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How to Know More about Forests?
Supply and Use of Information for Forest Policy

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Contents

Abbreviations

CIT	Countries in Transition
CSD	United Nations Commission on Sustainable Development
ECE	Economic Commission for Europe
FAO	Food and Agriculture Organization of the United Nations
FIPI	Forest Inventory and Planning Institute (of Vietnam)
FRA	Forest Resources Assessment (of FAO)
GIS	Geographic Information System
IFF	Intergovernmental Forum on Forests
IPF	*Ad hoc* Intergovernmental Panel on Forests
JRC	European Union Joint Research Centre
NFI	National Forest Inventory
nfp (NFP)	national forest programme
NGO	Non Governmental Organisation
OECD/DAC	Organisation for Economic Co-operation and Development/Development Assistance Committee
RWEDP	Regional Wood Energy Development Program
Sida	Swedish International Development Cooperation Agency
TFAP	Tropical Forestry Action Plan, later Tropical Forests Action Programme
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNFF	United Nations Forum on Forests
WB	World Bank
WCMC	World Conservation Monitoring Centre
WFI	World Forest Inventory
WRI	World Resources Institute

Abstract

There are serious shortcomings in the supply and use of information needed for policy making in the forestry sectors of developing countries (and often also in developed countries). The main weakness is the failure to connect supply to demand. Much information has been gathered not because it was needed but because donors were willing to fund inventories, on traditional lines, that were vaguely thought to be potentially useful. Information is usually inadequate on topics such as actual removals of wood and other products, or the useful-ness of the forests, especially to the local people. Not enough provision is made for continuous inventories to the necessarily high standards that are needed to measure change. The way in which remote sensing has been used has often been heavily influenced by the facilities that are on offer, rather than the potential usefulness of the results. It is suggested, for example, that the resources would be better used on the assessment of changes in land use and forest cover than on elaborate cartography. A key proposal is to set up national 'Analysis Units' that will collate and interpret available information, help users to define their needs, and make the link with suppli-ers, so that information gathering can be more driven by demand. Information at international level depends on what is available nationally, and therefore improvement should be sought mainly at national level.

Executive summary

This paper is about the supply and use of information needed for policy making in the forestry sector at national level. The focus is on developing countries. We note that there are serious shortcomings in this context, not only in developing but even in many developed countries. We discuss the character of the shortcomings and their reasons, the type of information needed in the policy process and its role, and we indicate ways towards a better situation.

Most of the shortcomings are related to poor links between the supply of and demand for information. Thus the situation cannot be remedied just, for example, by introducing or improving national forest inventories and related data gathering. The following are some common problems with information supply and demand and the connection between them:

- The mechanisms that formulate policy-relevant questions are lacking.
- The information presented is supply-driven. Inventories are undertaken in a routine way without proper analysis of the questions that need to be answered. As a result they tend to provide answers to irrelevant questions. Failure to analyse the real needs is one of the reasons why the information obtained is not fully used.
- Inventories are carried out under pressure from donors. In such cases they tend to be one-off undertakings, not providing the often-needed change information, and few attempts are made to keep the results updated.
- Inventories are also sometimes undertaken on the basis of spurious or exaggerated claims that they are a necessary preliminary step, in order to put off taking the action that is needed to bring forests under management.
- Existing information may be kept secret or in closed Government files.

Available information indicates that there hasn't been much improvement in the statistics on forest resources between 1970 and 2000. In many countries knowledge and capacity are going backwards.

Inventories rarely collect the information needed for forestry planning. There are particular problems with information about changes, plantations, trees outside forests, use of forests and biological diversity. Monitoring of plantations or other activities is rare. One reason is that field inventories are required to answer such questions. Countries tend to use remote sensing as a forest inventory tool without considering that this method cannot produce all the information needed. Experience tells us also that data collection has often focussed on the supply of goods and services from the forest, while there has been less interest in studying the corresponding demand. In most situations, supply information becomes meaningful only if related to a demand (for example, in so-called production- and consumption studies).

The lack of information can be caused by a lack of resources or a lack of understanding of the need. There is, however, another explanation as well: knowledge is power, and there is often a resistance from stakeholders to provide information and thus give power to others. This points to a need to understand the interests of various stakeholders in improving the knowledge base at the political level.

At the national level the need for information is related to developing forest sector policies and strategies, implementing them and monitoring their effects. It is important to recognise that forest policy cannot be seen in isolation. Forest policy should really be derived from the overall objectives of society, and forestry should help to fulfil the objectives of society. This has implications for the information needs in forestry sector policy making: socio-economic, environmental and cultural aspects also require attention.

To understand the role of information we consider the policy process, anticipating that it should be a democratic process. Democracy does not necessarily lead to good decisions, but it implies that decisions can be revised if a majority feels a need for it. A democratic policy process can be illustrated in the following way:

- Public debate ('political'[1] or 'scientific');
- Identifying problems and potentials;
- Designing options for (political) action;
- Analysing the consequences of such action;
- Decision making (which option to choose);
- Implementation;
- Monitoring.

The process can be seen as a cycle. Implementation and monitoring generate new public political and/or scientific debate and new problem identification. Implementation includes certain stages that have to be undergone, such as

- legislation;
- revision of organisational and administrative structures;
- financial arrangements;
- getting the message out.

Information is needed throughout all the steps in the process as a basis for informed decision making and for consensus building. Consensus is a prerequisite for a smooth process and in particular for successful implementation.

For a successful forest policy process it is often necessary to know more about the following:

- Forest use
- The present state of the forests. What is the capacity of the forests to fulfil their functions?
- Change. There are many problems with accuracy and comparability.
- Plantations
- Trees outside forests
- The role of forests for rural communities.

When collecting information about forestry, a number of considerations have to be made:

- What information is already available and how can it best be organised?
- What level of accuracy is needed?
- Is there a need for continuous inventories?
- How can the questions of strategic importance for the local level be identified?
- Which information must be collected with field inventories and which can be collected with remote sensing?
- How to get hold of relevant information about economic and social factors?

It is not realistic to expect that a set of desired policy outcomes (a scenario) that is given priority in a political process will actually take place. The scenario is built on assumptions that will most likely change. For this reason there is need for a continuous adjustment process. It is the strength of democracy that it can provide the mechanisms to detect the need for adjustments and to make adjustments possible.

The collection of information should start from the needs of the political process. Where there is no commitment for change a national forest inventory (NFI) and many other types of data collection will have limited value. It is not necessary (or possible) to cover all aspects at once; a step-by-step approach is normally more feasible.

The collection of information should in principle be demand driven. To approach the question of what information should be collected it is useful to examine what information is required to analyse the likely consequences of one or more political programmes. Such analyses are particularly demanding with regard to information and they must be made anyway in the political process. If the available information is sufficient in this context, then it will suffice in most other situations as well. Very often information is lacking or insufficient when it comes to

- people's reaction—how will forest owners or rural people react to various economic factors or political instruments (information campaigns, fees, subsidies, advice)?
- biological response—how will forests respond to various silvicultural interventions?

Forestry requires long term planning. At national levels much formal planning has in fact taken place (e.g. in the Tropical Forestry Action Plans). Many of these planning exercises have met with difficulties, some reasons being that the importance and potential of forestry was often overestimated and that the planners were looking for 'the correct technical solution'. An underlying assumption was also that more investment in forestry should automatically lead to development. What is important for the discussion in this report is that statistics were lacking but the work was done as if the available guesstimates were true and complete.

Are there ways to reduce or resolve these problems? Recognition of the problems and their character is certainly a first step towards improvement. Through this paper we aim to promote such recognition. Moreover, we propose that a group of specialists within public administration should be given the specific task of serving as a link between producers and users of information, identifying the sources and quality of information, compiling tailor-made information, carrying out *ad hoc* studies and identifying information gaps. These specialists would form an 'Analysis Unit'. We argue that each country needs:

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[1] The political or policy process does not necessarily mean general elections, parliaments and opposition parties. There was also a political process in the USSR of the Stalin days. But it was difficult to influence the ideas of those in power so in such a situation the forest policy would often show great deficiencies. It is difficult to achieve a good forest policy in highly undemocratic societies, one reason being that there is much money in forests. If there is no democratic control, the powerful may steal the resources.

- An Analysis Unit;
- The capacity to collect the information needed about forest resources, use of forests, the relationships between forests and people, etc;
- A political process that includes consensus building.

Capacity building should be geared towards developing these capacities and functions. We are of the opinion that such capacity building must include the development of forest policies and strategies and strengthening of institutions and other mechanisms that have a role in the political process. For the capacity building to be successful, countries must be committed and have full responsibility.

1. Introduction

This paper is an attempt to set out the authors' views on the gathering of the information that is required for forest sector policy making. The point is made that forest sector policy is to be seen as an integrated part of overall national policies. The paper builds on ideas presented at the 11th World Forestry Congress (Persson and Janz 1997) and elaborates on them. The views presented are based on observations made during many years of national and international work in the fields of forest inventory and forest policy. It is hoped that this paper will be useful to:

- Opinion formers who are concerned with information needs and how to meet them;
- Anyone working at the interface between forest inventory and forest policy making;
- Teachers and students of forest inventory, forest sector planning, and forest policy;
- Policy makers who wish to improve the forest-related knowledge base;
- Forest inventory specialists who wish to plan useful inventories that meet identified needs.

This report deals with forestry information at the national level. The national and international levels are intimately connected. Therefore we present, in Appendix 2, some observations on information issues at the international level. In general, as we see it, international activity should be increasingly directed to building up national capacity to handle information, and international compilations should depend on national sources and national contributions to assure a sense of ownership and, through this, acceptance.

The report concentrates on the situation in developing countries. Much of what is said is, however, also valid for developed countries.

The reader will notice that we often use examples from Sweden. This is because most of our experience comes from that country. But it would also be difficult to discuss problems in other countries as frankly as we can do in the Swedish case.

2. The problem

The gathering, analysing and use of information at national and provincial levels is strategic in nature. Its use is in developing, implementing and monitoring national forest sector strategies and policies. There are, as will be shown later, serious shortcomings in the supply and use of the information needed for policy making in the forestry sectors of developing countries (and often also of developed countries). The main weakness is the failure to connect the supply of information to the demand for it. Much information has been gathered not because it was needed but because donors were willing to fund inventories, on traditional lines, that were vaguely thought to be potentially useful. This information is usually inadequate, however, on topics such as actual removals of wood and other products, or the usefulness of the forests, especially to the local people. Not enough provision is made for continuous inventories' to the necessarily high standards that are needed to measure change. The way in which remote sensing is being used is often heavily influenced by the facilities that are on offer, rather than the potential usefulness of the results.

Our observations over the years and across countries lead us to believe that the situation cannot be remedied by just improving the supply side, i.e. introducing or improving national forest inventories and related data gathering. The reason for the shortcomings lies as much on the demand side. Policy processes including the administrative environments that affect the flow and handling of information are often inadequate. For this reason we will, in the following discussion, give much attention not only to information gathering, but also to the political process.

3. The current situation

This section deals with shortcomings in the provision and use of information. The first two subsections present general observations (3.1) and specific examples (3.2). Subsection 3.3 discusses the political background and subsection 3.4 provides a summary.

3.1 The information available in countries

In 1974 Persson wrote: 'We know quite a lot about the moon but do not know how much of the world's surface is covered by forests and woodlands' (Persson 1974). Since then the quantity and quality of available information has improved in some countries, but has declined in others and is in any case still far from meeting the needs. Information about the status of forest inventories in different countries can be found in the forest resources assessment publications of FAO (FAO 1982, FAO 1993, FAO 1995, FAO 1999a, FAO 2001b, FAO 2001c) and in those results of the Forest Resources Assessment (FRA 2000) that have so far been made available on FAO's website (FAO 2001a).

