FOREST RESOURCES INFORMATION SYSTEM (FORIS)

CONCEPTS

AND

STATUS REPORT

(22 June 1999)
Forests are crucial for the well-being of humanity. They provide foundations for life on earth through ecological functions, by regulating the climate and water resources, and by serving as habitats for plants and animals. Forests also furnish a wide range of essential goods such as wood, food, fodder and medicines, in addition to opportunities for recreation, spiritual renewal and other services.

Today, forests are under pressure from expanding human populations, which frequently leads to the conversion or degradation of forests into unsustainable forms of land use. When forests are lost or severely degraded, their capacity to function as regulators of the environment is also lost, increasing flood and erosion hazards, reducing soil fertility, and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.

FAO, at the request of the member nations and the world community, regularly monitors the world's forests through the Forest Resources Assessment Programme. The next report, the Global Forest Resources Assessment 2000 (FRA 2000), will review the forest situation by the end of the millennium. FRA 2000 will include country-level information based on existing forest inventory data, regional investigations of land-cover change processes, and a number of global studies focusing on the interaction between people and forests. The FRA 2000 report will be made public and distributed on the world wide web in the year 2000.

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Paper drafted by Peter Holmgren
## Abbreviations and Definitions

(as used in this document)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>client application</td>
<td>Executable software that is installed on the user’s computer</td>
</tr>
<tr>
<td>database</td>
<td>A set of tables, usually electronically stored</td>
</tr>
<tr>
<td>FORIS</td>
<td>Forest Resources Information System</td>
</tr>
<tr>
<td>FRA</td>
<td>Forest Resources Assessment Programme</td>
</tr>
<tr>
<td>FRA 2000</td>
<td>the Global Forest Resources Assessment 2000</td>
</tr>
<tr>
<td>information system</td>
<td>A collection of processes, data and data processing facilities that together provide useful information. Consists partly of computer software.</td>
</tr>
<tr>
<td>WAICENT</td>
<td>World Agriculture Information Centre</td>
</tr>
<tr>
<td>web application</td>
<td>Server-based software that generates pages and functions for use by world-wide-web browsers</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Purpose of this document

The Forest Resources Information System (FORIS) is developed by the Forest Resources Assessment Programme (FRA) at FAO’s Forestry Department to provide the world with baseline information on forest resources.

FORIS is developed for the production and presentation of the Global Forest Resources Assessment 2000 (FRA 2000), but with the perspective to continue to improve beyond this event.

FORIS includes both existing source information and derived information.

This document outlines the concepts and reports on the development status. The purpose is to stimulate the continued system development.

1.2 General FRA 2000 aspects on country information

The following principles guide how country information is handled in the FRA 2000 process:

- All distributed information should be verified, meaning that all data items should have a source reference, and the data processing should be transparent;

- The countries validate and approve information concerning their country before publication.

1.3 System development aspects

The following points have guided the system development work:

- The system include the FORIS database, client application and web application, as well as the processes applied in the work;

- The work procedures and principles require that many users can work with the system, and that data ownership is distributed among these users;

- It is a major ambition to make forest resources information accessible internally at FAO as well as externally, thus enabling a situation where data are only stored once, and duplication of efforts as well as risks of erroneous copies thereby minimized;

- FORIS will cover all country information needs for FRA 2000, meaning that a variety of subjects (presently 10) are included;
- Security (user privileges, backup, documentation, dependencies on persons, defined system manager/ownership) should be tight;

- Integration with other system development efforts is essential and must be kept in mind despite the FRA 2000 rush.

1.4 System status

FORIS has as of 22 June 1999 about 10 users that are entering information on forest resources. Two thematic subjects (Forest cover and Plantations) are ready and used for data entry. Generic modules for Contacts, Country Information Management, Geographic units and Species are implemented and used.

The database is presently MS Access, but work is ongoing to migrate to Oracle.

FORIS can be installed and used by any user at the Forestry Department (HQ).

The present version is 1.2.0.9
2. Information structure

2.1 General

The baseline resources information in FORIS is structured by Geographic units in one dimension, and by thematic subject in another.

Both these dimensions are flexible in the sense that items can be added or regrouped.

A third dimension is along the information production process (see 4.1), i.e. the degree of processing that has been applied.

2.2 Thematic subjects

Presently, ten thematic subjects have been identified. These are:

1. Country description
2. Forest cover
3. Plantations
4. Volume / biomass
5. Protected areas / conservation
6. Forest change
7. Ownership
8. NWGS
9. Fires
10. Wood supply

For each of these subjects a number of subject classes are identified. The subject classes essentially represent the final output of FRA 2000 (or any following presentation). For example, the Forest Cover subject include the subject classes Composition, Disturbance and Texts.
2.3 Geographic Units

The administration of geographic units is a known obstacle when producing FAO reports. Countries change name, split, merge or simply should not be shown. Furthermore, they can be grouped in different ways depending on the purpose of the report. Finally, countries are subdivided into administrative units, or into other arbitrary units based on e.g. climatic conditions.

