

# **The Information Superhighway and Environmental Challenges in Africa**

**By Margaret Karembu**

## **Abstract**

The protection of the environment is a matter of global concern that calls for global measures. Improved and effective information about the environment and communication within the globe is vital because it broadens public awareness and participation in the debate on environmental challenges facing human kind today. And the upsurge of electronic networking through computers which is generally called the information superhighway appears to be a development that can precisely address this need. However, as more and more environmental information on a global scale continues to be stored and controlled electronically, developing countries risk becoming more marginalized within the rapidly evolving world economy due to lack of computers and low levels of computer literacy among the majority of their population. The question is: what are the likely consequences of this situation bearing in mind the understanding that environmental degradation does not affect Africa only or but the whole globe?.

This paper gives a situational analysis of the information superhighway in Africa and suggests policy issues which need to be addressed both internationally and regionally if the expectations environmental communication are to be realized.

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# **La Super Voie de L'Information et les Défis de L'Environnement en Afrique**

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## **Résumé**

La protection de l'environnement est un devoir qui incombe à tout les habitants de la terre. Une diffusion efficace des renseignements sur l'environnement faciliterait grandement cette tâche. Cela permettrait à une proportion accrue du public de participer au débat sur les défis impliqués. La ramification des moyens électroniques (Super Voie de Communication) promet d'apporter une solution pratique à ce problème. Cependant cette entreprise risque de faire marginaliser les pays en voie de développement, qui n'ont pas le même niveau technologique, et dont une bonne proportion de la population est analphabète. L'auteur se demande quelles conséquences cela aurait sur l'Afrique (en particulier) et sur le globe (en général). En effet, la communication de Garembu se consacre à une analyse critique et détaillée de l'établissement possible de cette Voie de Communication en Afrique. Elle prend le temps de discerner les politiques régionales et internationales qu'il faudrait adapter à cet avancement technologique, afin de réaliser celui-ci au bénéfice de tous les habitants du globe.

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## Introduction

"Think globally and act locally" has become the universal slogan of environmental enthusiasts. It implies a universal ethic towards which one feels we are massively moving, (UNESCO, UNEP 1991). The idea behind the slogan is the realisation that the protection of the environment is a matter of global concern calling for global measures. Global thinking and concern requires tools capable of extending man's senses as well as enhancing his ability to comprehend the information they collect. The most comprehensive tools are electronic machines, notably computers. Their capability in making up for the natural limits to human beings' views of the globe has widely been acknowledged (Young 1993). A current development in electronic networking is the Internet, a term describing the union of connected computer networks, transferring information between millions of computer users everyday. UNEP (1995) refers to it as the "networks" while in the field of communication, it is generally called the "information superhighways". The electronic machines serve as the information highways which provide the means through which the transmission and circulation of information is made possible.

Unlike previous technological revolutions which focused on energy and matter, the fundamental change brought by the information superhighway involves our understanding of time, space, distance and knowledge. It is a revolution centred on the electronic processing, storage, retrieval and communication of information. This in essence will contribute significantly towards the promotion of sustainable growth in the global economy and the enhancement of the quality of life worldwide. That is a move towards achieving the super-ordinate goal of sustainable development through harmonising environmental and developmental needs for both developed and developing countries.

Although, the use of electronic machines ( the information highways) is heavily concentrated in the industrialised countries, environmental degradation knows no national or regional

boundaries. The consequences of environmental neglect in one quarter of the globe has evidently been shown to have harmful consequences in the other quarters (Western, 1986). Indeed, a global environmental problem such as the ozone layer depletion from the emission of chlorofluorocarbons (CFCs) is largely the outcome of consumption patterns of industrialised countries. It is massively contributing to loss of bio-diversity globally. What comes out of this background is that deprivation of environmental data in any part of the globe can lead to an environmental catastrophe which will affect the human race regardless of origin and location. The management of environmental problems will only be met when the best solutions are knowingly chosen by a well informed public. The information superhighway could help meet some of our environmental challenges.

### **The need for environmental information**

Generally, increased opportunities for public access to environmental information are seen as under-pinning the objective of encouraging people to take on their responsibilities of stewardship. The provision of information is not an end in itself but a means to an end, where the end in this case is the promotion of stewardship. The burden of stewardship is also not seen as resting on the government alone since the responsibility of our environment is an obligation to all.

