

*Webology, Volume 3, Number 1, March, 2006*

<a href="#">Home</a>	<a href="#">Table of Contents</a>	<a href="#">Titles &amp; Subject Index</a>	<a href="#">Authors Index</a>
----------------------	-----------------------------------	--	-------------------------------

## Environmental Knowledge and Marginalized Communities: The Last Mile Connectivity

### [A. Neelameghan](#)

Regional Advisor for Asia Pacific (retired), formerly UNESCO/PGI, Paris, France. E-mail: anm2002 (at) vsnl.net

### [Greg Chester](#)

Former Library Director, Leech Lake Tribal College, Cass Lake, MN, USA. E-mail: gchester (at) charter.net

*Received February 11, 2006; Accepted March 13, 2006*

---

### Abstract

*Expanding globalization implies, among other things, growing interdependence among peoples of the world. The convergence of information and communication technologies (ICTs) is enabling almost seamless access to a vast and varied range of information and knowledge sources from anywhere at any time. These are features of the emerging knowledge society. However, a substantial proportion of the marginalized communities in most developing countries and even in some of the technologically advanced countries do not appear to be benefiting from these developments. They do not feel participating in and contributing to the society at large. Yet they possess valuable knowledge about nature and its offerings, ethnic, cultural, and spiritual values that can benefit societies beyond their own communities. These communities suffer from several types of handicaps - low literacy, multiplicity of dialects, vulnerability to external exploitation, etc. There are also several impediments to communicating and introducing new ideas, innovations, and technologies into these communities. All these need to be examined and necessary measures and strategies adopted at local, national and international levels to overcome these barriers. Extending ICTs per se to these communities is not a solution. Human intervention is necessary to solve the last mile problem. Illustrative case studies of problems and issues and initiatives undertaken in different countries are briefly described.*

### Keywords

*Development planning, Environmental issues, Development communication, Barriers to communication, Marginalized communities, Information and communication technologies*

---

## ENVIRONMENTAL CONCERNS AND ENVIRONMENTAL PLANNING

Environmental planning is an integral part of socio-economic development planning at all levels - from local, sub-national divisions through national to international levels. In parallel, environmental information planning is an integral part of the national development information planning, and these are integral components of state and national development planning. "Development", after all, is the bridge between the hopes and

dreams of people on the one hand and the realities of the world on the other. Development messages constitute the principal traffic on the bridge.

The following environmental concerns are shared by most societies:

- Conservation of natural resources including soil, water, and energy.
- Degradation of earth's biosphere.
- Extinction of certain species of plants and animals through natural and man-made disasters.
- Preservation of local and global biodiversity, i.e. indigenous and migratory animals as well as plants, microorganisms, etc.
- Pollution and contamination of air and water.
- Improper and coerced exploitation of natural resources for commercial purposes.
- Rapid increase of population especially in developing countries and its effects on the environment and the economy.
- Contamination of existing species by bio-engineered species.
- Individuals and corporations patenting food and medicinal species domesticated and improved by local people.
- Individuals and corporations patenting wild species and herbal medicines discovered and used by local people.

The predicament of rural women is of particular concern in environmental management. In the developing world, women are the major producers. This is particularly so in recent times as many of the able-bodied men migrate to urban areas in search of work. Women, therefore, are increasingly involved in activities like farming, fishing, selling the produce and also taking care of domestic tasks - fetching water from a distant spring, river, or pond - preparing food, gathering wood for fuel and construction, and fodder for cattle, caring and nurturing children and elderly people. Thus, women interact intensively with the environment to meet their families' daily subsistence needs and are, therefore, most affected when their immediate environment is changed due to forest degradation, rain and fire havoc, quarrying, damming, and mining activities that render the land barren. Lengthening forage time has resulted in immense physical exhaustion and considerable hardship to women, children and the few cattle and other domestic animals they tender. In short, rural women bear the brunt of the worst of the problems caused by environmental degradation.

The importance of recognizing gender differences in local knowledge systems has been emphasized by [Appleton et al.](#), 1995.

In the context of expanding globalization even a small community in a developing country, far removed from an urban metropolis, is likely to be affected, directly or indirectly, by the processes and events occurring at global distances. In this scenario, the physical, mental and spiritual space even of an individual in the community may in some manner be affected. This signifies a growing interaction leading to greater interdependence among peoples of the world. The question becomes, will this growing interdependence be healthy for the indigenous communities? Will these relationships be on their terms or which may or may not be beneficial to the local communities?

## **RURAL COMMUNITIES AND INDIGENOUS COMMUNITIES**

In most developing countries over 70% of their population live in rural areas. They are mostly illiterate or semi-literate. They live in vast numbers of rural villages, often spread out, into small communities. But they form a vital cog in the national economy as they produce the raw materials of food, clothing, and shelter that are converted into consumable products, used and enjoyed by a much larger population in the urban and semi-urban

population nationally and even internationally. They also constitute a vital base of a democratic socio-political system. They usually have strong family and community bonds and democratic processes for making decisions. They live close to nature and have the knowledge of and stake in, the nurture and preservation of nature's offerings - their environment - for survival, and well being. They have skills in crafts, use of colors, and an integrated view of wellness or well being - physical, mental and spiritual. Much of this applies to the marginalized indigenous communities in the technologically and economically advanced countries as well.

Thus, these communities possess a fund of valuable native knowledge relating to the environment, the earth, climate, food, medicinal plants and animals, social and cultural value systems, ethnic music and the arts. Such knowledge is essentially locale specific, and may not even be found in modern textbook sources. For example, certain South Pacific Islanders have a detailed categorization and description of some thirty-five varieties of a single species of fish. This is important information for their daily life: when particular variety(ies) will appear and where in the sea, which of them have food and/or medicinal value, etc. On the other hand the same group may recognize only three primary colors instead of the usual five ([Farb, 1973](#)) Regarding environmental knowledge and management of forest wealth, Justice P.N. Bhagwati writes: "There is so much traditional wisdom amongst these tribals and forest dwellers accumulated over the years, that they are able to live in harmony with nature. Nature and environment are as much a part of their daily existence as food, shelter and clothing and they are continuously in communion with nature. Our plan for forest management must, therefore, take into account the human beings who live in the forests and nothing should be done which would affect their daily existence or their means of subsistence." ([Seshia et al. \[2005\]](#), quoted inside book jacket)

"The local knowledge and management of forest / tree resources for cultural / religious purposes is set within the complex social framework of the area. Conservation of tree resources through propagation of cultural and religious beliefs can best be understood in the context of control by the rural elite" ([Kumar, 2001, p. 2897](#)). The well-researched documentation *Traditional wisdom in natural resources management: the only way to conserve* ([Seshia et al. \[2005\]](#)) describes the wealth of environmental knowledge acquired by indigenous local communities of Uttaranchal, North India. Such knowledge has become tacit social knowledge of the communities. "In comparison to western scientific conservation models, which advocate the creation of national parks and sanctuaries, the conservation of bio-diversity in these people-declared-managed sacred groves is more effective. This may be due to the fact that these sacred groves are intimately connected to the social life of the communities and, such as in the case of Hariyali sacred grove, form an integral part of the cultural identity of the community. Rituals associated with the grove and annual festivals associated with the presiding deity serve to bind the community while strengthening the social bonds and relationships. Therefore, it is evident that sacred groves serve an important social function. This is clearly not the case with national parks, which completely alienate local communities from the area, cutting of all ties and relationships that the community had previously.

