities. Systems of sustainable forest management aim to achieve a situation that is implicitly stable: a certain level of timber production, a system of reliable NTFP production, a certain species composition. Depending on the level of human control over the system, it is not likely that stable situations can be attained or even exist. The species composition of tropical rain forests changes regardless of human interference; a multitude of motivations and incentives drives people around from one place to another; markets for forest commodities change as a result of new technologies and fashion. Sustainable management systems that do not acknowledge the dynamic nature of the underlying processes are bound to fail. This issue was little mentioned among the problems and research needs at the seminar, although there seems to be quite a large research challenge there. A proper understanding of dynamic systems requires that descriptive research (in taxonomy, biogeography, phytosociology, soil science, anthropology, etc.) is followed by research focusing on understanding the processes that define the dynamics of these systems. This should result in management systems which are process-based, i.e. systems that achieve management goals by influencing processes rather than manipulating outcomes. An example of this is forest management by manipulation of the light environment in forests, based on an understanding of light requirements of individual species, as described by Bongers.

3.4 Local issues and global issues

The information needs identified by the contributors reflect, logically, the context in which the contributor is working. Some of the information needs have a very wide field of applicability and a large range of potential beneficiaries, such as, e.g., the contribution of NTFP to national economies, while others are mainly relevant for the specific context for which they were identified, and have few potential users, such as, e.g., research on the marketability of certain lesser known timber species (de Camino). It is a relevant question where, on this scale, the responsibility of the international research community starts, and where the responsibility of the individual beneficiary ends. In his contribution, Sayer voiced the expectation that in the future ›research to support productivity increases and processing efficiency will be profitable and will be increasingly dominated by the private sector‹, whereas ›the role of public forest research institutes in the future should be to provide the scientific underpinnings for multiple use forest management with a heavy emphasis on environmental public goods and the equitable distribution of costs and benefits‹.

3.5 Semantic confusion and other misinterpretations

One obstacle in the advancement of research leading to sustainable management of tropical rain forests is the use of a dazzling number of terms and concepts which are confusing even to the scientific community itself. A number of examples will illustrate this point:

The information needs as presented by de Camino separate research into the ecology and population dynamics of species from research into the silviculture of these species. This distinction rather reflects a historical difference in approach between foresters and ecologists than a difference in nature between these research questions. The questions are nearly identical: the ecological question is about the mechanisms that determine the ecology of species, and the silvicultural question about ways to adjust these mechanisms to the advantage of the timber company. It is clear that a multidisciplinary and process-based approach is required.

In many policy documents a difference is made between timber and non-timber forest products. Also at the seminar, the workshop dealing with technical aspects of sustainable forestry focused on the study of timber forest products, while the workshop dealing with social aspects called for research on non-timber forest products. While the difference in focus is understandable from the different users of these two groups of forest products (companies for timber products, indigenous communities for non-timber products), the underlying research questions are essentially the same. In both cases, research is needed on the ecology (population dynamics) of the species, and on ways of sustainably producing the respective commodities. Dijkman pointed out that the commonly held notion that the extraction of non-timber forest products is sustainable while extraction of timber is not, is a myth. The result of the separation of these groups in different research disciplines is that little exchange of information occurs between the two, but there is much duplication of research. The bottom line is that research should be based on species groups that are defined on (in this case) biological grounds and not on socio-economic grounds (timber and non-timber forest products) or economic grounds (such as the commercial vs. non-commercial species grouping popular in forestry, see ter Steege).

The issue of biodiversity has entered the political centre stage (Baas). At the same time, the concept of biodiversity has widened so much, that it now seems to encompass the study of all systems that consist of more than two things. The most popular definition of biodiversity includes genetic, species and landscape aspects, as well as composition, process and function. Although it is laudable that the issues encapsulated in this definition of the term biodiversity have acquired much needed and overdue attention, the scientific debate, and, eventually, the political debate are better served by unambiguous terms. The term biodiversity now covers entirely different research agendas, and the use of it is frequently a cause of confusion or even conflict. Baas shortly alluded to this when he referred to ›specialists of various levels of biodiversity research‹ who ›see fit to claim their own branch of science to be the single Holy Grail to solve all the problems associated with the biodiversity crisis‹. The proper development of a research agenda (as was the objective of the seminar) would be greatly advanced by a clear definition of the research needs in the field of taxonomy and ecology of species.

