

VOLUME II

**Observations and Recommendations of CDIE's TDY Team
for Enhanced Information Technologies at the Natural Resource
Management Program Secretariat (NRM II)**

**A Report Submitted to
USAID/Jakarta
October 25, 1996**

Submitted by
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DRAFT

I. INFORMATION TECHNOLOGY TDY OBJECTIVE

The Center for Development Information and Evaluation (CDIE) in AID/W was asked by USAID/Jakarta to provide the Mission with a set of recommendations to enable the new Natural Resource Management Program *Secretariat* (NRM II) to establish an effective information communications system.

One critical role of the *Secretariat* is to fully support program implementation by providing a "nexus" to facilitate information sharing among all interested U.S., international and Indonesian environmental institutions and organizations (see Figure 1). Effective information sharing was deemed essential by the Mission as a first step to successfully carrying out additional key *Secretariat* functions: identifying activities to support their environmental strategic objective (SO3), coordinating technical assistance, developing results packages, drafting implementation plans, and responding to other reporting, programming, and accountability demands.

Two separate but closely related activities--communication and information sharing--by all USAID's developmental partners were also seen by the Mission as an essential way to facilitate a broad collaborative partnership among USAID's environmental stakeholders as well as a means to foster the long-term sustainability of protecting Indonesia's rich, but threatened, natural resource base.

II. NATURAL RESOURCE MANAGEMENT II

Natural Resources Management II (NRM II), the principal environmental program of USAID/Jakarta, supports achievement of the mission's environmental strategic objective (SO3)--decentralized and strengthened natural resource management.

The goal of NRM II is to enhance natural resource management by encouraging a broad range of participation by civic institutions (local communities, private entities, and non-government organizations) in collaboration with the Indonesian Government to strengthen natural resource policy implementation, planning, and management (see: USAID/ Indonesia, Strategic Objective 3, 6/96).

■ COMMUNICATION

By design, NRM II will (1) engage a wide number of developmental partners here and abroad, (2) test a variety of innovative field-based approaches to community-based natural resource management, and (3) conduct timely monitoring, evaluation and performance reviews. NRM II has also built into its implementation plan the ability to revise its technical approaches based on rapid feedback from field experimentation and "lessons learned". To achieve these goals, it is imperative that NRM II-related information flow **swiftly, accurately, and transparently** among all partners, program implementers, and development customers.

■ INFORMATION SHARING

As noted in the Funding Approval Document (FAD), there is a considerable wealth of information on the Indonesian natural resource base--especially relevant community-based NRM approaches--that is not now being widely shared. Relevant community-based NRM-management experience from elsewhere in the developing world--like the Philippines--is also not widely shared in Indonesia.

With these two concerns in mind, USAID/Jakarta has emphasized the need to consider, in advance of the NRM II institutional contractor award, recommendations for an effective and sustainable communications and information sharing system--managed, at least initially, by the SO3 *Secretariat*.

III. IT SURVEYS--Types and Issues

■ INTERNET SERVICE PROVIDERS (ISPs)

As requested in the Statement of Work (SOW), the CDIE Information Technology (IT) TDY Team conducted brief Jakarta-based interviews with ISPs and NRM II developmental partners. However, after reviewing available documentation (Blumberg 1995, Nusanet 1996) and following extensive discussions with ARD's on-site IT consultant (Appendix A), the TDY Team concluded that in-depth ISP interviews were not necessary at this time.

There are now over 30 ISP providers in Indonesia--and the number is growing rapidly. While there are some serious service gaps (not yet available everywhere), limits to full access (restricted number of ports for dial-in service), modem speeds limited to 9600 or even 2400 baud, and other hardware and software constraints--we judge that these problems will not impede effective communication and information sharing for NRM II. Further, some serious IT limitations, such as poor phone connections, high setup and installation costs, and limited access for island-specific locations, are well beyond USAID/Jakarta's manageable interests. But even these "stickier" problems are slowly being solved by the Indonesians and their telecom partners with the advent of a fiber-optic backbone. In addition, the national post office is developing an email system which should also reduce costs and facilitate access. So at best, many of the current IT problems, including cost, will be "self-correcting" as the demand for Internet increases and suppliers compete to meet customer needs.