The knowledge gained by rural and indigenous people through observation and experience, has largely been embodied in folklore and shared by word of mouth for centuries and passed down the generations. This knowledge needs to be recorded, processed, disseminated and utilized. For instance: "Myths can tell us a great deal about what happened in the past and were important in establishing what happened here (Seattle) 300 years ago," remarks Brian Atwater, U.S. Geological Survey. "Along the Oregon and Washington coast, there are Native American stories about boulders, called *a'yahos*, which can shake to death anyone who stares at them. In addition, Ruth Ludwin, a seismologist in Seattle, discovered tales of villages being washed away and of whales and thunderbirds

locked in flights." The new science of geomorphology is being harnessed by researchers who believe folklore can save lives ([McKie, 2005](#)). By utilizing the knowledge / folklore of the natives they will feel their participation in and contribution to the nation's progress. Equity and justice requires that development planning should include all sections of the society; and the benefits of development should be shared in appropriate measures by every class of people in the society. Heretofore, most sections of these communities have been largely marginalized in the national development process.

In the national development process local values, world views and understandings of the marginalized communities need to be recognized, respected, honored, and adhered to by the consultants and advisors who may be educated, technologically advanced urban people. Those seeking information must acknowledge and give credit to the people who have obtained or created the original sources of nutrition and healing. Further, those from the outside who gain from the developments of the rural people and indigenous communities must provide them financial compensation for their knowledge, medicines, foods, processes, etc. For this to happen they need to be informed of their contributions and 'rights' and be included in the development planning.

Inclusion means that not only must all peoples be addressed or included in the plan, but must also be included in the planning process. The interests of the rural and indigenous peoples and their territories must be respected and protected. Nation states and their local governments and schools must 'educate' the general public about the rights of the marginalized communities and the need for and obligation to, respect those rights. By providing appropriate information to the rural and indigenous communities and creating the necessary awareness among the public at large will reduce the chances of outsiders and even local people stripping the homelands of the rural and indigenous people of their vital plants, animals, and minerals they need for their health and survival. It will minimize their being exploited.

People at the grass roots suffer from various societal handicaps. Being barely literate, they are susceptible to economic, social, political, and technological exploitation by others. This together with other factors has resulted in their failure to receive basic education, health care delivery, employment and other economic and social benefits. These factors individually and collectively increase the vulnerability of these communities and widen the gaps - economic, social and technological - between them and others, for example the urban communities.

Reaching out to barely literate people in the remote areas implies that conventional printed materials are often of little use to them. Studies indicate that marginalized people do seek survival information, relating to their work, business or trade, on matters relating to health, sanitation, family and child welfare and on government programs, regulations, and other development messages. Currently they get much of this information from visiting government officials and extension workers, NGOs involved in rural development, the elders or leaders in the community, the local doctor, teacher, and through radio and television where available and accessible ([McChombu, 1993](#)).

## **COMMUNICATION AND COMMUNICATIVE ACTION**

### **The Potential**

The emerging convergence of technologies is making it possible for almost seamless access to knowledge across the globe. There are now greater opportunities for cooperation among communities within a nation and across nations. Increasing mobility of people is being supplemented and in many instances supplanted by connectivity. But the issue is connectivity to what extent and in what manner?

Communication is more than mere connectivity. It is more than the action of announcing or exchange of information. Communication is a form of action in giving advice, taking a position about an issue, assertion, command, demand, inquiry, judgment, request, report, warning, alerting, agreement, and other interpersonal exchanges. Through communicative action, in a special sense, the participants seek to enhance mutual understanding so as to facilitate cooperative and coordinated action for mutual support and to recognize the roles and functions of the participants in the program, project, community, group, etc. Validity conditions for and the effectiveness of, communicative action depends on the respective orientations of the communicator and the communicatee toward the material world, social world, and subjective world influenced by their native culture, language, spirituality, and their knowledge and understanding of the context. There may also be a power differential based on economic, political, social, knowledge possessed, physical, gender, technology, or language. While technology is advancing at a rapid pace and being applied to almost all sectors of the economy and extended to all sections of the society even in developing countries, it has barely touched the marginalized communities that constitute over seventy percent of the population of developing countries of the world. There are several barriers to effective "development communication."

## Development Communication

Development communication is the communication of information that enhances the capacity of recipient individuals and groups to select and integrate appropriate exogenous knowledge with indigenous knowledge systems to support their socio-economic development within the respective development contexts and to maintain and strengthen their cultural and spiritual value systems in the process. This should be achieved through a judicious blending of traditional and modern communication media facilitating the exchange of messages among local communities on the one hand and between them and communities in other locales in the country and in other nations on the other hand.

## Parties Involved in Development Efforts

In a development program for the rural areas there may be several parties involved at *different levels*, depending partly on the structure of the program and on whether it is supported by governmental or non-governmental agencies or a mix of the two, and on the sources of funding and expertise. For example, interested and involved parties may include the end-beneficiaries of the output of development (tangible and intangible); the program implementers (technical and managerial); the donor agencies and individuals; the legislators, policy makers, financial controllers, tax agencies, etc. Obviously, all of the parties need to be informed about aspects of the program relevant to them. In this context, the type of information and nature of flow of information are important considerations. This has been studied, among other things, by Hall and De (cited in [Neelameghan](#), 1981) in respect of over 250 supported rural development projects supported by international agencies. [Menou](#)'s study (1994) noted a correlation between the measure of the capacity to utilize information and economic development - concluding that the greater the utilization capacity higher the level of economic development.

## OBSTACLES TO DEVELOPMENT COMMUNICATION

In most developing economies one encounters low literacy level, poor information communication facilities in terms of number and quality of newspapers in local languages and dialects, telephones, radios, television sets, etc. say per hundred persons, due to historical, economic and political reasons, inadequate resources and/or resource mobilization and management capacity, and absence of an information use culture. The major barriers to effective communication can be grouped as follows:

- Language-related;
- Culture-related;
- Media-related; technology-related;
- Relation between communicator and communicatee;
- Level of communication competence of communicator and of communicatee;
- Level of subject competence / knowledge of communicator and communicatee;
- Presentation of information;
- Legal, administrative and political factors;
- Physical handicaps of communicator and communicatee; and
- Information system-related.

These barriers are briefly explained below.

### Language-related Factors

- Multiplicity of languages and dialects (common to most developing regions of the world);
- Use of jargon - technical and other lingo;
- Neologisms;
- Use of codes in communication, included especially in man-machine interface; and
- Synonyms, homonyms, and homographs leading to misinterpretation of messages.