Jeremy et al. (1996), quoting the Tenth Report of the Royal Commission on Environmental Pollution and the White Paper on Common Inheritance, list the benefits of improved public access to environmental information under five general headings all of which contribute to the stewardship objective as discussed below. The stewardship objective is defined in general terms as "the moral duty to look after our planet and to hand it in good order to future generations" (This Common Inheritance, 1990; quoted by Jeremy et al 1996). A nation's improved public access to environmental information thus performs the following roles :

(1) **Public reassurance:** It will reassure the public and



promote confidence on their part on the actions being taken by the government. Since secrecy of information fuels fear, withdrawal of secrecy promotes public confidence.

- (2) **Personal responsibility:** It informs the consumer of the choice, available in the demand for, and consumption of goods. This is in conformity with what the International Organisation of Consumers Union (IOCU) which in 1993 asserted that "Consumers play an important part in the process of environmental degradation and that all consumers, rich or poor are affected by environmental degradation". Information about the causes and consequences of pollution, for instance, may thus encourage consumers to adapt waste minimisation technologies such as reusing and recycling.
- (3) **Industry responsibility:** Increased public scrutiny should encourage industries to take environmental protection seriously. Environmental pressures on industries should be recognised as a helpful stimuli for industries to gain greater credibility and acceptance from the public other than viewing such pressures as obstruction (UNEP 1991).
- (4) **Agency accountability:** The knowledge that activities will come under public scrutiny should act as a vital discipline for environmental protection agencies, and lastly;
- (5) **Public participation.** It will enable members of the public to play a role in policy formulation and decision-making on environmental matters. Of these roles, public participation and personal responsibility appear to be the most essential in contributing towards the notion of stewardship. Personal responsibility ultimately enhances public participation.

The information superhighway is thus regarded as a powerful ingredient in broadening public awareness and participation in the

environmental debate by making previously inaccessible environmental information widely available. While the developed countries are battling with environmental degradation and natural resources depletion arising from the impacts of industrialisation, the developing countries are struggling with environmental degradation due to poverty and underdevelopment. This situation makes the domination of the superhighway by the West more unfortunate for the developing nations because African environmental problems may not be adequately addressed by research in developed countries.

Effective public participation further depends on the behaviour of different individuals. UNEP (1988) states that there are four ways in which members of the public may respond to environmental deterioration. First, the individual may remain completely unaware or unconcerned because the issue has no impact on his or her ways of life.

Secondly, the individual may recognise the existence of environmental stress but may adjust to it through a variety of compensating mechanisms or "sour grapes" or "sweet lemon" defence mechanisms. Symptoms of these reactions are commonly found in communities where the major source of employment are large polluting industries. Here, the source of pollution is not seen so much as contributing to environmental degradation as the provider of income and employment to meet basic needs. A number of such cases are common in Africa.

The third type of reaction is to assume that nothing can be done about the issue and that the individual's own concern plays little part in the decision-making process. The individual expresses no 'intention to act' and this deters his action towards the environment. The person may feel he has no power over the powers that be, since no genuine efforts are made to incorporate his views towards issues that have environmental consequences. For example, it may be rational for a local community to recklessly cut its forest, if the timber is also being cut by government forestry agencies or outside contractors over which the communities feel they have no control (UNEP 1993).



The fourth kind of response is that of the active participant who feels empowered towards resolution of environmental issues and has a sense of ownership of the environment. Such a person is not entangled in the phenomenon of the "tragedy of the commons". The tragedy of the commons as advanced by Garret (1968; by Kye 1995) states that even if the environment is attracting much attention everyday, it is quite another matter for persons to sacrifice their interests for the environment. That is, since the environment is a collective good, each individual has an incentive for over-exploitation. If he does not use the environment, somebody else will, anyway. To resolve this phenomenon, therefore, would require more than appeal to conscience and as Garret consistently argues "voluntary compliance with such appeals of conscience would only work for a 'simpleton' who can be ashamed into standing aside while the rest of us exploit the "commons"

The behaviour responses of individuals towards environmental deterioration will to a great extent determine their environmental information consumption habits although not disregarding the socio-economic, political and nature of communication infrastructures within a given region. In the light of the pressing environmental challenges facing Africa today (uneven development, poverty, uncontrolled population growth, resources depletion and management) innovative approaches to evolving technological developments in communication are required to address African needs in a way that is useful and acceptable to her people. Ironically, minority "elites" in Africa have access to the information superhighway or are in a position to access it. On the other hand, the poor do not even have basic needs for it, and it almost seems unrealistic to want to connect them to it when they have no food or shelter. Why should they participate when even basic survival is a problem? Yet it is this latter group that the superhighway needs to reach since they are not affected by environmental degradation which is Africa's main problem. The role of the communicator thus, as that of national leaders, becomes that of educating people to become proper stewards of

the environment by expanding the audience for public debate on particular issues affecting their survival needs.