■ NRM II DEVELOPMENT PARTNERS

Over the course of the 2-week IT TDY, the team met mainly in Jakarta but also in neighboring Bogor with 12 developmental partners to assess their IT needs (Appendix B). The "purposive sample" for IT visits, which was chosen mainly due to logistical considerations, included at least three organizations from each of the major types of environmental partners identified by the Mission--Indonesian NGOs, Indonesian university and government entities such as the Ministry of Environment, and an "Other" category which

included US universities (University of Rhode Island) and International Centers (CIFOR). It should be noted that the Indonesian NGOs visited were mainly Jakarta- or Bogor-based (Walhi, Pelangi, Latin). We did not include other developmental partners from the private sector or SO3 implementing agents like USAID's Global Center for the Environment or the Biodiversity Support Program (BSP).

■ OUTSTANDING ISSUES

Our initial analysis is that for the most part the private sector and SO3 implementers have adequate IT resources for the purposes of NRM II. We did not, however, interview respondents from rural sites outside Jakarta. Discussions with their Jakarta-based counterparts, where appropriate, revealed that most rural-based organizations have pressing IT demands but e-mail contact is mostly, but not exclusively, in place and operational. Finally, we did not interview provincial and local Indonesian government authorities and we are, frankly, uncertain about their communications and information-sharing needs. Anecdotal reports indicate that IT information sharing (data, reports, etc.) capabilities are quite limited.

IV. IT "INDEX" AND PROFILE

■ SURVEY INSTRUMENT

The IT Team conducted approximately 12 one-hour interviews in two phases. The first phase covered the reason for our visit and then broadly addressed the organization's current communications and information-sharing capabilities (Phase 1). In the next phase we focused on IT specifics in three areas--information sharing, equipment (hardware and software), and "other" which included training, data capabilities, and support/motivation for IT. After each survey the team met and "scored" the organization based on a crude Information Technology Index (ITI).

■ IT INDEX (ITI)

The ITI was crafted in the field to provide a quick but structured way to cover all of the major issues for assessing an organization's current IT capabilities and future needs. A glossary covering all the major variables in the index is provided in Appendix C.

■ IT PROFILE

The Team was struck by the wide discrepancies in the IT capabilities of Jakarta-based organizations (Figure 1). Some, such as Pelangi, SDNP and CIFOR, had busy Web sites (Appendix D), while similarly located organizations described themselves as low-end IT users -- they depend almost exclusively on more traditional means like fax, phone, and e-mail for communication and hardcopy document transfer for information sharing.

Figure 1 displays the twelve organizations interviewed arrayed by their ITI scores and grouped according to their organizational type. It would appear that there are a number of important Indonesian NGOs who could benefit from increased use of IT. At the same time, a number of mid-range IT users could also benefit from some modest IT upgrades. Discussion with a broad range of organizations suggest that many rural NGOs and some provincial government entities would fall into the lowest quartile using the ITI.

V. IT RECOMMENDATIONS

At this time (October 1996), NRM is winding down and plans are underway for drafting an SOW for the NRM II *Secretariat*. The following recommendations address options for USAID/Jakarta to consider for the current NRM *Secretariat* [CURRENT] and for positioning the upcoming *Secretariat* [NEW] in order for SO3 to maintain a IT leadership role.

(1) Hire an IT Specialist to maintain momentum

IT is a new developmental tool for many in a time of declining development dollars and increased mission workloads. Yet IT is critical, so to keep the IT momentum going we recommend you consider either hiring a short-term IT consultant or identifying a staff member to become the "IT Champion". Skills should include technical knowledge of networks and the various Internet tools software packages, strong hardware and software problem-solving skills, an ability to deal with the personnel training issues as well as each organization's technical requirements, and experience working with local groups in Indonesia. The consultant should report directly to the SO3 Team leader.

CURRENT: Take action within the next 2-3 months

NEW: IT specialist to serve as until Secretariat is up and running

(2) Draft IT requirements into new SOW - Invest time now

We understand that the SOW for the new SO3 Secretariat procurement is currently underway and will be awarded over the next few months. We strongly recommend that the SOW clarify the role that USAID/Jakarta envisions for IT, tasks to be performed, skills required of personnel, complete IT deadlines, and proposed IT implementation plan with benchmarks.

CURRENT: Take action as soon as practical

NEW: No action required

(3) Clarify IT role - Give it more prominence

IT is an essential "ingredient" for making development assistance work effectively and for sustaining what we have accomplished along with our developmental partners in host countries. In the past IT was seen as a luxury but increasingly--with the high costs of maintaining overseas missions--IT has really become a necessity for most donor

organizations. The *Secretariat* has a number of functions but it is not yet clear what priority has been placed on IT. We recommend that IT be one of the *Secretariat's* primary roles. The *Secretariat* should be the one place where information about NRM II is electronically available and where data from all implementors can be accessed. In turn, USAID/Jakarta will be in a position to make informed decisions (performance, programming, etc.) at all management levels (Mission Director, SO3 Team leaders, RP Team Managers). Further, we recommend that the *Secretariat* operate and maintain one of the IT Information sharing "vehicles" outlined in Section X of this report.