An example of the unwarranted exchange of two concepts which are essentially different concerns sustainable management (which, in itself, is a term inviting controversy) and criteria and indicators. The development of a clear and cheap set of criteria and indicators is considered as a means of achieving sustainable management. While this is not untrue, criteria and indicators should only be considered as a practical surrogate to measuring the sustainability of management. However, neither the existence of a set of criteria and indicators, nor, indeed, compliance with the norms set by criteria and indicators, necessarily imply sustainable management. This depends on the adequacy of the criteria chosen (i.e., their quality as a surrogate), and this is still an issue requiring much attention. Sustainable management could be achieved without using criteria and indicators. Both issues merit research.

4. RECOMMENDATIONS TO IMPROVE COMMUNICATION; LINK BETWEEN RESEARCH AND POLICY

Effective scientific research was defined by Lammerts van Bueren as research that is relevant, scientifically sound, produces results that are accepted and applied, and whose application has a positive impact on tropical forest ecosystems and associated socio-economic systems. This is

rather ambitious for many research programmes, but there are certain pre-conditions, which, once satisfied, greatly increase the probability of achieving the desired objectives.

In the following two sections, two aspects of successful research programmes are examined: the relation between research and the societal demands to which it is responding (i.e. the relation with the outside world); and conditions to improve the research process itself (the internal organisation of research). Two workshops of experts were convened to formulate recommendations on these issues. For the purpose of the discussion, the conclusions of these workshops were redistributed to fit into these two topics.

A returning element in the discussions was the perceived inadequacy of researchers and research institutions to make their results available for users: policy makers, forest managers and forest users. Research has not led to improved land use and conservation (Martínez). From the various contributors the following possible causes for this lack of application of results could be extracted:

10 There is no problem;
20 The problem is ill-defined, so no proper research questions can be developed;
30 The research programme is not relevant to the problem;
40 The research is improperly conducted;
50 The research questions can not be solved;
60 There are good results but they are not properly communicated to the users;
70 There is proper communication but the users do not understand the results, or had higher expectations of (the effects of) the results;
80 The users understand the results but have no interest in changing their behaviour, or incentives to change;
90 The users understand the results but there is no mechanism in place that adapts policies on the basis of new research insights;
100 There is a mechanism in place but there is no perceived or real profit to be gained from adopting new policies or methods.

(It is good to note that (certain forms of) research lead to deteriorated land use practices and a reduced conservation of natural resources, which shows that there *is* some impact of research on land use and conservation, and that users do know how to find their way to research results once a certain benefit is to be expected. This may be a cynical twist to a sombre story, but it may also indicate that one should consider the entire chain of mechanisms that eventually leads to the application or non-application of research results.)

Characteristics of programmes that fail in one or more of these aspects of communication between researchers and users were identified by the participants as follows: dominance of the research community and limited involvement and influence of the various stakeholders (policy makers, local communities, users, private companies) in setting the research agenda; a low priority given to social issues in matters relating to sustainable land use; and limited institutional counterparting between North and South, either resulting from a lack of interest or from limited institutional capacity. The dominance of researchers in setting the research agenda in some cases leads to a conflict between the personal interests of the researcher and societal demands. Another potential hazard to the success of research programmes was mentioned to be the shortage of well-trained scientists in developing countries (Samper, Baas). As local researchers are, theoretically, in a better position to fathom societal research demands, this shortage increases the probability of misguided research programmes. Finally, non-transparent procedures of identifying research needs and setting the objectives and priorities inevitably lead to a loss of commitment of the parties, and a reduced sense of ownership. In each research programme priorities need to be set and compromises found. Once the procedure to do that is unclear, the process is more often than not perceived to be biased, and the resulting decisions and research results are not endorsed.

The conclusions of the expert workshop, plus some additional points that emerged during the main sessions are summarised in Table 2.

Table 2 Conclusions of the expert workshop developing policy recommendations for improving the link between research and policy, extended with conclusions forthcoming from the papers presented at the meeting.