Most developed countries have some kind of forest inventory. In 1990, 18 of 34 such countries (containing

76% of the forest area of all 34 countries) derived their forest area information from sampling-based national forest inventories. Some of the inventories were quite old. In the other 16 countries (with 24% of the forest area) information had been compiled by aggregating local inventories, which had usually been carried out for forest management purposes (FAO 1995). Such information contains unknown errors and is usually biased. The aggregation method is known to produce significant underestimates of volumes and increment. A good example can be taken from Germany. When, at the end of the 1980s, the Federal Republic of Germany introduced a sampling-based national forest inventory, the reported growing stock per ha (within the boundaries of that time) increased from 155 m^3/ha in 1985 to 298 m^3/ha in 1990 (ECE/FAO 1985 and ECE/FAO 1992).

For developing countries, the quality of forest resources information varies greatly. FRA 1990 reported that all but seven had at least one estimate of forest cover dating from between 1970 and 1990, usually based on remote sensing. Twenty-five countries of 143 had made more than one assessment. On average, the figures supplied to FAO were about ten years old (FAO 1995).

FRA 2000 (2001c) states, 'the situation in several industrial countries (particularly in CIS area) is less than satisfactory for national and international forest policy development and implementation.' In developing countries there are many limitations. Only 22 countries (of 137) have repeated inventories, 28 countries have no inventory, 33 have partial forest inventory, 34 have an NFI from before 1990 and 43 from after 1990. 'Very few developing countries in the world have up-to-date information on their forest resources and fewer have national capacity for generating such information'.

Knowledge about the forests in different countries does not seem to be continuously improving. In many cases the knowledge is declining. Table 1 summarises information on the reliability of forest inventories into three classes (high, medium and low reliability). It covers the same countries through two periods and uses two different sources (Persson 1974 and FAO 1993). The inventory methods used were the main criterion for reliability classification.

Table 1. Trends in the quality of forest resources information[2]

Region	1970			1990		
	L	M	H	L	M	H
Africa	8	29	2	13	21	5
Asia	7	7	2	1	11	4
Latin America and Caribbean	6	13	4	4	12	7

Number of countries by reliability class. L=low, M=medium and H=high reliability[3]

It can be concluded that little progress has been made in the periods covered, in spite of the increasing potential of remote sensing and other modern techniques. Countries such as Gabon and Côte d'Ivoire have been covered by extensive inventories in the past, but are now placed in the 'low' category. In Africa the number in the 'low' category increased between 1970 and 1990. In Asia there are positive trends, but some improvements may be due to some 'quick and dirty' remote-sensing inventories.

Some additional observations are concerned with the quality rather than quantity of forestry-related information:

- Donors have often a strong interest in selling techniques and producing showpiece maps. Therefore modern forest inventories are frequently just forest mapping.
- There is much reliance on remote sensing, which is more appealing than work on the ground or digging in archives. This contrasts with the calls for information on themes such as ownership/tenureship, protection status, purpose and success rate of plantations, biological diversity and production and consumption of forest derived goods and services.
- Few forest inventories are undertaken as part of a continuous scheme. Most of them are one-time undertakings. The results of such inventories are rarely comparable over time. This contrasts with the need to monitor developments over time.

The demand for forest information is increasing (e.g. in the IPF/IFF Proposals for Action), but there is no corresponding allocation of resources. The funds available for forest inventories are actually decreasing in many countries due to budget cuts and structural adjustment. Twenty to thirty years ago FAO was supporting inventories in many countries. Today hardly a single inventory is being supported.

3.2 Examples from some Asian and African countries

To what degree do the systems used for collecting forest information relate to important policy issues? To what degree does existing relevant information come into use in the dealing with such issues?

We have studied these questions during visits to some Asian and African countries (Janz 1999a, Persson 1998/99) and by examining two relevant trip reports covering ten countries of southern Africa (Andersson 1999 and Nylén 1999). The following are some of the highlights from the findings:

- *National Forest Inventory.* Most of the countries analysed have some kind of National Forest Inventory. However, the content and design are not oriented towards answering specified questions, but rather to fit a particular inventory technique.

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[2]Comparable information for the year 2000 is not available.
[3]For definitions of reliability classes see Appendix 1.

- *Supply-driven information.* It is evident that the inventory method used often decides what information is collected. In fact, the method is often chosen before the questions are thought out.
- *Forest areas.* Area information is often based on remote sensing. Visual interpretation of LANDSAT-TM on a 1:25 000 scale has been commonly used. With this technique it is difficult to distinguish and identify areas smaller than 25 ha. Therefore major errors occur in fragmented areas and where forests are in small patches. In many cases the information available in the country is quite old.
- *Plantation areas.* Frequently the intention is to let plantations become the main source of wood in the future. Large plantation programmes are often underway, but few countries have good information about them. This is partly because remote sensing can seldom identify plantations. Practically nothing is known about their increment. Although plantations often represent the main thrust of the forest policy, there are no monitoring systems in place that can tell how successful the programmes are. This is serious as failures are common for a variety of reasons including pests, diseases and land-use conflicts (Pandey 1995).
- *Changes.* In most countries deforestation and rapid changes in land use are considered to be very important forest problems. Yet often only one-shot inventories have been made. In some countries, comparisons of independent inventories are made to assess changes but, since sampling errors can hide the real changes, the results can contain large errors.
- *Trees outside forests.* There are countries where this is the most important 'forest resource'. Bangladesh and Pakistan and parts of Indonesia and India are examples. In spite of this, information on trees outside of forests has rarely been collected. It is promising, however, that awareness of this fact and interest in the matter are increasing (Pandey 2000 and Singh 2001).
- *Fuelwood production.* In most developing countries fuelwood is probably the most important forest product, and yet hardly anything is known about removals. The difference between the highest and the lowest guesstimates even in large countries can be in the ratio of 1 to 3. It is technically very difficult to collect information about either the demand for or the supply of fuelwood. Consumption is composed of many kinds of biomass, among them wood. Different mixtures of biomass are used in different seasons and in different districts (FAO/RWEDP 1997, Persson 2000b).
- *Industrial wood.* Very little is known about the production of industrial wood and little or nothing about domestic consumption. Figures shown do in fact often represent planned production (annual allowable cut) rather than actual production, which may be much higher. Sometimes information is

recycled from the FAO Yearbook of Forest Products, which in turn often has to use crude estimates.
- *Non-wood forest products.* The occurrence of non-wood forest products in forests is known, but not the potential availability. Quantitative information is occasionally available about a few products that reach the market. In most cases the quantities produced and used by rural households are unknown. The role of these non-wood products in the economy of rural households is little-known and likely to be generally underestimated.
- *Biological diversity.* Much attention is now being given to the issue of biological diversity and how it is changing. In most of the countries studied, however, little is known about this matter. Research is going on and perhaps practical methods will be developed (Boyle and Boontawee 1994). But will the methods be used? At present, in most of the countries, there is not even any good information about the forest areas, although methods for estimating areas have long been known.
- *Monitoring.* In most of the countries there are no systems in place to follow up the impact of policy measures taken. The example of plantations has been mentioned. Other examples are changes in the quality of the forests, the practice of participatory/joint forest management and the amount of illegal felling.

Nylén (1999) made the following observation after his visit to five countries in southern Africa: 'In general the countries' ownership of their national data is not very strong. '...the national inventories as something foreign to them, as if they were a product of somebody else's...' .Often the inventories were criticised by the very people who are supposed to be working with them. This could be the result of the frustrating positions of many of the staff in the public sector. It is one thing to have information and another thing to have all the means to actually do something.'

We can further illustrate the situation with some 'deidentified' quotations from country reports presented at a three-country workshop on forestry information analysis held in South Africa in October 2000 (Janz 2001). The quotations are shown in Box 1. They are quite revealing and signify a promising awareness.

National forest inventories have been carried out in many countries over the years. However, they often suffer from certain shortcomings that are rather common. In Box 2 we have extracted some typical examples from a review of such an inventory that was recently made in an Asian country (communication from O. Lindgren):

To sum up, there is a big gap between what is needed and what is actually known. Decisions about what information to collect seem often based just on tradition, while assessments of real needs are rare. Data management is often inadequate, and much information is therefore either lost or never comes into use. We are

Box 1. Quotations from country reports to a workshop on Forestry Information Analysis in Southern Africa, October 2000

- The country 'is not necessarily and always 'information poor' but technical information is often found in disparate locations and as a result may be incompatible for trend analyses. Government departments, research institutions, NGOs and the private sector are involved in information collection in one form or another. Some of it is not available for public use, often resulting in duplication of efforts. There is therefore a need for greater collaboration and data sharing among the various institutions. In one sense it can be said that information is there, but insufficiently used.'

- 'Some of the data and information on forestry and woodlands…have never been analysed and published.'

- 'Information generation is not always demand driven nor is it always problem oriented. Little or no dialogue exists between users and generators of information. There is also little or no dialogue existing amongst the generators of information.'

- 'Absence of information (or the presence of misleading information) is sometimes due to a lack of capacity and resources, incompetence or absence of knowledge regarding certain methodologies, and sometimes due to a lack of will on the part of certain quarters/authorities/decision makers.'

- 'Currently, there is no proper mechanism of interaction between the users and suppliers of information and there is no formal request for information analysis from political structures…, no effective analysis of information.'

- 'Regrettably a lot of this important information … is scattered. And in absence of appropriate coordination mechanisms the information produced is generally not known or readily available/accessible to other potential users.'

- 'A lot of information from previous studies undertaken by foreign-based consultants has over the years neither been properly stored nor disseminated to other potential users.'

- To make matters worse the local staff was usually not involved in data capturing, analysis etc. hence a lot of it has been lost. What we now have are just final reports.'

Box 2. Typical shortcomings of a National Forest Inventory

- Different sets of objectives for the National Forest Inventory (NFI) were formulated during different phases of the project. These changes in the basis of its work make it difficult for users and donors to evaluate the project, or even to maintain a clear view of its purposes.

- Processing of the field data has been slow. Reports from several provinces are lagging far behind. This is partly due to key personnel leaving the organisation. It is also likely that the amount of work required to set up a functioning data-processing system was underestimated.

- The lack of safe back-up procedures is a serious threat to all of the data that have been stored so far.

- Interaction between the NFI and end users needs to be further developed. Positive steps have been taken by organising workshops in the provinces. The NFI has no formal obligation to report to anyone other than the Department of Forestry, which partly explains why there is a lack of interaction with other users.

- The information provided by the NFI is relevant to government policy making, in that the development and monitoring of any kind of strategy or programme require good general descriptions of land use and of the state of the forests. However, the inventory tools used at present are not sharp enough for monitoring. To get more timely information about area changes, for example, more recent remote-sensing data must be at hand, preferably analysed by digital methods. Only very large changes in forest composition (volume, species, etc) can be detected by the present system of successive inventories, which uses temporary sample plots.

- Policy making can make more use of the information provided by the NFI, but only if work is done to develop the policy-making methods themselves, including scenario modelling at different levels.

- The information from the NFI is part of the country's official statistics. However, those who publish such statistics need to be made more aware of the NFI information.

- The NFI database is a potential goldmine for research on topics such as forest mensuration, soil-vegetation interactions, occurrence of particular species, growth assessment, and natural regeneration. However, a thorough statistical analysis of the quality of the database is needed to verify its usefulness for research purposes. The control surveys that are already being made provide a basis for such an analysis.

still far from well-informed policy development. The causes of these inadequacies are both technical and institutional.

3.3 The politics of statistics

Strategic forestry planning requires information on forest resources, use of the forests, socio-economic conditions, etc. Many projects have been undertaken to improve the statistical base but, as has been shown above, the available information is still inadequate in many developing countries. This is so in particular where national commitment is lacking. The degree of commitment is influenced by many factors (Archer 1993). One important consideration in this context is that *knowledge is power*. The authorities in many countries may not want the truth to be known. They may have vested interests or things to hide or they may want to make claims that are not supported by the statistics. For example:

- In some countries with high deforestation rates the authorities may not want to publish the real figures, in order to avoid criticism.
- Conversely, in other countries they may want to show as high a deforestation rate as possible, in order to obtain increased support for forestry.
- They may not always want to bring results of plantations in the open, because there are many failures that they want to hide. Also, subventions to plantations may have been misused.
- There may be much illegal felling, often with the connivance of the forest authorities, and therefore there is only limited interest in finding out the true actual rate of use of the forests.
- Planning based on information usually leads to changes, but there are often many groups that benefit from the existing system.