CURRENT: Take action now to support Recommendation #2

NEW: Revise annually

(4) Require IT plans - Make the plan routine

As we understand it, three implementors are already operating under the NRM II umbrella (IRI, BCN, Pelangi) and one additional implementer--the SO3 Secretariat plus forestry--is still to be awarded. We recommend that all implementors be asked to submit an IT plan that will outline how they will communicate with the new Secretariat and how they will share information. Make the submission and discussion of the IT plan routine business and the finalization of IT plans subject to Secretariat and USAID/Jakarta approval.

CURRENT: Require IT plans for existing partners as soon as practical

NEW: As appropriate

(5) Reengineering customer surveys - Assess needs annually

USAID/Jakarta should consider including a series of questions on their annual "customer survey" which address the IT needs and capabilities of all SO3 developmental partners. We have developed a very rough Information Technology Index (ITI) but this will need further pilot testing and validation. CIFOR has a more extensive IT survey, elements of which the Mission may want to consider in a reduced version.

CURRENT: No action needed now

NEW: Secretariat to submit questions after contract award

(6) Complete IT surveys at non-Jakarta sites

The CDIE IT Team was directed not to survey provincial Indonesian government entities or rural NGOs at this time, but the Mission may want to conduct a few more non-Jakarta interviews to round out the IT sampling frame. This recommendation should be weighed against costs and other staffing tradeoffs. The team feels least strongly about this recommendation.

CURRENT: As appropriate

NEW: Every other year

(7) Support an IT workshop - Assess the need for "standards"

IT is becoming more integral to sustainable development than anyone realized just a few years ago. SO3 has taken the lead in advancing IT and may want to consider sponsoring an IT workshop. [CIFOR is planning such a workshop the week of October 28th and USAID, if possible, should attend. The IT Workshop agenda is in Appendix E]. One of the objectives of this workshop would be to explore the need for a common set of IT communication and data sharing software packages. A few responders to our ITI survey indicated that this was a major problem. However, other responders voiced no concerns, and even some resistance, to software standardization. At the very least, ways to optimize communication and enhance information sharing should be explored and decisions reached.

CURRENT: As soon as practical but see Recommendation #1 for skills required of IT Workshop organizer

NEW: As needed.

(8) Consider IT incentives - Filling gaps / strengthening links

Our surveys of 12 environmental development partners revealed a wide range of IT skills as illustrated in Figure 1--ranging from so-called low-level users to high-end IT users. USAID/Jakarta may want to consider modest subsidies to those low-end users deemed important partners (rural Indonesian NGOs, provincial entities?) for whom a modest subsidy would yield big IT returns. No survey responders indicated that IT was more than 3% of their entire budget--and most indicated a much lower cost. Some low-cost subsidy options might be: (a) in-kind technical assistance to build or run an electronic bulletin board; (b) funds for modems; or (c) offsets for subscriber fees.

CURRENT: After surveying outstanding IT users and after IT targets (NGOs, rural GOI entities, etc.) have been set by IT consultant--Recommendation #1.

NEW: As appropriate

(9) Ensure the development of a seamless email system for all partners

Because email is the lowest common denominator of Internet communications, it is recommended that a fully-functioning email connection be available for all partners. Wherever possible, restrictions such as limited time access, low bandwidths, etc. should be corrected. The email connection should allow for the ease of transfer of text, data, and graphics between partners. Small subsidies of modem purchases and access to ISPs might give the partners the extra help they need to establish a reliable email connection. Once email connectivity is enhanced and more fully developed, improving the institutional use of email as a communications tool would be the next step. Once all partners have email access, then more advanced communications tools can be implemented (Appendix F).