A flexible functionality to handle the geographic units has been developed in FORIS. The units are organized in a hierarchial tree. The units can be either Administrative (such as country or province), Report grouping unit (such as a region) or Custom (such as a particular forest block). The tree can be reorganized, for example when a country splits, without losing the connection to earlier information.

The above means that, although the main focus (particularly for FRA 2000) is on the administrative reporting units, the system can handle any georeferenced information. At the moment, this option is used for the Volume and Biomass study, by storing data from forest inventories. For the future it can be expected that other types of information can also be included, for example sample sites from a forest change survey.

Following the general development of georeferenced databases, it can also be expected that the spatial data (polygons, lines, points, images) will be fully integrated with normal tabular data in standard database software. Oracle is an excellent platform for this.
3. System Overview

3.1 Components

The FORIS system broadly consist of the following four components (further described in sections 4-7 below)

- System processes;
- Database;
- Client application;
- Web application.

3.2 Architecture development

The system architecture is developing alongside with the functional development. Figure 1 shows the steps to be taken over a two year period.

<table>
<thead>
<tr>
<th>Now</th>
<th>July 1999</th>
<th>January 2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical solution:</td>
<td>Technical solution:</td>
<td>Technical solution:</td>
<td>Technical solution:</td>
</tr>
<tr>
<td>Db: Access</td>
<td>Db: Oracle</td>
<td>Db: Oracle</td>
<td>Db: Oracle</td>
</tr>
<tr>
<td>Server: FO file server</td>
<td>Server: WACDB</td>
<td>Server: WACDB</td>
<td>Server: WACDB</td>
</tr>
<tr>
<td>Client app: Delphi</td>
<td>Client app: Delphi</td>
<td>Client app: Delphi</td>
<td>Client app: Phased out</td>
</tr>
<tr>
<td>5 users</td>
<td>20 users</td>
<td>40 users+ web access</td>
<td>Web presence with update</td>
</tr>
<tr>
<td>Issues:</td>
<td>Issues:</td>
<td>Issues:</td>
<td>Issues:</td>
</tr>
<tr>
<td>FRA 2000 data entry</td>
<td>As before +</td>
<td>FRA web design</td>
<td>As previous +</td>
</tr>
<tr>
<td>Add themes</td>
<td>Server access</td>
<td>Web db access</td>
<td>Updating procedures and priviliges</td>
</tr>
<tr>
<td>Awareness/training</td>
<td>Development setup</td>
<td>Web maintenance</td>
<td>Continued improvement and maintenance</td>
</tr>
<tr>
<td>Field office access</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1.* Tentative architectural steps in the FORIS development.
3.3 Time schedule

The following general time schedule outlines milestones in the development of FORIS and tentative deadline dates:

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORIS is migrated to Oracle and resides on a Waicent server</td>
<td>30 June 1999</td>
</tr>
<tr>
<td>All thematic subjects are implemented in the client application</td>
<td>31 August 1999</td>
</tr>
<tr>
<td>(although further refinement will be needed)</td>
<td></td>
</tr>
<tr>
<td>Temperate and Boreal countries included in the system</td>
<td>30 September 1999</td>
</tr>
<tr>
<td>First version of web application ready for internal testing</td>
<td>31 October 1999</td>
</tr>
<tr>
<td>Web application switched on, information from all countries available,</td>
<td>31 January 2000</td>
</tr>
<tr>
<td>although not complete</td>
<td></td>
</tr>
<tr>
<td>Generator for printed country profiles</td>
<td>31 March 2000</td>
</tr>
<tr>
<td>Remote update over the web implemented</td>
<td>31 July 2000</td>
</tr>
</tbody>
</table>
4 System processes

Mapping relevant processes is a necessary component and foundation for a successful system. The processes define the activities and outputs that the rest of the system shall support. The processes do not contain any technical aspects or preferences on the system. Neither do they imply that all steps should be supported by computer software.

Two main processes have been identified, the Information Production process and the Information Access process. Another process that is relevant is the Information Identification Process – i.e. how are the information sets that are relevant for FAO’s mission identified in the first place.

4.1 The Information Production Process

Production of (country) information, regardless of subject, uses this process (Figure 2) that starts with data collection and ends with the published information. It is realised mainly through the FORIS client application.

Users of this process is mainly FAO staff.

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![Diagram](image)

*Figure 2. The Information Production process as implemented in FORIS.*
4.2 The Information Access Process

This very general process (Figure 3) describes how information in FORIS is accessed from the web. It gives a conceptual basis for the web application development.

Users of this process is anyone.