Shortcomings in forestry-related statistics are often explained by technical reasons: Inventories are one-time undertakings that soon become outdated, there is a shortage of qualified personnel, the available qualified personnel are not given appropriate positions, inadequate resources are allocated, it is very difficult to collect information about forest use, and so on. However, the main reason may simply be that there are powerful people who do not want better information. In most countries there is a need for an analysis of different groups' interests in improving or suppressing statistics. Sometimes the forces working against improvement may be so strong that any attempt to upgrade the statistical base will be certain to fail. Meaningful planning and monitoring is then impossible, and the door is left open for the continuing misuse of the forests. In theory it would even be possible to rank countries according to their interest in planning and good statistics.

The above argument should not hide the fact that many countries do not collect statistics because they lack capacity. This can sometimes be due to poor appreciation of the importance of information and inadequate allocation of resources for this purpose. A lack of statistics can result from a number of causes, a fact that complicates decisions about support to this activity.

3.4 Summary of the current situation

Below, the process of developing forest policies is discussed as being the dominant 'user' of national level forestry information. Given this fact, forestry-related information work should focus on the needs of the political process. Likewise those involved in policy making should make sure that relevant and accurate information is generated and fed into the process. The real situation, however, often has some or all of the following features:

- The public is ill-informed and therefore easily misled.
- Problem identification and the selection of options for political action are not based on relevant facts or analyses.
- The analysis of consequences suffers from being based on insufficient information, or is not undertaken at all.
- Information about the forest resources and how they are changing, and about the consumption of forest goods and services, is kept in inaccessible government files and is not used to promote informed public debate or informed cooperation across the different sectors of society.
- Forest inventories are often *ad hoc* undertakings, unrelated to the planning process.
- Forest inventories are often one-shot undertakings, not providing for change assessment (monitoring).

4. Why is information needed?

At the national level the need for information is almost exclusively related to developing forest sector policies and strategies, applying them, and monitoring their effects[4]. Therefore we will discuss the question 'why' by examining the role of information in the policy process. We put emphasis on the political process also for the reason that national level information becomes meaningful only if a functioning policy process is in place. Theoretically the policy process should be in place first, with information work coming as a second step. In practice the two are usually developed simultaneously.

It should also be pointed out that the policy process we describe is a democratic process that requires a democratic environment. We advocate a democratic process not because it automatically produces good

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[4]One may argue that information is needed to provide 'geographic' knowledge about the country, information to be included in dictionaries, textbooks and newspapers. In this case, rough information is probably quite adequate and even this will often lead to demand for changes in policies. These demands are then forwarded to politicians (and not to scientists or NGOs). So in the end it is the demand from the political process that decides which information must be collected.

decisions, but rather because it makes it possible to revise policies when a majority finds they do not work well.

The policy process should include a number of steps that can be illustrated in the following way:

- Public debate ('political'[5] or 'scientific'),
- Identifying problems and potentials,
- Designing options for (political) action,
- Analysing the consequences of such action,
- Decision making (which option to chose),
- Implementation,
- Monitoring.

Stakeholders should be involved throughout the process, and great emphasis should be placed on consensus building. This is not only a requirement of democracy. It also has the very practical implication that the more consensus there is, the easier implementation will be. Information is needed throughout all the steps of the process. The general public as well as the stakeholders can only participate meaningfully if correct information exists and is readily available. It is easiest to build consensus through a series of steps, namely, consensus on:

- Basic facts about the forest resources and their utilisation;
- The nature of the main political problems;
- The options that are available to solve the problems;
- The consequences of different political programmes; and
- Decisions on political action to take.

In this sequence of steps, consensus building becomes progressively more difficult, and the information required becomes increasingly complex. Analysing the consequences of alternative action programmes demands a high standard of information and the ability to interpret it.

In real life, even if serious attempts are made, full consensus is hardly ever reached. In cases of disagreement, consensus should at least be sought as to what the issues are that are in dispute. We will return later to a further discussion of consensus building as part of the political process.

Consensus building is also made difficult by the fact that different participants can view the same information in different ways—they see different sides of reality. Box 3 illustrates this point.

From the above we understand that the political process and the monitoring of impacts place high demands on information. Without such information there is little meaning in working for consensus, and the search for political solutions is made in the dark. Even international documents and processes such as Agenda 21 and the Intergovernmental Panel on Forests (IPF) have stressed the importance of information in the policy and planning context, including consensus building, as shown in Box 4.

Box 3. Participant analysis

Information does not always tell the indisputable truth. Different people tend to interpret information in different ways. Conflicting interpretations can often end up in a discussion of definitions.

For example, in Sweden the foresters say there has never been as much forest as there is now, while conservation groups say there has never been as little. Both statements are in some sense correct. The apparent difference is due to quite different definitions. One side means the number of trees or cubic meters, while the other means 'naturalness'. This also implies that there is not only one definition of terms such as 'forest', 'plantation', or 'deforestation'.

Good information is a prerequisite of consensus but it does not always lead there. Sometimes consensus is simply not possible. Even good information does not always convince everybody. Many false but deeply rooted 'good stories' cannot be killed by facts. Some disappear only when a better story turns up (Roe 1991). For example, the 'fuelwood crisis story', which frequently exaggerates shortages in supply, has hardly been changed by the revelation of new facts: too many stakeholders have a vested interest in the old story. What could change people's opinions?

5. What information is needed?

5.1 Overview

It is useful at this point to recall that this report deals with information at the *national* level, and that at this level the main tasks are to draw up national forest policies and strategies, implement them, and monitor the outcome. These tasks require special types of information. It is also useful to remind ourselves that the information needed differs from country to country. Indonesia and Finland are rich in forests, and forest products play a major role in their economies. Information about the effect of political action on the production of industrial wood will be important in both of these countries. In Mauritania and in the Netherlands it has less importance; the focus there is rather on the social functions of forests, on the uses of trees for shelter, fodder and fuel, and on how the need for forest products can be satisfied.

A further point that we want to stress is that data collection should be *demand driven*. The set of information that is to be gathered and analysed should be defined by need, rather than by what is easy to measure with available techniques, or by what donors are ready to fund, or by what other countries do.

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[5]The political or policy process does not necessarily mean general elections, parliaments and opposition parties. There was also a political process in the USSR of the Stalin days. But it was difficult to influence stupid ideas of those in power so in such a situation the forest policy would often show great deficiencies. It is difficult to achieve a good forest policy in highly undemocratic societies, one reason being that there is much money in forests. If there is no democratic control, the powerful may steal the resources.

Box 4. Some high level statements relevant to the need for information

Agenda 21 (Chapter 11, problem area D) gives the following diagnosis:
    'Assessment and systematic observations are essential components of long-term planning, for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies. This mechanism, however, is one of the often-neglected aspects of forest resources management, conservation and development. In many cases, even the basic information related to the area and type of forests, existing potential and volume of harvest is lacking. In many developing countries, there is a lack of structures and mechanisms to carry out these functions. There is an urgent need to rectify this situation for a better understanding of the role and importance of forests and to realistically plan for their effective conservation, management, regeneration, and sustainable development.'
    The critical importance of information for a successful political process was highlighted by an IPF intergovernmental workshop on 'The Process of Consensus Building', held under a Swedish-Ugandan initiative in 1996 (National Board of Forestry 1997). The Synthesis Report from this workshop states (paragraph 43): 'There cannot be consensus unless the competing claims are understood and agreed upon by the interested parties. Understanding these claims expedites convergence of opinion and hence orientation towards common vision and goals. This implies that all the basic facts have to be known and presented in a transparent manner before decisions that are acceptable to all and can stand the test of time can be made.' The same report also notes (paragraph 53): 'The process of consensus building…must always be based on good knowledge of the actual land uses and on the different options for future use of land.'

The statement that information should be demand driven must be qualified. Not all information can in practice always be fully demand driven. Demand is a dynamic entity and may not always be comprehensive. Scientists may do research on a topic out of scientific interest. Such research may show that new types of information are needed. NGOs may also collect information to argue for a case. The point is that information shall not primarily be supply driven. One could say that the development of NFIs and collection of statistics should be an iterative process. Sometimes the NFI will respond to a known demand, sometimes it will anticipate demand.

What then are the information needs? How can we know what the questions are that need to be answered?

The political process, as described in the previous section, requires good information on many different topics. Here are some examples. What in fact *are* the forest-related problems? Who are the stakeholders? And how will they (especially the forest owners) respond to changes in wood prices, taxation, financial support, training, extension, agricultural techniques, markets for agricultural products, or the road network? In a country with a lot of forest in private ownership, how will the responses differ between owners of large and of small holdings, between young and old owners, or between those who live near their forests and those who live far

away? How will rural people be affected by changes in the forest? To what extent do rural households depend on forest-derived goods and services (Byron and Arnold 1997)? How does the availability of such goods and services change, and how is it affected by new policies? How are decisions made in a village? One of the problems in gathering information relating to forest sector policy is that some of these questions cut across sectors, and are not always considered to come under the subject of forest administration. Information gathering for forestry planning certainly involves far more than forest inventory.

A practical way to approach the question of what information should be collected is to ask what is needed for an analysis of the consequences of political action. This kind of analysis is very demanding in terms of information, and whatever satisfies its needs will satisfy many or most other needs. For monitoring of both the results of new policies and strategies and the implementation of programmes, good estimates of change are crucial.

It is often said, or proven, that the need for information is large, the information requested is complex, and so on. Such statements should not be taken in a discouraging sense. Certainly, not all information needs can be met at once. It is more realistic to assume a step-by-step improvement process. To begin with it may be more important to formulate questions than to answer them.

It must be stressed once more, however, that the needs vary from one country to another. Not all countries need a traditional National Forest Inventory. A needs assessment may show that only limited knowledge about the forests is needed, or that detailed information is only needed for part of the country.

5.2 Analyses of consequences

Analyses of consequences are a key part of the political process. They consider action programmes that have been designed as different options, and simulate or predict what will happen if a given programme is implemented. Box 5 illustrates what is meant. The analysis of consequences as outlined here is complex, and very demanding in terms of basic data and techniques. It is in this context that the most difficult questions will arise concerning data collection.

At this point the concept of production and consumption studies must be mentioned. Developed by Nilsson (1978), this has provided important conceptual input into what is presented here as 'analysis of consequences'. Some of the particular aspects stressed are outlined below:

- Studies in connection with forest policy development have often focussed on potential cut, allowable cut or similar quantifications of the supply side. In the policy context such studies become meaningful only if related (in comparable terms!) to the demand side,

Box 5. Analysis of consequences

In the political process a problem is identified. For example, it may be deforestation, the poor condition of young forests, conflicting claims on land in certain landscape types, or the loss of sources of non-timber forest products. To deal with the problem, options for solutions are designed, such as different programmes to promote the establishment of better young forests. The programmes may include legislation, research, special monitoring inventories, information campaigns, and financial incentives. There is then a need to estimate the consequences of each option, one of which may be to do nothing.

A simple example can be that politicians commission programmes to be designed to improve the quality of young forests, and wish to know the wood supply possibilities at different times in the future, if one of the programmes is implemented. The quality of regeneration measures can be influenced by forest policy tools such as information campaigns, extension services, legal requirements (and in particular their enforcement), as well as subsidies and taxation. Analysis must review these political tools and make assumptions as to their effects on various types of forest owners. Previous experience in this field must be studied. Forest research has to be used to find realistic relationships between the type and quality of regeneration measures and the biological responses they provoke.

thus fellings, removals or consumption. This also applies to non-wood goods and services.

