

KINGDOM OF THE NETHERLANDS
MINISTRY OF ECONOMIC AFFAIRS
Ministry of Foreign Affairs, Netherlands Development Assistance
Ministry of Agriculture, Nature Management and Fisheries

USER REQUIREMENT STUDY

**FOR
REMOTE SENSING BASED SPATIAL INFORMATION
FOR
THE SUSTAINABLE MANAGEMENT OF FORESTS**

WORKPACKAGE REPORT

[Workpackage 4.1 & 4.2]

**USER NEEDS ASSESSMENT FOR SPATIAL FOREST INFORMATION
RESULTS AND ANALYSIS**

August 1998

ITC	In cooperation with	FAO	IKC N	NIVR
	IBN-DLO	WAU	DOFI	NEO
	Fokker Space BV	NLR	TNO-FEL	Vissers
DataManagement				

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**USER NEEDS ASSESSMENT FOR SPATIAL FOREST INFORMATION RESULTS AND
ANALYSIS**

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August 1998

USER REQUIREMENT STUDY

FOR REMOTE SENSING BASED SPATIAL INFORMATION FOR THE SUSTAINABLE MANAGEMENT OF FORESTS

Preface

This study originates from the problems observed with information availability for sustainable forest management. It aims at addressing the following issues:

1. Identification of users of spatial information for forest management
2. Assessment of the information needs
3. Translation of these needs into functional and system requirements
4. Identification and assessment of existing and planned technology for application in forest management
5. Assessment of the extent to which information requirements are and/or can be met by existing/planned technology
6. Preliminary assessment of the need for an “end-to-end” monitoring system
7. Creation of a national and international platform to support the study

Three Netherlands Ministries have sponsored the study, i.e. the Ministry for Economic Affairs, the Ministry of Foreign Affairs (Netherlands Development Assistance – Neda), and the Ministry of Agriculture, Nature Management and Fisheries.

The study has been carried out by the International Institute for Aerospace Survey and Earth Sciences (ITC) of Enschede, the Netherlands in cooperation with:

- Food and Agriculture Organisation of the United Nations (FAO), Rome, Italy
- National Reference Centre for Nature Management (IKC N), Wageningen, the Netherlands
- Institute for Forest and Nature Research (IBN-DLO), Wageningen, the Netherlands
- Wageningen Agricultural University (WAU), Wageningen, the Netherlands
- DO Forestry International (DOFI), Bennekom, the Netherlands
- Netherlands Geomatics and Earth Observation BV (NEO), Lelystad, the Netherlands
- Netherlands Agency for Aerospace Programmes (NIVR), Delft, the Netherlands
- National Aerospace Laboratory (NLR) Amsterdam, the Netherlands
- Fokker Space BV, Leiden, the Netherlands
- TNO-Physics and Electronics Laboratory (TNO-FEL), The Hague, the Netherlands
- Vissers DataManagement, Wageningen, the Netherlands

The study results have been laid down in the following reports:

Final Report User Requirement Study

Workpackage Reports Workpackage Reports

1. International user platform
2. Design of the user needs assessment study
3. Forest functions, management principles and information systems
4. User needs assessment for spatial forest information: results and analysis
5. Country studies
6. User requirements
7. Remote sensing applications for forest management
8. Evaluation of requirements and applications
9. Proceedings of URS Workshop
10. User Requirement Study – Administrative Report

WORKPACKAGE 4.1 & 4.2

USER NEEDS ASSESSMENT FOR SPATIAL FOREST INFORMATION RESULTS AND ANALYSIS

Table of contents

1 Introduction

2 Response to the questionnaires

2.1 Response by different user groups

3 Method of Analysis

4 Questionnaire results.

4.1 Answers to the questions.

4.2 Compilation and summary of results

4.3 Sensor types, scales and frequency of data.

4.3.1 Sensor types

4.3.2 Frequency and age

4.3.3 Scale and resolution.

4.3.4 Scale and frequency

4.4 Information need by user groups

5 Discussion

6 Conclusions

APPENDIX 1 GLOSSARY FOR THE ANALYSIS OF THE ANSWERS TO THE QUESTIONNAIRE

APPENDIX 2.SPECIFICATION OF SENSORS

APPENDIX 3 SCALES MENTIONED SORTED ACCORDING LEVEL.

APPENDIX 4 SCALES AND FREQUENCY

APPENDIX 5 THEMES, SCALES AND FREQUENCY

APPENDIX 6 RESULTS BY LEVEL OF AREA OF INTEREST OF ORGANIZATION

APPENDIX 7 RESULTS BY CONTINENT OF INTEREST OF ORGANIZATION

APPENDIX 8 RESULTS BY TYPE OF ACTIVITY OF THE ORGANIZATION

APPENDIX 9 RESULTS BY FORM OF THE ORGANIZATION

APPENDIX 10 RESULTS BY FOREST FUNCTION

1 Introduction

An assessment of the spatial information needs of end-users was made, based on the questionnaires, distributed via E-mail, web-site and contact persons. The results that were obtained from country studies, carried out by FAO, will be dealt with in a separate report of WP 4.3.

Questionnaires were sent by E-mail and by fax to various organisations around the world. The questionnaire was also made available on the World Wide Web. An overview of the response to the questionnaire is given in chapter 2. The response by different user groups is explained in chapter 2.1.

The questionnaire was designed with open questions to avoid influencing the answers in a certain direction. This also allowed the participants to express their knowledge on the subject in full detail. This resulted in an enormous amount of different answers. It would be too much to present all these answers in this report. Therefore a categorisation of the answer was made. Then it was counted how many respondents mentioned certain items (or categories). The method of the categorisation is explained in chapter 3.

In chapter 4 the questionnaire results of all respondents together are presented. First the results of all the seven questions are given in chapter 4.1. A compilation and summary of these results is given in chapter 4.2. Details on sensor types and frequency of data and scales are given in chapter 4.3. Differentiation of information needs between user groups is investigated by comparing the questionnaire results of different groups (chapter 4.4). In chapter 5 a discussion on the results is given and conclusions in chapter 6.

2 Response to the questionnaires.

Initially 496 persons and/or organizations were selected. After distribution of the questionnaire a number of messages were not deliverable because of an incorrect E-mail address or fax number. After retrying and after searching for correct addresses 95 in total were still undeliverable.

From the 401 invitations to complete the questionnaires that were actually sent (as can be seen in table 2.1), in total 150 persons replied. (15 by fax and 135 by E-mail). This is a response rate of 37 %. This is rather high and indicates that this subject is found very important.

Table 2.1 Response on the invitation to the questionnaire.

	Not completed	Completed	Total
Sent	251	150	401
Undeliverable	95	-	95
Distributed	346	150	496

An overview of the means of communication used and the number of completed questionnaires is given in table 2.2. Through the World Wide Web announcement 13 participants sent in a completed questionnaire, mostly shortly after the site was available. Through interviews at the XI World Forestry Congress another 15 completed questionnaires were obtained. Through contact persons in 6 countries a total of 57 persons were interviewed.

Table 2.2 Number of respondents by means of communication.

Response E-mail	135
Response Fax	15
WWW	13
Contact persons	57
World Forestry Congress	15
Total	235

A total of 235 questionnaires were completed of which 11 were not considered suitable for further analysis. Consequently a total of 224 questionnaires was used for analysis.

2.1 Response by different user groups.

As explained in the study design (report WP2) different user groups were identified. Contact was made with persons and organisations of all types of user groups. The response by different user groups is presented here to indicate that all types of user groups are sufficiently represented.

First the organisations of the respondents were classified in different user groups. The organisations are classified based on the description given by the respondents in question 1 (see paragraph 4.1) and the name of the organisation. The information on user group criteria was not directly asked from the respondents to avoid a lengthy questionnaire with the possible result of a low response rate. The criteria used for this classification are:

- extent of area of interest or level of operation
- type of activities
- Government Organization (GO) or Non Government Organization (NGO)
- geographical location

The first three are identical to the ones used for identification of the user groups in WP3. In WP3 ecological zones is indicated as fourth criteria. This criterion was impossible to apply to many respondents as their country is situated in different zones. Therefore it was decided to use geographical location as fourth criteria.

According to level (area of interest), organizations are differentiated in:

- Global organizations with a worldwide action field,
- Regional organizations whose action field is defined by geographical borders rather than by administrative borders and encompass several countries (these include river basin or mountain area organizations)
- National organisations, whose action field is defined by country borders. These include departments of national governments
- Local level organisations, whose activities cover specific parts of a country, defined either by administrative or physiographic borders.

The number of respondents by level is presented in table 2.1.1

Table 2.1.1 Number of respondents by level.

level	Global	Regional	National	Local	Total
number of respondents	18	22	96	88	224

The organisation of the respondents was classified in Government Organisation (GO) or Non- Government Organisation (NGO). In 8 cases it was not possible to classify the organisation as nothing was indicated in the replies. The number of respondents by GO-NGO is given in table 2.1.2.

Table 2.1.2 Number of respondents by GO-NGO.

GO/NGO	GO	NGO	Total
number	144	72	224

In table 2.1.3 the number of respondents by type of activities of organisations is shown. The organisations of the respondents were classified according to the type of activities as follows:

- Policy developing organisations, for example national forest departments and regional co-ordination units.
- Policy influencing organisations, such as environmental or rural development organisations
- Financing organisations, like Green Funds and development banks
- Forest resource management organisations, including timber producers, national parks, forest departments and other organisations actively involved in resource management.
- Research organisations, although not specified as target group for the questionnaire, several research institutes sent in completed questionnaires. They are added as a separate category.
- A combination of the above.

In three cases it was not possible to classify the organisation, because nothing was indicated in the replies.

Table 2.1.3. Number of respondents by type of activities of organisations.

type of organisation	frm	pd	pi	fin	res	pd/frm	pi/frm	fin/fr m	pd/fin	pi/fin	pd/res	pi/res	total
number of respondents	80	52	41	2	22	9	7	1	1	1	1	4	224

Explanation on abbreviations used in the table.

frm = forest resource management

pd = policy development

pi = policy influencing

fin = financing

res = research

/ means a combination

The organisations are classified according to their geographical location as follows:

- Africa
- Asia
- Latin America (incl. Caribbean)
- North America, Europe and Russia

Table 2.1.4 Number of respondents by geographical location.

Continent	Africa	Asia	Latin America	Europe + N-America + Russia	Total
Number of respondents	53	60	56	37	224

As can be seen from table 2.1.4 the number of respondents are more or less equal for Africa, Asia and Latin America. Europe, N. America and Russia were much less, but from this area a lot of other information was already available. No reaction was obtained from Australia.

Although it was difficult to indicate precisely the ecological zones, as mentioned above, it can be noted that the major zones were well represented.

3. Method of Analysis.

As mentioned above, the questions were designed in open format. In order to condense the amount of information received and compare questionnaire results from different user groups the answers were categorised.

From a sample of about 30 completed questionnaires the answers by question were studied. Those, which had similar answers, were grouped. For these different phrased answer, but indicating the same, a category was made. All categories were listed by question. The other questionnaires were processed and categorised according to this glossary. When needed additional items were added to this glossary. The final glossary is presented in Appendix 1.

For each respondent it was noted if one of the items of glossary was mentioned. Per category the number of respondents mentioning a certain item or category was counted. This can serve as an indication of how important an item can be considered. When most respondents mention an item, it follows that this item is more important for all users than an item only mentioned by a few.

An explanation of the glossary by question of the questionnaire follows in chapter 4 together with the number of respondents mentioning the items.

The needs of different user groups were compared. The organisations of the respondents were classified in different user groups as described in chapter 2. To compare the needs of different user groups the % of respondents mentioning a certain item was used. No statistical analysis is applied, because the response to the questionnaire can not be treated as a sample of a certain population. The order of magnitude of the numbers was used in the comparison.

4. Questionnaire results.

A total of 224 questionnaires were used for the analysis. The answers were analysed according to the categorisation as mentioned in chapter 3.2. For each question the number of respondents that mentioned a certain category is counted and expressed as a percentage of the total number of questionnaires returned (224). These results are shown in chapter 4.1. In chapter 4.2 a summary and compilation of these results is given. The requirements per sensor type as well as current and required frequency of data supply and the scales currently used and those required are mentioned in chapter 4.3. In chapter 4.4 the need by different user groups is presented.

4.1 Answers to the questions.

For each of the questions the number of respondents mentioning a certain item is indicated and the percentage of the total number of responses is shown below. All items are explained in detail in the glossary in Appendix 1.

Question 1

What are the main forest management objectives of your organisation?