1. Strengthening the local capacity to identify possible problems and to manage the forest.
   - Social research needs to be focused on strengthening the capacity of local communities in forest management (participatory management plans). Hence, social research is mostly applied research, on request or in cooperation with local organisations (governmental or non-governmental).
   - Strengthening local capacity requires the understanding of local perceptions of the value of the forest, local knowledge, current utilisation systems and tenure arrangements. Participatory Resource Analysis (PRA) is an important tool for increasing this understanding.
   - The meaningful involvement of local researchers requires extra attention for training and the stimulation of a sense of ownership to the programme.
   - Strengthening the local capacity also requires making local communities less dependent through social organisation, by giving them the possibility to set the rules, by making them researchers (and turn this into cash) and by making them aware of their rights and obligations.
   - Research is needed on the ways local communities can benefit from sustainable forest management by exploiting markets for timber and non-timber forest products at different scale levels and by identifying opportunities in the forest industry.
   - Research is needed on the development of alternative land use options to relieve pressure on primary forest. The social sciences can play an important role in using participatory techniques (PRA, PTD) to develop viable options.
   - The development of management plans need to be based on guidelines from policy makers with respect to land use management options, priority areas etc.
   - A win-win situation should be created in research programmes, with clearly identifiable benefits to all parties involved.
   - National research institutions need to be developed (or strengthened) that, with strong political support, develop the national research agenda, coordinate research, and translate research results into extension, training and recommendations for politicians. The reader is referred to the contribution of Samper for the example of Colombia.
   - Research institutes should support private companies and NGOs and use a positive environment with motivated people to expand their research capacities.

Table 2 Conclusions of the expert workshop developing policy recommendations for improving the link between research and policy, extended with conclusions forthcoming from the papers presented at the meeting. (cont'd)

- Fundamental research is needed to supplement the applied research by private companies and NGOs in order to develop sustainable long-term management strategies and care for the public goods. These two ›streams‹ of research programmes need to be closely interlinked. Financial support is needed to support private organisations, and to implement fundamental research.
- More attention needs to be paid to the impact of logging on local communities and sustainable forest management.

3. Recognition of the role of research as a policy instrument.
   - Researchers should become aware of the role of research as a policy instrument. It is just one of the instruments that a policy maker uses in developing a policy. How does research relate to other instruments, such as legislation and price policies? There should be insight in a country's key players, and their specific interests and motives need to be charted.
   - How to ›sell‹ preliminary research results? This requires additional skills of a researcher and external support with, e.g., public relations. Many speakers mentioned the need to organise workshops between researchers and policy makers as well as in villages (Nkwi).
   - The necessity of integrating results was frequently mentioned: aggregating and further translation of complex research issues in terms that are suitable and understandable for stakeholders.
   - Lobbyists and media are needed to promote the important points made by scientists among policy makers.
   - A clear distinction should be made between the rules regarding tropical forest land use themselves, and their compliance.
   - Support may be needed by the national government in the process of certification.
4. The development of an information management system linking different disciplines at different scale levels.
   - National or regional research institutes should serve as platforms for information exchange between researchers, planners, users and decision makers.
   - The development of an approach (for land use planning and GIS) by a group of institutions is an important strategy to direct the research process towards priorities and integrating results of existing research and local knowledge. It must be linked to local policies, programmes and specific problems.
5. Linking Dutch and international research and policy development.
   - Forestry research institutes should focus on multiple forest management (while production forestry will be dominated by the private sector). Attention is needed for environmental public goods and equitable distribution of costs and benefits.
   - The main contribution of Dutch research is to develop the capacity to predict the response of forest ecosystems to a variety of management interventions.

Table 2 Conclusions of the expert workshop developing policy recommendations for improving the link between research and policy, extended with conclusions forthcoming from the papers presented at the meeting. (cont'd)

- The role of CIFOR should be to generate options for institutional and policy interventions through seminars and workshops, e.g. ›Making forest policy work‹, on the role of research and information in supporting policy making; partnership models; trade issues; forest certification. Also, through the electronic mailing list on policy issues and the discussion paper series.

The issues mentioned under the first heading all concern the proper identification of the problems to be investigated, and the meaningful involvement of local communities, researchers and policy makers into this process. The development of an information management system (4) agrees well with the comments made above about the role of models. In (4), the example of models for land use planning is used, but the same approach could be used for other issues.

5. RECOMMENDATIONS TO IMPROVE THE PRE-CONDITIONS FOR EFFECTIVE RESEARCH

The development of systems of sustainable management of tropical rain forests and the improvement of the socio-economic conditions of forest-dependent people is a complex issue requiring complex, multi-faceted and multi-stage research programmes. A clear concept of the research needs and strong integration of various, sometimes very different scientific disciplines are required. A lack of integration of research, poor compatibility and communication between disciplines and dominance by certain disciplines were problems that were frequently mentioned during the seminar. Other aspects received less attention, but are equally important for organising effective research (realisation of different requirements of research).