### **The reality of the information superhighway in the African context**

According to the 1990 Report of the South Commission, the inferior position of development in science and technology of African countries in relation to other parts of the world has serious implications for development in communications and information technology. This, coupled with what the CNN, African Bureau Chief Garry Strikker (1996) laments as low information consumption levels, seems to justify Africa's marginalisation in global information coverage. The level of information infrastructure and applications development still lags far behind the industrialised countries. As such, the information technology gap between Africa and industrialised countries continues to widen as the same Western agencies continue to dominate the international information technology development trends (Karinga 1996). Due to the low socio-economic status of majority of the countries and Structural Adjustment Programmes which have hit these countries even further, equipment for the information superhighway is extremely difficult to obtain, maintain and repair, while in other instances electric power is absent or unreliable.

The diffusion of environmental information and communication technologies implies critical adaptation such as ability to deal with computers. It also calls for specialised knowledge of network administration and design which in most cases is weak or absent. In some countries, there is virtually no access to the outside world and thus they are threatened with exclusion from the entire information revolution. Illiteracy levels are high, aggravating the problems of training where majority of the population generally lack the basic skills to exploit new innovations. Good quality telephone lines, e-mail connections and affordable telecommunication costs to a majority of the population are serious problems to contend with. There is also no policy yet on telecommunications in some African countries where the



government, maintain monopoly over services and gives low priority to improvement of existing infrastructure.

In sub Saharan Africa, South Africa, Mali and Zambia are some of the few countries, that have taken the information superhighway a little ahead of being vehicles for commercials to vehicles for development especially in health and small scale business issues. Other countries in Africa that have access to the Internet (the operational vehicle of the information superhighway) include Egypt, Uganda, Kenya, Senegal, Ghana, Algeria, Tunisia, Namibia, Mozambique, Tunisia Morocco and Zimbabwe.

### **Advantages of the highway**

One of the most obvious advantages is electronic mail which is cheaper than international phone calls, faxes, or express package services, and allows its users to bypass signals, unpredictable postal services and schedule conflicts created by different time zones.

User discussion group computer conferences (sometimes called electronic notice boards) allow any number of individuals to:

- Share information and opinions globally,
- Assemble information from many sources that are immediate;
- Collaborate on research, writing or planning events;
- Distribute and respond to action alerts, and;
- Ask questions that can be seen and answered by any other user watching that conference.

News bulletins from electronic conferences have revealed environmental information globally within a few hours, unlike through conventional media where the environmental story would take three to four days to be reported. Other barriers that therefore hindered information flow such as censorship and magazine bans are also overcome by the superhighway.

And when something significant happens almost anywhere in the world, word of it spreads more quickly through other

information channels, since there are millions of users and fewer delays. Environmentalists for instance can share information on rare and endangered species globally and simultaneously.

Other Internet tools that are useful for information retrieval include, Telnet, Archie., Gopher, WAIS, and the World Wide Web (WWW). The latter is the best tool available on the Internet today. It is the fastest growing part of the Internet and is a vast network of documents that combine texts, images, sound and video. The biggest advantage of the Internet is the capability to be an electronic node once you have a desktop computer and a good telephone line. The implication of this to environmental information is that the constraints cited earlier regarding accessibility are minimized since such information can be obtained as required through other channels as long as the TCP/IP is obeyed.

Availability of environmental information through the information superhighway is an issue that African countries need to give a higher priority than is the case today. What may be expensive are the initial basic accessories which include a computer, a modem ( the device that links the computer to others through standard phone lines, a telephone and a communication programme that acts as an interface between the computer and the modem. This way the Internet would go a long way in levelling the playing field for Africa and also enhance her ability to achieve sustainable development.

Access to the Internet will not only facilitate communication within and between countries, but will also bridge the data gaps between regions, enabling countries to broaden their decision making scope.