The answers can be divided into the organisation's actual objectives, such as sustainable use, conservation, protection, production, CO2 sequestration, forest health and the organisation's main activities to reach these objectives, such as survey, planning, monitoring. In many cases respondents have mentioned both objectives and related activities. Community forestry and certification, which indicate both objectives as well as activities, are mentioned by a number of respondents. Research, extension and information supply is mentioned mainly by organisations that are not actively involved in forest management but merely have a management support function. A number of organisations have mentioned a combination of several objectives and activities. In table 4.1.1 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the first question is presented. The sum of the percentages in the last column can exceed 100, indicating that organisations fall in more than one category.

Table 4.1.1 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the first question: What are the main forest management objectives of your organisation?

Categories	No.	%
Sustainable use	135	60
Conservation	87	39
Protection	48	21
Production	83	37
Community forestry	34	15
CO2 sequestration	9	4
Forest health	10	4
Certification	5	2
Monitoring	68	30
Planning	82	37
Survey	96	43
Research	45	20
Extension +inst. building	70	31
Info supply/awareness	33	15

Question 2

Which of your tasks in the organisation require spatial information on forests?

The answers can be differentiated as follows:

- Respondents who use spatial information for policy development, planning or to advise policy makers and planners.
- Respondents who use spatial information for actual implementation of forest management activities and/or forest monitoring and assessment.
- Respondents who are involved in the management of the organisation and who usually do not use spatial information themselves but whose organisation does. They mostly answer in name of the organisation.
- Respondents who generate information themselves by mapping and remote sensing analysis and/or data processing
- Respondents who are involved in training, capacity building and research.

Some respondents do not specify their tasks, a few respondents do not use spatial information and a few others use spatial information for all tasks but do not specify these tasks. In table 4.1.2 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the second question is given.

Table 4.1.2 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the second question: Which of your tasks in the organisation require spatial information on forests?

Categories	No.	%
advising	40	18
policy development	25	11
planning	45	20
management/organisation	19	8
Implementation	52	23
monitoring/assessment	68	30
area demarcation/mapping	42	19
data processing/ RM	17	8
extension/training	15	7
research	23	10
all tasks	6	3
not specified	10	4
none	5	2

Question 3

What spatial information on forests do you currently use?

The answers to this question can be divided into two major categories:

- Information themes, such as topography, forest cover, land use, forest cover change etc. as mentioned in the glossary
- Information carriers, such as GIS, databases, maps, satellite images, radar images, aerial photographs, field data

Most respondents give information on both themes and carriers used. In addition to these categories some respondents mention to be working with models, some others use time- series and a few do not use spatial information at all. The scales of the information carriers, as well as the sensor (in case of images) and the

frequency respondents indicated on this answer will be dealt with in chapter 4.2 and 4.3. In some cases respondents mention also the remote sensing data on which their (paper) maps are based. Because they only use maps that are produced elsewhere and do not process data themselves, they are categorised as using maps only. In table 4.1.3 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the third question is given.

Table 4.1.3 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the third question: What spatial information on forests do you currently use?

Categories	No.	%
Topography	100	45
Land tenure	25	11
Land use	73	33
Forest area/land cover	138	62
Forest cover change	36	16
Deforestation/fragmentation	15	7
Reforestation	11	5
Forest health	18	8
Forest classes	72	32
Species/biodiversity	53	24
Silvicultural treatments	10	4
Forest fires	19	8
Productivity	28	13
Soils	35	16
Hydrology	43	19
Slope/morphology/terrain	46	21
Climate	11	5
Socio-economic info	23	10
Time series	5	2
Models	9	4
GIS	63	28
Database/statistics	10	4
Maps	140	63
Radar images	5	2
RS images	90	40
Aerial photographs	65	29
Field data	103	46
none	9	4

Question 4:

What additional spatial information do you require for better decision-making on forest management?

In table 4.1.4 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the fourth question. As in question 3 the answers can be divided into additional information required on specific themes (see glossary) and additional information carriers such as GIS, databases, remote sensing images, radar, video, aerial photographs, field data. More specific requirements are:

- More recent information, either in the format of a map, as images, aerial photographs or other. The frequency with which up-dates are required is also mentioned (see bottom of glossary).

- Time series are required by respondents working in monitoring forest fires, illegal logging, forest conservation etc.
- More detailed information, such as high resolution images and more detailed maps and in some cases aerial photographs.
- Low resolution images, to be used for mapping of very large areas.
- Radar is required to solve cloud cover problems.

Table 4.1.4 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the fourth question: What additional spatial information do you require for better decision-making on forest management?

Categories	No.	%
Topography	23	10
Land tenure	13	6
Land use	34	15
Forest area/land cover	57	25
Forest cover change	54	24
Deforestation/fragmentation	13	6
Reforestation	8	4
Forest health	15	7
Forest classes	36	16
Species/biodiversity	43	19
Silvicultural treatments	6	3
Forest fires	15	7
Productivity	26	12
Soils	20	9
Hydrology	15	7
Slope/morphology/terrain	11	5
Climate	12	5
Socio-economic info	21	9
Time series/monitoring	37	17
Models	5	2
GIS	55	25
Database/statistics	16	7
RS images (recent)	53	24
High resolution images	30	13
low resolution images	2	1
Radar images	10	4
Aerial photographs (recent)	43	19
Video	3	1
Field data	9	4
More recent other info	19	8
Recent maps (theme)	72	32
More detailed maps	42	19

Question 5

How do you presently obtain the spatial information specified in your answer to question 3.?

In table 4.1.5 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the fifth question is presented. Answers can be divided in three categories:

- produced internally

- produced externally
- exchanged with other organisations or institutes

In several cases organisations specify how they generate their own information, through remote sensing interpretation or GIS analysis. Some respondents mention the Internet and literature as information sources. Some respondents mention their funding sources, own funds or external funds, or available budget.

Table 4.1.5 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the fifth question: How do you presently obtain the spatial information specified in your answer to question 3.?

Categories	No.	%
Own funds	2	1
External funds	6	3
Exchange	36	16
Own production	107	48
External production	135	60
GIS analysis	15	7
RS interpretation	23	10
Literature	18	8
Internet	12	5

Question 6.

How do you think the supply and use of spatial information could be improved?

In table 4.1.6 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the sixth question is shown. In the answers to this question respondents often mention their major constraints in obtaining required information:

- Inaccessibility of the required information is mentioned by the major part of the respondents. As main reasons for this problem were given:
 - lack of communication between institutes (cf. between information suppliers and users)
 - access to information is prohibited due to security reasons or due to unwillingness of institutes to share information
 - users do not know where to find required information
 - users do not know what kind of information is available
 - remote sensing data is not always properly distributed amongst users.
- High cost of images and software is mentioned as constraint.
- Supplied information is often not adapted to the needs and the capabilities of the users. Software and technology are considered complicated and not user friendly and the supplied information is not adapted to the needs because it does not cover the required area or themes.
- Quality of data should be improved. Data are not sufficiently reliable and accurate, especially with respect to the positioning and the scales.
- Cloud cover is a severe problem in some areas (i.e. for obtaining cloud free air photos and satellite images).

Improvements suggested by the respondents are: spatial information is distributed through the Internet and more awareness raising on the value and the need to use spatial information, especially at government level. This may add to improved communication of data.

Standardisation of methods for data collection and analysis is mentioned to improve exchange of information.

Many respondents suggest training and capacity building. In addition a few respondents also mention more projects for training and data collection.

Table 4.1.6 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the sixth question: How do you think the supply and use of spatial information could be improved?

Categories	No.	%
Awareness	19	8
Proper data distribution	36	16
Better quality of data	34	15
Standard. coll.&anal.	23	10
Cheaper images/software.	46	21
Cheaper technology	16	7
User friendly/impr.tech	26	12
Training/cap. build.	86	38
Communication (org.)	104	46
Access to info denied/limited	23	10
Unfamiliar with info available	12	5
Location of info unknown	4	2
Info adapted to user needs	15	7
Internet	19	8
Projects	6	3
Cloud cover problem	8	4

Question 7

Do you have any additional remarks in relation to the above questions?

In table 4.1.7 the number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the seventh question is given. Only a few respondents have answered this question. They mostly express their interest in the initiative and willingness to contribute to the discussion on this topic. Some suggestions are made for improvement of data distribution, such as creating central data storage and organising joint data collection amongst institutes. A suggestion was made for automatic georeferencing of aerial photographs to improve accuracy.

Table 4.1.7 The number of respondents and the percentages of the total respondents (224) who mentioned a certain category on the seventh question: Do you have any additional remarks in relation to the above questions?

Categories	No.	%
Central data storage	16	7
Auto geo-referenced AP	4	2
Joint data collection	7	3

4.2 Compilation and summary of results

In order to give an overview and for comparison of the different user groups (in chapter 5), the categories are grouped together based on four major aspects of this study: data/info need, land use/forest cover, monitoring and improvements for data use and supply.

Data/info need

In table 4.2.1 a compilation of the results of all the answers for the total 224 respondents is given. In the categorisation of answers recent data is indicated under question 4 separately for maps, aerial photographs

and remote sensing images. In the summary in table 4.2.1 these are grouped together under the heading 'recent data needed', indicating the number of times at least one of these three data carriers was mentioned by a respondent. A similar summary was made for detailed spatial data, indicating the number of times high-resolution images and/or more detailed maps was mentioned. In addition these two (recent and more detailed spatial data) were compiled again. That means those who indicated or recent data or more detailed data/info or both were needed. Additional information on forest is separated in the categorisation of answers in forest area/land use, deforestation/fragmentation, reforestation, forest health, forest classes, species/biodiversity, forest fires and productivity. Here it is summarised if any of these themes is mentioned under question 4. Finally under additional spatial info is summarised if one of the three (recent spatial data: more detailed spatial data; additional forest information) is indicated.

Table 4.2.1 The number of respondents and the percentages of the total respondents (224) who expressed a need in data and/or info.

data/info need	No.	%
recent spatial data / info	121	54
more detailed spatial data / info	61	27
recent and/or more detailed spatial data/info	143	64
additional forest info (themes)	115	51
additional spatial info	179	80

Land use/forest cover

As land use and forest area/land cover is the most important theme used by the respondents this is highlighted in the summary in table 4.2.2. First in additional data/info need on land use/forest cover it is indicated if additional info/data is needed on land use or forest area/land cover. Those who mention that they utilise this type of data/info are summarised from question 3. Those who utilise this data/information, but who need additional information as well, are also indicated.

Table 4.2.2 The number of respondents and the percentages of the total respondents (224) who expressed a need in land use / land cover data and/or info.

Land use / land cover	No.	%
additional data/info need land use/forest cover	73	33
utilise land use / forest cover	156	70
utilise forest cover and additional data/info need	57	25

Monitoring

In table 4.2.3 a compilation on monitoring is given. The need for additional data/info on land use/forest cover, change detection or monitoring is separated in the categorisation of answers under question 4 in forest cover change, deforestation/fragmentation, deforestation, forest fires and time series/monitoring. If any of these are mentioned in the questionnaires this is indicated here under 'addition change data/info'. Under 'utilise change data/info' is indicated those who already use change detection data (derived from the answers on 3). Those who utilise change data, but who require additional data as well, are indicated under 'change utilise and additional data/info need'.

Table 4.2.3 The number of respondents and the percentages of the total respondents (224) who expressed a need in monitoring data and/or info.

change detection	No.	%
addition change data / info	83	37
utilise change data / info	60	27
change utilise and additional data/info need	31	14

Improvements for data use and data supply.

In total 87 % of all respondents suggested improvements or mentioned constraints in data and/or supply either in question 6 or in question 7. A summary from the answers to question 6 on the improvements or constraints in data use and data supply is given in table 4.2.4. This is presented in seven items ranked by the number of respondents mentioning this item. Under accessibility is summarised if one or more of the following items was indicated: proper data distribution; communication (org); access to info denied; unfamiliar with info available; location of info unknown or awareness; Internet. Central data storage mentioned in some cases under question 7 was included as well under this item accessibility. Cost indicates that cheaper images/software or technology is mentioned. The items training/capacity building, standardisation in collection & analysis, better quality of data and cloud cover are copied from table... If user friendly/improved technology or information adapted to user needs was mentioned this is summarised under info or technology user suitable.

Table 4.2.4 The number of respondents and the percentages of the total respondents (224) who expressed certain constraints and/or suggested improvements.

Improvements	No.	%
Accessibility	134	60
Cost	54	24
Training/cap. build.	86	38
Info or techn. user suitable	37	17
Standard. coll.&anal.	23	10
Quality of data	34	15
Cloud cover problem	8	4

4.3 Sensor types, scales and frequency of data.

The sensor type as well as current and required frequency of data supply, the age of data used and required and the scales currently used and those required as indicated by the respondents is presented first separately. The combination of required scale and frequency together with the theme is presented in chapter 4.4

4.3.1 Sensor types

A specification of currently used as well as preferred sensor types is presented in table 4.2.1. The number of times a certain sensor type was mentioned is given and the percentage of the total responses. In Appendix 2 a specification of sensors is given.