Many authors stressed the importance of multidisciplinary research. The issue of multidisciplinarity strongly focused on the contribution of social sciences to research programmes. Verhoeff, Nkwi and Jepma mentioned the poor balance between biophysical (too much) and social sciences (too little). The relation between social and biophysical sciences is marred by differences in ›language‹ and approaches. Social sciences often utilise qualitative research methods, which are difficult to integrate with the quantitative methods used in the biophysical sciences (Nkwi). Note, however, that Dijkman showed examples of quantitative approaches by socio-economic researchers. The seminar produced few answers to solve these problems. Nkwi suggested to organise workshops in which biophysical scientists are trained in socio-economic research methods. Further, several contributors and the experts at the expert meeting stressed that sufficient funds should be made available to set up the structures that are required to optimise the integration within research programmes. It seems reasonable to state that successful multidisciplinary research depends on two important conditions. First, the research objectives (and associated outputs) should be formulated in clear and preferably quantifiable terms. Second, the actual research (in the field) should be designed in such a way that the participating researchers and/or disciplines are not competing with each other (for space, time, people, etc.). Too often it is forgotten that the execution of one project may preclude the execution of another.

It seems justified to note that multidisciplinary research also concerns research projects within the biophysical sciences and within the social sciences. The issue whether these programmes encounter similar problems as integrated social and biophysical programmes received little attention.

The seminar was not so positive about monodisciplinary work. Monodisciplinary research was perceived to be insensitive to conditions and demands from outside the discipline, and the nature of the problems in tropical rain forests would not allow monodisciplinary research. It is very likely that this

attitude will be reconsidered once research programmes will be formulated on the base of a clear and systematic conceptual analysis of the problems. At that stage it will be evident that some research objectives need to be achieved with multidisciplinary approaches, while others require a monodisciplinary approach. This approach will produce results that will be integrated with information from other projects at a much later stage (or at a higher level in the problem tree) than the results of multidisciplinary research. In certain aspects, monodisciplinary research may have advantages over multidisciplinary research. It does not require the sizeable input of funds, time (meetings) and managerial expertise that is needed to maintain the multidisciplinary structure itself. These assets can be used for making scientific progress. Further, as was also noted before when discussing the research agendas, in monodisciplinary research it is often easier to formulate detailed information needs and the requirements to meet these. This will also increase the probability of success.

Apart from the balance between societal and biophysical sciences, many other unbalances were observed in research programmes: domineering personal interests of researchers vs. societal needs (Walcott); the quest for new data vs. the utilisation of existing data (e.g. in botanical and zoological collections: Baas; or in earlier research findings (duplication of research): Verhoeff). Funds were considered too little for: research and land-use planning (Martínez), species and habitat conservation (Rijksen); and development of sustainable logging methods in primary forests (de Camino); but too much to governmental organisations and too little to NGOs (Rijksen). The balance between ›basic‹ and ›applied‹ research is often perceived to be wrong (too basic: Faohom; possibly too much applied research: Verhoeff; too little research on mechanisms: Bongers). In most cases, the solution was sought by improving the mechanisms of defining research programmes and prioritising objectives in research and management.

Table 3 Conclusions of the expert workshop on developing recommendations for improving the preconditions for effective research, extended with conclusions forthcoming from the papers presented at the meeting.

1. Research should be translated into training programmes to be coordinated by a national forestry institute.
• Researchers of scientific institutions should work together with forest managers on the same site.
• Training is required for forest workers (as crucial managers of the forest).
• Training of students should be contracted to local institutions.
2. Collaboration of research institutes should be based on partnership.
• Collaboration of research institutes should be based on equal partnership with mutual benefits to all partners in terms of desired output.

Table 3 Conclusions of the expert workshop on developing recommendations for improving the preconditions for effective research, extended with conclusions forthcoming from the papers presented at the meeting. (cont=d)

- Strong lines of communication between on-site research teams and regional and national authorities are imperative.
- Research programmes should be strongly linked to organisations with operational responsibilities. Such organisations should have a long and positive history and some political backstopping (power).
- A network of all key stakeholders should be set up in each country.