In most cases, developed countries have the resources and skilled manpower to analyze the costs and benefits to the environment from development projects. Through the Aprior Informed Consent, it is hoped that such information will be made available since environmental impacts of one country differ only slightly from the other . It would infact be a big saving on the part of African countries since it would be assumed that replication



of some impact assessments which would be very expensive on their part may not be necessary. Inter-country collaboration and networking on successful environmental management strategies within Africa will further reinforce massive development.

### **Overcoming barriers of access to the superhighway**

The reality today is that most of the data measuring the status of, and changes in environment are currently being gathered by automated systems, such as satellites and are being fed electronically into networks. The ability to use these data to make informed decisions about sustainable environmental management depends on the ability to locate and access, combine, compare, and collate them. It is also dependent on collaboration and communication between the data gatherers and data end users. The main challenge here is how to get this high level environmental electronic information down to grassroots and conversely getting grassroots non-electronic environmental information up to the high electronic levels, considering the realities of the information superhighway in Africa.

At a global level, at least 80 percent of the world's population still lacks the most basic telecommunications access to the Internet. A more realistic interface between the information superhighway and existing conventional modes of communication seems to be the only option so far, and can take several of the following forms:

Electronic form (Internet) to Printed form (Newsletter) to Community (Village meeting).

### **The information superhighway and the environment**

The slow rate of adoption of the information superhighway in Africa has had serious implications for dissemination of information on the environment. According to *Econews Africa* Editor, Mercy Wambui, about 80-90 percent of the information on environment through the superhighway is not generated

from Africa. Rarely do Africans provide such vital information on the state of the environment although research continues to be carried out in this region. Unfortunately most of the research findings and plans of action as recommended remain in shelves of major libraries, research institutes and government offices. Part of this could be attributed to low levels of awareness among researchers and scholars about current information transfer technologies while the culture of "hoarding" information is still prevalent among scholars.

The spirit of sharing information on research experiences is very weak. The fear of "publishing to perish" and disrespect for copyrights are real among African scholars. This is despite the fact that Africa has a highly competent human resource base and many environmental specialists whose experiences could be shared by information dissemination to other regions. Egypt's Metropolitan City of Cairo for instance, is reknown for its extensive informal waste recycling system. Through the super highway, such positive trends could be communicated directly to other African cities such as Nairobi or Accra whose waste management strategies are still in the preliminary stages. According to Inge (1993) conventional approaches to waste management in industrialised countries which include high-tech equipment such as compaction vehicles, incinerators and computerised routing programmes would result in the loss of means of survival for the vast numbers of people who work in the informal waste trade in developing countries. In such instances, information on wastes through the superhighway from developed countries would not be of much use to developing countries.

### **Constraints relating to the nature of environmental information**

Freedom of access to information on environment is limited especially due to incoherent regulatory system for environmental protection, in both developing and developed countries. For instance, it was not until 1986 that American environmentalists.



fought for, and won the Emergency Planning and Right-To-Know Act, which created the world's most comprehensive national pollution database - the Toxics Release Inventory (TRI). It includes data on toxic chemicals released to land, air and water from about 24,000 US industrial facilities each year (U.S. Environmental Protection Agency 1993). The sufficiency of information becomes even more suspect when human health is at stake. As Weatherill, quoted by Kye (1996) stresses, there are some circumstances where the threat in question cannot be adequately addressed by informing the public.

Information on the environment is also problematic regarding its dependence on disclosure by commerce and industry or what environmental communication researchers refers to as uncertain nature of environmental information (Kunst et al. 1993). Various other barriers exist to the collection of environmental information. First, the costs are great given the complicated nature of evaluating environmental consequences. Second, the "social goods" problem and "tragedy of commons" phenomenon arise where producers have a weakened incentive to understand environmental damage in the absence of a distinct and personal interest.

Environmental data is at its most useful when it is current because in some cases, it is a matter of life and death. A case in point is the 1988 toxic waste dump in the Nigerian village of Koko and the waste's effects on the health of local citizens. Greenpeace International used computer networking to monitor the traffic of the hazardous waste. During the ensuing international uproar, the waste was traced back to an Italian company. Any delay in releasing such information would be disastrous to people in not only West Africa but Africa as a whole. In case of delayed information the public cannot adequately express an opinion on pollution levels, neither can it hope to influence executive decision making if such decisions are taken on the basis of confidential information which is disclosed long after an irrevocable decision has been taken.