Table 4.2.1 The number of respondents and the percentages of the total respondents (224) who mentioned the use of or preference for a certain sensor type.

sensor type used:	No.	%
NOAA	9	4
Landsat MSS	3	1
Landsat TM	19	8
Landsat not specified	18	8
Spot	21	9
IRS	3	1
ERS	4	2
JERS	1	0
SAR	1	0
sensor type desired:	No.	%
NOAA	1	0
Landsat MSS	1	0
Landsat TM	5	2
Landsat not spec.	6	3
Spot	7	3
IRS	6	3
ERS	0	0
JERS	1	0
SAR	1	0
most detailed	3	1

4.3.2 Frequency and age

The number of respondents who mention a certain frequency of data used and required is presented in table 4.3.2.1 and the percentage of the total number of respondents.

Table 4.3.2.1 The number of respondents and the percentages of the total respondents (224) who mentioned the use of or preference for a frequency of data/info.

frequency acquired:	No.	%
monthly	0	0
every 6 months	1	0
yearly	0	0
2 years	1	0
5 years	2	1
10 or more years	2	1
real time (actual)	1	0
frequency required:	No.	%
monthly	8	4
every 6 months	4	2
yearly	35	16
2 years	11	5
5 years	22	10
10 or more years	8	4
real time (actual)	2	1

In table 4.3.2.2 the number of respondents who indicated how old the data they presently use is presented and the percentage of the total number of respondents. In addition the number of respondents who mentioned the required age of the data and its percentage.

Table 4.3.2.2 The number of respondents and the percentages of the total respondents (224) who mentioned how old the presently used data/info was and the preferred age of data/info.

Age of used data	No.	%
<1	1	0
1 -> 2	3	1
2-> 5	10	4
5 -> 10	14	6
> 10	17	8
Age of data required	No.	%
<1	1	0
1 -> 2	3	1
2-> 5	2	1
> 5	0	0
> 10	0	0

4.3.3 Scale and resolution.

Scales and/or resolution used or preferred are mentioned by 118 of the 224 respondents. Their answers show that a wide range of scales is used or preferred. In Appendix 3 detailed information is given on the scales and resolutions mentioned by respondents who are, for this purpose, classified by their level of geographical interest. For a general overview these scales are grouped together in classes. In the case resolution is specified and not scale, the largest possible scale is taken as is used in several countries, based on expert knowledge of the project members. Detail on this is given in Appendix 3.

In table 4.3.1 both the number and the percentage of the 118 respondents per scale class are shown. This is based on the most detailed scale mentioned in the last column of desired or used in Appendix 3.

Table 4.3.1. The number of respondents who prefer a certain scale and the percentages of those (117) who indicated scales. In the case more scales are mentioned the largest (most detailed) was taken. If no preference was given but a certain scale was used, then this was taken.

scale	No.	%
<10.000	27	22.9
10 000-15 000	28	23.7
20 000-30 000	30	25.4
50 000-60 000	23	19.5
100 000-125 000	4	3.4
200 000-250 000	5	4.2
400 000-500 000	1	0.8
Total	118	100.0

4.3.4 Scale and frequency

In chapter 4.3.2 the frequencies mentioned and in chapter 4.3.3 the scales mentioned are given separately. Here the combination the two and also in relation to theme is presented.

The scale and frequency is presented in Appendix 4. From those users, who mentioned a combination on these two topics, the scale and frequency is given. The combination are ranked first according scales, then by level and then by frequency. For scale the last column of Appendix 3 was taken: the desired scale and in the case this was not mentioned the used scale. Each row represents the answer of one respondent. One respondent can have mentioned different frequencies, as well as different scales.

From the 224 respondents 58 indicated a clear difference in scale and frequency with the parameter or theme. In Appendix 5 the theme, scale and frequency is presented for those users, who mentioned a combination on these three topics. For users who indicated more than one combination all the combination are given. In these cases the User-ID (administrative number) can be found more than once. The combination are ranked first according group of themes, then according scale and last frequency. The following theme are combined in the first group: forest cover, land use forest cover and forest monitoring. The second group is: forest types and vegetation/forest types. The third group is forest planting and production. The fourth group is forest protection and forest fire. Bio-diversity and forest health are only once indicated in this table and are presented next to each other. While soil and topography are presented at the end.

The group of themes (or major theme) and scale is summarised from Appendix 5 in table 4.2.4.1. From the most occurring combinations the most mentioned frequency is as follows. Those who need land use and forest cover data/info on scale 1:10,000 the required frequency is 5-10 years (9 out of 10), for scale 1:25,000 2-5 years (6 out of 9), 1:50,000 scale 5-10 years (6 out of 17) and 1-2 years (8 out of 17). Those who need vegetation/forest types data/info on scale 1:10,000 the most mentioned frequency is 5-10 years (7 out of 10 and for scale 1:50,000 1yr (4 out of 5). Those who need data/info for forest production and planting on scale 1:5,000 the most mentioned frequency is 1 year (3 out of 4) and for scale 1:10,000 also 1 year (6 out of 7). For those who need data/information for forest protection the frequency required is mostly 1-3 months. Many respondents indicating the need for data/information for fire damage detection did not mention the scale required. Based on this information no conclusion on scale can be drawn.

Table 4.3.4.1 Combination of major themes and scale. The number of respondents indicating a combination is given for each scale and major theme.

Theme group	1:5,000	1:10,000	1:20,000	1:25,000	1:50,000	1:100,000	1:250,000
land use forest cover	4	10	2	9	17	1	1
vegetation/forest types	1	10	3	1	5	1	0
forest production	4	7	1	1	1	0	0
forest protection	2	2	0	0	1	0	0

4.4. Information need by user groups

Information need by level.

The summarised results and the answers on the seven questions sorted by level (global, regional, national and local) are given in Appendix 6. When comparing the order of magnitude of the percentages given, it shows that there are no obvious differences in spatial information requirements between levels. Only small differences were found in spatial data needs for forest between different user groups. Relatively more local respondents than national, regional and global indicated the use of topographical information, use of species/bio-diversity information, use of field data and the need for recent maps and recent aerial photographs. Relatively fewer local users indicated the need for change data/information.

Information need by continent.

The summarising results and the answers on the seven questions by continent of the area of interest of the organisations is presented in Appendix 7. When comparing the order of magnitude of the percentages given, it shows that there are no obvious differences in spatial information requirements between continents for almost all items. Only for two items a difference is found. Relatively more users from Africa, Asia and

Latin America are in need for recent data/information and training (incl. institutional capacity building) than those in Europe and N-America.

Information need by type of activity of organisation.

The summarising results and the answers on the seven questions by type of activity of the organisation is presented in Appendix 8. When comparing the order of magnitude of the percentages given, it shows that there are no obvious differences in spatial information requirements between type of activities.

Information need by form of organisation.

The summarising results and the answers on the seven questions by form of organisation (governmental organisation or non-governmental organisation) is presented in Appendix 9. When comparing the order of magnitude of the percentages given, it shows that there are no obvious differences in spatial information requirements between form of organisation.

Needs by forest function

The summarising results and the answers on the seven questions by forest function is presented in Appendix 10. In order to make a good comparison the number of respondents of a user group should be sufficient. In addition the respondents should clearly have indicated only one forest function. When two or more function are mentioned the information need was not specified for which function. Because of these two arguments the groups of conservation only (38 respondents) can be compared with the group of production only (37 respondents).

When comparing the order of magnitude of the percentages given, it shows that the conservation group uses less remote sensing images and uses as well as needs more information on forest area/land cover and forest classes. The conservation group needs more data on bio-diversity, while more of the production group uses bio-diversity data. The production group needs more field data and had more complaints on the data quality.

5. Discussion

Only small differences were found in spatial data needs for forest between different user groups. The differences are that local users are more in need of recent data and indicate more the need for topographical data/information. They also are more in need for field data and data/information on bio-diversity. The local users seem to be less in need for change data/information. That no more needs were found to be different for national and local is caused by the fact that the working area of a local user in for instance Brazil or India is comparable in size or even or bigger than that of a country like Nepal, the Netherlands.

There are no differences found in spatial information needs between international, regional and national level. This was not expected. Most of the regional level participants were from regional offices of international organisations. Only a few of the organisations that have an area of interest, which encompass a few countries, like basin wide organisations, responded. Most of the international organisations that contributed to this inquiry were not actually working on global scale, but have more service function throughout the world. Only 5 of the 25 gave indications on scale and all indicate scales of rather detailed level.

Although the questions have been designed with great care, on several occasions some misunderstanding and misinterpretation on the part of the respondents occurred. In question 2 respondents sometimes mention the main activities of the organisation in stead of their own activities. On some occasions questions 4 is regarded as an addition to question 3, with the respondents mentioning the main spatial information used in question 3 and additional, non-spatial information in question 4. On such occasions information requirements are mentioned in question 6, together with suggested improvements. Additional improvements are some times mentioned in question 7. In these cases these were counted for question 6. In the questionnaires in the Spanish language three respondents wrongly interpreted the word 'espacial' (meaning spatial) for 'especial' (meaning special) and consequently irrelevant answers were given to some of the questions. In spite of these slight misinterpretations most respondents understood the objective of the questionnaire very well and supplied valuable information.

Due to communication/distribution problems participants are not well informed about technology possibilities and therefore can not express their wishes according the latest technology. As they are already happy with what they can get, they were not able to specify preferences of themes or scale.

6 Conclusions

The study showed a large and urgent need for additional spatial data and information on forests: 80 % of the respondents said they needed more data and information. More specifically, 54 % of all respondents required more recent data, 51% additional forest information on certain themes and 27 % more detailed data and information.

Spatial data and information were needed on four major themes:

- Land cover, land use, forest cover (70%)
- Vegetation and forest types (32%)
- Forest production and stand parameters (13%)
- Forest protection and fire damage assessment (8%)

In total, 87 % of all respondents mentioned constraints or suggested improvements in data supply. This shows that the User Requirement Study indeed addresses a problem felt by most people dealing with forest management.

The first and largest group of constraints and improvements concerned the accessibility of data and information (mentioned by 60 %). More specifically, 46 % of all respondents indicated a lack of communication between organisations, 16 % an absence of proper data distribution, 10% was denied access to information, 5 % was unfamiliar with the information available and 2% did not know where to find the required spatial information. To improve accessibility, 8 % of all respondents suggested access to information via Internet, 8% awareness raising and 7 % recommended central data storage.

A second group of constraints and improvements concerned training and institution building (indicated by 38 %). Costs are also important: 24 % asked for cheaper data and technology and 3% for joint data collection. Furthermore, 17% of the respondents suggested to use improved or user-friendlier technology or to adapt the information better to the needs of the users. Improved quality of data was asked for by 15% of the respondents, while 10% suggested standardisation of data collection and analysis. Surprisingly, constraints in data acquisition due to cloud cover were mentioned only by 4 % of the respondents.

The required scales and update frequencies depend on the theme of the information. Concerning information on land cover, land use, forest cover and vegetation or forest types there seem to be two main groups of users: one needs updated information every 5-10 years at scale 1:10,000, the other every 1-5 years at scale 1:25,000 or 1:50,000. Information on forest production and stand parameters is needed on a yearly basis at scales 1:5,000 and 1:10,000. For forest protection and fire damage assessment an update of the information is required mostly every 1-3 months. The respondents did not indicate the required scale.

When comparing users of forest information on global, regional, national and local level, these groups showed little difference in their needs for spatial information on forest. Users at a local level more often asked for recent data, topographical information, field data and data on bio-diversity. They showed less interest in data on forest change than the users in the other groups. When comparing users per continent, the users from Africa, Asia and Latin America more often expressed a need for recent data and for training and institution building than the users in Europe and North America.

Organisations concerned with the management of different forest functions, such as production, conservation of bio-diversity and protection of watersheds, showed slight differences in information needs. When comparing the order of magnitude of the percentages given, it shows that the conservation group uses less remote sensing images and uses as well as needs more information on forest area/land cover and forest classes. The conservation group needs more data on bio-diversity, while the production group uses more data on bio-diversity. The production group needs more field data and had more complaints on the data quality.

Different types of activity of the organisation (forest resource management, policy development, policy influencing, financing and research) were also not reflected in clear differences in spatial information needs. No clear differences could be found between governmental and non-governmental organisations.