- We can only make realistic scenarios of future developments if today's land use is known and well-quantified. Another aspect of the same is that readers can understand the forecast changes only in relation to a known starting situation.
- 'Today's land use' here includes knowledge of competing claims on land. In relation to forests it includes wood as well as non-wood goods and services.

5.3 National forest-sector planning

Forestry requires long-term planning. Harvest that exceeds the long-term potential will necessarily lead to a reduction in what can be obtained from the forests at some time in the future. This may imply, for example, that wood processing industries will have to close down. However, if the facts are known with sufficient accuracy, investments can be made that will reduce the coming difficulties (See Box 6).

Much planning work has been done under the TFAP (originally referred to as the Tropical Forestry Action Plan, later as the Tropical Forests Action Programme and now 'national forest programmes' or nfp[6]). TFAP was started in 1985 by the World Resources Institute (WRI), World Bank (WB), United Nations Development Programme (UNDP), and FAO. It was mainly a response to the information about high deforestation rates revealed by FRA 1980.

There were also reports about some forestry projects that had been successful in leading to positive development and reducing deforestation. It was thought that if an adequate number of such projects were put

into effect, a more widespread reduction could be effected in the rate of deforestation. An estimate for some fifty countries showed a requirement for about eight billion US dollars over a five-year period (World Resources Institute 1985). It was thought that half of it, US$800 million a year, should come from assistance; the present annual rate of international assistance to forestry is possibly in the region of US$1 billion (Madvani 1999, OECD/DAC 2000).

It was suggested that tropical countries should develop plans for their forestry sectors. Donors should support this work. Donors should also support the eventual implementation of the national plans. A detailed system for TFAP exercises was developed, with lead agencies, core support agencies, issue papers, round tables, donor coordination and so on (FAO 1996).

What does this tell us? Does it say that no planning is needed?

In Indonesia, planning has been rather 'weak'. A number of large pulp mills are currently in great trouble due to a shortage of raw material (Barr 2000). Many pulp mills may in the coming years only get 50% of the wood they need. As the information base is very weak all these figures could be wrong in either direction. Should Indonesia try to improve its statistical base or should it continue with its *laissez-faire* approach?

Box 6. Strategic Planning

Much has been said about the need for strategic planning at national and provincial level. This can sound like top-down planning. It is, as has been said, necessary to involve all important stakeholders. If, for example, 300 000 forest farmers in Sweden don't accept a forest policy it will most likely fail. Nowadays the urban population also wants to have a say in how the forests are managed. A method of involving different stakeholders will be described in Box 11, and theoretical models for sector planning have been developed by, for example, Nilsson-Axberg (1993). The key is dialogue at all levels in step-wise planning.

It is not possible to just focus on local planning. The 'centre' needs to know what happens at different levels, and must often try to influence what happens at the local level.

It is possible to raise doubts about the value of strategic planning if it is treated as a 'one off' exercise. In a planning exercise in Sweden in 1978 it was foreseen that the growing stock would be reduced (from 2.3 billion m^3 in 1970 to 2.1 billion m^3 in the year 2000 [National Board of Forestry 1988]). Fellings would need to be reduced (the 'wood gap') if heavy investments were not made. In reality the growing stock in the year 2000 was about 3 billion m^3.

The reason for this 'surprise' is that investments in improved forestry were made. The increment also increased. This is probably due to 'atmospheric fertilization'. Felling has also been lower than expected and the import of wood has increased drastically.

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[6]The use of lower-case letters or capitals is under discussion. Currently, lower-case letters are preferred, the reason being that it does not signify any particular UN model. Each country is, however, free to use its own model.

This report argues that one should try to avoid running into an Indonesian-type situation. Planning shows what happens under certain conditions. If the basic conditions are changed the 'expected' future will change. The 'analyses of consequences' shows what happens under different assumptions. We can be sure that many basic assumptions will change. It is therefore necessary to make continuous adjustments in the 'analyses of consequences'. It is the strength of democracy that it can provide the mechanisms to detect the need for adjustments and to make adjustments possible.

The TFAP is said to have led to a doubling of assistance to forestry (e.g. Joshi 1999). It has certainly increased awareness, and in many countries it has started a planning process. However, it also encountered a range of problems. The problems of main concern in this context include the following (e.g. Schmidt *et al.* 1999):

- The TFAP was designed primarily by people working within the UN system. Therefore, quite naturally, it developed into an attempt to draw up a list of projects according to the standards of the WB or UNDP.
- The need for national action and commitment was rarely analysed. There was often only a limited commitment (or ownership) from the countries for which the plans were made (or in fact by the countries officially responsible for the plan).
- It was often said that the government of the country concerned had approved the TFAP, but in fact such approval rarely included any form of commitment to implement the plan. There were seldom any concrete proposals for changes in policies, administration, and so on. Even if a theoretical commitment was occasionally made, in practice the proposals were hardly ever followed up. There was rarely any understanding of the need for a preliminary political process that included consensus building. There was often little or no statistical basis for the planning, so that in reality true planning was impossible.
- Some of the plans assumed that what was wanted was a single correct technical solution to the exercise. Some of the plans were technically very amateurish.
- The final report often featured a long list of projects that awaited funding. Usually these were just a dream. If all these projects had been accepted, almost all of the available development funds would have had to go to forestry! For most countries a best-case scenario was produced. If all these best-case scenarios had been realised, the market would have been flooded with forest products.

Although the TFAP experienced these and other difficulties, the underlying ideas were good. The flaws could have been corrected. Advantage can possibly still be taken of the momentum that TFAP and its successors

developed. The nfp concept, which has been much discussed—and supported—by the IPF and IFF, should be valid for all countries. However, there has been some tendency to 'mystify' nfps. To be successful, an nfp should not lead to a list of projects, but to a 'national will', based on solid information about the actual situation, and anchored in general national objectives and policies[7].

Here, we wish to emphasise that national policies and programmes for the forest sector must be integrated into national objectives and policies. Sector policies that are developed taking only sector objectives into consideration will lead to conflicting programmes that counteract each other. Fig. 1 describes the nfp process as part of general national objectives and policies, illustrating the interdependence of sector policies.

Commonly, general national objectives cover components such as employment, price stability, economic growth, balance of payments, and income distribution. Statements of these objectives have led in turn to the setting out of national policies in the fields of environment and forestry, among others. Forest policy should aim to fulfil the goals of society (and not primarily forest goals).

Formulation of policy as well as monitoring and evaluation within the forestry sector requires relevant and accurate information on the conditions prevailing both in the forestry sector and in other sectors. It is the task of information work to provide it.

Much of this information is used as input into various studies, the results of which affect the general national objectives and policies. This is an ongoing process without beginning or end.

It is in this political situation that new objectives (the 'national will') and new policies (the way to reach these objectives) can be formed. Information must now be brought into the process. A crucial element is information about the supply of and demand for forest products, exemplified by wood, but equally applicable to any forest-derived commodity. Various studies are required, in the first place to investigate the current situation and the need to adjust objectives and secondly, the consequences of alternative policies. What is the present situation regarding employment? Are the current objectives leading in the right direction? What effect will alternative policies have on the availability of labour and the demand for it? Similar questions need to be asked on other topics such as costs, investments, energy, and environment. Basic data and information analyses are needed by all the stakeholders who participate in the political process, both for drawing up and for implementing policies.

The outcome of the process is normally a revised set of general national objectives and policies, forming the basis from which to start the next round in the

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[7]Certain basic elements of nfps have been agreed in the IPF/IFF process. What is different from the old planning exercises is, for example, the emphasis on stakeholder involvement.

Figure 1. Development of a national forest programme
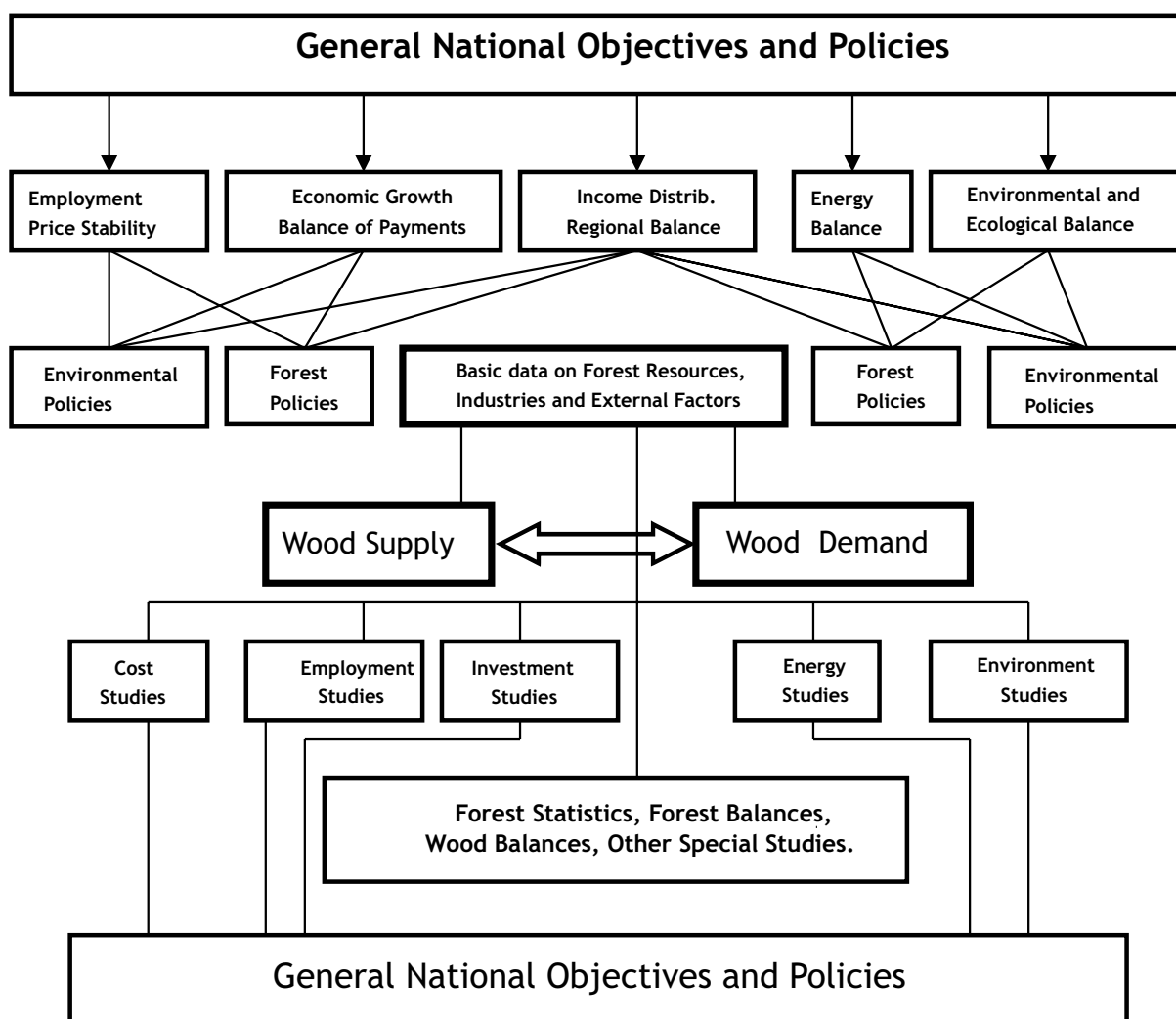
development of national forest programmes and their implementation. The process is demanding in several ways. It requires:

- A sound base of statistics on a wide range of topics such as forests, forest industries, production and consumption of wood and of processed goods made from wood, trade, and employment;
- Specific information about the response of forest growth and other environmental conditions to forestry interventions;
- A capacity to retrieve, evaluate and analyse information and undertake studies of the type suggested above;
- A democratic approach, which emphasises the involvement of stakeholders in all parts of the political process, so as to facilitate consensus building and the eventual implementation of the agreed policies;
- Information about forest owners and their behaviour.