### Culture-related Factors

- Diversity of cultures and traditions;
- Apprehensions about technology;
- Alienness to or different perceptions of reality - differences in role perception, needs and experiences;
- Difficulties in comprehending and accepting other cultural practices;
- Inadequate or wrong understanding of local culture;
- Misinterpretation of local practices;
- Lack of respect for differences in culture and practices, visual and physical symbols and mnemonic devices; and
- Differences in world view.

### Media-related Factors

- Tradition, e.g. oral tradition |
- Visual perception | User-related
- Comprehension problems | factors
- Distortion introduced by media
  - Voice distortion | Loss of
  - Image distortion | information
  - Environmental noise |
- Use of inappropriate or inadequate technology
- Hidden messages, product sale promotion
- Promotion of alien and culturally destructive behaviors
- Manipulation.

### Communicator-Communicatee Relationship

- Nature of relation - employer-employee; family relationship;
- Standing in the field of specialization;
- Level, length and experience of previous interactions; and
- Power-related - Social, economic, political, corporate, gender, physical, knowledge.



## Competence Level of Communicator and Communicatee

- Educational level;
- Fields of specialization; and
- Communication ability.

## Presentation of Information-Related Factors

- Standard vis-à-vis audience;
- Clarity and organization of ideas;
- Repetition, redundancy, and precision; and
- Style and elegance.

## Legal, Administrative and Political Factors

- Misinformation and disinformation - unintended; deliberate;
- Propaganda / manipulative; and
- Withholding and / or restrictions in the use, of information;
  - Economic reasons
  - Confidentiality reasons - individual and corporate
  - Security reasons - individual and corporate
  - Administrative reasons
  - Profit deception.

Transborder data flow, patent information, copyright, personal and corporate privacy are related issues.

## Physical and Mental Handicaps of Communicator and Communicatee

More particularly impaired vision and / or hearing, and mental, psychological and behavioural factors that affect communication.

## Information System-related Factors

Some or all of the factors mentioned above may affect the information systems and services and interface between communicator and communicatee. In addition, the following system-related factors can affect the efficiency and effectiveness of information delivery.

- Adequacy of information sources;
- Adequacy of access to information sources;
- Adequacy of information services;
- Competence of information service personnel;
- Level of user-friendliness of system;
- Adequacy of user-sensitization, user orientation, user education;
- Cost of information system and service;
- Delay in information access and delivery;
- Difficulties in obtaining pertinent information at the right time, in a form convenient to information seeker / user;
- Location of information systems and sources vis-à-vis users; and
- Sustainability of information system.

## Technological Factors

- Equipment appropriate to their climate and terrain;
- Adequate source of energy to operate the equipment;
- Skills to operate, maintain, and repair equipment;
- Skills and resources to interconnect equipment locally and globally; and
- Source of repair and enhancement of parts and resources to obtain them.

## SOME INITIATIVES

During the past decade or so, there has been an increasing number of initiatives by governments, non-government organizations, academic institutions and even individual efforts to study the development and communication problems of rural communities in developing countries and hitherto marginalized communities in developed countries. The programs and projects of the M.S.Swaminathan Research Foundation (Chennai, India), and the National Institute of Rural Development (Hyderabad, India) relating to empowerment of rural people, enhancement of literacy, child welfare, agriculture productivity, etc. do cover issues relating to the rural environment. There have been successful programs, including the use of ICTs to reach the unreached. Here are some examples.

### E-Governance

The last two decades saw citizens all over the world demand better governance. The tremendous growth in ICTs holds sufficient promise to fulfill these aspirations. In the well researched book by [Holmes and Brealey](#) give many examples from different parts of the world, both developing and developed countries, how e-government can deliver public services in a consumer-friendly manner with better transparency and accountability. Some examples from developing countries are mentioned below.

In the beginning, of course, there was fear, mistrust and turf protection in many places; however ICT and an integrated online service have survived and come to stay. The entire Dhar village of Madhya Pradesh, India, is now wired-up and connected to a network of cyber cafes for the benefit of farmers.

DakNet is a wireless technology to send the Internet to villages in India on a local bus or even a bicycle, very much like the *dak* or mail is sent out now. The goal is to provide non real-time Internet access to rural India ([Bhatia and Bhatia](#), 2005). Land records are accessible online in several Asian countries and banks accept this for sanction of loans. Grain merchants are able to check product prices across India, at a cost that is less than 5% of a telephone call.

Multimedia mobile units drive around Costa Rica providing Internet access, e-mail, and computer training to rural citizens.

[Ian H. Witten](#) (2001) gives several examples from developing environments: The Kataayi Cooperative in Uganda; disseminates humanitarian information in Africa; in disaster relief situations; for preserving indigenous culture; and capture and dissemination of locally produced information. He considers these cases as the fulfillment of Dr. S.R. Ranganathan's *Five Laws of Library Science*.

[Bhatnagar and Schware](#) (2000) also present interesting case studies under the following headings:

- Improving services to citizens and bringing in transparency.
- Decision support to public administration for improving planning and monitoring of development programs.



- Empowering citizens through access to information and knowledge.
- Use of ICT for training in rural areas.

The establishment of telecentres with UNESCO support in India and Africa is worth mentioning ([Rose](#), 2000).

## Improvement in Health Care Delivery - Latin America

(AN = A. Neelameghan; GC = Greg Chester)

One of the main reasons for the poor health care delivery in rural areas and areas remote from the metropolis and towns in developing countries is that the services of qualified and experienced doctors and other auxiliary health personnel are not easily and quickly accessible. One among several reasons why doctors and health personnel may not opt to work in these remote areas is that access to information about developments in their fields of interest is found to be inadequate and they feel isolated in this sense.

Before the spread of national communications networks and the Internet, BIREME (the western wing of WHO), planned a project (LILACS), which brought together for a cooperative work among medical libraries in some 17 Latin American countries. Selected medical libraries in each country were assigned the task of indexing certain medical journals in the country according to an agreed upon bibliographical format and using UNESCO's free software CDS/ISIS. The list of entries was sent to a national centre. The latter would then collate the entries and pass them on to the BIREME centre in Brazil. The centre then put the material on a CD-ROM and distributed copies periodically to medical practitioners. The CD-ROM also holds databases of UNEP's environment information materials, international health legislation, medical subject headings, and union catalogue of medical periodicals in Brazil. Doctors willing to work in remote areas were also provided with microcomputers to use the CD-ROM. An item published in a medical journal could be located in the libraries through the union catalogue and photocopies obtained. Over a period of time the service caught on and health personnel were not averse to working in areas far removed from the cities. The remote areas thus began to receive *better health care delivery*.

These days BIREME provides access and connectivity via the Internet to several other medical information services, including full text translations of papers into Spanish / Portuguese of current journals, and people to people contact.

