



# **Preliminary Database Assessment for International Long-Term Ecological Monitoring Efforts**

**G. Bruce Wiersma**

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MAINE AGRICULTURAL AND FOREST EXPERIMENT STATION  
University of Maine

# Preliminary Database Assessment for International Long-term Ecological Monitoring Efforts

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## INTRODUCTION

The U.S. Environmental Protection Agency embarked on a major effort to assess the ecological condition of the United States (Jones n.d.; Thornton et al. 1994; Shepanek 1994). This program was called the Environmental Monitoring and Assessment Program (EMAP). Subsequently, management decisions have significantly modified the direction of the program.

I originally intended the study to look at the availability of databases in the international community associated with long-term ecological monitoring efforts. The purpose of this paper was not to obtain these data, or even to determine what kinds of databases were out there. The scope was much more limited than that. My purpose was simply to determine what kind of data-handling capacity the identified long-term ecological study programs had.

EMAP has used Oracle as a database management system. With the existence of the World Wide Web (WWW), we assumed we could share the data easily by using the WWW. We also felt that this study would capitalize on several existing studies that this author completed for the United Nations Environment Program Global Environment Monitoring System. These studies were as follows:

- A study on the long-term ecological monitoring efforts underway in the United States (Wiersma 1991). (Referred to in this report as the SACTEMA study).
- A study of long-term ecological monitoring efforts underway in the United States on managed ecosystems (Wiersma 1993).
- A study of long-term ecological monitoring efforts underway on managed ecosystems internationally (Wiersma 1994, 1995).

The SACTEMA paper was not based on a mail survey as is the current report. It was primarily a literature review and was my first attempt to look at how much long-term, site-specific ecological monitoring was underway. The report supported the planning efforts underway by the United Nations Global Environment Monitoring Systems of the United Nations Environment Programme (UNEP GEMS) to set up a global integrated monitoring network around the world. This system was to be called SACTEMA, and the report's purpose was to find out what monitoring was currently underway.

While integrated monitoring has a specific definition, for this report it simply refers to sites where a series of multimedia sampling efforts takes place in a coordinated spatial and temporal manner. Most were site-intensive studies and not extended surveys. The thinking of SACTEMA at the time was that we should use existing networks and sites rather than initiate a new series of sites.

In all, I identified about 60 to 70 long-term integrated monitoring sites around the world, involving at least 12 different countries. Although most of the sites had not been designed with each other in mind, there was a great deal of similarity in measurements made on each site, which made it appear that it would be relatively simple to coordinate these sites into a long-term global-monitoring effort. The report was never published in the open literature, but a copy can be obtained from the author of this report.

The second report "Survey of Long-term Studies on Agricultural Ecosystems in the United States," had its genesis in another of the various meetings held on the development of SACTEMA. At this meeting I recognized that I had missed a possible significant source of information on long-term ecosystem-oriented studies: agricultural research efforts. I realized that agricultural research efforts have been carried out over long periods of time and have produced data of high value to global change concerns. (By this time much of the thinking behind SACTEMA had begun to focus on global change related issues.) Therefore, I undertook a second review. In this review, I used both traditional literature sources and CRIS (Cooperative Research Information System) reports. More than 90 sites were located, all of which were currently underway. I did not include any sites that did not intend to operate over long periods of time. It was interesting that many of these sites had been under continuous operation for a long time, many for decades. The oldest plots were initiated in 1876. Also many sites were focused on ecological research rather than agricultural activities. In addition, I found a number of long-term ecological monitoring sites that I had missed in my original SACTEMA report, and they were included in this latter report. Although it was never published in the open literature, a copy of the report can be obtained from the author of this publication.

Finally this second report and another series of meetings lead to the analysis of similar sites on an international basis (Survey of Long-term Studies of Agricultural Ecosystems—International). In this case an automated database of ongoing research (such as the CRIS system) did not exist. I decided a literature search would not be a productive way to approach such a diverse onset of information particularly because

I was interested in not only what was going on but capability and interest as well. Particularly noteworthy in this regard was the developing Global Terrestrial Observing System (GTOS). It should be noted here that at this point (or shortly thereafter), the concept of SACTEMA was dropped in favor of the GTOS. The final report, therefore, was a bridging report between the SACTEMA efforts and the new GTOS activities.