When people potentially at risk of such impacts do not possess

a comprehensive environmental information package, they cannot realistically gauge the extent of the risks they face. The bureaucratic procedures involved in retrieving such information is an area of concern, which can be addressed effectively by the information superhighway.

Lastly, even if industries have accurate environmental information, some have little incentive to disclose everything since their main objective is to make profits within the shortest time possible and with the available resources, (Kye, 1995). This has led to re-location of polluting industries by the multinationals who, in most cases, have not bothered to alert the governments in Africa of the environmental consequences of their industries. As a result, Africa continues to suffer the woes of environmental degradation which perpetuates a poverty cycle. Until recently (1992 during the Earth Summit conference) environmental information has been subjected to a strict regime of secrecy which explains why the environmental performance of industry has been very poor.

### **Constraints related to government regimes**

Many governments appear to treat environmental information as an important "secret" which must be safeguarded to protect the interests of politically connected "fat cats" within their systems. As such, not much genuine effort is directed towards increasing public access to environmental information because their involvement in policy formulation and decision-making would hurt such interested parties. In other instances, little effort if any is made, to sensitise the public on the existence of environmental information.

Security issues are also a matter of concern. Since each group/individual accessing the Internet is responsible for their own machine and line selection, it is possible for someone to remotely try and log in onto another machine and get information that could be confidential. Indeed, there have been cases of hackers trying to break into systems at the highest national



security level. The implications of this to environmental information accessibility is that industrialised countries may decide to use inaccessible passwords for their gains only to exploit Africa's rich biological and cultural diversity. However, with tough regulatory measures on the environment being enforced by the UN system, such secrets will go public since even home owned desktop computers have the capability of the Internet nodes. Somehow, among the industrialists, a moral voice of reason (an earth friendly being) will make such information available to the less privileged countries. Moreover, action alert lines do exist and some, such as the Green Peace International GreenNet, Earthwatch, Oxfam and the Sierra Club have successfully lobbied against environmental misdeed of some industrialised countries.

### **Issues related to international imbalances**

Perhaps, the greatest constraint facing the African continent as far as environmental rehabilitation is concerned is the unquestionable adoption of alien approaches to development dictated by the West (Lester 1991), which is now also threatening dominance over the information superhighway. The realisation of such dominance to the environment has been expressed by many. Numerous calls have been made for the formation of a strategy for sustainable living with emphasis on a "global alliance to care for the global village"

As a result, important international and regional protocols have been drawn up to establish environmental standards globally. Examples of such efforts include the Convention on Biological Diversity which was signed during the UN Conference on Environment and Development in June 1992. The aims of the convention are to conserve biological diversity and ensure that its components are used sustainably and that the resulting benefits are equitably shared. This includes appropriate funding, access to genetic resources and transfer of technology, taking into account all rights involved.

Another global effort is the adoption of the Basal Convention

on the control of transboundary movement of hazardous wastes and their disposal. The convention entered into force in May 1992 and its ultimate aim is to cut the generation of hazardous wastes to a minimum. As the industrialised countries tightened their control over the movements and disposal of hazardous wastes in the 1980s, illegal dumping and traffic of such wastes increased in developing countries. Infact, within the period, a series of scandals involving hazardous waste dumping in Africa came to light. Other efforts at the global level to arrest environmental degradation include the adoption of World Soils Policy of 1982, the 1977 Global Plan of Action for the Conservation, Management and Utilisation of Marine Mammals, adoption of the Convention on Climate Change, the Montreal Protocol on Substances that Deplete the Ozone Layer, among others.

### **Prospects of the Information Superhighway**

Despite the pessimism in Africa, the development of the information superhighway ( Internet, e-mail, teletext, facsimile and others) promises positive changes in access to environmental information globally. The Internet which is the world's largest collection of computer networks has been cited as a very useful tool especially to the scientific (including environmental) community where sharing and free exchange of information have provided more research and faster learning. The Internet offers a sense of freedom where any node can speak to any other node as long as it obeys the Transmission Control Protocol/Internet Protocols (TCP/IP). Internet users can also connect through it to the Association of Progressive Communications (APC) networks, the world's largest assembly of online environmental information and activities. Altogether the system connects 17,000 activists relatively cheaper than other forms of telecommunication and gives access to a huge amount of information. For instance, according to the African Regional Centre for Computing (ARCC) it costs about US \$ 50:00 to be connected to the Internet for non-profit making organizations with a minimum charge of 5 US dollars per month for two hours. Each group accessing the Internet



is responsible for their own machine and selection of the line.