## Connecting People - PEACESAT - South Pacific islands

In 1983, I had occasion to participate in a demonstration of the information exchange process in the PEACESAT program during a seminar in Manila using a simple foldable antenna. Some ten years later, the facility was used to setup a discussion among and approval of, some six librarians of the national libraries of as many islands in the Pacific on a project for developing an information network for the region prepared by an international group meeting in Papua New Guinea.

The Pan-Pacific Education and Communication Experiment by Satellite ([PEACESAT](#)), currently based within the Social Research Institute of the University of Hawaii, is a public service telecommunications network that links educational institutions, regional organizations, and governments in the Pacific Islands region. In partnership with the Telecommunications and Information Policy Group encourages development and public service telecommunications. PEACESAT is funded, in part, by the National Telecommunications and Information Administration of the U.S. Department of Commerce and other program partners. Currently there are over 50 PEACESAT sites in 22

Pacific Island jurisdictions. Each site is able to use either voice or data transmission capabilities. Some of the sites are enabled to use the new digital facilities. The PEACESAT program enables international cooperation in public service telecommunications and the sharing of knowledge, information, culture, and resources, thereby partially overcoming the barriers of distance among the Pacific Islands and between them and other centres around the globe.

There are several programs for which PEACESAT is used for information exchange among persons, institutions and agencies involved in development activities. Some are regular periodical programs (daily, weekly, monthly, etc.) and others are one-time programs for a specific purpose. Teleconferencing, voice exchange, information and data exchange take place regularly within the framework of some 60 programs. These cover health, nutrition, women, youth, AIDS, drug addiction, cerebral palsy and other disabilities in children, animal (livestock) health, fisheries, specific problems in agriculture, environment, distance education, environment etc. Organization for Community Network, Community Network System On-Line, Emergency Weather Information Network, Pacific Island Internet Resources, are associated programs serving the very dispersed communities. (AN)

### **Hopi Solar. Bringing Solar Electricity to the Hopi and Navajo People - North America**

Hopi Solar is a small company staffed by Hopi and Navajo people that is installing and maintaining photovoltaic systems to provide electricity to isolated rural families that are too far from the grid to receive electricity by land lines and left behind by the coal using electric generating companies. While power plants on their reservations powered by coal from their territories supply power to cities throughout the southwest, these families cannot receive electricity even though their homes are only a few miles from the plants. (GC)

### **Bio-Intensive Agriculture - Costa Rica, Kenya, Thailand**

Rick Lathrop in 1993 founded the Global Service Corps, a "mini Peace Corps". It is a volunteer service-learning organization that supports small scale sustainable development projects in developing countries. Beginning first with a rain forest conservation project in Costa Rica in 1993 they have since expanded to conservation and social justice projects in Kenya and Thailand. They promote Bio-Intensive Agriculture (BIA), utilizing locally available food crops planted in double-dug growing beds. This practice increases the yield per acre relative to industrial planting, often with less overall effort by the farmers.

Other advantages are that they do not require large machinery for the small scale beds and by composting and recycling local agricultural wastes and other residue farmers can achieve bountiful yields at the same time avoid buying expensive chemical fertilizers. Furthermore, when farmers plant diverse crops they can also reduce their use of chemical pesticides. They have worked with families in such villages in Kenya as Mumias, Kibwezi, and Machokos conducting classes and small workshops wherein they have inspired thousands of people to use BIA practices. (GC)

### **Using GIS to Improve Accuracy of Mapping to Protect Homelands - Borneo, Indonesia**

The Dayak people of Keluan in northeast Borneo in Sarawak Province are using geographic information system (GIS) and other modern technology to more accurately map their territory in order to defend it and their indigenous rights. The success has been promising for, together with previous mapping skill lessons the Dayak people have won

four major legal victories in 18 months in the Borneo courts. They are making the maps they produced during the previous years even more accurate.

There is tension between the need for income from oil palm plantations and maintaining healthy forests. The forests can provide income if the trees are selectively harvested in a sustainable intelligent way. At the same time the forests are hosts to a wide variety of food and medicinal plants.

To help the Dayak people deal with this management problem Dan [Scollon](#) is incorporating GIS and sophisticated software that turns huge amounts of data into multi-layered maps. In this way they can coordinate maps of several villages with regional data to determine large-scale landscape changes, such as the impacts and expansion of huge oil-palm plantations.

One plantation threatens to destroy 30,000 hectares of forest encompassing seven villages. To protect their forests the villages can use the GIS map to compare the village boundaries with the current footprint of the plantation and force the government to admit that the plantation boundaries violate the traditional land-ownership laws.

[Scollon](#) (2001) stated, "In the future, GIS will help communities develop sustainable resource management plans and provide the Borneo Project with an opportunity to expand coordination with local NGOs focused on addressing Borneo's native rights and conservation concerns" (p. 10).

The global importance of this project is highlighted by the World Wide Fund's study that documented 514 plant species including 22 not known by the scientific community in the Ulu Padas region of the neighboring Sabah Province.

The Borneo Project is attempting to help the people maintain a delicate balance through a thoughtful application of will power and effort and knowing they have a just cause they can live in their forest in an ecologically and economically sustainable way that will both maintain their culture and the essentials of their way of life and in so doing maintaining the reservoir of plants and animals that are like a green Fort Knox of genetic diversity. (GC)

## **Energy Generation -The Dakota Winds - North America, Great Plains**

Some Lakota leaders are generating wind energy and money for their people in an environmentally friendly way. The Lakota and other Indigenous Nations on the Great Plains of the United States can produce 3000 megawatts of wind energy with current technology and generate \$3 billion in revenue at current rates.

The Rosebud Sioux of South Dakota, U.S.A. put up their first commercial scale 750 kw wind turbine on Indigenous land. They financed the project through combining rural electrification money, Department of Energy money and "green tags" purchased, sold, and retired by Vermont-based Native Energy who partnered with Ben and Jerry's Ice Cream and the Dave Mathews Band.

The Rosebud Tribal Utility Commission now wants to build a 30-megawatt "wind farm" to provide power to their reservation housing developments. Since the reservation uses only 10 megawatts they plan to sell the remaining 20 megawatts to the regional utilities, therefore, providing the reservation with needed revenue in their cash strapped economy.

The Great Plains are described as the "Saudi Arabia of Wind Energy" being capable of supplying one third of the electrical energy that the U.S. currently uses. These pilot

projects are an example for other Indigenous nations in the U.S. and throughout the world who can provide electrical power, earn revenue for their economies, and protect their homelands from the depletion of their resources and pollution ([LaDuke, 2004](#)). (GC)

The following section presents case studies that illustrate the effects of some of these barriers.

## LESSONS LEARNT / UNLEARNT

Working and interacting with rural communities and the marginalized native communities in different countries by non-governmental organization, academics and interested individuals, has enabled a deeper understanding of the problems, more particularly those relating to introducing, communicating and acceptance and use of new ideas, innovations and technologies in such communities. Erich Fromm's studies in Africa (cited in [Benge, 1972](#)), and anthropologist Margaret Mead's work among and reports on the South Pacific Island societies provide valuable lessons on the need to understand local cultures and concepts before introducing new practices.