Therefore, it was decided that this last report would be generated from a specific mail questionnaire sent to more than 350 locations around the world. The original list for these locations was developed from a review of three sets of information: *Agricultural Research Centers—A World Directory of Organizations and Programs* (Anon. 1993); *International Research Centers Director* (Picarelli 1992–1993); and the *Directory of Technical and Scientific Directories* (Anon. 1988). Many of these respondents were interested in working with GTOS. Also it was apparent from the information obtained in this mail survey that while the original intent was to survey agricultural research sites around the world, the end result was a survey of managed ecosystem long-term research efforts around the world. Therefore, the results were much more catholic in coverage than I had originally planned. This report also was never published in the open literature, but a copy can be obtained from the author of this publication.

It was this “Survey of Long Term Studies of Agricultural Ecosystems—International” that I felt had the most potential to provide much needed ancillary data to the EMAP effort and to benefit from a closer relationship with the EMAP program. It was assumed that those programs underway in the United States could be picked by other already existing methods.

## METHODS

In 1994 I sent a questionnaire to more than 350 organizations to see if they had long-term research efforts underway. I specifically asked if they had long-term studies underway that related to global change and global pollution issues. I was particularly interested in focusing this effort on managed ecosystems including agricultural and forested systems. The studies had to be long-term (defined as having operated longer than 25 years or intending to operate for 25 years or longer) and had to be testing hypotheses on human impacts related to global change, pollution, or land use issues. I also polled these researchers to see if they were interested in participating in the then proposed Global Terrestrial Observing System (GTOS). From the perspective of this report, we can assume that if they were interested in working with the GTOS, they would almost certainly be interested in sharing information and data with the US EPA EMAP effort.

I received 183 responses and of these more than 100 indicated that they met the simple criteria mentioned above and were also interested in the GTOS program. These 112 interested respondents were the ones polled in this current effort (see Table 1). I sent each of them a letter. A copy of the letter is shown in Figure 1. My intent was to determine if they were interested in working with the US EPA EMAP program and to see what kind of data-handling systems they had. In particular I was interested in whether they could access the World Wide Web.

Of the 112 letters sent, I received 43 completed questionnaires (38% return rate). I sent out one follow-up mailing (see Figures 2 and 3), but obtained few additional responses. Six of the respondents indicated no interest in the project.

## DISCUSSION

Table 1 presents brief summaries of the responses received in this survey. A total of 21 different countries responded, including locations in North America (excluding the U.S.) Europe, Asia, Africa, and South America. Given the responses, it can be assumed that there is a strong interest internationally in cooperating with the EMAP program. It is essential for the development of the EMAP program that this international component be encouraged. I further recommend that these research locations be contacted as the EMAP concept is refined.

September 1, 1995

Dear

Recently we communicated relative to your interest in possible participation in the developing Global Terrestrial Observing System (GTOS). In your reply letter to me you indicated that you were interested in possibly participating in this important new program. Perhaps by this time you have already received a rather detailed questionnaire on your ongoing research programs from Dr. Bucher-Wallin of the Swiss Federal Institute for Forest Snow and Landscape Research as a follow on to my original inquiry.

As you may know, the United States Environmental Protection Agency has initiated a very large environmental monitoring program called EMAP (Environmental Monitoring and Assessment Program). Because of my close affiliation with both the EMAP program as well as the developing GTOS program, the USEPA asked me to look into possible ways in which on-going environmental research (including agricultural and natural resources research) around the world could interface data with the USEPA EMAP program. The idea is eventually to facilitate a two-way exchange of data.

Our thinking at this time is that the simplest way might be to use Home Pages and the World Wide Web (WWW). However, to further develop this idea, we need to know a bit more about your data handling capabilities. It would be of great help to us if you could take a moment and provide us some simple information on the following questions.

1. Do you have automated data handling capabilities and if so, what type of equipment are you using?
2. What data handling software are you using? If a commercially available package, the name of the package is sufficient for now. If you have developed your own please indicate that but we don't need more details at this time.
3. Are you currently accessing the World Wide Web?