APPENDIX 1
GLOSSARY FOR THE ANALYSIS OF THE ANSWERS TO THE QUESTIONNAIRE

<u>Question 1</u>	<u>Organisation's main objectives and tasks</u>
Sustainable use	Sustainable use and management of forest resources
Conservation	Conservation of forest as nature reserve, bio-diversity conservation
Protection	Protection/conservation of watersheds, slopes, soils
Production	Commercial production of wood and Non Timber Forest Products (contrary to sustainable use by local communities)
Community forestry	Forest management executed by , and benefitting specifically local communities. (<i>not</i> : involving local people as employees in production or management)
CO2	Reduction of CO2 in the atmosphere through forest management/CO2 sequestration.
Forest health	Health of the forest (inventory and/or reduction of the effects of acid rain, pests, diseases)
Certification	Involved in certification of timber from forests under sustainable management
Monitoring	Monitoring of forest resources (<i>not</i> : of project progress)
Planning	Planning of forest management (<i>not</i> : planning of the work of the organisation etc.)
Survey	Survey, inventory, mapping of forest resources
Research	Research on forestry, sustainable use, management systems etc., mostly policy supporting and influencing research
Extension +inst. build.	All extension, training, awareness raising, institution building goals, including improvement of economic situation of local people through improved forest products utilisation
Info supply/awareness	Organisation supplies information on forests to others, e.g. governments, projects, etc. and creates awareness on forest issues.
<u>Question 2</u>	<u>Respondents own activities</u>
Advising	Respondent advises policy makers and/or provides information to other organisations
Policy development	Respondent develops forest management policy
Planning	Planning of forest management activities (<i>not</i> of project activities)
Management/organisation	Management and organisation of the institution's activities, including coordinating with other institutions
Implementation	Implementation of forest management related activities, including production, conservation activities
Monitoring/assessment	Monitoring and assessment of forest resources(e.g. <i>not</i> of project activities)
Area demarcation/ mapping	Demarcation of specified areas and all mapping activities, mapping method not specified (GIS or other)
Data processing/ RM	Respondent is specialist in data processing, mapping (GIS), remote sensing interpretation
Extension/training	Extension activities, including community forestry, awareness raising and training at all levels
Research	Respondent is researcher at research institute (<i>not</i> additional back up research in project)
All tasks	Respondent needs spatial information for all his/her tasks, but does not specify his/her tasks
Not specified	Respondent does not mention his/her tasks nor is there any indication of the tasks in the personal identification section of the questionnaire
none	Respondent does not use spatial information

<u>Question 3</u>	<u>Information themes & information carriers currently used</u>
None	No spatial information is currently used
Topography	Spatial information on location of roads, railroads, cities, etc.
Land tenure	Cadastral information, including information on ownership and user rights
Land use	Spatial information on the different uses of the land, including location of nature reserves and timber concessions
Forest area/land cover	Spatial information on land cover in general and/or forest cover (mainly forest/non-forest)
Forest cover change	All spatial information on changes in the forest (changes in area, degradation, restoration, regeneration)
Deforestation/fragm.	Spatial information on clear cutting of forest areas and the often resulting fragmentation
Reforestation	Spatial information on the planting of forest on previously cleared areas.
Forest health	Spatial information on the health condition of the forest (damage by pests and diseases, effects of acid rain).
Forest classes	Spatial information of location on the different forest types (more detailed than forest/non-forest)
Species/biodiversity	Spatial information on plant/animal species distribution, biodiversity classification
Silvicultural treatments	Information on special treatments to maintain/improve timber production (thinning, liming, ..)
Forest fires	Spatial information on the occurrence & location of forest fires
Productivity	Information on growth, increment of woody biomass, (potential) production of timber and Non Timber Forest Products.
Soils	Spatial information on soil type and possible vulnerability
Hydrology	Spatial information on groundwater level, catchment areas, rivers, lakes, and drainage in general
Slope/morphology/terrain	Spatial information on terrain forms, slope, elevation, including digital terrain models
Climate	Information on climate & weather data
Socio-economic info	Information on population and economic activities, forest product marketing possibilities
Time series	Series of aerial photos, satellite images, and/or less frequently, maps of the same area at different dates
Models	Growth and productivity models of distinctive tree species
GIS	Geographic information systems, digital maps, geographical databases
Databases/statistics	General, non-geographical databases and/or statistical data
Maps	Drawing, representing a simplified representation of spatial reality
Radar images	Images recorded with radar sensors, both satellite borne as well as airborne
RS images	Images in the visible – infrared spectrum recorded from satellites, including not further specified “remote sensing images”
Aerial photographs	Analogue and digital photographs in the visible – infrared spectrum from aeroplanes
Field data	Data, collected in the field
<u>Questions 4</u>	<u>Need for additional data/information for (better) management</u>
Topography	Spatial information on location of roads, railroads, cities, etc.
Land tenure	Cadastral information, including information on ownership and user rights
Land use	Spatial information on the different uses of the land, including location of nature reserves and timber concessions)
Forest area/land cover	Spatial information on land cover in general and or forest cover (mainly forest/non-forest)
Forest cover change	All spatial information on changes in the forest (changes in area,

	degradation, restoration, regeneration)
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Silvicultural treatments	Information on special treatments to maintain/improve timber production (thinning, liming, ..)
Forest fires	Spatial information on the occurrence & location of forest fires
Productivity	Information on growth, increment of woody biomass, (potential) production of timber and Non TimberForest Products.
Soils	Spatial information on soil type and possible vulnerability
Hydrology	Spatial information on groundwater level, catchment areas, rivers, lakes, and drainage in general
Slope/morphology/terrain	Spatial information on terrain forms, slope, elevation, including digital terrain models
Climate	Information on climate & weather data
Socio-economic info	Information on population and economic activities, forest product marketing possibilities
Time series/monitoring	Series of aerial photos, satellite images, and/or less frequently, maps of the same area at different dates
Models	Growth and productivity models of distinctive tree species
GIS	Geographic information systems, digital maps, geographical databases
Databases/statistics	General, non-geographical databases with statistical data
RS images (recent)	Respondent lacks remote sensing images, because he/she has no images or images are too old.
High resolution images	Spatial resolution of the images presently used is insufficient, respondent needs images with higher resolution
Low resolution images	Low resolution images for mapping large areas
Radar images	Radar images (from satellite or from plane)
Aerial photographs (recent)	Aerial photographs are presently unavailable or out-dated, respondent needs (recent) photographs
Video	Video for collecting forest data
Field data	All data collected in the field
More recent other info	Present information is outdated, more recent info is needed, non-spatial or not specified
Recent maps (thema)	More recent maps are needed (on certain themes)
More detailed maps	More detailed maps are needed
Question 5	Sources of data & information
Own funds	Information collection & analysis is funded by the organisation itself
External funds	Information collection & analysis is funded by an external party (e.g. through a project)
Exchange	Information is obtained through exchange/co-operation with other institutes
Own production	Information is collected/processed at the institute
External production	Information is bought, analysis/interpretation is done externally
GIS analysis	Information is generated within the organisation through analysis in a GIS
RS interpretation	Information is generated within the organisation through image analysis and/or interpretation

Literature	Information is collected from literature
Internet	Information is collected through the Internet
Question 6	<u>Suggested improvements</u>
Better quality of data	Quality of the data needs to be improved
Awareness	Respondent wants more awareness raising, especially at policy level, on topics of data/information needs and/or sustainable forest use/management
Proper datadistribution	Respondent has trouble in obtaining remote sensing images
Standard. coll.&anal.	Respondent wants standardisation of methods for data collection and analysis, to enable exchange of information
Cheaper images/softw.	Images and image processing software are considered too expensive
Cheaper technology	The technology (mainly hardware) needed to obtain and process digital spatial information is too expensive (image processing & GIS)
User friendly/impr.tech	Technology presently used by respondent is inadequate and needs to be developed and/or it is considered insufficiently user friendly.
Training/cap. build.	Need for training and capacity building (mostly but not exclusively in digital image processing, GIS)
Communication (org.)	Respondent doesn't have access to existing information due to communication problems, but doesn't specify the reason. Also included here is the need for exchange of information.
Access to info denied	Respondent is not allowed to use required information (military/ political reasons or just because institutes keep it to themselves)
Unfamiliar with info available	Respondent does not know what information is available
Location of info	Respondent does not know where to find the required information
Info adapted to user needs	Information is not available in a form that is adapted to the needs of the respondent
Internet	Respondent wants information on internet
Projects	Respondent wants (more) projects to improve data collection & analysis
Cloud cover	Respondent has problems with cloud cover on images/photographs
Question 7	<u>Additional remarks</u>
Central data storage	Respondent wants central data storage (on country level, world-wide, ..)
Auto georef., AP	Respondent wants automatic georeferencing of aerial photographs
Joint data collection	Respondent wants to share the effort of data collection among institutes and/or countries

APPENDIX 2.
SPECIFICATION OF SENSORS

<u>NOAA AVHRR 1 & 2</u>	Satellite born imaging sensor system, area width 3000 km., 4/5 bands, max. resolution 1100*1100 m
<u>Landsat TM</u>	Satellite born imaging sensor system, area width 183 km., 7 bands, max. resolution 30*30 m., orbital period 99 min., orbital period 99 min.
<u>Landsat MSS</u>	Satellite born imaging sensor system, area width 183 km., 4 bands, max. resolution 56*79 m. orbital period 99 min.
<u>Landsat not specified</u>	Satellite born imaging sensor system, type not specified
<u>SPOT-xs & pan</u>	Satellite born imaging sensor system, 2 sensor types, area width 60 km., 3/1 bands, max. resolution 20*20 /10*10 orbital period 101 min.
<u>IRS 1c-pan & 1c-LISSIII & 1c-Wifs</u>	Satellite born imaging sensor system, 3 sensor types, area width 70/141/806 km., 1/5/2 bands, max. resolution 5.8*5.8/ 23*23/ 188*188 m
<u>ERS</u>	Satellite born radar sensor system, area width 100 km., 1 band, max. resolution 12.5*12.5 m.
<u>JERS</u>	Satellite born radar sensor system, area width 75 km., 1 band, max. resolution 18*18 m.
<u>SAR</u>	Satellite born radar sensor system, several sensor types, area width varying from 50 to 470 km., 1 band, max. resolution varying from 8.4*8.4 m. to 100*100 m.

APPENDIX 3.
SCALES MENTIONED SORTED ACCORDING LEVEL.

In separate columns is indicated which scale for maps or remote sensing material (incl. aerial photographs) is used and/or is desired. Resolution mentioned is indicated separately if used or desired. In a additional column it is summarised what scale is used and what scale is desired, thus from maps and remote sensing data together. In the case no scale was specified and resolution was mentioned an applicable scale was added, based on expert knowledge of the work package team. (1x1 and 2x2 for 1: 5,000, 5x5 for 1:10,000; 10x10 for 1:25,000; 20x 20 for 1: 50,000 ; 30 x 30 for 1:100.000; 100x100 for 1:250,000 and 1000 x 1000 for 1: 500,000). In the last column these two were compiled by taken the desired scale and in the case this was not mentioned the used scale.

level	scales of maps used	scales of maps desired	scales of AP used	scales of AP/RS desired	resolution used	resolution desired	scales used	scales desired	scales desired or used
Int	b+o						b+o		b+o
Int	j					s	j	d	d
int			e+h+j	d+j			e+h+j	d+j	d+j
Int	e						e		e
int				g+h				g+h	g+h
R Af	h+k						h+k		h+k
R As	j		e+j				e+j		e+j
R As		j						j	j
R As	o+q						o+q		o+q
R LA		h+j						h+j	h+j
R LA	d+e+q	j+q					d+e+q	j+q	j+q
N Af	e						e		e
N Af	e+j		g				e+g+j		e+g+j
N Af	j+n		g+j				g+j+n		g+j+n
N Af			h	u			h	h	h
N Af	l	h+l					l	h+l	h+l
N Af	i+j				w		i+j+l		i+j+l
N Af	j						j		j
N Af		j						j	j
N Af	o+q						o+q		o+q
N As	a+j+l						a+j+l		a+j+l
N As	h+j+l				r+t+v+w		d+e+h+j+l		d+e+h+j+l
N As	j+o	j+l	j		w+y	t+u+w	j+l+o	e+h+j+l	e+h+j+l
N As	e+h+l						e+h+l		e+h+l
N As	j		h				h+j		h+j
N As					v+w			j+l	j+l
N As	h		j	l		w	h+j	l	l
N LA				f+l				f+l	f+l
N LA			g				g		g
N LA	j+o		l+k	g			j+l+k+o	g	g
N LA	d+h+l	h+l	h+j				d+h+j+l	h+l	h+l
N LA	j						j		j
N LA			k				k		k
N LA	l	l					l	l	l
N LA	l						l		l
N LA	o						o		o