### Contextual Framework

In general, development communication has an organizational structure, that of the institution or development program and also a symbolic structure. The symbolic structure includes the meanings and values attached to the messages by the generators, the communicators and the recipients of the information. The three may not be co-terminus. Hence, effective development communication has to be achieved through a judicious blend of traditional and modern communication media and methods so as to facilitate the exchange of information among local communities on the one hand and between them and people of different categories elsewhere at the local, national, regional and international arena, on the other.

Within this framework the information communicated should

- be relevant to the development concerns of the local communities, that is, agriculture, literacy, food, water, health and sanitation, women, family and child welfare, conservation of natural and other resources, fuel and energy, environment protection, etc.;
- help prevent exploitation of people and/or deny them their rights to development, by others, whether the latter be locals, nationals or of other nations;
- build and enhance indigenous capacity to access, retrieve and use effectively development messages; and
- guide people in the positive, beneficial use of knowledge and prevent its use in ways that are harmful to people, material, and environment.
- consider the seventh generation as well as their sovereignty, materials, resources, and environment.

The method of presentation of development messages and the media used should enable overcoming barriers to communication. It is also important to consider such factors as:

- the information content, that is what messages are being disseminated and made accessible;
- accessibility to all at an affordable cost;
- building / enhancing the capacity of people and institutions to select and use appropriate technology in information communication, as well as
- allow them to choose the system(s) and manner(s) of communication from those offered.

Development communication entails not merely providing access to data and information but also ensuring that the information is properly and effectively used and that it leads to an improvement in some aspect of the lives of the people. Thus, even if ICT is extended and connectivity provided to rural areas, human intervention appears to be essential to bridge the last mile, unintended consequences and opportunity costs.

Multimedia, videocassette, and CD-Rom have been used in developing countries for dissemination of information to and for use as learning tools by, rural people. Such devices need to be prepared in local languages. The contents should be carefully selected and planned and should relate to the needs of the target audience. In the past, the medium of folk arts have been used in various campaigns with some success. These could be converted to multimedia and ported on to CD-ROMs, video-cassettes, etc. and more widely broadcast via TV and cable networks. Here collaborative efforts by different expert groups, financial support, and the assistance of TV and cable networks need to be mobilized.

Libraries, especially public libraries and community information centers can play useful roles. Libraries have information resources. Information professionals have experience and expertise to organize and present information to meet specific user needs. Trained in media technology and communication skills, they can, in collaboration with extension workers, government organizations, and NGOs, play decisive roles. Local libraries can also collect and record information about specific local resources, practices, and innovations for wider dissemination.

Public and community libraries in some developing countries are using satellite communication to transmit information to and about, rural areas. Schools in rural areas could also benefit from such services.

## **Selected Case Notes**

(AN = A. Neelameghan. GC = Greg Chester)

### **Information Presentation - audience specific - Africa**

On my (AN) visit to a government department of agriculture in a developing country in Africa, we were discussing technology transfer and the problems of communicating research findings to the field level workers, such as, farmers. My host narrated the following instance.

A paper published in a scientific journal had reported that laboratory research and pilot field studies had shown that when seedlings (of a particular cereal) were planted 5 cm apart there was optimal use of water and better growth of the young plants. The department wished to spread the information among the farmers so they would adopt the technique in practice.

Of course no farmer could read and understand the English language research paper. The practical but technical information had to be translated and presented in a manner acceptable to and easily grasped by the farmers. Help from a known specialist in mass communication in another African country was sought. He translated 'the 5 cm to be roughly equivalent to the width of a closed fist.' A large picture of farmers bending in the field with one fist closed and placed near the ground and the other hand planting seedlings on both sides was drawn up and shown to farmers. They interpreted the message of the picture correctly, and the picture was multi-copied for wider distribution. Later a video of the picture was made to show dynamic movement, adding greater realism to the message and being able to disseminate information to a larger audience at the same time.



## Policy support - Not to Use a Sophisticated Technique - China

During one of my (AN) early visits to China on behalf UNESCO, in the 1980s, I was assigned, among other tasks, to survey the use of information in projects and practices relating to alternative energy sources (e.g. biogas, solar, wind, hydro-pump, etc.) and to collect information on such projects. By arrangement I visited biogas units, solar energy centres, etc. in different towns, had discussions and collected information, all through interpreters. Before arriving China I had read some papers in journals, mostly from Europe and USA, on the use of alternative energy sources in China, especially biogas and hydro-pumps.

Regarding hydro-pumps most of the articles appreciated their widespread use in agriculture / irrigation; but they also noted that the efficiency of the pumps was only about 75% whereas the technology used in some western countries could deliver up to 95 percent efficiency. Toward the end of my tour I had a meeting with one of the directors in the government department concerned with energy matters. During the course of the dialogue I told him what I read about the lower efficiency of the hydro-pumps used in the fields, and enquired whether this was due to non-availability of information on the current technology, or inaccessibility to the technology, or whether the farmers were not made aware of the current technological developments. The director said they knew about the technological development (in fact there are Chinese translations of the foreign language papers), and had tested the new more sophisticated technology. However, as a matter of policy, they have not advised the farmers use of the sophisticated technology for the following reasons: (1) The hydro-pumps that the farmers were then using were locally made and relatively cheaper, within the budget resources of the farmers; to raise the efficiency of the pump from, say 75 to 85 percent, the cost of the pump would almost double and go beyond the financial resources of the farmer. That would considerably reduce the number of users of the pump for irrigation, which will result in overall reduction in the yields of the farms; and (2) if anything goes wrong with the sophisticated / hitech pump, immediate local repair may not be possible; the farmer may have to wait for a expert technician to come from elsewhere and that will cost more and take time; meanwhile the farmers will be idle. Presently the local smithy, if not the farmer himself/herself could repair the indigenous pumps. This is considerably cheaper and there is less idle time. Therefore, taking all these factors into consideration, as a matter of policy the high tech pumps have not then been introduced in field irrigation.

## Differences in the Perception of Development Priorities - South Pacific Island

While on a development information assistance mission in Thailand, I (AN) happened to travel with the Vice-President [VP] of a development bank located in one of the South Pacific island countries. As we chatted about our respective work areas, I asked the VP as to how they went about evaluating development support requests, what types of information and data were required for the purpose, how the bank obtained such information from the rural areas, etc. He explained what they normally did - their own files on earlier grants, information from other similar countries, and people, especially locals, in the field, were used. But, he said, sometimes much depends upon the perception of the local people as to what they considered as their priority, which may be quite different from the perception of the bank. He narrated the following instance.

The development bank noted that the mosquito menace and other health hazards of a small town in one of the Pacific islands could be greatly mitigated by improving the local drainage and sewerage system. The bank was prepared to provide substantial financial support if the town authorities (council) would take up the work on a priority basis.