A good example of an organisation using the Internet is Econews (ENA) which is currently working with three communities in East Africa on a pilot project to halt desertification. ENA monitors global trends in desertification through the Internet, then informs these communities about policies at global, regional and national levels through newsletters which are distributed to the community information officers who then translate such information. The dialogue that follows is condensed in form of a newsletter which ENA again puts on Internet. The Environmental Liaison Centre International (ELCI) is collaborating with ENA in certain aspects of this project.

Mass communication in its different forms is indispensable for increasing public awareness of different environmental issues. In Africa, this calls for competent environmental communicators, who are capable of translating or (searching for) non-technical yet precise terms to pass the desired messages. Ideally, it would be wonderful if there were fully trained environmental reporters who understood the complexity and technical nature of environmental information to be able to play the role of a watchdog. Playing this role for environmental management, the communicator needs to have some knowledge of the situation, the parties involved in the environmental event, the government agencies monitoring it, what actions are being taken and what others should be doing. As a watchdog, one has a responsibility to keep the public informed even when faced with bureaucratic barriers which are many in the field of environment. Again, the information flow should be cyclic such that community inputs are translated to scientific or technical forms (mainly through research) by competent reporters, translating it from the Internet and passing the feedback to the community.

Because of their relevance to the cultural, social and physical set-ups, traditional media systems such as popular theatres, folkrole, community radio and drama, can play a significant role if they are integrated with the superhighway. These are particularly important while repackaging information. The importance of

integrating traditional media with the superhighway is now widely recognized.

Of the various forms of traditional communication in existence, community radio has been acknowledged as a form of media that can easily be used by rural communities with the subsequent information stored and accessed through the Internet. Likewise the electronic information from Internet could be translated into non-electronic language to local communities. According to Delome (1992), community radio encourages expression, participation and values local culture. He further defines the purpose of the radio as giving a voice to the voiceless, to marginalized groups.

### **Existing internet facilities for environmental information in Africa**

The need for environmental information is obvious. Important environmental decisions will contribute to the common destiny for all of human race by enlarging peoples' choices and increasing opportunities for sustainable modes of development globally. Deprivation of such vital information by the West which dominates the superhighway would spell doom since all of us, rich and poor, rural and urban are in the spaceship earth and are dependent and responsible on its either sinking or floating. Fortunately, various institutions at the international and regional levels have spearheaded inter-networking in environmental issues.

At the international level, the Global Environmental Information Exchange Network (IFOTERRA) and UNEP are located in Africa and both have Internet access. INFOTERRA, for instance, is one of the most comprehensive environmental information exchange networks in the world. It was designed by UNEP to stimulate and support the exchange of scientific and technical environmental information within and between nations. The network comprises 172 National Focal Points (NFPs) located in nearly every United Nations member country. In order to strengthen the national information capacity of developing countries, INFOTERRA



promotes partnerships between the national focal points of developed and developing countries.

In Africa, the South African Sub-regional Network (SASIN) has become a model for future companionship networking programmes. SASIN is comprised of 11 NFPS in Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe and is closely linked with the Southern African Development Community (SADC). Currently, INFOTERRA is using two Internet services to promote the electronic exchange of environmental information. First, a subscription list has been established and users can submit or respond to queries by sending an e-mail message to the list address Secondly, information on INFOTERRA and its partners can be accessed via any personal computer connected to a network service provider.

The Environmental and Natural Resources Information Networking (ENRIN) is another of UNEP's environmental data and information networking activities. It is a capacity building programme for data management in support of environmental assessment and reporting in the context of sustainable development. The overall objective of ENRIN is to help ensure that environmental factors and their complex interactions with social and economic parameters are fully considered in the formulation of national policies and action plans by countries.

Another network available for the collection and dissemination of information on the environment is UNEPnet which is a system that provides multiple services to governments, international institutions, NGOs and academic institutions on environment-related activities. Services offered through UNEPnet include electronic mail where each user has a mailbox for receiving and sending messages, attached files, access to other networks such as INFOTERRA and ECONET, libraries containing files with information on environmental topics and a daily collection of news items on the environment from various international news services.

At the regional level, the United States Agency for International

Development (USAID) is engaged in a number of activities to facilitate access to the Internet for its colleagues and partners in Africa. One such activity is AfricaLink whose focus is on the end users of information technologies. Within the context of each country's existing infrastructure and regulatory environment, AfricaLink implements simple strategies to help end users obtain electronic mail access as quickly as possible.