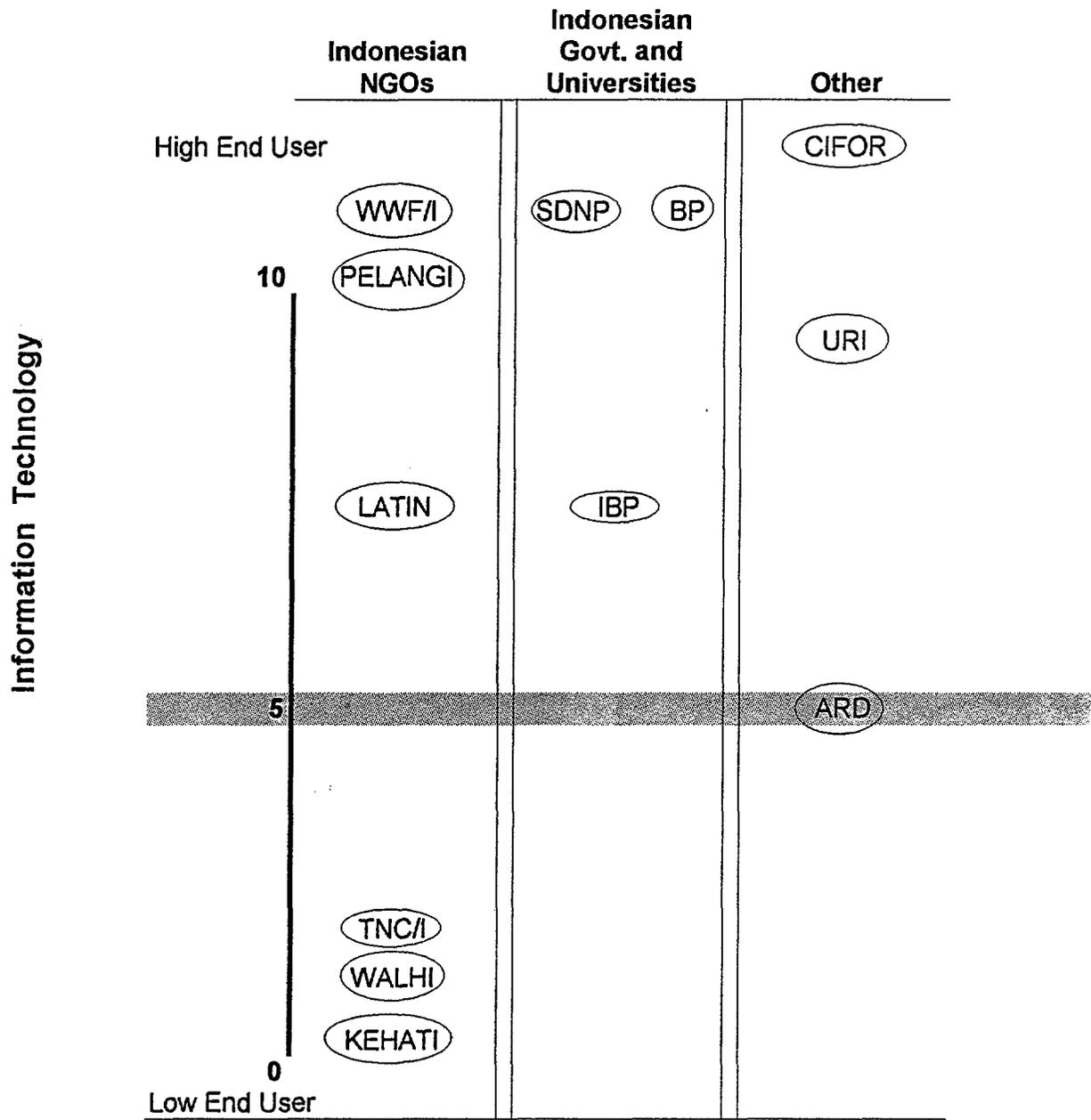
CURRENT: Take action within next 2-3 months

NEW: Assess email access and use by partners and address needs as required

VI. BIBLIOGRAPHY

- Blumberg, Robert. Indonesia On-Line: Better Decision-Making for Sustainable Development through Electronic Networking.** Jakarta: U.S. Agency for International Development. June 1995.
- Sari, Omar and Tedjabayu. NusaNet Survey Report: Sustainability and Future Enhancements.** Jakarta: International NGO Forum on Indonesian Development, in collaboration with the U.S. Agency for International Development. April 7-June 14, 1996.
- U.S. Agency for International Development. USAID/Indonesia SO3: Funding Approval Document for Natural Resources Management Program (NRM II).** Jakarta: U.S. Agency for International Development. June 1996.