However, from consultations with the local councilors and discussions with other elders of the town it became evident that the local top priority at that time was to have a 'town band' more than anything else! Because the neighbouring town had such a town band and they made 'much noise' flaunting their possession during festivities! The priority perception of the locals could not be changed in spite of much discussion and persuasion attempts. Finally, a compromise was arrived at: the town council would have a band but it should also take up work for the improving the sewerage system. In such instances an outsider's (even donor's) perception of priority may not be imposed on that of the locals.

### Missing Detail Makes Much Difference - Locale specific - South Pacific Island

A town in a South Pacific island wishing to install biogas generator using the local night-soil, obtained the know-how from another developing country in the region. Financial assistance was available. Operations were started without much of a hitch. After preliminary tests and trials full-scale operations were begun. At the end of a year's operation the yield of biogas was quite small. Information was exchanged with the institutions from where the know-how was obtained. Some changes were tried out; and yet after more than three years' of operation and effort and much additional expenditure the yield had not improved significantly. A thorough examination by an outside expert showed that the locals had followed the instructions correctly, but he remembered a similar situation in another developing country - due to the difference in the acidity of the night soil of the user locale and that of the place from where the know-how was obtained. A missing apparently minor detail made a great difference. (AN)

### Contextual Appropriateness of Technology - Africa

**Piped water:** A remote African village consisting of a few small thatched dwellings dispersed over an area was visited by an international team of development assistance experts. They noted that the women folks were daily trudged a mile or two to fetch spring water. The team members felt that this was waste of time of the women which they could spend on some other 'useful activity.' A large water tank was built near the spring and water pumped into it. The water was piped to the huts and it was simply a question of turning the faucet to get water. Everyone appeared to be happy.

After six months or so some members of the team revisited the village for feedback. They noted that the faucets were not being used and the women continued to walk to the water source. On inquiry it was found that the pipes and faucets were all in good condition. The women folk explained that it was when they congregated at the water source they could exchange information about each others family - impending child birth, incidence of sickness, new visitors, etc. and coherence of the village life depended on this exchange of information. The newly introduced technology (water tap in the hut) was perceived as an impediment to their meeting and exchange of information (Fromm, cited in [Benge, 1972](#)).

**Termites:** In another instance the international team of experts visiting an African village of a few thatched huts noted that the women folks were using mud ovens for cooking purposes. The team members felt that the smoke from the fire was harmful to the women in particular. So non-smoking ovens were distributed to replace the smoking ovens.

A few months later some members of the team revisited the village to assess the situation. They found that the non-smoking ovens were being used but the roofs of the huts were gone. Most places in interior Africa are infested with termites. Earlier the smoke from the oven prevented them going through the wall of the hut to the thatch. Now there being no smoke the termites scaled up and destroyed the thatched roof. It was a dicey situation - the

choice between a non-smoking oven in a hut without a roof or a smoking oven in a hut with a roof! ([Benge](#), 1972).

## Cultural Differences - North America

An herbalist who resides on the Six Nations Territory in Southern Ontario, Canada, told me (GC) a story of his father who had practised herbal medicine for many years. A scientist from a large pharmaceutical company offered him \$35,000 Canadian Dollar in the 1950s for his treatment for cancer. He asked the scientist if he intended to synthesize the herbal medicines. The scientist said, "Yes". The herbalist replied, "Then you will not give credit to the plants." "No", the scientist responded. "Then I cannot sell you the secret", the herbalist concluded.

## Cultural Issues - Reciprocity and Consideration - North America

Several elders have taught me (GC) that whenever I harvest an herb to cure an illness then I must first ask permission and reciprocate by placing a gift such as sema (tobacco) next to the plant. They view plants as sentient and deserving of respect. If we take from them we must give something in return. Furthermore, we should only take what we need and leave enough for the plants to survive as well as for others to use.

Another piece of advice I received was to not pick the first berries I see when out picking wild berries. I understand now that if these berries are left there will be at least one berry left to seed to enable these plants to increase their numbers for the next year. It also leaves some food for the birds.

## Medicine, a different view

A few months ago during a weekend while I (GC) was being taken on a tour of a wood bison compound in the Anishinabe territory northwest of Winnipeg, Manitoba, Canada, the manager of the herd pointed out the various foods that the bison eat. He also mentioned some of the plants often eaten by the deer, moose, and elk that live in the compound. He and one of their councilmen pointed out that they use many of those plants for medicinal purposes. The manager said that one of their herbalists told him that when the animals eat these medicines their meat also becomes a medicine that it can heal humans who eat it.

## Battling AIDS by Encouraging Small-scale Healthy Farming - Tanzania, Africa

Farming with natural fertilizers and pesticides is being encouraged to improve community life and nutrition in order to prolong the lives of people with HIV and AIDS in small rural villages.

In 2001, the Global Service Corps (GSC) moved to Tanzania where 80% of its people are rural and of these 90% work in the agriculture sector. Most farms consist of about 1.5 acres. They worked first on AIDS prevention wherein 1 in 12 people are HIV positive. This translates into 1.2 million infected people of whom 670,000 are women. Raising cash crops such as coffee, the farmers are dependent on the world price for coffee. Thus, in the 1990s when the price fell the farm families were deeply impacted. Coupled with increasing numbers with HIV and AIDS leading to fewer field workers, the country in dire circumstances.

Several factors contributing to the spread of HIV/AIDS in rural Tanzania are ritual circumcision, "widow cleansing", reluctance to use condoms, and the belief that healthy looking partners are HIV free. Ritual circumcision is often carried out with unsterilized

instruments. "Widow cleansing" wherein a brother marries the widowed sister-in-law could be a problem if the husband died of AIDS. Reluctance to use condoms and the belief that a healthy looking sexual partner does not have HIV can leave people vulnerable to catching or spreading the disease.

In Tanzania the GSC teams are disseminating information and teaching the critical understanding of how HIV/AIDS spreads and the tools to think critically about the disease in order to develop strategies to protect themselves from being infected. This they will be able to better determine if the rumors and misunderstandings that they will hear from time to time are actually true. Most of the people cannot afford the current drugs, which in turn only delay its progression. [Clark](#) (2003) concludes, "Until a cure is found, that capacity of critical thinking-and a bigger ration of fresh vegetables-is, thanks to GSC volunteers, something at least a few Tanzanians can count on to fight AIDS" (p. 40).

## Prisoners and AIDS - Africa

"As the world enters the 3<sup>rd</sup> decade of the AIDS epidemic, the evidence of its impact is undeniable. The disease is robbing countries of resources and capacities in human security and development dividends. The lists of populations at risk of HIV, AIDS transmission are inexhaustible. These include youths, commercial sex workers, military personnel, drug addicts, long distance drivers and prisoners among others; but prisoners are the most neglected in terms of prevention and management strategies.