N LA	o+q						o+q		o+q
N La	o						o		o
N Te		a						a	a
N Te	a+g						a+g		a+g
N Te		b+d	e				e	b+d	b+d
N Te					w+z	r	l+q	d	d
N Te	c+p+j	d+e	d+g+l		t+w+z		c+d+g+j+l+p	d+e+l+o	d+e+l+o
N Te					s+w		d+l		d+l
N Te	d+j+n+q		d+e			t	d+e+j+n+q	e	e
N Te	h	e					h	e	e
N Te	h				u+w	t	h+l	e	e
N Te	e+l						e+l		e+l
N Te			f				f		f
N Te	h						h		h
N Te	q						q		q
N Te	e	a					e	a	a
L Af				a				a	a
L Af		d						d	d
L Af	e+h+j	e					e+h+j	e	e
L Af	e+h+j+o	e					e+h+j+o	e	e
L Af	e+j	e					e+j	e	e
L Af	e+j	e					e+j	e	e
L Af	e+j+l+o	e					e+j+l+o	e	e
L Af	h+j	e					h+j	e	e
L Af	e+j	e+h					e+j	e+h	e+h
L Af	e+h+j	e+j		e			e+h+j	e+j	e+j
L Af	f+h+j						f+h+j		f+h+j
L Af	j+l	g+j					j+l	g+j	g+j
L Af			g+k				g+k		g+k
L Af	j	h		h			j	h	h
L Af	j	h					j	h	h
L Af	o	h					o	h	h
L Af	q	j+l	l+o+q		v	u	j+l+o+q	h+j+l	h+j+l
L Af	l+o	j					l+o	j	j
L Af		j						j	j
L Af	j+q						j+q		j+q
L As	j+o		c+d				c+d+j+o		c+d+j+o
L As	j+o						j+o		j+o
L As	c+j+m						c+j+m		c+j+m
L As	j			d+e			j	d+e	d+e
L As	d+j+o		j	d+g			d+j+o	d+g	d+g
L As	d+h						d+h		d+h
L As	d+h						d+h		d+h
L As	j		d	d+j			d+j	d+j	d+j
L As	d+l						d+l		d+l
L As	e						e		e
L As		e						e	e

L As	f+j+l	e+f+j					f+j+l	e+f+j	e+f+j
L As	h+l	e	h	e+g			h+l	e+g	e+g
L As	e+h		e+h	e		u	e+h	e+h	e+h
L As	j+l+o	e+j					j+l+o	e+j	e+j
L As	g		j				g+j		g+j
L As	e+h	h					e+h	h	h
L As	e+h+j	h					e+h+j	h	h
L As	e+l	h					e+l	h	h
L As	h+j	h					h+j	h	h
L As	j		h				h+j		h+j
L As	h+j						h+j		h+j
L As	h+l	h		l+j			h+l	h+j+l	h+j+l
L As	j						j		j
L As	j						j		j
L As	j						j		j
L As	j						j		j
L As	j		j				j		j
L As	j						j		j
L As	j		j				j		j
L As	j						j		j
L As			j				j		j
L As	j+o						j+o		j+o
L As	j+o+q						j+o+q		j+o+q
L As					w+z		l+q		l+q
L LA	b+e+j						b+e+j		b+e+j
L LA	j	d+e	j				j	d+e	d+e
L LA	j+l+o	e		d+e			j+l+o	d+e	d+e
L LA	c+h+j	d+f	k				c+h+j+k	d+f	d+f
L LA	d+o						d+o		d+o
L LA	j		k	e+g+l			j+k	e+g+l	e+g+l
L LA			g				g		g
L LA	l+h	h	j	g		t+v+w	l+h+l	g+h	g+h
L LA	j+o			h			j+o	h	h
L LA				h+l				h+l	h+l
L LA	j+l+o				u+v+w		j+l+o		j+l+o

Abbreviations on level: AF = Africa, AS = Asia, LA = South and Middle America + Caribbean (Australia and Oceania not represented) Te = Europe + USA + Canada, Int = International, R = Regional, N= National, L = local

Codes for scale and resolution.

Scale	code
1:1000	A
1:2000	B
1:4000	C
1:5000	D
1:10.000	E
1:15.000	F
1:20.000	G
1:25.000	H

1:30.000	I
1:50.000	J
1:60.000	K
1:100.000	L
1:125.000	M
1:200.000	N
1:250.000	O
1:400.000	P
1:500.000	Q
Resolution	
1*1 m.	R
2*2 m	S
5*5 m.	T
10*10 m.	U
20*20 m.	V
30*30 m.	W
50*50 m.	X
100*100 m.	Y
1000*1000	Z

APPENDIX 4.
SCALES AND FREQUENCY

The scale and frequency is presented for those users, who mentioned a combination on these two topics. The combination are ranked first according scales, then by level and then by frequency. For scale the last column of Appendix 3 was taken: the desired scale and in the case this was not mentioned the used scale. Each row represents the answer of one respondent. One respondent can have mentioned different frequencies, as well as different scales.

scales desired or used	level	3 monthly	every 6 months	yearly	2 years	5 years	10 or more years	real time (actual)
a	N	4		1				
c+d+j+o	L	5		1	1			
d	Int	6			1			
d+f	L	7		1				
d+g	L	8		1				
d+h	L	9 1		1				
d+h	L	10	1	1				
d+j	int	11			1	1		
d+j	L	12		1	1			
d+l	L	13 1		1				
d+o	L	14	1					
e	L	15				1	1	
e	L	16				1		
e	L	17				1		
e	L	18				1		
e	L	19				1		
e	L	20					1	
e	N	21		1				
e	N	22		1				
e+f+j	L	23		1				
e+g	L	24	1					
e+g+l	L	25		1		1		
e+g+j	N	26		1				
e+h	L	27					1	
e+h	L	28		1		1		
e+h+j+l	N	29						1
e+h+l	N	30		1				
e+j	L	31					1	
e+l	N	32		1				
g+j	L	33					1	
g+j	L	34				1		
g+j+n	N	35			1			
g+k	L	36			1			
h	L	37 1		1				
h	L	38 1		1		1		
h	L	39 1		1		1		
h	L	40		1		1		
h	L	41				1		
h	L	42				1	1	

h	N	43				1		
h+j	L	44		1	1			
h+j+l	L	45					1	
h+j+l	L	46	1					
h+l	N	47			1			
i+j+l	N	48		1				
j	L	49		1	1			
j	L	50		1				
j	L	51		1				
j	L	52		1				
j	L	53				1		
j	L	54				1		
j+l+o	L	55		1	1			
j+o	L	56		1				
j+o+q	L	57		1				
l	N	58				1		
l+q	L	59	1	1				
o+q	N	60				1		

APPENDIX 5.**THEMES, SCALES AND FREQUENCY**

The theme, scale and frequency is presented for those users, who mentioned a combination on these three topics. For users who indicated more than one combination all the combination are given. In these cases the User-ID (administrative number) can be found more than once. The combination are ranked first according group of themes, then according scale and last frequency. The following theme are combined in the first group: forest cover, land use forest cover and forest monitoring. The second group is: forest types and vegetation/forest types. The third group is forest planting and production. The fourth group is forest protection and forest fire. Bio-diversity and forest health are only once indicated in this table and are presented next to each other. While soil and topography are presented at the end.

User ID	Theme	Scale	Frequency
110	land use forest cover detailed area	1:5,000	2 years
129	land use forest cover	1:5,000+25,000	6 months
67	land use forest cover	1:5,000-15,000	1 year
97	land use forest cover	1:5,000-50,000	3 years
9	land use forest cover	1:10,000	1 year
215	land use forest cover	1:10,000	10 years
213	forest cover	1:10,000	5 years
217	forest cover	1:10,000	5 years
218	forest cover	1:10,000	5-10 years
219	forest cover	1:10,000+1:25,000	10 years
183	land use forest cover	1:10,000+1:25,000	1-5 years
186	forest cover	1:10,000-100,000	5 years
119	land use forest cover	1:10,000-30,000	1-5 years
110	land use forest cover large area	1:10,000-50,000	5 years
160	land use forest cover	1:20,000	1 year
163	land use forest cover	1:20,000	2 years
189	forest cover	1:25,000	1 year
91	land use forest cover	1:25,000	1 year
235	forest cover	1:25,000	1-2 years
74	land use forest cover	1:25,000	2-3 years
182	forest cover	1:25,000	5 years
187	forest cover	1:25,000	5 years
212	forest cover	1:25,000	5 years
25	land use forest cover	1:25,000	5-10 years
185	land use forest cover	1:25,000	6 months
180	forest cover	1:50,000	1 year
222	land use forest cover	1:50,000	1 year
160	land use forest cover	1:50,000	1 year
161	land use forest cover	1:50,000	1 year
184	forest monitoring	1:50,000	1 year
227	forest cover	1:50,000	1-2 years
228	forest cover	1:50,000	1-2 years
72	land use forest cover	1:50,000	2 years
214	forest monitoring	1:50,000	10 years
192	forest cover	1:50,000	20 years
162	land use forest cover	1:50,000	3 years
22	forest cover	1:50,000	5 years
221	land use forest cover	1:50,000	5 years

193	forest cover	1:50,000	5-10 years
211	forest cover	1:50,000	5-10 years
70	land use forest cover	1:50,000	real time
30	land use forest cover	1:50,000-100,000	5 years
65	forest cover	1:100,000	1 year
236	forest cover	1:250,000	1-2 years
129	vegetation/forest types	1:5,000+25,000	6 months
225	vegetation/forest types	1:10,000	1 year
210	vegetation/forest types	1:10,000	5 years
213	vegetation/forest types	1:10,000	5 years
217	vegetation/forest types	1:10,000	5 years
216	vegetation/forest types	1:10,000	5-10 years
218	vegetation/forest types	1:10,000	5-10 years
219	vegetation/forest types	1:10,000+1:25,000	10 years
119	vegetation/forest types	1:10,000-30,000	1-5 years
160	vegetation/forest types	1:20,000	1 year
195	vegetation/forest types	1:20,000-50,000	10 years
62	forest types	1:20,000-50,000	5 years
25	vegetation/forest types	1:25,000	5-10 years
220	forest types	1:50,000	1 year
224	forest types	1:50,000	1 year
226	forest types	1:50,000	1 year
161	forest regeneration	1:50,000	1 year
162	vegetation/forest types	1:50,000	3 years
133	vegetation/forest types large area	1:100,000	1 year
233	bio-diversity	1:10,000	1-2 years
9	forest health	1:10,000	1 year
190	forest planting	1:5,000-25,000	1 year
191	forest planting	1:5,000-25,000	1 year
97	forest production	1:5,000-50,000	3 years
188	forest planting	1:5,000-100,000	1 year
181	forest planting	1:10,000	1 year
9	forest production	1:10,000	1 year
140	forest production	1:10,000	1 year
150	forest production	1:10,000	1 year
216	forest planting	1:10,000	5-10 years
183	forest production	1:10,000+1:25,000	1-5 years
186	forest planting	1:10,000-100,000	1 year
62	forest production	1:20,000-50,000	5 years
182	forest planting	1:25,000	1 year
180	forest planting	1:50,000	1 year
188	forest fire	1:5,000-100,000	1 month
190	forest protection	1:5,000-25,000	3 months
233	forest protection	1:10,000	1-2 years
186	forest protection	1:10,000-100,000	1 month

72	forest fire	1:50,000	1 year
187	soil	1:25,000	5 years
25	topography	1:25,000	5-10 years

forest planting = plans for forest harvesting, planting and maintenance

forest protection = fire, pests, slash and burn

forest production = growing stock, biomass, wood volume, yield, age

APPENDIX 6

RESULTS BY LEVEL OF AREA OF INTEREST OF ORGANIZATION

The number of respondents per level is given first. Then the percentage responses per summarised category is given. The percentage in the columns is given as per number of respondents of a certain level. The percentage of the total as presented in chapter 4.2 is represented here as well for comparison.

level	Global	Regional	National	Local	Total
number of respondents	18	22	96	88	224
data/info need					
recent spatial data / info	44	41	49	65	54
more detailed spatial data / info	39	27	23	30	27
recent/more detailed spatial data / info	61	50	58	74	64
additional forest info (themes)	50	36	55	51	51
additional spatial info	78	64	79	85	80
Land use / land cover					
additional data/info need land use/forest cover	44	14	35	32	33
utilise land use / forest cover	72	64	66	75	70
utilise forest cover and additional data/info need	44	14	23	27	25
change detection					
addition change data / info	50	55	42	25	37
utilise change data / info	28	32	30	22	27
change utilise and additional data/info need	22	23	18	6	14
Improvements					
Accessibility	56	73	67	50	60
Cost	17	41	26	19	24
Training/cap. build.	39	27	34	45	38
Info or techn. user suitable	6	23	18	16	17
Standard. coll.&anal.	11	9	15	6	10
Quality of data	39	9	16	11	15
Cloud cover problem	6	5	3	3	4

Answers per question by level.