AfricaLink has found that service providers based in end-user's own community are generally best situated to provide end-user's support that is timely. Experience shows that end-users who do not receive timely technical support when problems arise are more likely to become frustrated with the technology and perhaps abandon it for older, more familiar, but ultimately less effective means of communication. There is a two-step process for the accomplishment of AfricaLink's mission and results can be measured at each step. They are the physical connections to the Internet and enhanced network information sharing.

African countries can also gain access to the WorldWide Web of electronic networks for environmental information through a grassroots networking programme called Fidonet. Fidonet is a low cost method of linking together computer bulletin systems through ordinary phone lines. Its virtue and usefulness in Africa lies in its ability to overcome the limitations of inadequate phone systems. Regular connections called gateways between Fidonet computers and other systems such as the Internet and the APC networks, allow Fidonet users to communicate with virtually anyone with an electronic mail address, with most messages reaching their destination within 24 hours, (Jensen 1992).

Fidonet computers can even operate where no telephone systems exist by using a technique called "packet radio". Packet radio-set antennas are attached to computers much like a modem and can be used to exchange electronic mail and other data automatically. Where the computers are separated by long distances, packet radio sets can transmit their messages via low-orbit satellites. Such technology is already being used in Africa to get valuable medical information from such updated sources



as the New England Journal of Medicine. Similarly Volunteers in Technical Assistance (VITA) uses Fidonet connections and packet radios to link its small-business development projects in two cities in Chad. While Internet and other high-tech computer networks require powerful machines, some old, outmoded personal computers can run FidoNet programme, providing a very fast communication link.

### **Potential areas for internetworking**

At the national level, African countries should be assisted through the ongoing process of the formulation of National Environment Action Plans (NEAPS) supported by the World Bank to connect to the Internet. The search for appropriate environmental information networking must begin in each country but with sensitivity to the concerns of neighbouring countries. The exchange of experiences through the Internet in the adaptation and use of traditional knowledge can be useful in introducing environmental sensitivity in the application of modern technologies to agriculture - the main economic back bone for most parts of Africa and a big environmental degrader and in the management of ecosystems and natural resources. Efforts to funnel both new and used computers, properly equipped for local conditions could also link grassroots communities to the growing web of computerised information.

Experiences with the management of common resources, especially in similar ecosystems may be usefully shared within and between African nations by this "flick-of-a-button" satellite information technology especially using the Fidonet which can surmount infrastructure problems and reach far into even the most remote parts of Africa.

Although private and non-governmental organisations may not contribute to public networking, certain links, among grassroots organisations of African and industrialised countries can be a valuable tool that can enhance international understanding and co-operation. Lastly local institutions of higher learning such

as universities and research institutes should be given priority and be used as nodes for effective internetworking in Africa. Above all, successful internetworking will depend on awareness creation about the superhighway and proper training in using, managing, promoting, and maintaining the electronic network through identification and categorisation of potential users and receivers of environmental information. Training of Trainers (TOTs) programmes where local people are trained to train others with similar and/or contrasting ecological orientation is perhaps the only way that Africa can end the now dreaded dependency on alien ideologies.

### **Conclusions and recommendations**

Africa has the potential to tap the benefits of the information superhighway to meet her environmental challenges. The existence of United Nations offices in Africa, numerous grassroots organisations and donor agencies coupled with genuineness on their part to build networks, could play a major role in using the superhighway for development. The top-down approaches that introduce any form of development such as in telecommunications through government agencies will only succeed when officials are in favour of such undertaking. On this note, the liberalisation of the telecommunications ownership would thus be a first step for any government committed to inter-networking.

Concerted efforts must also be made regionally to:

- (i) Create awareness among researchers and scholars about the information superhighway and the need to use it to disseminate research findings.
- (ii) Make the internet accesible to many users. This should include the encouragement of privatisation in order to enhance competition.



- (iii) Provide comprehensive information especially for communicators in mainstream media, through inservice training on professional environmental reporting.
- (iv) Encourage and promote distant learning to raise literacy levels in basic as well as specialised education such as computer handling and maintenance. There is also need to update information and promote, the "culture of participation" on the part of the public towards environmental conservation.
- (v) Support, encourage and strengthen internetworking between African countries through existing regional bodies.

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