The story of TFAP is told in order to make clear that planning of the TFAP/nfp type requires *inter alia* knowledge about forest resources. Such knowledge was often lacking when the TFAPs were implemented. There are also a number of planning tools that can be utilized in planning and strategy development (analyses of consequences, scenarios, relation to other sectors). These were often not used at all in TFAP. No wonder the results of many TFAP exercises showed limitations.

Nfp programmes are or have been working in over 100 developing countries (FAO 1999b). It is important that the work is improved step by step. Without 'facts' it is difficult to develop good nfps, and at present the nfps are not supplied with the facts they need.

It should be pointed out that the FAO report does not mention the lack of statistics/information as one of the main problems. Instead, a lack of capacity in general, lack of finances, inadequate coordination, lack of awareness and lack of valuation are the main problems identified. Would the problems with nfps cease if these problems were solved but the knowledge base still remained weak?

5.4 Forest use

Most forestry aims at producing goods and services that people need. In developing forest policy, it is important to have information on quantities, patterns and trends in the production and consumption of forest products and on the trade in them. Policies on forest resource management must be related to demand. This is true whether we are dealing with wood or non-wood commodities, or with services derived from the forests.

Studies on the outlook for supply and demand of goods and services derived from forests place high requirements on data content and quality. They involve making estimates of actual and forecast production and consumption of goods and services, and expressing the results in comparable terms. A common problem is identifying and quantifying all of the components on both the supply and the demand sides. Box 7 illustrates the complexity of the problem with the fibre balance[8] as an example. Similar balances can be thought of for any forest-derived product or service ('forest balance').

Work on outlook studies and, in particular, attempts to establish the balances described in Box 7 do in most cases encounter serious data deficiencies (e.g. FAO's Outlook Studies). The figures on exploitation may be just guesstimates, sometimes reflecting the formal level of allowable cut, but with little or no relation to reality. Occasionally consumption studies are made, the results of which, however, are soon outdated. In most countries information about fuelwood consumption is very limited (see Box 8). The same is true of non-wood forest products (Ruiz Perez and Arnold 1996).

To make things worse, information about forest resources and forest use are often dealt with in different offices with little communication between them. The result is that the two sets of information are not comparable or do not match. This incompatibility in the data constitutes a serious obstacle to making studies, for example of the present and future fibre balance.

Gaps in information on the use of forests and forest products make it difficult for governments to develop well-informed and quantified policy goals on production and product mixes. The complexity of information needed is shown in the boxes on components of the fibre balance (Box 7) and on fuelwood (Box 8). Very few countries are in a position to quantify all the components listed. However, it is important to understand what the components are. If they cannot be quantified at present, then one can make some working assumptions about them, and eventually try to improve the data. Knowing where the information gaps are is already a step towards filling them.

5.5 The present state of the forests

We have touched upon the various steps involved in the political process, among them the identification and quantification of problems. The questions to be raised next are where do we stand, and in which direction are we moving, with regard to the more important characteristics of the forest resource? A characteristic

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Box 7. Components of the fibre balance

Forest
Net fellings = gross fellings – whole trees felled and left in the forest.
Removals under bark = net fellings – tops, bark and reject.
Consumption of domestic wood = removals – transport losses and measurement losses.

Balance
Supply = consumption of domestic wood + import – export + recycling + fibre from other sources.
Industry consumption = supply – household consumption – other non-industrial consumption.

Industry
Industry consumption = intake in sawmills + intake in pulp mills + intake in board and plywood industries – sawmill residues used in other industries – quantities deposited as waste (such as unused sawdust)
Industry intake is compared with industry production in volume or in weight terms by using conversion factors, such as cubic metres of roundwood per tonne of pulp.

Box 8. Fuelwood

In many countries attempts have been made to work out the balance between fuelwood supply and demand. Both are in fact extremely flexible. As to demand, people use not only fuelwood, but also other biomass. They adjust to the resources available, so that the amount used in a year and different periods of the year can vary widely also in the same area depending on the supply. They will use a lot of fuelwood if it is readily available, but can get by with much less if there is a shortage. As to supply, the resources available are very difficult to estimate. Most fuelwood resources used are often found outside 'forests'. The rate of growth of scattered trees and bushes is very different from that of plantations. Much wood comes from looping and pollarding and from farm and garden waste. Non-wood biomass, such as agricultural waste and cow dung, is widely used.

For the reasons mentioned traditional fuelwood balance studies may be difficult or impossible to carry out. Traditional inventory or planning methods may not be useful. Some other forms of investigation may be needed. It is likely that new methods of inquiry will have to be employed. As always, the main thing is to start by identifying the important questions. What problem do we want to solve? What are the options to solve it? What will be the consequences of applying the different options? From these general questions we can derive specific questions (Persson 2000b).

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[8] Box 7 and surrounding text introduce the term 'fibre balance'. It is similar to the more frequently used term 'timber balance'. We prefer fibre balance, since fibre from sources other than roundwood contributes—sometimes significantly—to the total fibre supply.

of key importance is the capacity of the forests to fulfil their functions. Describing this capacity and how it is changing implies that we should first find out what the factors are that influence it, and how they contribute in both qualitative and quantitative terms.

Then we need to measure these factors. What are they? This question has been a topic of forest research, in particular yield research, but traditionally it has dealt only with the factors that affect wood production, such as species choice, stand density, rotation age, and the complex dynamics of species and size composition after selective cutting. Asking questions about the capacity of forests to fulfil their functions in a broader sense will usually reveal important gaps in our knowledge. It will reveal not only that many of the factors that influence the yield of non-wood goods and services are insufficiently known, but also that there are significant information gaps even about the factors that influence timber production.

For many of the 'new' questions, such as biological diversity, air pollution and its effects on forest ecosystems, the carbon cycle, the social functions of forests, and the type and intensity of forest management, there are serious problems in finding relevant relationships and valid concepts (Nyyssönen and Ahti 1996). It may be harder to know what to measure and how to analyse the raw data than to know how to measure.

It seems reasonable for the gathering of forest resources information to concentrate on those goods and services that can be controlled or influenced by forest policy. Taking wood production as an example, the analysis of consequences has to answer questions about how much wood of specified qualities can be extracted from the forests now and in the future under specified conditions, or about what the area and productive capacity of the forests will be at the end of the period considered. The time span may be a rotation period, or the lifetime of an investment in the wood processing industry. The analysis will specify a silvicultural programme that corresponds to the proposed policy programme. This programme must take into account the ownership or other tenure conditions, and people's response to policy actions such as legal supervision, extension services, information campaigns, taxation and subsidies. The analysis will then seek to quantify the consequences of the programme for the future state of the forests and the amounts of wood that can be extracted. Information is required on the area of the forests and their structure with regard to species-cover type, age, tree size, density and other characteristics. The standing volume and the growth in different categories of forest must be known in order to make projections of future stocking and yields. Calculations to analyse the consequences of ongoing or planned activities will require additional information about the forest's response to silvicultural interventions such as assisted regeneration, weeding, enrichment planting, thinning and the use of fertilisers.

If the interest is in non-timber products or in services provided by the forests, the analysis will proceed in a similar way. In most cases non-timber goods and services are 'consumed' locally. Therefore analyses concerning them are more location-specific than those for timber. For example, typical questions on recreation forests may be about the attractiveness of forest landscapes now and in the future, and about their capacity to receive visitors. Here we need to know or to make assumptions as to what constitutes attractiveness. It may be influenced by measurable characteristics, such as the age and size of the trees, forest density, occurrence of mosaics of forest and open landscapes, species richness, presence (and visibility) of wild animals, and the availability of edible berries and mushrooms (Kardell and Eriksson 1983). How will these characteristics be influenced by the policies now being proposed?

Traditional forest inventory has developed its measurement methods. There are established techniques and instruments, and there is statistical theory that has greatly enhanced the efficiency of data collection and analysis. However, new information elements are being added that require new measurement methods. For example, in Vietnam, interviews in a nearby village are used to collect demographic, socio-economic and hunting information, linked to a forest sampling unit (communication from Dr. Ngyen Huy Phon, FIPI). In Indonesia, the production of sago is estimated by observations on the flowers or fruits of the sago palm (Revilla 1991). In Sweden, pollution studies on the deposition of heavy metals use an analysis of moss samples on georeferenced sample plots. On the same plots the occurrence and relative cover of a list of indicator species is assessed in space and over time (von Segebaden 1998, pp 247 & 401). There are many other examples of innovative techniques for all sorts of observations. One needs to know which factor to measure and how to use the information. Finding a suitable measurement method may still be a problem, but it is one that can usually be solved.

5.6 Change

What has been said above about assessing the current state of the forests is essentially valid also for assessing changes. For change assessments, however, the problems of accuracy and comparability are more critical. The magnitude of change is often small compared with errors in current-state assessments, and its measurement may 'drown' in these errors. Comparability over time is easily jeopardised by small changes in standards, classifications and methods. For these reasons, when change assessment is planned, the organisational set-up, inventory design and assessment routines must be specially adapted.

Change assessment requires continuity and stability in the inventory organisation, with certain minima of funding security and of institutional memory. Good

instructions and good control of measurements are essential. Special inventory techniques are needed to ensure the comparability of measurements, as well as special sampling designs to focus the repeated inventory on its content of change information. Types of inventory will be discussed later.

5.7 Plantations

Plantations as defined here are even-aged forest stands, established by planting or sowing one or two species. In tropical and subtropical zones they consist typically of introduced species and differ significantly from natural forests. Sometimes this is also the case in temperate and boreal zones.

The information needs of plantations in tropical and subtropical zones deserve special discussion. They are planted for a specific purpose and are often intensively managed for fast growth and high yield. If planted for wood production they can in theory take pressure off natural forests and produce high yields of commercial value. In other cases they are planted in small plots to produce fuelwood for local use, where the wood may or may not enter a market. Plantations can also be established for other purposes, such as watershed protection—although in other places plantations may be found to use unacceptable amounts of scarce water supplies (CIFOR 1999). In all cases there is a politically significant intention behind the plantations. There is therefore a need to know whether and to what degree they fulfil their functions. For commercial tree plantations, data on their past and potential yield are of key importance. The information needs for plantations in general are typically concerned with purpose, planted area by year, whether on previous forest or non-forest land, site class, species, survival, age, density, health, and felling records. In the context of land-use planning, the type of land and the owner's identity are important.

5.8 Trees outside forests

Trees outside forests are an important forest resource. In a number of countries and regions (e.g. Bangladesh, Java, Pakistan and India) studies have shown that the majority of 'forest products' originate from this resource (FAO/RWEDP 2000). In spite of this, failure to collect information about trees outside forests is a major flaw in many inventories. The prime reasons for this are that scattered trees or groups of trees have been considered to be outside the responsibility of forest authorities and the commonly used remote sensing techniques cannot detect this type of resource. The fact is, however, that without this information meaningful forestry planning is simply not possible in many areas.

Techniques to collect information about scattered trees are available (Singh 2001) and during the last decade some inventories have been undertaken in which trees outside forests were included (Pandey 2000).

5.9 The role of forests for rural communities

In many developing countries there is a shift in emphasis away from limiting 'forestry' to state or big-business management of gazetted forests and industrial plantations. The aim is to let rural people benefit more from nearby forest and tree resources. Another aim is to encourage more involvement of local communities in the management of forests, woodlands and trees, which play an important and often underestimated role in the livelihood of rural people. The trend is to give local communities both rights and responsibilities in the management of the forests, and an equitable share in the benefits (Arnold 2001, Saxena 1997, Wiersum 1999). Many countries see a need to adapt forest policy to the realities of today. Existing policy documents, including legislation, are often inherited from colonial times and exclusively concerned with regulating access (or non-access) to gazetted forests. Many countries simultaneously seem to be in a phase where this insight is quite clear within forestry administrations, but not yet amongst a wider public, or in governments and parliaments. Therefore forestry administrations struggle to get the understanding of the general public and of budget-responsible Ministries for a redirection of focus. To achieve this they wish to show, in quantitative terms, the role of forests in the economy of rural households. They see it as a serious problem that this role of forests is generally underestimated and receives little attention in national policy (Janz 1999a and b).