Again, I appreciate greatly your taking the time to reply. I believe that together we should be able to begin the development of an excellent data sharing system to the ultimate benefit of all of us concerned about the development and use of our natural resources on a global scale.

Sincerely,

G. Bruce Wiersma  
Director, Maine Agricultural and  
Forest Experiment Station

Figure 1.

November 17, 1995

Dear

I hope you have received the letter about on-going environmental research that I sent to you on September 1, 1995. Two months have passed and we still have not received your response which is very important to us in this research project.

Some of the wording in my initial letter may have been unclear. Your answers are important to me so I will try again to explain the questions in my initial letter. It would be a great help to us if you could take a moment and provide us with some simple information on the following questions:

1. Do you have computers to handle the research data and research records? If so, what type of equipment are you using? For example, IBM 386 PC, IBM 486 PC.

2. What software are you using? If a commercially available package, the name of the package is sufficient. For example, spread sheet (Lotus 1-2-3, Quattro Pro), SAS, SPSS etc. If you have developed your own, please indicate that but we don't need more details at this time.

3. Are you currently accessing the World Wide Web? WWW (World Wide Web), i.e. the World Wide Computer Net Works and Home Page, i.e. one of the channels of WWW which you may collect and communicate the information and data from your country to other countries. If so, could you provide us your Web address?

Again, I appreciate greatly your taking the time to reply. I believe that together we should be able to begin the development of an excellent data sharing system to the ultimate benefit of all of us concerned about the development and use of our natural resources on a global scale.

Sincerely,

G. Bruce Wiersma  
Director, Maine Agricultural and  
Forest Experiment Station

Figure 2.

November 17, 1995

Dear

Thank you very much for your response to my letter about on-going environmental research that I sent on September 1, 1995. In your letter, you said that you could not understand some of the wording in my letter. First of all, I want to apologize for the confusion. Your answers are very important to me, so I will try again to explain the questions as follows:

1. Do you use computers to handle the research data and research records? If so, what type of equipment are you using? For example, IBM 386 PC, IBM 486 PC.

2. What software are you using to manage and analyze data? If a commercially available package, the name of the package is sufficient for now; for example, Lotus 1-2-3, Quattro Pro, SAS, SPSS, etc. If you have developed your own, please indicate that but we don't need more details at this time.

3. Are you currently accessing the World Wide Web? WWW (World Wide Web), i.e. the World Wide Computer Net Works and Home Page, i.e. one of the channels of WWW which you may collect and communicate the information and data from your country to other countries. Would you give us your Web address?

Again, I appreciate greatly your taking the time to reply. I believe that together we should be able to begin the development of an excellent data sharing system to the ultimate benefit of all of us concerned about the development and use of our natural resources on a global scale.

Sincerely,

G. Bruce Wiersma  
Director, Maine Agricultural and  
Forest Experiment Station

Figure 3.

I learned through this survey that there is a great deal of variation in the hardware these different organizations use. A review of the table indicates that most locations used a PC-based system. The most common type of equipment was an IBM or (IBM clone) PC. Of those who responded to this question, most had 286-, 386-, or 486-based machines. A few had acquired the more advanced Pentium-based system.

A smaller number of respondents used a variety of work stations. Examples are VAX 3100, Micro Vax and Sun UNIX-based systems. Very few were using Macintosh systems. The names of other systems can be found in the individual tabular data.

### **Software**

I had anticipated that commercially produced software would be the norm for most respondents. This has indeed turned out to be the case, particularly for statistical analysis packages and data-handling systems (e.g., spreadsheets). A number of different statistical packages were reported, but the most commonly used system was SAS, with eight respondents indicating they used it. Other systems mentioned were SYSTAT, MINITAB, and GENSTAT.

Spreadsheet programs were even more restricted. Their use was restricted to three commercially available packages: Microsoft EXCEL, Quattro Pro, and Lotus 123. The most widely used software was EXCEL, and the least used was Lotus 123.