Figure 1



**Notes taken during a meeting with Bruce Johnston
Monday, Oct. 14, 1-2:30pm**

Internet Service Providers (ISPs)

According to Mr. Johnston, there were no ISPs in Indonesia 3 years ago, and now there are 20-30 nationwide. However, service is poor and access a problem. There are not enough ports, for example, to deal with users dialing in, and the companies do not currently buy enough bandwidth. People are frequently kicked off the system due to inadequate hardware support and bandwidth.

The postal office in Indonesia is developing email connectivity in all their offices, and the World Bank is spending \$400 million to help build a backbone in the country.

The PUSATA network, run by the Ministry of Industry and Trade, is a good online provider. According to Mr. Johnston, they are the best in town. However, they do not use software like Netscape but rather use shareware which is not as reliable. Also, this ISP does not service the private sector. Their effort, however, might appeal to NGOs, who might be interested in using this network.

Connectivity

When using 9600 baud rates, there is 60-70% reliability; at 2400 baud, access to providers is pretty reliable but obviously very slow and inadequate if one is seeking to use the web. To have a 28.8K leased line, the cost is around \$1,000-\$2,000 per month. For an ISDN line, one would pay around \$3,000 for installation, and around \$3,000 per month for access.

Telephony is completely unregulated in Indonesia. Mobile cellular phones are being promoted (cheaper than installing phone lines), but for data exchange this is not feasible.

If one considered the connection from the user to the provider to the web sites, the problem is not the web sites. The problem is not the provider. The problem is the phone connection between the user and the provider.

Data

Mr. Johnston said that the companies with which he works cannot send data by modem, unless the data are sent as uuencoded attachments. Character-based files, and tables, can be sent easily by email. The problem is really the graphics on the World Wide Web (WWW).

As organizations increase their use of WWW pages for data and document dissemination, the use of advanced graphics and other web features also increases. However, this increasingly shuts out users in countries like Indonesia who cannot afford to sit and wait for graphics to download, or perhaps do not even have access to anything but email, file transfer protocol, telnet, and maybe a text-based web

browser.

The government's Bureau of Statistics collects 90% of the government data and disseminates it to other agencies at cost. It is a nationwide network funded in part by the Japanese Government (\$20M). All the data are stored in SAS, but one record might be 12MB long. This means that there are no PC-level software packages that allow one to translate that data into something more user-friendly. The positive aspect of this bureau is that it is apolitical. However, the issue of the size of the records, as well as the data costs, makes accessing this data difficult for NGOs and others.

There is no real time series gathered and stored in a database. Once a data set is used to produce an annual report, the data tend to be stored on a diskette which is then shelved.

The transfer of data from the government is very difficult. Government agencies are reluctant to disseminate data, particularly to NGOs. Some of the fees charged for the data are prohibitive. Even if required to disseminate essentially public data by law, ministries will not give data to NGOs. Now, this is not such a problem in the areas of economic, finance, and urban development.

Suggestions

Subsidize NGO data transmission

Indicators at the programmatic level: Considerable technical assistance will need to be focused on training the NGOs and local people. They do not know how to collect data, and need to be trained on what indicators are useful, etc. This technical assistance will need to be budgeted in the projects. Also, Mr. Johnston indicated that NGOs will resist gathering data on indicators, because this is not seen as their role or job.

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MITE
INFORMATION TECHNOLOGY INDEX
Variable Glossary

I. Information Sharing

- Access:** The ability to send and receive information electronically
- Bulletin Board:** The ability to run a bulletin board system on a server, and the corresponding ability to provide adequate modem access to that bulletin board
- Web Page:** The resident ability to operate and maintain a web page, ranging from the updating of pages stored on another organization's server to the ability to run a web site on a server

II. Necessary Equipment

- Hardware:** Acquisition and utilization of equipment (computers, modems, etc.) needed for successful information transfer
- Software:** Ability to acquire and effectively utilize software packages designed to facilitate information exchange

III. Other

- Skill Base:** Degree to which resident staff have the necessary skill base and training to support information technology and exchange
- IT Motivation:** Level of understanding and support for improving and maintaining the organization's information technology systems, and enthusiasm for IT overall
- Dataset Availability:** Current capacity to not only store and maintain datasets (text, files, etc.) electronically, but provide electronic access to those datasets



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- A new link to the USDA/CIESTN is now available on the relevant links section. (Jul 31, 96)
- CIFORNews Number 11 is now online. (Jul 24, 96)
- Criteria and Indicator (C&I) Updates is now online. (Jul 17, 96)
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 - Australia's Forests
 - Canadian Forests
 - International Registration of Forests
 - Swedish University of Agricultural Science
- TROPIS (Tree Growth and Permanent Plot Information System) is now online.