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\[\text{Figure 3. The Information Access process as it will be implemented in FORIS.}\]
5. The FORIS database

5.1 Infrastructure

The FORIS database is currently (15 June 1999) being migrated to Oracle. It will reside on a server optimized for web applications on a server maintained by Waicent. Besides the production database, there will be a mirrored database dedicated to development and tests. Waicent provides technical backstopping to the maintenance and development of the database.

5.2 Data ownership

As a principle, data will be owned and controlled by the person(s) who created them. For practical purposes workgroups will be defined (e.g. for Plantation data), meaning that all users within the workgroup can add, modify or delete data within their domain.
5.3 Data model

FORIS is a relational database. The relationships between tables are conventionally described in a data model. At present the FORIS database consists of approximately 45 tables. Figure 4 is a generalized data model showing the main components of the database. Note that the data model will be expanded, and also may change.

Figure 4. Generalized data model for FORIS, status 22 June 1999.
Explanations to Figure 3:

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic Unit</td>
<td>Any geographic unit</td>
</tr>
<tr>
<td>Reference</td>
<td>Bibliographic (normally) or other reference (eg website) with the usual attributes</td>
</tr>
<tr>
<td>Subject classification</td>
<td>The subjects and attached classifications defined by FAO, constituting mainly the output datasets. (Note that datasets can consist of numbers or texts or potentially any other data type)</td>
</tr>
<tr>
<td>Source data</td>
<td>Definitions (classifications) and data from the source document</td>
</tr>
<tr>
<td>Derived data</td>
<td>Processed data, typically source data reclassified into FAO classification or translated text</td>
</tr>
<tr>
<td>Data Context</td>
<td>The gateway that connects the reference and source data with the subject class and derived (output) data. Note that a data context can (a) refer to source data or (b) point back to an earlier Data Context.</td>
</tr>
<tr>
<td>CIM</td>
<td>Country Information Management, a control component to follow and coordinate the progress of country information</td>
</tr>
<tr>
<td>Contacts</td>
<td>A contact (eg country correspondents) component that also logs events with each contact</td>
</tr>
<tr>
<td>Species</td>
<td>A general component for species names and their hierarchy</td>
</tr>
</tbody>
</table>
6. The FORIS client application

6.1 General

The FORIS client application is used to view or manipulate the contents of the FORIS database. The application is a program that runs on a personal computer (the client) that can be connected to the database server over the network.

The client application is developed as a conventional software package, i.e. it must be installed on the client computer. The application is developed using the software development tool Delphi 4, which is one of the leading tools on the market.

6.2 Security

The FORIS client application takes care of security and data ownership restrictions when browsing the database. Standard login procedures are applied. Each record in the database has the identity of the creator and last modifier, and the client application uses this information to modify the options for the current user.

6.3 Modules

6.3.1 General

The FORIS application is divided into generic and thematic modules. The generic modules provide supporting functionality. The thematic modules deal with the actual forest resources information, divided by the identified subjects (See 2.2). Figure 5 outlines the currently identified modules.
Figure 5. Identified modules in FORIS client application.
6.3.2 Generic components

The generic components support the thematic components by helping to organize particular variables such as geographic units, contacts or species. A special generic component is the Country Information Management (Figure 6) where the country information coordinator keeps track of work progress by country.

Figure 6. Country Information Management form in FORIS.
6.3.3 **Thematic components**

The thematic components allows the user to work with one subject at a time along the information production process (see 4.1). That is, you start with the Reference, review the reference and create a Data Context, enter Source Data, modify (reclassify) the source data into Derived Data, and finally determine the output datasets.

This is done in a similar way for all subjects, by following the tabs in the window form, see Figure 7.

![Figure 7. FORIS client application, example showing forest cover in Colombia.](image)
6.4 Master/Detail relationships

A functionality that occurs in many places in the FORIS client application is the Master/Detail relationship as illustrated in Figure 8. In the Master window form a list of all (selected) records are shown. Typically this window looks like the Windows Explorer with a navigation tree to the left and the list to the right.

From the Master window form the full details of each record can be displayed by double-clicking or through a menu. A Detail window form is then displayed and – provided that the user has appropriate privileges – the record can be changed. Similarly, creating a new record (from a menu), displays an empty detail window that can then be filled.

Some Master window forms have two or more lists. Typically this indicates a one to many relationship, i.e. the bottom list displays the records connected to the selected record in the top list.

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**Figure 8.** General structure of master-detail forms.
7. The FORIS web application

The development of a Web application in FORIS has not started. A mockup design of the contents of country pages has been done and will be used as a template. Persons to take part in the work have been established. There will be close links to the Forestry website development.
FRA Working Papers

1998

1. *FRA 2000 Terms and Definitions* (18 pp. - E/F/S/P)

2. *FRA 2000 Guidelines for assessments in tropical and sub-tropical countries* (43 pp. - E/F/S/P)

1999


5. *Volume/Biomass Special Study: georeferenced forest volume data for Asia and Tropical Oceania* (102 pp. E)


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