Although many sites used commercially available data management packages, there appeared to be an increase in use of more specialized data management programs. GIS management systems, however, were primarily of the commercially available varieties; mostly ARC INFO and its companion piece ARC VIEW. One organization reported using ERDAS for managing remotely sensed data. DBASE and similar database packages were also used by the stations/locations. More specialized software appeared to be related to specialized needs. Examples are a CRISP program designed for crop experiments, ARRMS for agricultural research management system, and FORESTMASTER. Many reporting stations indicated the use of and ability to manage GIS and G.P.S. data and systems, but did not specify the software they were using.

One of the more surprising results of this survey was that I expected that the easiest way to share data would be through the World Wide Web, but few sites had access to the WWW. Only 22 of the respondents indicated that they had the ability to access the WWW. This question was specifically asked in my letter of inquiry so it cannot be assumed to be simply the result of an oversight on the respondent's part. This lack of access has a significant impact on the ability of EPA to transmit data as originally intended. On the other hand, growth in access to WWW is very rapid and given time, many of these sites and locations may be brought on the WWW. No indication was given as to reasons for not being able to access the WWW.

Table 1. Summary of responses from organizations involved in the survey.

**Australia**

Organization: Agricultural Research and Advisory station  
 Glen Innes. PMB Glen INNES NSW 2370  
 Phone: (067) 30 1900  
 E-Mail: Crowthm@agric.nsw.gov.au.

Contact person: Margart Crowther, Technical Officer

Response:

1. computer system: ?  
scanners and hand held microcomputers
2. software:  
Spreadsheets: Excel & QuattroPro  
Statistical packages: S-Plus & Genstat statistical packages
3. having access to WWW, using E-Mail for communication and data exchange

**Belize**

Organization: Belize Center for Environmental Studies.  
 P.O. Box 666, #55 Eve Street  
 Belize City, Belize, C.A.  
 Tele: (501)2-45545/32348  
 Fax: (501)2-32347

Contact person: Delia Tillett, Geographic System Manager

Response:

1. somputer system: PC 486,HP715/80 workstation
2. software: GIS, GPS ArcVies for Windows
3. Now not accessing WWW

**Canada**

Organization: Agriculture & Agri-Food Canada  
 Research Branch  
 Box 10, Scott, Sask. SOK 4AO  
 Canada

Contact person: Stewart A. Brandt, Agronomist

Response:

1. computer system: IBM compatible PCs, IBM PC, Station PCs
2. software: AGri-Food Canada Network., MSTAT Version 4.0., QuattroPro 4.0
3. Not currently accessing WWW

Organization: Agri-Food Diversification Research Center  
 Unit 100 -101 Rout 100  
 Morden, Manitoba  
 R6M1Y5, Canada

Contact person: R.M.N. Kucey, Director

Response:

1. computer system: IBM PC and commercial database handling program
2. software: Agrobase, dBase IV, Excel, SAS
3. have access to the WWW but not using the data exchange

Organization: Northern Agriculture Research Center  
 P.O. Box 29. Beaverlodge, Alberta  
 Canada T0H0 C0  
 Phone (403) 354-2212

Contact person: P.F. Mills, Agrometeorologist

Response:

1. computer system: 20 datalogging equipment, PC and VAX
2. software: SAS, Genstat, DQMS, INSTAT, Lotus, dBase
3. have access to WWW

Table 1. Continued.

Organization: Gouvernement du Quebec  
Ministere de L'Agriculture des Pecheries et de L'Alimentation

Contact person: Michel Rompre, Agronome

Response:

1. computer system: IBM system, PC
2. software: QuattroPro
3. no access to WWW

Organization: Agri-Food Diversification Research Center  
Unit 100 - 101 Route 100  
Morden, Manitoba  
R6M 1Y5, Canada

Contact person: Campbell G. Davidson, Ph.D, Head

Response:

1. computer system: VAX 3100 as a server and network manager, PC 386, 486 and Pentium
2. software: WordPerfect, dBase IV, FoxPro, Excel, QuattroPro, SAS, AgroBase, M.C. Arboretum
3. have access to WWW: HTTP://RES.AGR.CA/

### China (Beijing)

Organization: Science and Technology Office  
Monitoring and Measurement  
Station of Resource and Environment  
China Academy of Agricultural Engineering Research and Planning  
Agricultural Exhibition Road, 10026  
Beijing, China  
Fax: 5005388  
Tel: 5003961

Contact person: Zhao Yue Long, Science and Technology Officer

Response:

1. computer system: Workstaion: Sun sparc20, Sun20 (no importing); Input device: digizer calcomp 9100AO; scanner: contex Fss 5200 AO; Output Calcomp 2036 AO, printer: HPDJ500.; IMB system PC
2. software: GIS; ARC/Inf 6.0 RS:ERmapper 5.0 Envi; ARMS; DBMS developed by ourselves on Foxbase.