The percentages of times answers were given in a certain category are given by of the level of the area of interest of organisation. The number of respondents per level is given first. The percentage in the columns is given as per number of respondents of a certain level. The percentage of the total as presented in chapter 4.1 is presented here as well for comparison.

level	Int	Reg	Nat	Loc	Total
number of respondents	18	22	96	88	224
Question 1					
Sustainable use	78	59	56	61	60
Conservation	28	27	34	49	39
Protection	11	14	24	23	21
Production	33	36	44	31	37
Community forestry	11	18	16	15	15

CO2	11	5	5	1	4
Forest health	0	0	6	5	4
Certification	17	0	2	0	2
Monitoring	33	23	30	32	30
Planning	17	41	41	35	37
Survey	33	32	48	42	43
Research	39	14	19	19	20
Extension +inst. building	44	55	27	27	31
Info supply/awareness	44	18	11	11	15
Question 2					
advising	28	27	21	10	18
policy development	6	18	17	5	11
planning	6	18	21	23	20
management/organisation	17	9	10	5	8
Implementation	22	9	21	30	23
monitoring/assessment	28	23	23	41	30
area demarcation/mapping	17	5	20	22	19
data processing/ RM	6	9	13	2	8
extension/training	6	14	6	6	7
research	22	9	10	8	10
all tasks	6	0	4	1	3
not specified	11	5	6	1	4
none	0	9	2	1	2
Question 3					
none	6	23	1	2	4
Topography	33	18	36	63	45
Land tenure	17	5	9	14	11
Land use	39	18	28	40	33
Forest area/land cover	61	64	60	63	62
Forest cover change	11	18	23	9	16
Deforestation/fragm.	11	9	5	7	7
Reforestation	6	0	4	7	5
Forest health	17	5	11	3	8
Forest classes	28	32	27	39	32
Species/biodiversity	11	23	18	33	24
Silviculture treatments	0	0	9	1	4
Forest fires	22	5	9	6	8
Productivity	17	23	15	7	13
Soils	6	5	15	22	16
Hydrology	11	9	17	26	19
Slope/morphology/terrain	0	14	21	26	21
Climate	0	9	2	8	5
Socio-economic info	17	9	11	8	10
Time series	6	9	2	0	2
Models	11	0	6	1	4
GIS	28	27	34	22	28
Database/statistics	6	5	7	1	4

Maps	67	41	55	75	63
Radar images	6	5	3	0	2
RS images	39	36	51	30	40
Aerial photographs	11	18	32	32	29
Field data	17	18	42	64	46
Question 4					
Topography	17	5	11	9	10
Land tenure	17	0	7	3	6
Land use	28	9	14	16	15
Forest area/land cover	28	9	31	23	25
Forest cover (change)	39	41	27	14	24
Deforestation/fragm.	17	9	4	5	6
Reforestation	17	0	4	1	4
Forest health	17	9	7	3	7
Forest classes	33	23	14	14	16
Species/biodiversity	28	14	16	23	19
Silviculture treatments	6	0	5	0	3
Forest fires	11	9	9	2	7
Productivity	17	9	14	9	12
Soils	6	0	9	11	9
Hydrology	6	0	4	11	7
Slope/morphology/terrain	6	0	3	8	5
Climate	0	0	8	5	5
Socio-economic info	11	9	9	9	9
Time series/monitoring	17	23	20	11	17
Models	6	0	3	1	2
GIS	11	23	21	32	25
Database/statistics	11	18	5	6	7
RS images (recent)	22	23	24	24	24
High resolution images	6	18	9	18	13
low resolution images	0	5	1	0	1
Radar images	6	9	3	5	4
Aerial photographs (recent)	11	5	16	28	19
Video	0	0	1	2	1
Field data	6	5	3	5	4
More recent other info	11	9	8	8	8
Recent maps (thema)	22	27	27	41	32
More detailed maps	33	14	17	19	19
Question 5					
Own funds	0	0	0	2	1
External funds	0	0	4	2	3
Exchange	33	36	14	10	16
Own production	28	18	54	52	48
External production	78	59	57	60	60
GIS analysis	0	0	11	5	7
RS interpretation	17	5	17	3	10
Literature	6	9	9	7	8

Internet	17	9	5	2	5
Question 6					
Awareness	6	9	10	7	8
Proper datadistribution	17	36	17	10	16
Better quality of data	39	9	16	11	15
Standard. coll.&anal.	11	9	15	6	10
Cheaper images/softw.	17	36	24	14	21
Cheaper technology	11	5	6	8	7
User friendly/impr.tech	6	18	11	11	12
Training/cap. build.	39	27	34	45	38
Communication (org.)	50	55	48	42	46
Access to info denied/limited	11	0	9	14	10
Unfamiliar with info available	11	0	4	7	5
Location of info unknown	6	5	1	1	2
Info adapted to user needs	0	9	8	6	7
Internet	22	9	9	5	8
Projects	0	5	3	2	3
Cloud cover problem	6	5	3	3	4
Question 7					
Central data storage	6	5	10	5	7
Auto georef,. AP	0	0	1	3	2
Joint data collection	0	5	3	3	3

APPENDIX 7

RESULTS BY CONTINENT OF INTEREST OF ORGANIZATION

The percentages per summarised categories are given by continent. The percentage in the columns is given as per number of respondents of a certain continent. The percentage of the total as presented in chapter 4.2 is represented here as well for comparison.

Continent	Africa	Asia	Latin America	Europe+N America	Total
Number of respondents	53	60	56	37	224
data/info need					
recent spatial data / info	64	58	59	30	54
more detailed spatial data / info	32	17	27	32	27
recent/more detailed spatial data / info	75	65	64	46	64
additional forest info (themes)	58	52	45	51	51
additional spatial info	87	78	84	68	80
Land use / land cover					
additional data/info need land use/forest cover	36	30	29	32	33
utilise land use / forest cover	75	78	54	70	70
utilise forest cover and additional data/info need	30	23	16	27	25
change detection					
addition change data / info	30	27	50	38	37
utilise change data / info	21	32	29	24	27
change utilise and additional data/info need	13	10	18	11	14
Improvements					
Accessibility	51	60	68	62	60
Cost	19	20	32	30	24
Training/cap. build.	49	50	36	8	38
Info or techn. user suitable	15	22	13	22	17
Standard. coll.&anal.	6	8	11	19	10
Quality of data	6	23	4	22	15
Cloud cover problem	2	2	9	0	4

Answers per question by continent.

The percentages of times answers were given in a certain category are given by of the continent of the area of interest of the organisation. Therefore the global or international organisations are excluded here. The percentage in the columns is given as per number of respondents of a certain continent. The percentage of the total as presented in chapter 4.1 is represented here as well for comparison.

Continent	Africa	Asia	Latin America	Europe+N America	Total
Number of respondents	53	60	56	37	224
Question 1					
Sustainable use	64	53	75	35	60
Conservation	57	45	32	19	39

Protection	30	20	18	22	21
Production	40	33	48	24	37
Community forestry	17	17	20	5	15
CO2	2	0	7	5	4
Forest health	2	3	4	14	4
Certification	0	0	4	0	2
Monitoring	28	28	34	30	30
Planning	28	42	55	22	37
Survey	51	53	25	46	43
Research	17	20	7	35	20
Extension +inst. building	21	38	36	22	31
Info supply/awareness	6	15	9	22	15
Question 2					
advising	11	10	30	16	18
policy development	6	5	23	14	11
planning	17	28	23	14	20
management/organisation	6	3	13	11	8
Implementation	38	20	18	16	23
monitoring/assessment	32	40	29	16	30
area demarcation/mapping	26	17	18	14	19
data processing/ RM	2	5	13	14	8
extension/training	8	8	5	5	7
research	8	5	4	27	10
all tasks	2	2	0	8	3
not specified	4	5	4	3	4
none	0	5	2	3	2
Question 3					
none	4	2	7	3	4
Topography	49	72	23	32	45
Land tenure	11	15	4	14	11
Land use	25	52	29	16	33
Forest area/land cover	72	65	48	62	62
Forest cover change	13	20	18	14	16
Deforestation/fragm.	8	7	7	3	7
Reforestation	4	8	5	0	5
Forest health	2	8	4	19	8
Forest classes	38	37	20	38	32
Species/biodiversity	23	43	11	19	24
Silviculture treatments	2	2	7	11	4
Forest fires	4	5	11	11	8
Productivity	4	8	21	16	13
Soils	15	20	9	24	16
Hydrology	23	18	23	14	19
Slope/morphology/terrain	17	28	14	32	21
Climate	8	3	4	8	5
Socio-economic info	8	13	11	5	10
Time series	2	2	2	3	2

Models	2	0	4	11	4
GIS	17	27	27	49	28
Database/statistics	2	3	4	11	4
Maps	68	77	52	46	63
Radar images	0	0	7	0	2
RS images	26	35	61	38	40
Aerial photographs	38	32	29	22	29
Field data	47	67	36	41	46
Question 4					
Topography	15	12	2	11	10
Land tenure	4	7	4	5	6
Land use	13	17	14	11	15
Forest area/land cover	32	23	21	24	25
Forest cover (change)	19	20	29	24	24
Deforestation/fragm.	8	0	11	0	6
Reforestation	0	2	4	5	4
Forest health	6	2	4	16	7
Forest classes	13	15	11	22	16
Species/biodiversity	26	20	7	22	19
Silviculture treatments	4	0	4	3	3
Forest fires	2	5	13	5	7
Productivity	6	17	9	14	12
Soils	8	8	11	11	9
Hydrology	11	5	4	8	7
Slope/morphology/terrain	4	5	5	5	5
Climate	6	3	7	8	5
Socio-economic info	8	10	11	8	9
Time series/monitoring	13	13	25	14	17
Models	2	0	0	8	2
GIS	32	22	25	24	25
Database/statistics	6	5	7	11	7
RS images (recent)	26	15	39	11	24
High resolution images	15	10	18	14	13
low resolution images	0	0	4	0	1
Radar images	2	0	14	0	4
Aerial photographs (recent)	21	23	23	8	19
Video	4	0	2	0	1
Field data	8	3	0	5	4
More recent other info	11	7	5	11	8
Recent maps (thema)	45	42	21	19	32
More detailed maps	25	10	14	24	19
Question 5					
Own funds	2	0	2	0	1
External funds	6	0	4	3	3
Exchange	8	17	20	14	16
Own production	40	63	43	51	48
External production	45	68	64	54	60

GIS analysis	2	5	14	8	7
RS interpretation	6	5	16	14	10
Literature	9	7	7	11	8
Internet	2	3	7	5	5
Question 6					
Awareness	17	5	5	8	8
Proper data distribution	11	7	23	27	16
Better quality of data	6	23	4	22	15
Standard. coll.&anal.	6	8	11	19	10
Cheaper images/softw.	15	18	27	24	21
Cheaper technology	6	8	7	5	7
User friendly/impr.tech	8	17	9	16	12
Training/cap. build.	49	50	36	8	38
Communication (org.)	42	48	55	35	46
Access to info denied/limited	2	17	13	8	10
Unfamiliar with info available	6	3	4	8	5
Location of info unknown	0	3	2	0	2
Info adapted to user needs	9	7	5	8	7
Internet	4	5	5	19	8
Projects	8	0	4	0	3
Cloud cover problem	2	2	9	0	4
Question 7					
Central data storage	9	3	9	8	7
Auto georef., AP	4	0	2	3	2
Joint data collection	8	3	2	0	3

APPENDIX 8

RESULTS BY TYPE OF ACTIVITY OF THE ORGANIZATION

The percentages of times answers were given according the summarised categories are given. The percentage in the columns is given as per type of organisation. The percentage of the total as presented in chapter 4.2 is represented here as well for comparison. In three cases it was not possible to classify the organisation, because nothing was indicated in the replies.

frm = forest resource management, pd = policy development, pi = policy influencing, fin= financing, res = research and / means a combination.

type of organisation	frm	pd	pi	fin	res	pd/frm	pi/frm	fin/frm	pd/fin	pi/fin	pd/res	pi/res	total
number of respondents	80	52	41	2	22	9	7	1	1	1	1	4	224
data/info need													
recent spatial data / info	55	62	49	50	27	78	57	0	100	100	100	50	54
more detailed spatial data / info	28	17	34	50	41	11	29	0	0	100	100	25	27
recent/more detailed spatial data / info	64	65	66	100	50	78	57	0	100	100	100	50	64
additional forest info (themes)	55	54	54	0	32	44	57	0	100	100	100	25	51
additional spatial info	83	79	83	100	64	89	86	0	100	100	100	50	80
Land use / land cover													
additional data/info need land use/forest cover	35	35	37	0	14	33	14	0	100	100	100	25	33
utilise land use / forest cover	71	62	76	50	64	78	86	100	0	100	100	50	70
utilise forest cover and additional data/info need	28	25	29	0	9	33	14	0	0	100	100	25	25
change detection													
addition change data / info	31	40	41	100	27	44	57	0	100	100	100	0	37
utilise change data / info	23	33	27	0	27	33	43	0	100	0	0	25	27
change utilise and additional data/info need	8	23	17	0	9	22	14	0	100	0	0	0	14
Improvements													
Accessibility	58	67	61	50	55	56	100	100	100	0	0	25	60
Cost	29	25	24	50	27	11	0	0	0	0	0	0	24
Training/cap. build.	39	42	39	0	18	78	43	0	100	0	100	0	38
Info or techn. user suitable	14	17	20	0	14	44	14	0	0	0	0	0	17
Standard. coll. & anal.	10	13	5	0	18	0	14	0	100	0	0	0	10
Quality of data	11	12	15	0	32	11	14	0	100	100	0	25	15
Cloud cover problem	6	2	5	0	0	0	0	0	0	0	0	0	4

Answers per question by type of activity.