The Judicial System in most of the countries are an extreme system of a chronic illness affecting a fair criminal justice process. It suffers from a basic lack of humanity. It is not surprising for inmates to spend months or years in contaminated prisons awaiting trial! For example, the prison services have been neglected more than any other criminal justice and the situation is similar in majority of the other countries. Prisoners engage in risky sexual and non-sexual practices thereby making the prison and other custodial settings serve as breeding grounds for diseases such as HIV/AIDS, Tuberculosis, and hepatitis among others." . . . "There is need to sensitize Policy makers, Non-Governmental Organizations, Faith-Based Organizations, National HIV/AIDS Control Programs, Anti-AIDS Clubs, Prisons authorities etc, to be more sensitive and responsive to prisoners in all areas of HIV/AIDS prevention and management as the World 'celebrates' AIDS Day on 1st December, because these are the marginalized segments of the society." [Joshua & Ojong](#) (2005) detail several reasons for the deteriorating situation in the prisons. They emphasize the importance of information, education and communication (IEC) of the inmates: IEC is important in increasing knowledge and awareness, which may improve health attitude, behavior modification and risky practices in order to prevent the spread of HIV/AIDS in prisons. This should be done in the local language, which the inmates understand. However, knowledge of safe sex as a means of HIV prevention does not necessarily translate into actual safe sex practices. There have been an intensive IEC programmes to educate the general population to improve their knowledge and awareness so as to modify their behavior and practices positively. Why are prisoners left out in most cases? It is the basic right of inmates to have access to regular and well-coordinated multi-disciplinary IEC programs.

"The 3 by 5 initiative of the World Health Organization (WHO) may not reach these marginalized, forgotten HIV/AIDS risk group if they are not remembered by WHO, Policy makers, NGOs, etc; and achieving the millennium development goal of combating HIV/AIDS and tuberculosis by 2015 will be a mirage! This is because vast numbers of these incarcerated people that may be infected with the virus will be released into the wider society after completing their prison term" ([Joshua & Ojong](#), 2005).

## **Brazil's Xavante use Modern Methods to Defend their Way of Life - Mato Grasso, South America**

The people of the Xavante Nation use diplomacy and modern education techniques to educate the leaders and people of Brazil about them in an effort to protect their homelands and develop better relations with their Brazilian neighbors. The Xavante live in a lush forest homeland that they have maintained for tens of thousands of years so that it produces an abundance of plant and animal food that sustains them in a healthy life way. Here they hunt, gather, and garden in a measured thoughtful way, guided by their elders in councils who consider their impact generations into the future.

Yet their Brazilian neighbors are encroaching into the Xavante homelands daily cutting their trees and planting farms. With over 420 species of trees, 10,000 plants species and 800 bird species the territory is close to the paradise pictured in the Bible, the Garden of Eden. With such a Biblical homeland to defend the Xavante are seeking every means to save it for their future generations and for all passengers of Space Ship Earth. Who better to accomplish this task than a people who know it best who share stories about it, some of which are tens of thousands of years old.

The contrast between the Xavante Nation's lush green forest and the encircling barren lands caused by the small Brazilian farms and cattle ranches stretching as far as one can see is stark. Yet Brazil is not satisfied with this level of destruction and is planning a 1200 mile long industrial canal called a Hidrovia. Starting at the mouth of the Amazon it is projected to extend through the Xavante homeland and those of 11 other Indigenous nations.

Faced with the potential for an ecological disaster in the region as well as the annihilation of these nations several organizations have teamed up with the Xavante and their Indigenous neighbors to develop a strategy to save their homelands. They include the Cultural Conservancy, the Institute for Deep Ecology (IDE) and the Institute for the Development of Indigenous Traditions to develop a multi-pronged strategy. They are reaching out to the Brazilian public to develop understanding of them and their way of life. They walk the halls of the Brazilian governments with brief cases in hand lobbying and litigating to stop these invasions. Furthermore, they sent eight of their sons to live among the Brazilian people to learn Portuguese and how those people think and act. These youths will help their diplomatic efforts in the future.

They are working hard to keep their circle of life, circle of ceremonies, circle of songs and dances whole and active. They seek to defend their homeland by numerous means to include alliances with people and organizations of Brazil as well as NGOs throughout the world. They have much to lose as do the other people of the world. What affects them will affect us all. We need their strength, intelligence, and wisdom and they need ours ([Klasky, 2003](#)).

## **Maya People of Guatemala Recover after Generations of Oppression Central America**

Maya peoples of Guatemala rebuild their lives, communities, and their economies after nearly fifty years of war. The Maya people are renowned for their many accomplishments. Their calendar is one of the most accurate. Their mathematics was one of the most advanced at contact, having already developed calculus and being one of the first people to develop the concept of zero. Their beautiful cities, elegant pyramids, and productive agriculture are a marvel even today. They have managed their affairs admirably for millennia, yet they are not permitted to do some of the simplest human things today. They are the poorest in their homeland.

They have maintained their spirit and are slowly rebuilding their health system and economy with outside assistance. Some improvements include training nurse midwives, fair trade coffee, ADESCO an Atitlan cooperative, and tourism. These small steps are bringing a measure of health and prosperity lacking a few years ago and are in contrast to the economic and social impacts of large corporations.

On the shores of Lake Atitlan in Santa Clara la Laguna, Liz Remily and Joanna Bruno, two Presentation sisters are operating a clinic that serves the local people. They offer full obstetrics with nursing midwives, along with minor surgery provided by missionary surgeons who visit once a week. They have a general clinic and install hearing aides. The treatment is free and they charge minimal fees for the medicines. They receive their funding from their mother house in the U.S. and the Seton Institution.

The promotion of fair trade coffee is another approach to provide the Mayan farmers with a fairer return on their labor. Currently, in the free trade system a three dollar cup of espresso coffee has only eight cents worth of coffee beans in it. This benefits neither the consumer nor the farmer. Those in the middle pocket the difference. Several North American Indigenous Nations such as the Oneida Nation of New York are buying directly from the Maya people, cutting out the current middlemen. The recent trend of many farmers converting to organically grown coffee is also increasing their income. A remarkable aspect of their culture is that many of the now prosperous farmers are using some of their money to fund community projects rather than building large fancy homes.

The U.S. government's Inter-American Foundation is funding a Guatemalan NGO ADESCO. This organization is teaching and advising small coffee growers near Lake Atitlan how to grow organically. They may not use chemical pesticides and fertilizers using compost and other natural fertilizers and pesticides instead. The next step is to help the farmers organic certification, which will greatly increase their income. Shade coffee is tastier than thus some are beginning to plant fruit trees, such as limes, lemons, and bananas, among the coffee plants. This provides fruit for their families and for sale. They have also added more diversity and income with medicinal plants, beans, chilies, tomatoes, and achiote.

Tourism is another source of income, especially for people who do not have land to farm. Since many Maya people have retained their traditional dress, languages, and many of their arts, crafts, foods, and ceremonies people from throughout the world are drawn to their homeland to see them as they recall their great achievements. The Peace Accords of 1996 between the Guatemalan people and the government brought the peace that has made this possible. The tourism is not solely for a few hotels but benefits many families in the community who trade, operate guest houses and restaurants, as well as act as mountain guides, rent canoes and horses. Artisans, painters, and weavers also sell their wares wherein nearly all are Maya. While there are many problems there are many improvements ([Sprague, 2004](#)).