1 The expertise and structure of research institutes should be focused on interdisciplinary research.

- The training of students should be contracted to the participating institutions in order to obtain their meaningful participation.
- The local institutions should be held accountable for their own performance.
- More attention needs to be paid to applied research on demand of local communities and local organisations.
- New approaches and techniques such as Participatory Technology Development (PTD), Participatory Learning and Action (PLA) and Participatory Rural Appraisal (PRA) should be used to develop research programmes.
- Research topics and funding should be flexible.
- Experiences and approaches from community forestry should be used.

4. Research as interdisciplinary work.

- The difference in perception and expression between researchers of different disciplines should be bridged. This will cost time, logistic support and funds for the integration of results.
- ›Hard= and ›soft= systems need to be linked.
- Common objectives need to be set using e.g. OOPP and PRA techniques.
- Most research is implemented by PhD students. They need additional time to integrate their work and to make it applicable. Research should become less dependent on PhD programmes.
- Interdisciplinary work should be rewarded.

5. The interaction between policy strategies and research agendas.

- The role of national policy in defining research programmes should be increased (rather than emphasising the role of research in formulating policy)
- Beneficiaries of research should have a greater input in the choice between alternative research projects.
- Research priorities and policy design should be based on a top-down analysis. Bottom-up approaches should fit into a top-down policy.
- Due attention needs to be paid to the analysis of the underlying causes of forest exploitation in order to find appropriate strategies for solutions.
- Macro-economic research is needed on the international linkages between ecosystems and economic systems.

Table 3 Conclusions of the expert workshop on developing recommendations for improving the preconditions for effective research, extended with conclusions forthcoming from the papers presented at the meeting. (cont=d)

6. Clearing house.
- There is a great need for the establishment of a central project registration and advice centre on research efforts on the national and European level.

1. (Inter)national exchange of knowledge and information should be stimulated by funding study trips, newsletters, workshops, etc.

DISCUSSION AND INTEGRATION

Achievements
- Much progress in mono-disciplinary work that focuses on description, inventory, categorisation and providing technical solutions to specific problems.
- Progress in taxonomy and production of floras.
- Progress in the inventory and description of indigenous social systems.
- Progress in the inventory and description of perceptions of local people on values of the forest and forest management.
- Progress in the inventory and description of traditional uses of plants and animals.
- Progress in the description and categorisation of ecological requirements of trees.
- Progress in the development of technical systems for the sustainable production of timber.
- ABiodiversity@ and Anon-timber forest products@, among other issues were raised on the international political agenda.
- Several examples of successful integration of research in the political, social and economic fabric of tropical countries, with positive effects on the quality of life of forest-based people and the wise management and conservation of rain forests.
- Training and education have led to increased local capacity to carry out research and to achieve sustainable forest management.

Challenges and Problems; Information Needs
- Administrative and legal frameworks inadequate for carrying out sustainable forest management.
- Improper land use planning and land use plans lead to deteriorating quality of forests.
- Biodiversity of the tropical rain forest is inadequately catalogued.
- Poor knowledge of the mechanisms leading to proper forest management.
- Feasible harvesting systems are not applied.
- The economics of sustainable forest management including non-timber forest products are poorly known.
- Perceptions of various users on forest and forest management are different and poorly acknowledged.

DISCUSSION AND INTEGRATION (cont'd)

Points for Future Research

- Develop the legal and institutional framework that is conducive to appropriate land use planning.
- Study mechanisms for improving land use planing and land use.
- Collect strategic information about biodiversity, make it accessible and develop capacity in identification.
- Carry out monitoring and associated modelling studies describing ecosystem processes.
- Carry out demonstration projects showing the feasibility of low impact harvesting techniques.
- More attention for economic aspects of sustainable utilisation and conservation of rain forests.
- Study mechanisms to empower actors in forest management to increase support for sustainable forest management.

Conclusions

- Modelling approaches followed as tools for the planning of management and predicting the effects of human intervention.
- Sustainable forest management systems should acknowledge the dynamic nature of forests and forest use.
- The potential impact of research programmes should be evaluated in advance by carrying out a comparative impact assessment of alternative research options.
- Dominance of research community and limited involvement of other stakeholders lead to failing research programmes.
- Programme formulation should be transparent, involve all stakeholders and build partnerships with responsibilities to all parties involved.
- Monodisciplinary work is perceived to be insensitive to conditions and demands from outside the discipline, and the nature of the problems in tropical rain forests requires multi-disciplinary research.