Organization: Forest Ecology and Environment Institute  
Chinese Academy of Forestry, Beijing 10091  
P.R. China

Contact person: Deying Xu, Deputy Director

Response:

1. computer system: ?
2. software: Excel 5.0, Turbo Basic, Foxbase
3. have access to WWW (xudy@bepec2.ihep.ac.cn), but not using for data exchange now

### Chile

Organization: Institute de Investigaciones Agropecuarias  
Centro Regional de Investigacion La Platina  
Santa Rosa 11610, Parad. 33, La Pintana  
Tel: 5417223  
Fax: 5427667

Contact person: Daniel Claro M., Director CRI La Platina

Response:

1. computer system: IBM PC 286, 386, 486
2. software: Lotus 1-2-3; FoxPro
3. no access to WWW

Table 1. Continued.

**Cyprus**

Organization: Agricultural Research Institute  
 Ministry of Agriculture, Natural Resources and Environment  
 1516 Nicosia, P.O. Box. 2016  
 Cyprus  
 Tel: 357 2 305101  
 Fax: 357 2. 2316770  
 E-Mail: ari@athena.cc.ucy.ac.cy.

Contact person: A.P. Mavrogenis, Director

Response:

1. computer system: IBM PC
2. software: SAS
3. Soon will have access to WWW

**Finland**

Organization: Forest Research Institute  
 Metla, Unioninkatu 40 A  
 FIN-00170, Helsinki  
 Finland  
 Fax: 358 0 85 705 478

Contact person: Eljias Pohtila, Director General

Response:

1. computer system: area network (LAN), minicomputers (SUN, DEC)
2. software: CA-Ingres, Paradox, VAX/RMS
3. have access to WWW (<http://www.metla.fi>)

Organization: Agricultural Research Center  
 Data and Information Service  
 FIN-31600 Jokioinen  
 E-mail: jukka.ofversten@mtt.fi

Contact person: Jukka Ofversten, Head of Data and Information Services

Response:

1. computer system: VAX/VMS computer, 15 Unix Servers; PC 400-500; and Local network system developed by home country.
2. software: ORACLE, INGRES, TRIP; SAS; SPSS; ARCINFO for GIS, dNASEILL; dBase IV; AGROBASW; WP; Excel
3. have access to WWW (<http://www.mtt.fi>)

**France**

Organization: Office National des Forets  
 Technique et Commerciale  
 EPIC/RCS Paris B 662 043 116  
 Siege: 2, av. de Saint-Mande  
 75570 Paris Cedex France  
 Fax: 64 22 49 73.

Contact person: B. Roman-Amat,

Response:

1. computer system: IBM system PC hardware
2. software: Windows-environment; Excel 4.0; Word for Windows; Paradox
3. have access to WWW

**Ghana**

Organization: Water Resources Research Institute  
 Council for Science and Industrial Research.  
 P.O. Box M32. ACCRA  
 Ghana  
 E-Mail: WRRRI@Ghastinet.GN.APC.ORG  
 Tel: 233-21-775351  
 Fax: 233-21-777170

Contact person: Dr. A.T. Amuzu, Director

Table 1. Continued.

## Response:

1. computer system: IBM. PC.486/66 420 hard disk; 486/33; IBM PS/2, 50/60, PC 286
2. software: HYDATA: Hydrological Database; GRIPS: Hydrogeological Database; Raison: Water Quality Data Analysis; Spreadsheets: Lotus 1-2-3, QuattroPro
3. have no access to WWW at present

**Japan**

Organization: Hokkaido National Agricultural Experiment Station  
Office of the Research Coordination Section  
1, Hitsujigaoka Toyohira-Ku  
Sapporo, Japan  
Fax: 81-11-859-2178

Contact person: Akio Yoshino, Chief of Research Coordination Section

## Response:

1. computer system: WS (UNIX-BSD, SYSTEMV), PC (IBM PC/AT compatible 386, 486, Pentium), Macintosh (68030, 68040, PowerPc).
2. software: Lotus 1-2-3, Microsoft Excel, Microsoft ACCES, Microsoft SQLserver (sybase), INFORMIX (UNIX), SAS (UNIX)
3. have access to WWW and using a lot for data exchanges.