The percentages of times answers were given in a certain category are given by the type of activity of the organisation. The percentage in the columns is given as per number of respondents of a certain organisation type. The percentage of the total as presented in chapter 4.1 is represented here as well for comparison.

type	frm	pd	pi	fin	res	pd/frm	pi/frm	fin/frm	pd/fin	pi/fin	pd/res	pi/res	total
number	80	52	41	2	22	9	7	1	1	1	1	4	224
Question 1													
Sustainable use	58	71	66	100	23	44	86	100	100	0	0	75	60
Conservation	43	31	46	0	18	67	43	0	0	100	100	25	39
Protection	23	23	20	0	9	44	14	0	0	0	100	0	21
Production	43	42	32	50	18	44	29	100	0	0	100	0	37
Community forestry	20	13	17	0	5	11	29	0	0	0	0	0	15
CO2	1	6	2	0	9	0	14	0	0	100	0	0	4
Forest health	3	8	2	0	0	0	14	0	100	0	0	25	4
Certification	3	0	2	0	0	0	29	0	0	0	0	0	2
Monitoring	30	29	27	50	36	44	14	0	100	100	0	50	30
Planning	40	50	22	0	9	67	29	0	100	0	100	0	37
Survey	39	50	41	50	45	44	29	0	0	0	0	75	43
Research	8	6	32	0	82	22	0	0	0	0	100	50	20
Extension +inst. building	35	19	44	50	23	11	71	0	0	0	100	0	31
Info supply/awareness	9	8	34	0	14	0	14	0	0	0	100	75	15
Question 2													
advising	10	17	37	0	18	0	57	0	0	0	0	0	18
policy development	0	37	0	100	0	11	29	0	100	0	0	0	11
planning	26	27	7	0	5	56	14	0	0	0	0	0	20
management/organisation	6	12	5	0	9	11	14	0	0	100	0	25	8
Implementation	31	21	20	50	5	33	14	0	0	0	0	0	23
monitoring/assessment	39	19	32	0	18	22	29	100	0	100	0	50	30
area demarcation/mapping	20	15	22	0	18	22	0	100	0	0	0	25	19
data processing/RM	9	10	7	0	9	0	0	0	0	0	0	0	8
extension/training	6	4	12	0	9	0	0	0	0	0	100	0	7
research	3	0	17	0	55	11	0	0	0	0	0	25	10
all tasks	1	4	2	0	5	0	0	0	0	0	0	25	3
not specified	5	4	7	0	0	11	0	0	0	0	0	0	4
none	0	6	0	50	5	0	0	0	0	0	0	0	2
Question 3													
none	3	12	2	0	0	0	0	0	0	0	0	0	4
Topography	55	38	39	0	36	56	29	0	0	100	100	0	45
Land tenure	10	8	17	0	18	11	14	0	0	0	0	0	11
Land use	44	25	27	0	27	22	29	0	0	100	0	25	33

Forest area/land cover	60	62	71	50	55	78	57	100	0	100	100	25	62
Forest cover change	13	23	10	0	23	22	29	0	100	0	0	0	16
Deforestation/fragm.	5	10	5	0	9	11	0	0	0	0	0	25	7
Reforestation	5	4	5	0	5	22	0	0	0	0	0	0	5
Forest health	5	8	15	0	9	0	14	0	100	0	0	0	8
Forest classes	33	25	37	0	36	33	43	100	100	0	100	0	32
Species/biodiversity	30	17	22	0	23	33	0	100	0	0	0	25	24
Silviculture treatments	3	4	0	0	14	11	29	0	0	0	0	0	4
Forest fires	8	12	10	0	0	22	14	0	0	0	0	0	8
Productivity	10	17	7	0	9	22	29	0	100	100	0	0	13
Soils	20	6	7	0	41	11	0	0	0	0	100	0	16
Hydrology	28	12	17	0	23	11	0	0	0	100	0	0	19
Slope/morphology/terrain	26	13	17	0	32	0	0	0	0	0	0	25	21
Climate	6	4	2	0	14	0	0	0	0	0	0	0	5
Socio-economic info	14	8	10	0	5	0	29	0	0	0	0	0	10
Time series	0	0	10	0	0	11	0	0	0	0	0	0	2
Models	1	2	10	0	14	0	0	0	0	0	0	0	4
GIS	29	29	29	50	27	11	14	0	0	100	0	75	28
Database/statistics	3	2	12	0	0	0	29	0	0	0	0	0	4
Maps	68	56	61	0	55	89	71	100	0	100	100	50	63
Radar images	3	2	0	0	9	0	0	0	0	0	0	0	2
RS images	35	44	46	100	36	44	29	100	0	100	0	50	40
Aerial photographs	26	35	29	0	32	33	0	0	0	0	0	25	29
Field data	56	33	39	50	36	67	43	100	100	0	0	50	46
Question 4													
Topography	8	10	10	0	14	22	0	0	0	0	0	25	10
Land tenure	3	6	12	0	9	0	0	0	0	0	0	0	6
Land use	16	17	17	0	9	22	0	0	0	0	0	0	15
Forest area/land cover	28	25	29	0	9	22	14	0	100	100	100	25	25
Forest cover (change)	19	35	22	50	18	11	43	0	100	100	0	0	24
Deforestation/fragm.	4	6	15	0	0	0	0	0	0	0	100	0	6
Reforestation	1	6	5	0	5	0	14	0	0	0	0	0	4
Forest health	4	10	10	0	9	0	14	0	0	0	0	0	7
Forest classes	10	19	22	0	18	0	43	0	100	100	0	0	16
Species/biodiversity	14	19	29	0	14	22	43	0	0	0	100	0	19
Silviculture treatments	1	4	5	0	0	0	14	0	0	0	0	0	3
Forest fires	6	12	10	0	0	0	0	0	0	0	0	0	7
Productivity	9	17	7	0	14	0	29	0	100	100	0	0	12
Soils	13	8	5	0	9	11	14	0	0	0	0	0	9
Hydrology	5	4	5	0	5	22	14	0	0	100	0	0	7
Slope/morphology/terrain	5	8	5	0	0	0	0	0	0	100	0	0	5

Climate	6	8	2	0	5	11	0	0	0	0	0	0	5
Socio-economic info	9	10	2	50	14	11	29	0	0	0	0	0	9
Time series/monitoring	13	17	20	50	14	33	14	0	100	100	0	0	17
Models	1	2	2	0	9	0	0	0	0	0	0	0	2
GIS	24	29	22	0	23	22	29	0	0	0	100	0	25
Database/statistics	5	8	7	0	9	11	0	0	0	0	0	50	7
RS images (recent)	21	35	20	50	9	22	14	0	100	100	100	0	24
High resolution images	18	10	15	50	9	0	14	0	0	0	100	0	13
low resolution images	1	2	0	0	0	0	0	0	0	0	0	0	1
Radar images	8	6	2	0	0	0	0	0	0	0	0	0	4
Aerial photographs (recent)	19	23	17	0	5	56	0	0	0	0	100	0	19
Video	1	2	2	0	0	0	0	0	0	0	0	0	1
Field data	3	4	7	50	0	0	0	0	0	0	100	0	4
More recent other info	9	6	15	0	5	0	0	0	0	0	100	0	8
Recent maps (thema)	29	40	27	0	27	33	43	0	0	0	100	50	32
More detailed maps	15	13	22	50	41	11	14	0	0	100	0	25	19
Question 5													
Own funds	0	4	0	0	0	0	0	0	0	0	0	0	1
External funds	3	4	0	0	5	0	0	0	0	0	0	25	3
Exchange	11	23	22	50	14	0	29	0	0	0	0	0	16
Own production	50	58	39	50	36	67	14	0	100	0	0	50	48
External production	61	46	71	100	59	67	86	100	100	100	0	50	60
GIS analysis	9	10	5	0	5	0	0	0	0	0	0	0	7
RS interpretation	11	15	2	0	14	22	0	0	0	0	0	0	10
Literature	5	8	7	100	14	0	29	0	0	0	0	0	8
Internet	3	2	12	0	14	0	14	0	0	0	0	0	5
Question 6													
Awareness	6	10	7	0	14	11	14	0	0	0	0	25	8
Proper data distribution	9	21	22	0	18	0	29	100	100	0	0	25	16
Better quality of data	11	12	15	0	32	11	14	0	100	100	0	25	15
Standard. coll. & anal.	10	13	5	0	18	0	14	0	100	0	0	0	10
Cheaper images/softw.	21	23	24	50	23	11	0	0	0	0	0	0	21
Cheaper technology	11	4	5	0	9	11	0	0	0	0	0	0	7
User friendly/impr.tech	11	13	10	0	9	44	0	0	0	0	0	0	12
Training/cap. build.	39	42	39	0	18	78	43	0	100	0	100	0	38
Communication (org.)	51	54	44	50	32	33	86	0	0	0	0	0	46
Access to info	16	4	10	0	5	0	29	0	100	0	0	0	10

denied/limited													
Unfamiliar with info available	6	2	10	0	5	11	0	0	0	0	0	0	5
Location of info unknown	0	2	5	0	5	0	0	0	0	0	0	0	2
Info adapted to user needs	8	4	10	0	5	0	14	0	0	0	0	0	7
Internet	4	10	20	0	9	0	14	0	0	0	0	0	8
Projects	4	4	2	0	0	0	0	0	0	0	0	0	3
Cloud cover problem	6	2	5	0	0	0	0	0	0	0	0	0	4
Question 7													
Central data storage	5	6	15	0	5	11	14	0	0	0	0	0	7
Auto georef., AP	4	0	0	0	5	0	0	0	0	0	0	0	2
Joint data collection	3	2	5	0	5	0	0	0	0	0	0	25	3

APPENDIX 9

RESULTS BY FORM OF THE ORGANIZATION

The percentages of times answers were given according the summarised categories are given. The percentage in the columns is given as per number of respondents of a form of organisation. The percentage of the total as presented in chapter 4.2 is represented here as well for comparison. In 8 cases it was not possible to classify the organisation as nothing was indicated in the replies.

GO/NGO	GO	NGO	Total
number	144	72	224
data/info need			
recent spatial data / info	56	54	54
more detailed spatial data / info	26	29	27
recent/more detailed spatial data / info	65	63	64
additional forest info (themes)	49	54	51
additional spatial info	79	81	80
Land use / land cover			
additional data/info need land use/forest cover	33	33	33
utilise land use / forest cover	66	75	70
utilise forest cover and additional data/info need	24	28	25
change detection			
addition change data / info	38	39	37
utilise change data / info	30	22	27
change utilise and additional data/info need	19	6	14
Improvements			
Accessibility	59	64	60
Cost	24	25	24
Training/cap. build.	42	31	38
Info or techn. user suitable	18	14	17
Standard. coll.&anal.	10	11	10
Quality of data	13	19	15
Cloud cover problem	1	8	4

Answers per question by GO/NGO.

The percentages of times answers were given in a certain category are given by the form of the organisation(GO or NGO). The percentage in the columns is given as per number of respondents of a certain organisation form. The percentage of the total as presented in chapter 4.1 is represented here as well for comparison.