Among other things this development brings a wide array of new information needs, for example:

- In quantitative terms, what is the importance of forest-derived goods and services for rural people? Facts are needed to attract political attention, and funding for activities such as community forestry and extension services.
- What is the present state of the forests and how is it changing, with regard to their potential contribution to the livelihoods of rural people?
- What are the environmental and social impacts of forestry-related activities and developments?
- What is the productivity of forest and tree resources with respect to locally needed goods and services and how can it be influenced?
- What are the ownership and tenureship conditions and what is the local decision-making process?
- How is the economic position of the rural people involved in the participatory forest management changing?

In most countries little is known or understood about these matters. Therefore it is difficult to develop policies that will strengthen the beneficial role of forests for rural communities and enable these communities to participate in sustainable forest management.

5.10 Other information

Sections 5.4 to 5.9 have dealt primarily with forest-related information. During analysis work there will be a need for many other types of information. Here we can mention issues such as employment, urbanisation, trade with forest products and agricultural productivity. Sometimes there is a need to collect this information in special studies, but often authorities outside the forest sector have already collected it. In the latter case, availability is a matter of knowing where, and of collaboration and data sharing.

6. Solutions

6.1 Analysis Unit

Repeatedly in this report concludes there is a need for an 'analysis unit' What kind of animal is this? Does it exist in real life? What we mean is a set of functions that link supply and demand for information (or information gathering and policy making) together. The functions can be collected into one administrative unit or spread over several but made to work together. The analysis unit that we have in mind is in close touch with policy making so that it can help in identifying the questions that need to be answered. It is also in close touch with data collection so that it can retrieve and organise existing information, identify gaps, and collate relevant material for use in policy and decision making. It has the capability to know the sources of information, to understand source information and to prepare analyses. With an analysis unit in place, dialogue will be facilitated between users and producers of information, and information gathering will become more demand driven than otherwise. By assisting the policy and decision makers, on request, with tailor-made information and studies, it acquires knowledge of the problems and needs of the user community. By interacting with data collecting organisations it can feed back to them its knowledge of current and emerging information needs. It can also advise on any need for new research to be undertaken. Box 9 summarises the tasks of an analysis unit.

What has been described here is not a theoretical construction. For several decades Sweden has had practical experience of an 'analysis unit' that has grown out of various existing analysis functions. Tanzania has recently established such a function. Experience from Sweden tells us that long-term political commitment is needed to make such a unit work well, that it takes decades to build up the necessary expertise, and that institutional memory is important. In order to create an analysis unit it is usually possible to adapt existing organisational structures. Often, what is needed is to concentrate scattered existing activities in one place. The best recommendation may be to assign the tasks described to an identified group that is big enough to build up an institutional memory.

Box 9. Tasks of an Analysis Unit

To fulfil its function as a link between users and producers of information an analysis unit will
- undertake work to identify 'topical' forestry issues
- create and maintain an overview of forestry-related information that may be scattered in many places—for example, information on the supply and demand of forest products and services, or on employment in forestry;
- undertake *ad hoc* studies to support the formulation and implementation of forest policy, in particular analyses of the consequences of political action;
- based on contacts with users, specify information needs that are not being met;
- based on contacts with producers, supply users with tailor-made information, in particular information that has to be compiled from different sources and made consistent;
- promote and ensure comparability between information originating from different sources;
- compile and disseminate standard information relating to the forest sector, for example in a statistical yearbook;
- take responsibility for the international exchange of information;
- work on analyses of consequences.

The importance of institutional memory cannot be overly stressed. This applies to forest inventory work as well as to analysis. In administrative environments with frequent changes of personnel it is impossible to build capacity and progressively accumulate the knowledge that is needed.

An analysis unit ought to be as independent as possible. There are cases where it can be placed at a university. In many developing countries this can be a good solution: at universities different types of capacity are often available. But it must of course have very close contact with the forest administration, and this may not always be possible if a university location is adopted.

The functions and processes described above seldom takes place. Fairly sophisticated national forest inventories are often undertaken, but their usefulness is not clear. In a typical example, the original reason for undertaking the inventory may have been a forest policy problem such as deforestation and degradation. Combating this problem is in fact a complex matter, affecting many sectors of the economy. It involves changing the living conditions and behaviour of many people. There is a general notion that more information is needed. In this situation it is only too tempting to ask first for a forest inventory. There is then a great risk of an inventory being planned as a one-shot operation and without putting the questions that have to be answered in the political process. It may give an impression of

activity, and may be attractive to donors, but it has little chance of producing the knowledge base that is needed to develop and apply well-targeted policies.

In recent years a number of countries have shown interest in developing their analysis functions. The following observations were made during a workshop in late 2000 for a group of southern African countries on the theme 'Information Analysis' (Janz 2001):

- A full-fledged analysis unit with all its desirable functions cannot realistically be created in one go. Rather it should grow organically in an iterative process and progressively make use of and amalgamate existing relevant functions.
- Several of the functions of an analysis unit are usually in place in one way or another.
- Different political and administrative environments will necessitate different solutions as to how an analysis unit should be set up.
- Should an analysis unit be a 'one-stop-shop' that handles all kinds of forestry-related information? This was found desirable; however, it should have a coordinating, overview function, rather than doing all the information work itself.

It should be said here that an analysis unit in principle is necessary for successful policy making. It is of course not enough. Commitment to improving policies and making the necessary changes is also necessary. The administration in general must of course also be competent and the administrative set-up suitable.

6.2 Country Capacity Building

The concept of 'country capacity building' needs to be thoroughly examined, as well as the means and methods to make the process self-sustaining. It should be given a much broader meaning than just 'transfer of knowledge'. Why it is so essential relates to Principle 1a of the *UN Forest Principles (UNCED 1992)*:

'States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.'

The broader aspects of country capacity building can be derived from Principle 2:

'(a) States have the sovereign and inalienable right to utilise, manage, and develop their forests in accordance with their development needs and on the basis of national policies consistent with sustainable development and legislation, including the conversion of such areas for other uses within the context of an overall socio-economic development plan based on rational land-use policies.

(b) Forest resources and forest land should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs for present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity, carbon fixation sinks and reservoirs and for other forest products and services. Appropriate measures should be taken to protect forests against harmful effects of pollution, including airborne pollution, fires, pests and diseases in order to maintain their full multiple value.

(c) The provision of timely and accurate information on forests and forest ecosystems is essential for public understanding and informed decision making and should be ensured

(d) Governments should provide and promote opportunities for the participation of interested parties, including local communities and indigenous people, industries, labour, non-governmental organisations and individuals, forest dwellers and women in the development, implementation and planning of national forest policies.'

The above leads to the conclusion that country capacity building is everything that can contribute to the capacity of states to exercise their authority and responsibility with respect to sustainable land use and within the boundaries set by international accords and agreements. This may be taken in a broad sense, so as to include the capacity of relevant organisations, both governmental and non-governmental.

Traditional technical assistance certainly aimed, at least partly, for capacity building. But after 30–40 years of often quite extensive support to inventories and planning there are still great limitations in the capacity to collect and organise information and to make it useful in planning and decision making. The counterpart system used by the UN and many other donors to build capacity normally failed. Among the reasons that can be mentioned (Berg 1993) are:

- The 'expert' took the responsibility for the work (producing a report). Little training was provided.
- The person trained for a job was transferred to other duties once a project was completed.
- No institutional development.

To solve some of the problems with the old system the following proposals have been made by Berg (1993):

- 'Unashamed gap-filling'. An 'expert'/expatriate is simply hired to fill a post.

- Returning short-term experts.
- More use of local consultants.
- More use of institutional twinning.

Every country needs the capacity to plan the use of its forests (as part of general land use planning), to draw up policies, to collect the information needed, to monitor the development of the forest resources, and to help stakeholders to reach consensus. Donors cannot do this on behalf of a country. It is not enough for a group of experts to formulate plans, policies, etc by themselves, as in the early TFAPs. Such plans and policies were seldom adjusted and accepted as part of a political process. They were only technical exercises that said, in effect, what should be done if there were no stakeholders. In most developing countries the capacity to plan the use of the forests is insufficient. In our opinion international efforts in the field of forestry should have the relevant capacity building as a focus area. Later in this report we will give an example of how international cooperation can help (Box 10).

A prerequisite for successful support to country capacity building is a political commitment to sustainable land use. If there is no such commitment there is not much that donors can do. It is an unfortunate fact that it is lacking in many countries. Democratic attitudes are important elements of policy development and are prerequisites for successful national consensus building. National consensus building processes aimed at sustainable land use need to be promoted and supported by the international community, in ways that need to be further developed. The processes must have a sufficient knowledge base with respect to the actual land uses. There are many indications that the organisation of existing information and the collection of new information in these fields require fairly independent national analytical units to be set up (as discussed above) that can provide a good basis for informed participatory decision making.

In summary, what is needed in each country is:

- an analysis unit (preferably independent);
- the capacity to collect the information needed about forest resources, use of forests, the relations between forests and people, etc;
- a political process to reach consensus.

6.3 What types of information gathering are needed?

Given that we know our information needs, a first consideration will be what information is already available. Organisation of existing information is a task that may be tedious and lack glamour, but it can often save much money and time. At a minimum it requires good archiving and retrieval systems. Often it requires some of the specialised functions of an analysis unit as previously discussed.

A second consideration is the degree of accuracy that is needed for the intended purpose. What will be

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Box 10. An example of support for country capacity building

There is a need to start building capacity wherever it is inadequate—that is to say, in most developing countries. It is a long-term process. The following describes a Sida (Swedish International Development Cooperation Agency)-supported programme in this field, which started in 1996 and which is expected to run for 10-15 years (Janz 1999b).

Sweden started its first own national forestry programme (nfp) about 100 years ago (Ekelund and Dahlin 1997). While working with TFAP, the personnel of Sida noticed that many countries and experts thought that TFAP/nfps were something strange and new. Many countries and experts started to 'learn by doing', without considering the old experience that was at hand in Sweden and many other countries. The IPF seminar mentioned earlier (National Board of Forestry 1997) was an attempt to spread existing knowledge (see Box 4). Sida also decided to support a two-month course that discussed, among other things, the Swedish experience of nfps, methods, the need for statistics, and the need for analysis. After this general introduction different country cases were discussed on the basis of presentations by the participants.

Sida has supported different courses of this type for a number of years. Not all of the training has been successful, as the participants were not able to use the knowledge gained when they went home. Sida has therefore decided to support a follow-up to the courses. The National Board of Forestry has been engaged in building up a network of people who have attended the courses, with the intention that they can have discussions with experts at the National Board of Forestry about the problems that arise. Short-term experts can also be supplied to the countries concerned. The most important provision, however, is for follow-up seminars to be held. The idea behind this approach is that the work will be concentrated on those people who stay on in the area of inventory and planning, and who work in countries and organisations that are committed to change. The local personnel should take full responsibility. If they run into trouble, some support can be given, but it is important that foreign experts should not do the work for them. Long-term experts should not be provided. In reality, if countries and organisations are committed, not much support is needed to get the work going. In the project, limited sums have been included that can be used to supply countries with Internet connections, software, etc. It is expected that in the long run the project will probably concentrate on one region (such as English-speaking Africa). It will succeed in countries that are truly committed. It will not succeed (fully) in countries where the government or the forest authorities are not committed, although even there it may build up some capacity that can be of value once a commitment is developed.

It should be added that the above project has tried to use the findings of Berg (1993) and other recent thinking.

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the consequence of an error of a certain size? In view of the error tolerance, is the existing information good enough? Can we afford to collect better new information? Can we afford to wait for new information? Or is there a case for making educated guesses or 'guesstimates', perhaps just while waiting for new information?