**India**

Organization: Council of Scientific & Industrial Research  
Regional Research Laboratory  
Trivandrum - 695 019  
India

Contact person: C.S.P. Iyer, Head

## Response:

1. computer system: PC
2. software: Methane Measurements, FoxPro
3. have access to WWW

**Mexico**

Organization: Centro Investigacion Y de Estudios Auanzados del I.P.N. Unidad Irapuato  
Departamento de Inenieria Genetica de Plantas  
Km.9.6 del Libramiento Norte, Carretera Iraputo-Leon  
Apdo. Postal 629  
Irapuato, Gto., C.P. 36500  
Mexico  
Fax: (+52-462)458-46; 45849

Contact person: Ariel Alvarez-Morales, Principal Researcher

## Response:

1. computer system: ?
2. software: ?
3. have access to WWW

**New Zealand**

Organization: New Zealand Institute for Crop & Food Research Limited, A crown Research Institute  
Crop & Food Research, Private Bag 4704,  
Christchurch New Zealand  
Tel: (64) 3 325 6400  
Fax: (64) 3 325 2074

Contact person: Dr. Peter Jamieson

## Response:

1. computer system: ?
2. software: Capbell Cr10s, QuattroPro
3. have access to WWW

Organization: New Zealand Forest Research Institute  
P.O. Box 465 Rangiora  
Tel: +64 (03) 313-8053

Table 1. Continued.

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	Fax: +64 (03) 313-8051
Contact person:	Piers Maclaren
Response:	<ol style="list-style-type: none"> <li>1. computer system: IBM 486 PC, Pentiums</li> <li>2. software: Microsoft Excel, SAS, Freelance Graphics, Word for Windows; Specialist software: STANDPARK, MARVL, FORESTMASTER, FOLPI, AEM, MicroPSP, and AUTOSAW, DRYSPEC</li> <li>3. have access to WWW</li> </ol>
<b>Norway</b>	
Organization:	Plante Forsk Norsk institt for planteforskning 2858 Kapp, Verdipoving, Naringsutvikling Norway Fax: 61 16 1747
Contact person:	Ragnar Eltun
Response:	<ol style="list-style-type: none"> <li>1. computer system: ?</li> <li>2. software: SAS</li> <li>3. no access to WWW</li> </ol>
<b>Pakistan</b>	
Organization:	Atomic Energy, Agricultural Research Center Tando Jam Pakistan Fax: 02233-284 Tel: 0221-880868-02233 750
Contact person:	Dr. Khushnood A. Siddiqui, Director
Response:	<ol style="list-style-type: none"> <li>1. computer system: IBM system 640Kb, 310Kb</li> <li>2. software: MSTAT, commercial package: Methods (provided by Michigan State University)</li> <li>3. no access to WWW now</li> </ol>
<b>Poland</b>	
Organization:	Institute Uprawy, Nawozenia I Gleboznawstwa Institute of Soil Science and Plant Cultivation 24-100 Pulawy, Poland UL. Czartoryskich 8 Fax: (48-811)86547
Contact person:	Seweryn Kukula, Director General
Response:	<ol style="list-style-type: none"> <li>1. computer system: UNIX SUN Station with ARC INFO system; PC MAP INFO</li> <li>2. software: FoxPro</li> <li>3. have access to WWW (Sybilla)</li> </ol>
<b>Portugal</b>	
Organization:	Instituto de Investigacao Cientifical Tropical Rua da Junqueira 86 - 1300 Lisboa Portugal Fax: 351 1 3631460
Contact person:	Antonio Reffega, Vice President
Response:	<ol style="list-style-type: none"> <li>1. computer system: InterPro 6240, 48 MB, Monitor 27",15B</li> <li>2. software: Msiatiojn: Bundled sys., MicroStation I/RAS B.-- Terrain Modeler; MCE/SX -- Oracle Relational Database Manage., MSI.-- Oracle SQL* Plus Database Utility., ISI-2 -- RIS UNIX Oracle Data Servers</li> <li>3. no access to WWW</li> </ol>

Table 1. Continued.