For more information about CIFOR: cifor@cgnet.com
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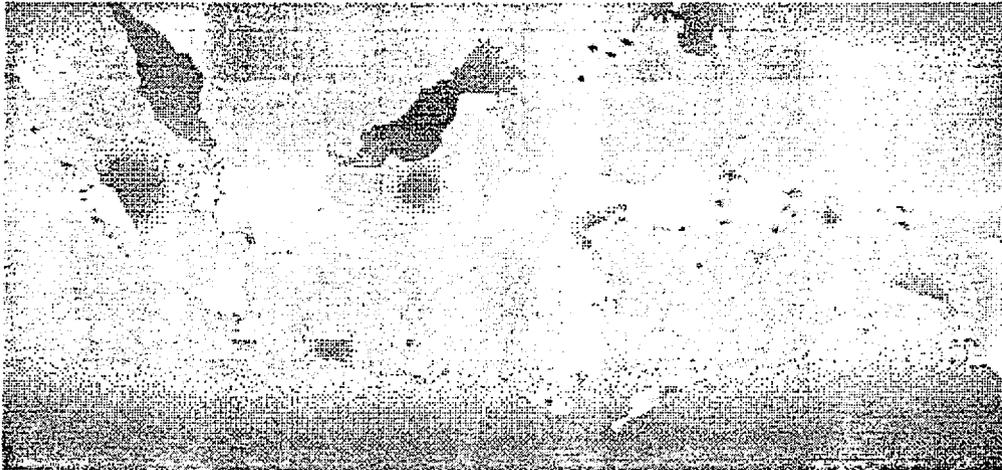
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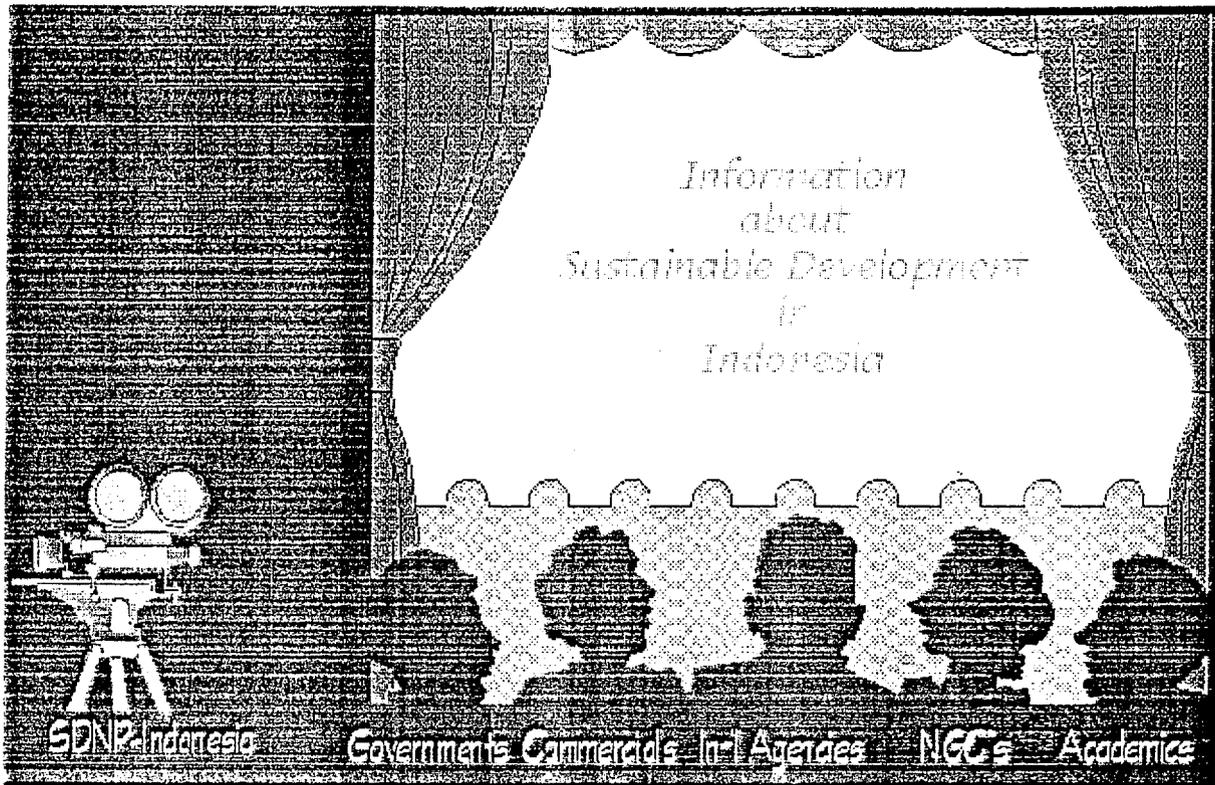