GO/NGO	GO	NGO	Total
number	144	72	224
Question 1			
Sustainable use	58	64	60
Conservation	37	42	39
Protection	26	10	21

Production	37	39	37
Community forestry	15	18	15
CO2	3	6	4
Forest health	6	1	4
Certification	1	6	2
Monitoring	32	28	30
Planning	40	29	37
Survey	45	38	43
Research	17	25	20
Extension +inst. building	28	39	31
Info supply/awareness	17	13	15
Question 2			
advising	17	21	18
policy development	15	6	11
planning	23	14	20
management/organisation	9	8	8
Implementation	22	25	23
monitoring/assessment	30	31	30
area demarcation/mapping	18	19	19
data processing/ RM	8	7	8
extension/training	8	6	7
research	11	8	10
all tasks	3	1	3
not specified	5	4	4
none	2	3	2
Question 3			
none	6	0	4
Topography	42	47	45
Land tenure	6	21	11
Land use	31	36	33
Forest area/land cover	60	65	62
Forest cover change	19	13	16
Deforestation/fragm.	8	3	7
Reforestation	6	4	5
Forest health	7	10	8
Forest classes	26	40	32
Species/biodiversity	20	31	24
Silviculture treatments	5	4	4
Forest fires	11	4	8
Productivity	13	14	13
Soils	13	18	16
Hydrology	19	21	19
Slope/morphology/terrain	17	26	21
Climate	5	6	5
Socio-economic info	8	14	10
Time series	1	4	2
Models	4	3	4

GIS	29	26	28
Database/statistics	2	10	4
Maps	60	65	63
Radar images	2	3	2
RS images	41	38	40
Aerial photographs	31	22	29
Field data	43	50	46
Question 4			
Topography	11	7	10
Land tenure	6	4	6
Land use	17	10	15
Forest area/land cover	24	28	25
Forest cover (change)	27	19	24
Deforestation/fragm.	6	7	6
Reforestation	3	6	4
Forest health	5	10	7
Forest classes	14	18	16
Species/biodiversity	16	24	19
Silviculture treatments	1	6	3
Forest fires	8	6	7
Productivity	10	17	12
Soils	8	11	9
Hydrology	6	7	7
Slope/morphology/terrain	4	7	5
Climate	6	4	5
Socio-economic info	10	7	9
Time series/monitoring	19	11	17
Models	2	3	2
GIS	27	15	25
Database/statistics	7	8	7
RS images (recent)	27	18	24
High resolution images	15	8	13
low resolution images	1	1	1
Radar images	4	6	4
Aerial photographs (recent)	22	14	19
Video	1	1	1
Field data	5	3	4
More recent other info	8	10	8
Recent maps (thema)	32	35	32
More detailed maps	18	22	19
Question 5			
Own funds	1	0	1
External funds	3	3	3
Exchange	15	21	16
Own production	53	40	48
External production	59	67	60
GIS analysis	7	7	7

RS interpretation	13	6	10
Literature	8	10	8
Internet	3	10	5
Question 6			
Awareness	10	6	8
Proper data distribution	18	14	16
Better quality of data	13	19	15
Standard. coll. & anal.	10	11	10
Cheaper images/softw.	22	19	21
Cheaper technology	6	8	7
User friendly/impr.tech	13	10	12
Training/cap. build.	42	31	38
Communication (org.)	42	57	46
Access to info denied/limited	8	14	10
Unfamiliar with info available	4	8	5
Location of info unknown	2	1	2
Info adapted to user needs	7	7	7
Internet	8	11	8
Projects	3	1	3
Cloud cover problem	1	8	4
Question 7			
Central data storage	6	11	7
Auto georef., AP	2	1	2
Joint data collection	3	3	3

APPENDIX 10 RESULTS BY FOREST FUNCTION

Based on their answers to question 2, respondents were classified according to the function of the forest in their area of interest, e.g. production, conservation or protection or a combination of these. In the case none of these were mentioned it is also distinguished if community forestry was indicated. In 46 cases nothing at all was mentioned and these respondents are excluded here. Only the answers of national and local level organisation are analysed here, as function at international and regional level is not clearly defined in most cases.

The percentages of times answers were given according the summarised categories are given. The percentage in the columns is given as per number of respondents of a forest function. The percentage of the total of national and local (N&L) together is represented here as well for comparison.

c = conservation, p = production, t = protection, u = Community forestry
/ combination of forest function

forest function	c	p	t	u	pc	ct	pt	pct	n&l
number of respondents	38	37	7	8	12	16	10	10	184
data/info need									
recent spatial data / info	68	62	57	75	58	63	70	50	57
more detailed spatial data / info	37	32	43	13	25	6	10	10	26
recent/more detailed spatial data / info	79	70	71	75	75	69	70	60	66
additional forest info (themes)	63	38	43	13	58	56	80	50	53
additional spatial info	89	78	100	88	83	88	80	90	82
Land use / land cover									
additional data/info need land use/forest cover	39	27	0	0	50	25	60	30	34
utilise land use / forest cover	79	62	71	63	92	88	80	60	70
utilise forest cover and additional data/info need	37	19	0	0	50	19	40	10	25
change detection	0	0	0	0	0	0	0	0	
addition change data / info	26	30	43	63	42	13	30	30	34
utilise change data / info	16	27	29	13	42	25	60	10	26
change utilise and additional data/info need	5	11	29	0	33	0	30	0	12
Improvements									
Accessibility	50	51	57	38	83	44	80	70	59
Cost	18	24	71	13	33	6	30	10	23
Training/cap. build.	53	35	14	38	50	63	60	60	40
Info or techn. user suitable	11	8	0	13	33	44	20	20	17
Standard. coll.&anal.	5	5	14	0	8	6	0	20	10
Quality of data	0	22	14	0	8	19	30	10	14
Cloud cover problem	5	3	0	13	0	0	0	0	3

Answers per question by forest function

The percentages of times answers were given in a certain category are given by forest function. The percentage in the columns is given as per number of respondents of a certain forest function. The percentage of the total of national and local (N&L) together is represented here as well for comparison.

Forest function	c	p	t	u	pc	ct	pt	pct	n&l
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Number of respondents	38	37	7	8	12	16	10	10	184
Question 1									
Sustainable use	58	68	57	75	67	56	40	70	59
Conservation	53	41	43	25	50	50	40	60	41
Protection	32	19	29	25	33	13	30	10	23
Production	24	46	29	38	67	25	60	50	38
Community forestry	18	22	0	13	33	0	30	10	15
CO2	3	0	14	0	0	0	0	0	3
Forest health	5	3	0	0	0	6	0	0	5
Certification	0	0	0	13	0	0	0	0	1
Monitoring	34	30	29	50	25	25	20	40	31
Planning	24	35	43	50	25	63	60	60	38
Survey	39	38	43	13	58	63	50	90	45
Research	18	16	0	0	17	25	30	0	19
Extension +inst. building	21	30	14	50	50	31	50	20	27
Info supply/awareness	8	16	0	25	0	6	20	0	11
Question 2									
advising	11	11	43	38	8	6	30	10	16
policy development	5	8	43	25	8	0	10	0	11
planning	18	11	29	25	17	56	20	50	22
management/organisation	0	14	14	0	8	0	10	10	8
Implementation	32	27	0	0	50	38	30	10	25
monitoring/assessment	32	49	0	25	33	44	30	10	32
area demarcation/mapping	24	22	0	25	33	13	10	50	21
data processing/ RM	0	3	29	25	8	6	10	0	8
extension/training	5	11	0	0	8	0	30	0	6
research	8	5	0	0	0	13	0	0	9
all tasks	3	0	0	0	0	0	0	10	3
not specified	3	0	0	13	8	0	0	20	4
none	0	3	0	0	0	0	20	0	2
Question 3									
none	3	5	0	0	0	0	0	0	2
Topography	58	51	43	25	33	88	60	70	49
Land tenure	21	11	14	0	8	0	20	10	11
Land use	26	43	43	25	50	56	50	30	34
Forest area/land cover	71	46	71	63	83	75	80	60	61
Forest cover change	5	14	29	13	33	13	50	10	16
Deforestation/fragm.	5	14	0	0	8	0	20	0	6
Reforestation	5	5	0	0	8	13	20	0	5
Forest health	8	0	14	0	0	0	20	0	8
Forest classes	45	24	0	25	25	50	30	20	33
Species/biodiversity	24	32	14	25	17	50	40	20	25
Silviculture treatments	0	3	0	0	8	0	10	0	5
Forest fires	0	11	14	0	17	6	0	0	8
Productivity	0	14	29	0	8	13	20	0	11
Soils	21	11	0	13	17	44	30	0	18

Hydrology	24	35	29	25	17	6	30	20	21
Slope/morphology/terrain	24	38	14	25	8	0	30	10	23
Climate	11	5	0	0	0	6	0	0	5
Socio-economic info	11	3	14	13	8	13	20	10	10
Time series	0	0	0	0	8	0	0	0	1
Models	3	0	0	0	0	0	0	0	4
GIS	16	22	43	13	17	31	30	50	28
Database/statistics	3	0	0	0	0	0	10	0	4
Maps	66	76	71	50	75	88	50	90	65
Radar images	0	0	0	13	0	0	0	0	2
RS images	18	49	71	75	42	19	40	60	41
Aerial photographs	34	35	43	63	42	25	40	20	32
Field data	47	70	14	38	58	88	40	40	52
Question 4									
Topography	11	5	0	0	33	13	30	0	10
Land tenure	5	3	0	0	0	0	30	10	5
Land use	13	19	0	0	8	19	30	30	15
Forest area/land cover	34	19	0	0	50	6	60	20	27
Forest cover (change)	13	16	29	38	42	6	30	20	21
Deforestation/fragm.	8	3	0	0	0	0	0	10	4
Reforestation	0	3	0	0	0	0	10	0	3
Forest health	5	0	14	0	0	6	0	0	5
Forest classes	21	8	0	13	0	6	20	10	14
Species/biodiversity	37	8	0	0	8	25	20	20	19
Silviculture treatments	0	0	0	0	17	0	0	0	3
Forest fires	3	0	43	0	0	6	0	10	6
Productivity	8	3	14	0	17	25	30	0	11
Soils	11	8	14	13	0	19	0	20	10
Hydrology	13	8	0	0	0	13	0	10	8
Slope/morphology/terrain	8	8	0	0	0	6	10	0	5
Climate	0	5	0	13	17	13	0	10	7
Socio-economic info	5	14	14	0	25	6	0	20	9
Time series/monitoring	13	16	14	38	17	0	20	10	16
Models	3	0	0	0	0	0	0	0	2
GIS	34	30	29	38	17	38	0	10	26
Database/statistics	3	14	0	0	8	0	10	0	5
RS images (recent)	24	30	43	38	17	13	30	20	24
High resolution images	21	22	29	0	8	0	0	10	14
low resolution images	0	0	0	13	0	0	0	0	1
Radar images	3	8	14	13	0	0	0	0	4
Aerial photographs (recent)	21	30	14	50	25	38	30	0	22
Video	5	0	0	13	0	0	0	0	2
Field data	11	0	0	0	0	0	20	0	4
More recent other info	8	8	0	0	17	6	20	10	8
Recent maps (thema)	53	30	14	38	33	44	50	30	34
More detailed maps	29	16	14	13	17	6	10	10	18

Question 5									
Own funds	3	3	0	0	0	0	0	0	1
External funds	3	5	0	13	0	0	0	10	3
Exchange	5	16	14	0	25	13	30	0	12
Own production	45	49	57	25	50	75	70	60	53
External production	42	57	57	75	58	100	50	60	59
GIS analysis	3	8	29	13	0	0	30	0	8
RS interpretation	3	8	29	25	17	0	20	0	10
Literature	11	5	14	0	8	0	30	0	8
Internet	3	3	0	13	0	0	10	0	4
Question 6									
Awareness	13	3	0	0	25	0	20	20	9
Proper datadistribution	8	16	14	13	17	0	10	20	14
Better quality of data	0	22	14	0	8	19	30	10	14
Standard. coll.&anal.	5	5	14	0	8	6	0	20	10
Cheaper images/softw.	13	16	71	13	33	6	30	10	19
Cheaper technology	11	8	0	0	8	0	10	10	7
User friendly/impr.tech	5	5	0	13	17	38	10	20	11
Training/cap. build.	53	35	14	38	50	63	60	60	40
Communication (org.)	42	46	29	38	75	31	70	60	45
Access to info denied/limited	8	16	14	13	8	19	0	10	11
Unfamiliar with info available	8	5	0	0	8	6	0	0	5
Location of info unknown	0	3	14	0	0	0	0	0	1
Info adapted to user needs	8	3	0	0	17	6	10	10	7
Internet	5	5	14	0	0	0	0	10	7
Projects	3	8	0	0	8	0	0	0	3
Cloud cover problem	5	3	0	13	0	0	0	0	3
Question 7	0	0	0	0	0	0	0	0	
Central data storage	0	8	0	0	25	6	0	20	8
Auto georef., AP	5	3	0	0	0	0	0	0	2
Joint data collection	3	5	0	0	25	0	0	0	3