Making educated guesses should not be seen as unprofessional practice. Many political decisions are made without a solid base of knowledge. In these cases some kind of assumptions or guesses as to which choice is the best is used in the place of better knowledge.

The quality of such assumptions or guesses can vary a lot depending on the skill of the person or group making them. It is important that this person or group has experience of the matter, uses the limited knowledge that may exist and does the research that may still be possible. It is also important to be as objective as possible and avoid utilizing just the conventional knowledge. Improving the information may be a gradual process; not all improvements need necessarily be made at once.

If a new national or province level inventory is deemed necessary, then we can consider the relevance of the following inventory characteristics to our policy issues:

- one-time versus continuous inventories;
- local inventories versus large-scale, sampling-based inventories;
- field inventories versus remote sensing;
- inventories of forest resources versus information gathering on economic, social and administrative topics.

These characteristics are typical subjects of forest inventory textbooks. This report will only highlight certain features that may not usually receive attention or that have particular bearing on policy making.

Policy making usually requires information on changes over time, rather than mere status information. Only repeated or 'continuous' inventories can provide such information. Comparability and accuracy are of critical importance in such inventories. Typically, permanent sample plots with hidden marking are used. The use of permanent sample plots places considerable demands on the continuity, stability, and funding security of the inventory organisation. Good instructions and good control of measurements are essential. In developing countries these necessary conditions are often absent, leading to frequent failures in the use of permanent sample plots.

The value of information is usually significantly increased if the information can be put in relation to other information. An observation that the density of the growing stock in a given forest is 200 m^3/ha does not tell us much. But if we also know the variation in stocking within the same category of forest we can discuss the reasons for variation and scope for increase/change. Therefore, recording and archiving the whole variation of observations rather than just means has great value and should be given attention. Information about regeneration (density, frequency of blanks, species composition) can be compared with standards known from research. This comparison allows an assessment to be made of the quality of the regeneration, the scope for improving it, and its probable further development. Using such opportunities requires cooperation with related research to ensure measurements and standards are comparable.

Local inventory typically means that the (forest) area is completely covered by some kind of description. Detailed mapping (at scales of 1:10 000 or 1:20 000) is normally part of the work. Local inventory produces detailed operational information that answers the questions of what action is needed, when, where and how much? Emphasis is on detecting and describing the need for action rather than on accurate measurements. Very rarely do local inventories cover all the forests of a country. In contrast, large-scale inventories make accurate measurements on a small sample of the area. They can easily cover not just forest but all the land area of the whole country (province), and frequently do so. They produce strategic information at national or province level, but no large-scale maps. Information on single holdings cannot be derived from such inventories. Where no sampling-based national forest inventories are available, national level information is sometimes compiled by accumulating local inventories. Owing to the characteristics of local inventories such accumulations are as a rule inadequate tools for policy making, not allowing, for example, analyses of consequences of political action.

Forestry is increasingly involving local people. For this reason it is important to involve local people when designing inventories (Carter 1996). This is perhaps most important when executing local management inventories. In this report we deal primarily with the national level, but local questions must also be understood when designing strategic national inventories.

With regard to remote sensing, we have already pointed out in this paper that frequently the technique has dictated the questions to be answered by inventories. For this reason we wish to stress even that in this context the role of remote sensing versus field observations needs thorough consideration in each case. In a review of the rich remote sensing literature Holmgren and Thuresson (1998) conclude that 'many studies (of satellite remote sensing) have adopted simplistic views of the information needs in the forestry planning process. These studies do not relate the analysis to management decisions, but instead assume that plain and approximate mapping of forests has a great value'.

Information gathering on economic, social and administrative topics is obviously important for forest policy making. It uses statistical reporting, *ad hoc* inquiries, research and literature studies. Such activities are usually carried out by different people in different offices, and tend to be inconsistent and incomplete. Mechanisms are needed to simplify and focus data collection, and the capability is needed to trace information from a variety of sources and extract, compare, compile and present it in ways that are convenient for the users. For this purpose it is proposed that an 'analysis unit' be created or enabled as referred to earlier in this paper.

6.4 Linking information gathering and policy making

This section contains a summary of aspects that have been discussed so far.

6.4.1 The cycle of information gathering and policy making

An absence of clear links between information gathering and policy making has meant that little use has been made of the collected information, and that any policies, strategies and plans that have been developed are not based on solid information. This kind of vicious circle is rather common. How can it be broken?

One way is, as mentioned, to start from the needs of the political process. Information gathering will then be focussed on these specified needs. To illustrate what this means we may go back to Fig. 1. In the present context the figure implies that policy making and information gathering must start from a situation where the government is committed at the highest levels to the sustainable development of the forestry sector. It is not enough that the forest authorities are committed. The policy making and the strategy development that emanate from such a commitment will generate the questions that should be answered by national forest inventories and other sources of information. Where commitment and the intent to develop a knowledge-based forest policy are lacking, national forest inventories and other collection of statistics will have very little value.

It may seem theoretical to suggest that the political process should be the starting point, and that it is this process that should identify and specify the information needs. In fact, both a political process and a system of forest information gathering are usually in place, and what is needed is simply to link them together and make them work in a cycle. An *analysis unit* can establish the link.

6.4.2 The political process

No general recipe can be given for the development of strategies and policies for the forest sector. It depends on factors that differ greatly between countries. To give only a few examples, these factors include the structure of land ownership or tenure, the number and kinds of stakeholders, the types of problem encountered, political structure and stability, the structure of organisations and institutions, and the administrative environment. There are, nevertheless, a few considerations that are universally applicable and worth highlighting, such as the need to build consensus and the necessity of having a solid information base.

- **Consensus.** The process must ensure maximum consensus on the main elements of the programmes. There must be agreement, for example, as to what are the main current and emerging problems, and about possible measures for dealing with them. Without a basic consensus on these matters there

will be poor acceptance of political programmes, and their implementation is likely to fail. Governments often change, but forestry is a long-term undertaking. It is desirable that there should not be any drastic changes in policy after each election or change of government. It is best, therefore, if the policy is basically accepted by all political groupings. Box 11 gives an example of a process designed to ensure a maximum of consensus. The process is characterised by openness and participation. It conveys a sense to those involved that they 'own' the process, and prepares the ground for acceptance and implementation (see also 4).

- **A solid information base.** The prerequisites for good strategies and policies include the correct identification of problems and an adequate understanding of the consequences of political programmes. Meeting them will also facilitate the credibility and acceptance of the planning process. Different policy options have to be examined. Designing realistic options requires a correct understanding both of the forestry situation and of the political and administrative environment. The same is true of implementation. The necessary basis of solid information cannot be built overnight. Even if there are good statistical services and a good

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Box 11. The political process in Sweden

The political process in Sweden and its historical background were described in an information paper prepared for the World Forestry Congress in Antalya, Turkey, 1997 (Ekelund and Dahlin 1997), from which the following note is extracted.

The process of instituting and changing forest policy in Sweden includes both formal and more informal elements. There is a long national tradition of democracy and of seeking consensus, which forms an important background. In outline, the formal part of the process can typically be as follows:

Once a forestry-related problem (often a conflict) is identified and the government considers that political action is required it appoints a commission of inquiry, composed of parliamentarians representing the major political factions and of advisers and experts representing government agencies, organisations and NGOs who may be affected by the decisions taken. The commission will undertake a public investigation into a specified issue, following directives given by the government. It is given resources to commission *ad hoc* studies, appoint additional *ad hoc* experts, and seek the opinion of stakeholders as needed. Its report is made public and actively circulated to stakeholders for review. The report with the reviewers' comments becomes the basis for a government proposal to parliament. Parliamentary decisions then provide a frame, e.g. a new law, within which designated authorities will supply the details, e.g. rules and regulations, that are required for their implementation.

An informal process involves stakeholders, chiefly forest owners, in negotiations about the practicalities. This process is important for acceptance and smooth implementation, and facilitates the correction of policy elements that may be found to be inappropriate.

technical capacity for forest inventory, the information available often fails to meet the needs. It takes a continuous dialogue over a long time between the data collectors and the data users (the decision makers) to bring the collection and organisation of data into close alignment with the real needs. As part of the process, the political decision makers must decide what questions they need to ask, which in turn will define their information needs.[9]

6.4.3 What follows decision-making?

Governments and parliaments take decisions about new policies and new strategies for forestry. The process that follows may take different shapes, depending on the circumstances. The following is a typical list of the stages to go through:

- *Legislation*. Usually a new policy makes it necessary to pass a new law. The law needs to be accompanied by regulations that specify its exact implications, in quantitative and measurable terms, for example, what is meant by 'sufficient density', 'reasonable time', 'mature forest' or similar expressions.
- *Revision of organisational and administrative structures*. A new policy may require existing structures to be adjusted, or new ones created, for example to lay the ground for substantially increased extension services. The delegation of powers may need to be revised. In terms of practical application it may prove best to leave much to be decided at local level. The responsibilities of different agencies must be made clear.
- *Financial arrangements*. A new forest policy may have far reaching consequences for funding, subsidies, fees and taxation, which in turn may imply the need for further legislation and new budget arrangements.
- *Getting the message out*. Changes in forest policy have implications for many people. Both those who are the agents of change and those who are affected by it must be informed and, if applicable, activated. To convey the necessary messages to all concerned may require a strenuous information campaign. In some cases the task may be to translate the information acquired from research into language that can be understood by illiterate local participants, and into techniques that they are capable of applying. The ease or difficulty of the task will depend to a great extent on the degree to which the people concerned have been involved in the political process.

Many examples can be found in which good forest policies and strategies were developed, but little happened on the ground. In any case, implementation takes time, and nothing will happen unless action is firm and well-planned.

The Swedish 'Richer Forest' campaign (National Board of Forestry 1990) shows how long a policy drive can take. Preparations, including the education of forestry personnel in forest ecology and the preservation of flora and fauna, took about five years, and the campaign itself took about another five. As a consequence of all the education efforts the demand for a deeper knowledge of forest ecology has greatly increased. All the personnel of the National Forest Organisation (National Board plus County Boards) have undergone an intensive ten-day course in forest ecology and biological diversity preservation, and 150 people have attended specific university courses (equivalent to 20 weeks for each person) in order to respond better to future requirements.

6.4.4 Monitoring

The effect of the implementation of policies and strategies must be monitored. Are the policies successful? What are the problems encountered? How do the forests develop?

Certain aspects may be covered by a NFI. For things like success of plantations, protection of biodiversity, zoning for recreation and influence on local people special studies will have to be done. Since one can be quite certain that things won't develop exactly as expected when a policy is formulated, monitoring is really necessary.

Results from the monitoring (and independent) studies will lead to a public, scientific and political debate. In due time this will lead to requests for changes in the policy or parts of the policy. The whole process will have to start anew (or rather continue).

7. Conclusions

- Forest sector policies must be seen as an integrated part of overall national policies. Forest policies cannot be developed in isolation.
- Questions of a policy nature should be identified as the first step. Collection of information (e.g. a National Forest Inventory) follows thereafter.
- In most countries there is need for an analysis of different stakeholders' interests in improved statistics.
- Countries should recognise the need for policy making and planning for information about use of the forests, change, plantations, trees outside of forests, non-wood forests products and the role of forests for rural communities

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[9]The questions they ask are of course often based on information collected by researchers or NGOs. Research can make problems visible. This also points to the importance of an open society. In a closed society 'problems' may be hidden, no one daring to bring them into the open. This leads to lower quality forest management.

- Most countries should establish an <u>analysis unit</u>. This unit should be active in identifying 'hot' forestry issues, participate in the collection of statistics and analyse the consequences of different policy measures. It should work in close cooperation with both the policy-making authorities and the organisations that collect information. An important task should be to identify the need for different types of information. It ought to be as independent as possible.
- In committed developing countries 'donors' must assist in building the needed capacity. Donors should avoid doing the work on behalf of the recipient.
- Analyses, collection of statistics etc. must be seen in the context of the political process. Forest inventories undertaken in isolation are of little value.
- In the political process it is necessary to seek as much consensus as possible. This is a condition for acceptance and smooth implementation. Planning cannot just aim at finding the best technical solution.
- An implementation strategy must be part of any forestry strategy. To make a strategy work requires much work (and therefore often fails).
- Implementation must be followed by adequate monitoring.
- And finally a quotation from Jack Westoby: 'Forestry is not about trees, it is about people. And it is about trees only insofar as trees can serve the needs of people'.