Halo Apa Khabar.....
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The Indonesian Forum for Environment was founded on October 15, 1980 in response to the need for a forum for Indonesian non- governmental organization (NGOs) concerned by the detrimental ecological impacts of development. Now hundreds of NGOs from throughout Indonesia are actively involved in WALHI's Regional Forum and attend triennial National Environmental Meetings.

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Sustainable Development Networking Programme was initiated by United Nations Development Programme (UNDP). Its aim is to help developing countries in implementing Agenda 21 by providing acces to Sustainable Development information.

In Indonesian, stakeholders involved in SDNP activities include UNDP representative international agencies, Office of the State Minister for Environment, representing government, the Indonesian Forum on Environment (WALHI), representing NGO's; the Computer Science Center of the University of Indonesia and Bandung Institute of Technology representing higher education institution; and the Indonesian Environmental Management and Information Center (IEMIC) representing the business sector.

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**DISCUSSION FORUM ON INFORMATION SERVICES
IN THE ASIA-PACIFIC
30 October - 1 November 1996
Bogor, Indonesia**

- AGENDA -

TUESDAY, 29 October

18:00 - 19:00h Welcome Reception - New Mirah Hotel

WEDNESDAY, 30 October

08:30 - 09:30h Opening Session, Introduction of Participants, Organisational Matters

09:30 - 10:00h Coffee

Session 1: Definition of Needs and Opportunities

10:00 - 10:45h Presentation of Survey Results (Michael Ibach, CIFOR)

10:45 - 11:15h **Keynote Paper No. 1: The Future of Scientific Publishing and Information in the Asia-Pacific** (Francis Ng, CIFOR)

11:15 - 12:30h **Working Group Session No. 1: Analysis of Needs and Opportunities**
For all working group sessions: three working groups, each with leader & rapporteur

12:30 - 14:00h Lunch

Session 2: Prioritising of needs and opportunities

14:00 - 14:45h Presentation of Results of Working Group Session No. 1

14:45 - 15:00h Synthesis of Results of Working Group Session No. 1

15:00 - 15:30h **Keynote Paper No. 2: Institutional Factors of Forestry Information Services in Asia-Pacific** (Author t.b.a.)

15:30 - 16:00h Coffee

16:00 - 17:00h **Working Group Session No. 2: Priority Issues**

19:00h Dinner

THURSDAY, 31 October

08:30 - 09:15h Presentation of Results of Working Group Session No. 2

09:15 - 09:45h Summary of Results of Working Group Session No. 2 and agreed List on Priorities

Session 3: Development of Action Plans for high-priority Needs and Opportunities

- 09:45 - 10:15h Keynote Paper No. 3: Information Services at IUFRO and the Latin American Experience (Heinrich Schmutzenhofer, IUFRO)
- 10:15 - 10:45h Coffee
- 10:45h - 12:30h Working Group Session No. 3: Identification of action plans to address high-priority areas
- 12:30 - 14:00h Lunch
- 14:00 - 14:30h Joint Session: Discussion of Preliminary Results of Working Group Session No. 3
- 14:30 - 15:30h Working Group Session No. 3 (continued): Refinement of action plans to address high-priority areas
- 15:30 - 16:00h Coffee
- 16:00 - 17:00 Joint Session: Synthesis of Action Plans
- 19:00h Dinner

FRIDAY, 01 November

Session 4: Sources of Information

- 08:30h - 09:00h Keynote Paper No. 4: Sources of Forestry Information (Ken Becker, CAB International)
- 09:00h - 10:00h Demonstration - CAB International
- 10:00 - 10:30h Coffee
- 10:30h - 11:30h Demonstration (continued) - CAB International
- 11:30 - 14:00h Lunch
- 14:00 - 15:30h **Session 5: Operational Aspects of Action Plans**
(Assignments of Responsibilities, Financing Requirements, Milestones, Future Events)
- 15:30 - 16:00h Coffee
- 16:00 - 17:00h Closing Session
- 19:00h Farewell Dinner at Bogor Lakeside Restaurant

SATURDAY , 02 November

Post-Meeting Event:

Seminar on Advances in Information Technology

This is an informal seminar; topics will cover CD-ROM technology and the Internet. Participants will get hands-on experience using facilities at CIFOR.