**Russia**

Organization: Russian Academy of Agricultural Sciences  
 The All-Russia Scientific Research Institute of Agroforestry Amelloration  
 Vnialmi 39 Krasnopresnenskaya Str.  
 Fax: (011-7)(844-2) 43-34-72

Contact person: Ye S. Pavlovsky, Director Of VNIALML

Response:

1. computer system: ?

**South Africa**

Organization: Jonkershoek Forestry Research Center  
 Division of Forest Science and Technology  
 Private Bag X5011 Stellenbosch 7599  
 South Africa  
 Fax: (021) 889 1130  
 E-Mail: bvwilgen@forjnk.csir.co.za)

Contact person: B.W. Wilgen

Response:

1. computer system: IBM PC 80-486
2. software: ACSYS: data management system
3. have access to WWW

**Switzerland**

Organization: Swiss Federal Institute for Forest, Snow and Landscape Research.  
 Zuercherstrasse 111, CH-8903 Birmensdorf  
 Switzerland  
 Fax:(+41) 1739 2215

Contact person: Dr. John L. Innes

Response:

1. computer system: PC, Macs, SUN Workstation
2. software: Excel, Splus, SAS, ARC\_INFO
3. have access to WWW

**United Kingdom**

Organization: Institute of Terrestrial Ecology  
 Merlewood Research Station  
 Windermere Road, Grange-Over-Sands  
 Cumbria LA11 6JU  
 United Kingdom  
 Fax: (015395)34705  
 E-Mail: MLANE@lte.ac.UK.

Contact person: Mandy Lane, Database Manager

Response:

1. computer: Novell PC network, most 486s and Pentiums linked to Unix LAN, 128K WAN link
2. software: Oracle RDBMS on a Dedicated Unix server; Arc/Info.(as its primary software), 2X 64K WAN MS Access, GQL, SAS, SYSTAT, Excel
3. have access to WWW (URL <http://www.nmw.ac.uk/ecn>).

Organization: Rowett Research Institute  
 Greenburn Road, Scotland, U.K.  
 Tel: +44(0) 1224 712751

Contact person: Roger Stansfield

Response:

1. computer: IBM compatible PCs Sun Workstation. The network is park of Internet.
2. software: common software and Oracle (developed by its own)
3. have access to WWW (<http://www.rri.sari.ac.uk>)

Table 1. Continued.

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Organization: IACR-Rothamsted  
 Integrated Approach to Crop Research  
 Harpenden, Hertfordshire AL5 2JQ  
 Fax: (01582) 760981  
 E-Mail: PESMITH@BBSRC.AC.UK.

Contact person: Pete Smith

Response:

1. computer system: PCs
2. software: ERA (developed by its own system) Oracle-based database system, ASCII, CSV
3. have access to WWW (URL: <http://yacorba.res.bbsrc.ac.uk/cgi-bin>)

Organization: Medalus Project Office  
 20a, High Street  
 THATCHAM, Berkshire  
 RG13 4JD, UK  
 Fax: (44) 1635 876015

Contact person: Nichola Geeson, Project Manager

Response:

1. computer system:
2. software: MEDALUS (1991-2) on CDROM
3. have no access to WWW

**Zimbabwe**

Organization: Dept of Research and Specialist Services  
 Ministry of Lands, Agriculture and Water Development  
 Coffee Research Institute  
 P.O. Box 61  
 Chiping, Zimbabwe

Contact person: Dumosani Kutwayo, Acting Head of Institute

Response:

1. computer system: ?
2. software: dBase IV
3. have no access to WWW

Organization: Forest Extension Services  
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Response:

1. computer system
2. software: ERDAS;ARC/INFO, VEGRIS (vegetation resources information system, dBase III and IV, MINITAB, SYSTAT, NORTON COMMANDER, and home grown FRC analysis system
3. have no access to WWW yet

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