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Appendix 1. Definition of Reliability Classes

Persson (1974) distinguished five classes as follows:

1. Well-known. Information based on good inventories.
2. Relatively well-known.
3. Rather unreliable information. Partly based on inventories.
4. Poorly known.
5. Practically unknown. Information close to a guess.

Translation used in Table 1: High = classes 1 and 2; Medium = class 3 and half of class 4; Low = half of class 4 and class 5

FAO (1995 and 1993) distinguished three classes as follows:

1. Forest inventories based on high resolution satellite data (LANDSAT TM, SPOT) or aerial photos, supplemented by extensive field checking or sample survey.
2. Forest inventories based on medium resolution satellite data (typically LANDSAT MSS) with limited ground truthing.
3. Surveys or maps based on heterogeneous material like vegetation maps, land use surveys, etc. generally at coarse resolution and often out of date. The reliability class 'low' is synonym for insufficient information and the need for a reliable baseline in future.

Translation used in Table 1: High = class 1; Medium = class 2; Low = class 3

Appendix 2. Some Observations Regarding International Level Information

The handling of information at national and international levels is closely linked. For this reason we summarise here some observations regarding the latter.

Background
- The last decade has seen strong international calls for more information about forests. In 1992, demands were made by the United Nations Conference on Environment and Development (UNCED) for data to be collected by National Forestry Programmes (nfps) and other national systems. Of particular interest are (1) the emphasis put on improving 'national forest resources assessments, forest statistics and the capacity to analyse and make proper use of forest resources information', and (2) the way in which 'Agenda 21' has placed forest inventory in a context of long-term planning, the quantitative and qualitative evaluation of effects, and the rectification of inadequacies. The Intergovernmental Panel on Forests (IPF) and the International Forum on Forests (IFF) have raised the same issues and have also made high demands on FAO's World Forest Resources Assessment.
- There is now also much pressure on international organisations such as FAO to supply new types of information, but it is not always clear how it will be used, or who will pay the costs. Such new information is concerned with, for example, forest vitality, forest quality, the quality of forest management and biological diversity. The demands can seem somewhat naïve, considering that most countries do not even have basic information about forest area, changes in forest area and woody biomass.

History
The first attempts to estimate the world's forest resources date back to the 1920s (Zon and Sparhawk 1923). When FAO was established a World Forest Inventory (WFI) was a major item on its agenda. Studies using questionnaires were carried out in 1948, 1953, 1958 and 1963. The lead question in these early studies was whether the forest resources would suffice to meet growing demands for industrial wood. There was a fear of overexploitation. It was believed that repeated inventories would be the instrument by which change could be detected and that knowledge of changes would be used to draw up sound directives for national forest policies. Around 1970, FAO abandoned the work with WFI. Following this, most of the work was carried out at the the Royal College of Forestry in Stockholm (Persson 1977). A renewed interest in forest resources led to new work around 1980. World or Tropical Forest Resources Assessments have been published for 1980, 1990 and 2000.

Methods
The World Forest Inventories used a questionnaire method, but this met with serious problems. Persson (1974) and FRA 1980 used an 'expert' method, whereby experts summarized all kinds of available information. Since 1980 remote sensing has also been used to complement other information (both at national and international levels). From 1990 a change assessment based on a sample of satellite imageries for different points in time has been used (FAO 1996). A databank (FORIS) collected as much inventory information as possible from the countries. This information was adjusted to common definitions and base-years, and put into country tables. The same method is, in principle, still used. Some organisations (like WCMC and JRC) produce maps based on remote sensing. FAO depends primarily on work done by individual countries to collect primary information about forest resources. Several other organisations then publish summaries of FAO reports.

Present situation
As has been shown in sections 3.1 and 3.2 there are great deficiencies in current information at national level. Therefore our information about the state of the world's forests is equally incomplete and insufficient with respect to reliability.

Who are the users?
The users of international forest-related information are not easily identified. We assume that the following are the principal categories of such users:

- National and international planners and policy makers in forestry and related development issues.
- Industries engaged internationally in the production, consumption, trade and marketing of wood products.
- The scientific community, including global modellers.
- The general public and the media.

What information is needed?
- It is not really clear what and how much forestry information is needed at the international level. Are approximate figures good enough? Do we need to have more details? So far the information available internationally has not led to much action.

- The following list indicates the main topics of present-day forestry information needs at the international level (on which there is a kind of agreement):

  1. Supply and demand for forest products in a broad sense
     (a) What use is being made of forests?
        - for wood supply,
        - for non-timber products, and
        - for environmental services?
     (b) Are there any shortages of these goods and services? If so, how much and where?
     (c) What are the conditions needed for producing these goods and services in sufficient quantity to satisfy the demand?
  2. Global climate change: carbon flows and carbon sequestration in biomass.
  3. Biodiversity.
  4. Changes in important forest conditions, e.g. forest area and stocking.

Further discussion of information needs

- In the WFI era there was a fear of a coming global shortage of wood. This is now longer the case. Problems occur in countries or parts of countries.
- During the last two decades there has been a strong interest in information on changes in forest area. FAO's periodic study, FRA 1990, was eagerly awaited. However, when the results were published, they did not provoke much action.
- The annual rate of deforestation in the tropics was estimated in 1990 at 15 million ha. Would it make any difference if the estimate had been 10 million or 20 million ha? FRA 2000 reports lower deforestation rates. What will this change in figures mean? Less need for action?
- What seems to be needed more than global figures on deforestation is support for developing and implementing sound forest policies. This will require better knowledge of the facts at the national level, and in particular a better understanding of the causes of deforestation in each individual country.
- Many developed countries (often with small forest resources) want to be assured that other countries do not misuse their forest resources. But one cannot expect the UN to put resources into answering the related questions. Forest resources information must be collected primarily to satisfy national needs. If a country wants to know about *other* countries' resources, it must be prepared to pay for this work (and, for example, to support relevant UN programmes).[10]
- Climatologists and UNFCC (United Nations Framework Convention on Climate Change) seek information on the amount of the global biomass and how it is changing, in order to learn more about the carbon

cycle. This is a most legitimate request. But who is prepared to pay for improving the statistics (because this information cannot be given at present)? The yearly production of forest products may be worth US$500 billion and the trade may be worth US$140 billion (FAO 1995). In spite of this importance the forestry sector has so far not managed to get resources for making adequate inventories. Will UNFCC manage to get the resources needed?
- International policies (for example recommendations developed by IPF/IFF) are often based on global analyses. Many global analyses are biased—they are analyses for advocacy—or are derived only from fragmentary statistics. Examples of 'hot' environmental or forestry issues during recent decades include desertification, overgrazing, the fuelwood crisis, erosion and land degradation, forestry and water, forest decline, the Sahel crisis, the Himalayan crisis and the Ethiopian crisis. We have now learned that some of the analyses that led to action in these fields were very badly done (see for example Leach and Mearns [1996]). They were based on anecdotal evidence and rarely on correctly ascertained facts. Some of the activities that were recommended or undertaken were of doubtful value or even damaging. There is a risk in using 'international statistics' for making national policies. Many decisions about fuelwood projects were taken based on 'international knowledge'. This led sometimes to investments in areas where there were no problems.
- International information will sometimes make it possible to influence national policies. It is no longer possible for a country to hide the facts that can be seen from space. This was evident, for example, during the 1997 fires in Southeast Asia.
- NGOs have considerable resources and make many studies. These studies are often aimed at advocating certain policies. They have their role in debate. However, there is a need for more neutral and reliable information sources. UN organisations are probably the only alternative. If a UN organisation wants to influence national policy, it is of course imperative that its recommendations be based on accurate information.

In summary, it is not fully clear what information is needed at the international level. Even more unclear is how it will be used. A real analysis may show that we need less information than is often argued.

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[10]Consumers often want to be sure that products they buy come from well-managed forests. Certification is a market instrument which relates to exported wood. Important exporters may have to collect information so that the demand from the market is satisfied. But most countries in the world are not exporters.

Something about the techniques used in FRA and inventories

- In many quarters there is a strong belief that remote sensing can produce all the information that is needed. Other technical fixes are also being sought that will provide the information needed rapidly and cheaply—but in practice easy solutions rarely exist.
- Remote sensing specialists always tell us that with new techniques (higher resolution, new satellites, or digital interpretation) satellite imagery can give all kinds of information. Serious limitations become apparent, however, if we confront such a statement with the list of information needs presented above in this section. There has been a continuous search for new and better techniques, but a long-standing problem has been the difficulty of making good use of the techniques that are already available. Remote sensing is of great value and has great potential. But questions remain, such as: How much remote sensing activity is supply driven? How much activity is overlapping? Will the information be of value to developing countries, or to whom? Where can this information lead to changes in national or international policies?
- Knowledge about forests is not increasing as one would expect, given all the modern techniques. One reason for this may be that forest inventories now mean forest mapping. The need to work in the field is often neglected.

Some conclusions about international level information

- The knowledge about the world's forests is weak. A problem we often have to face is 'ignorance about ignorance'—people are simply not aware of how little is known, or of the inaccuracy of published results.
- Many policy makers claim that FAO's FRAs do not give enough information (even if they can rarely show how better information would be used).
- It is often argued that FAO should use modern techniques to do the work and give countries and the international community what they need—the lack of information could be solved by a technical fix. In many cases this originates from organisations with an interest in remote sensing techniques, and is interpreted as producing maps.
- It would hardly be feasible for an international organisation (like FAO) to provide countries with the information they need; their need for information is localised. FAO could possibly provide the type of information requested by, for example, UNFF. It is difficult to imagine that FAO would be given the resources to collect information on the ground (and many/most countries wouldn't accept such an intrusion).[11]
- It has been argued here that countries need to identify information needs through a political process. Countries cannot rely on ordering information from some international organisation. If this were possible countries wouldn't feel ownership. What would be the result of being able to order a lot of cost-free information?
- At this stage, world forest resources assessments cannot, in practice, be much improved by new methods. What is primarily needed is improvement of the capacity to collect and analyse information at the national level. Improvement of international level information must come through the strengthening of national capacity.
- The primary need for information is at the national level. This is where action can be taken. World forest resources assessments cannot, in practice, be much improved by new methods. What is primarily needed is improvement of the capacity to collect and analyse information at the national level. There is really no short cut available. Therefore, the most important requirement seems to be to put as much effort as possible into building national capacity for information handling. In time, if the national knowledge base is improved, the use of this knowledge at the international level will also be improved.
- If countries are committed to the collection of statistics, planning, policy making, and eventual implementation, a number of things can be done. Without this commitment it is difficult to do anything useful, and most work that does get started will probably be wasted. It is in fact also meaningless to supply non-committed countries with better information. They will not use it for meaningful planning.
- Most existing international statistics are collected through questionnaires. Existing data compilations seldom leave blank spaces, but fill in the forms with 'guesstimates' that are often ill-founded. This practice has helped to conceal the 'ignorance about ignorance'—we do not know how much we do not know. This is the case for many countries concerning e.g. deforestation and fuelwood production. The question of whether FRA should leave blank spaces where no reliable information is available could be discussed.
- In Europe some of the issues related to improved forest statistics have been handled by a Working Party of the UN and FAO. Something similar would be of value in other regions as well.

To sum up, in the coming years most efforts must be put into strengthening capacity in the different countries. The FRA work can be used as a part of capacity building in each country. Countries should, when needed, be given assistance to work out the 'forest resources

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[11] But FAO has been advocating for a 'World Forest Survey'.

report' needed for their own purposes. In due time this will also improve the information in the World Forest Resources Assessment.

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