09:00h - 10:00h Introduction

10:00 - 10:30h Coffee

10:30 - 12:30h Demonstrations

Afternoon: free

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IT OPTIONS

BULLETIN BOARD SYSTEMS

One low-technology option for increasing communications is the establishment of a bulletin board system (BBS). A BBS can be set up on a hard drive with a modem, and would facilitate the dissemination of information between SO3 developmental partners with a wide range of information technology capabilities. Users would need a modem, to which they would dial the phone number of the BBS modem. The connection does not require high baud rates.

As with any information source, the information needs to be maintained and constantly updated to remain relevant to users. Also, such a system is useful to those groups who dial a local number to access the BBS, but as soon as groups across a country or in different countries seek to access the BBS, they face long distance and international phone charges. Here is where a slow baud rate on their modem might lengthen their phone call and increase their telecommunications costs. The use of a toll-free number might also reduce such costs.

INTERNET

Email and Enhanced E-mail

Email is the most widely used method of communication over the Internet, and is the least technology-intensive tool. Individual users and organizations either dial into their own local email system using a modem, or have access set up on their organization's network (which eliminates the need for individual users to use modems). With email, information can be disseminated in the email or as attachments. Compared to a BBS, which is usually separate from the Internet, email is a tool that can be enhanced over time by advanced technology such as World Wide Web and gophers (see below) as the users increase their technological capabilities and phone lines improve.

The only problem with using email as the primary dissemination tool is that each group uses a different email package which would require preparatory work to ensure the accurate transmission and translation of email attachments (see: Recommendation #4). Also, as distribution lists grow, the time commitment to managing distribution lists increases. One approach would be to use a listserv.

Listservs

A listserv is simply a distribution list to a group of email addresses located anywhere over Internet. There is a main listserv address to which all correspondence is emailed. At the physical site where the listserv is managed, the correspondence is automatically forwarded to

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list members (or is screened by the manager of the listserv for relevancy and then forwarded to list members). This tool is particularly useful when emailing newsletters and other text-based information. As an email distribution list grows, a listserv becomes a viable and perhaps necessary option.

To run or manage a listserv, a server is required. If the topic of the listserv appeals to universities or other groups with large capacity servers, they might be willing to store the listserv on their server. This eliminates the need to purchase a server. Management of the listserv is also required so as to maintain its relevancy. The difference between a listserv and an email distribution list is the option to automate distribution of information by all users to all listserv members. With email, the primary effort involves receiving emails and forwarding information to the distribution list. With listservs, the primary effort (assuming that someone else is storing the listserv on their server) is the screening of listserv messages.

Gopher

A gopher is a menu-driven, text-based directory accessible over the Internet. It could be a mirror of a BBS (which would give users with advanced technological capabilities the option of accessing information over Internet rather than through a BBS). Gophers are lower on the technology side than Web pages due to the lack of graphics and other more advanced features. Another advantage in using a gopher is the option of using email as the access method. A simple email message sent to the gopher address will generate a response giving the gopher menu. A second email is then sent requesting a submenu or file which is then emailed back to the user. Although time consuming, this enables a wide range of users to access information.

All users need at least Internet email access, and someone must maintain the gopher, update the information, and manage it on a server.

Home Page

A home page is accessible through Windows Internet browsers such as Netscape and Microsoft Explorer, and allows for more than just text. Graphics, video, text and interactive requests are all possible with web pages. This allows for improved dissemination of information in a nicer structure than simple menus. It is the most advanced Internet tool and requires high baud rates (ideally a modem operating at 14.4bps or greater). One method of reducing the time online would be to develop a home page that has a text-only option for users with lower speed modems, or is set up as a gopher.

Home pages can be stored at other sites, and the cost is much lower than if the organization wanted to run their own web site on a server. Usually there is a monthly fee, and additional charges if the web pages need to be written by someone outside the organization.

Web Site

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If a server is purchased and a web site developed, all of the above tools can be used to disseminate information. In addition to creating home pages, a gopher can be created and listservs developed to suit the range of users that might require information. A BBS can be run off the server as well. This is the most costly option and requires, in addition to the purchase of a server with all necessary software, the hiring of a staff member to manage the web site and other dissemination tools. The other option is to have someone else run the web site, manage home pages and gophers, and perform needed technical maintenance. The only requirement would be the development and maintenance of the information.