## Maya Birthing Practices

A physician from Costa Rica told me (GC) about his effort to bring modern birthing practices to some poor Mayan people in Guatemala. However, upon witnessing their success rate he experienced a dramatic change in his understanding of the birthing process. He observed Maya mothers birthing their babies in their dirt floor homes, experienced fewer problems than mothers and newborns experienced in his hospital with the latest state of the art technology. He observed that the midwives kept the mother and baby together and that the mother began to nurse her baby shortly after the birth. Both rebounded from the birth very quickly and seldom had illnesses or complications.



The physician commented that this was often not the case in his sterile, ultramodern hospital with advanced technology. There the babies were often separated from their mothers shortly after birth, placed in a nursery, and often given chemical formula. Many of the babies developed problems and at times so did the mothers. This process required a great deal of personnel time and skill for nurses needed to boil bottles, mix the chemical formula, and care for the sick babies.

When the physician returned to his hospital in Costa Rica he introduced new procedures that keep the mother and baby together, promote breastfeeding while in the hospital and later upon returning home, and closed the nursery. Complications and illnesses decreased for both the mother and newborn. The nurses had much more free time and some were reassigned to other wards to care for sick patients, which was what they were taught to do in nursing school. Lastly, they have an extra room to use for other more productive tasks.

## CONCLUDING REMARKS

We are living in dynamic times of great advances in global knowledge and technology. But, we must ask if the knowledge and technology are being shared sufficiently, equitably, and appropriately among Indigenous and rural peoples? Knowledge and technology sharing among Indigenous peoples and the technological cultures are at a critical crossroad. The knowledge and technology are essential for the well-being of not only the Indigenous and rural peoples but also the economically and technologically advanced peoples. Both can gain from the exchange of ideas. On the other hand if the interchange is handled inappropriately it can be either of little benefit for the Indigenous people at best or very harmful at worst. Therefore, much planning and cross cultural communication must occur before sharing begins.

This communication can be done on a broad sampling basis initially to get a tenor of the problems that may be encountered. However, before actual information sharing begins between a specific community and a government, agency or NGO, the organization intending to conduct the sharing must communicate directly with the leaders or representative council of that community to determine if they would like to share information, what information they would like to share, and the most effective and compatible manner to exchange it. What roles will libraries play in this process? Throughout respect for the Indigenous and rural peoples, their cultures, territories, and resources is essential, as is the long term survival of the peoples, cultures, languages, and ecosystems. The Hippocratic oath provides a useful guideline here: Do no harm.

## REFERENCES AND ADDITIONAL SOURCES

- Akhtar, S. (guest editor) (1993). Equity, growth and participation: the information age, Development. *Journal of the Society for International Development* , 3(3) (whole issue).
- Appleton, H., Fernandez, M.E. and Hill, C.L.M. (1995) Claiming and using indigenous knowledge. In: *Missing Links: Gender Equity in Science and Technology for Development*.
- Bengé, R. C. (1972). *Communication and identity*. London: Clive Bingley.
- Bhatia, P., & Bhatia, S. (2005). DakNet. *IT Information Technology*, 15(2), 30-32.
- Bhatnagar, S., & Schware, R. (eds.) (2000). *Information and communication technology in development: cases from India*. New Delhi: Sage Publications.
- Crandall, R. W. (2001). The digital divide: bridging the divide naturally. *Brookings Review*, winter, 38-41.
- Clark, C. (2003). Battling AIDS by encouraging small-scale healthy farming - Tanzania, Africa. *Earth Island Journal*, Autumn, 36-40.



- Emerging information and communication technologies and developing countries: a global agenda for collaborative research, Cairo Workshop report (1993). *Information Studies*, 2(3), 152-160.
- Farb, Peter (1973). *Word play: what happens when people talk*. New York, N.Y.: Knopf.
- Florina, C. (2001). Crossing the digital divide. *Executive Excellence*, 4 January 2001, 2-3.
- Hall, E. T. (1973). *The silent language*. New Delhi: Affiliated East-West Press.
- Hammond, A. L. (2001). Digitally empowered development: the growing gap. *Foreign Affairs*, 80(2), 96-102.
- Holmes, D., & Brealey, N. (2002). *eGov - eBusiness strategies for government*. London.
- Holt, G.E. (1995). Pathways to tomorrow's service: the future of rural libraries. *Library Trends*, 44(1), 190-215.
- Joshua, I.A., & Ojong, M.M. (2005). [Prisoners: the forgotten HIV/AIDS risk group](http://allafrica.com/stories/200512030032.html). *The New Times Publications Sarl*, Kigali - Rwanda, Saturday, 03 December 2005. Available at: <http://allafrica.com/stories/200512030032.html>
- Klasky, P.M. (2003). The unbroken circle. *Earth Island Journal*, 18(2), 31-35.
- Kumar, S. (2001). Indigenous communities' knowledge of local ecological services. *Economic and Political Weekly*, July 28, 36(30), 2859-2869.
- LaDuke, W. (2004). The Dakota Winds - North America, Great Plains. *Native Americas*, Fall/Winter, 52-54.
- Lahiri, A. (2001). The widening digital divide: community information services, the state-of-the-art in India. *CurzonCo Seshachalam Endowment Lecture*, Bangalore, 5-7 December 2001. Bangalore: Sarada Ranganathan Endowment for Library Science.
- Levy-Strauss, C. (1966). *The savage mind*. Chicago: University of Chicago Press.
- McChombu, K.J. (1993). *Information needs and seeking patterns for rural people's development in Africa. Report on phase I of the INFORD Research Project*. Gabaronne, Botswana: Department of Library and Information Studies, University of Botswana.
- McConnell, S. (1999). [The first mile of connectivity: Connecting with the unconnected](http://www.fao.org/sd/CDdirect/CDre0031.htm). *SD: Knowledge: the first mile of connectivity: connecting with the unconnected*. *FAO*, *SDDimensions*, April, <http://www.fao.org/sd/CDdirect/CDre0031.htm>
- McConnell, S. (1999). *Global trends. Connecting with the unconnected. Proposing an evaluation of the impacts of the Internet on unconnected rural stakeholders*. [fao.org]
- McKie, R. (2005). [Ancient legends warn of modern disaster]. *Guardian Newspapers Limited*, 2005. *The Hindu*, 2005 December 05, p. 12.
- Menou, M.J. (ed.) (1994). *Measuring the impact of information on development*. Ottawa, CA., International Development Research Centre.
- A mission to take IT to poor children (2001). *The Hindu*, 2001-12-05.
- Meyer, H.W.J. (2005). [The nature of information, and the effective use of information in rural development](http://informationR.net/ir/10-2/paper214.html). *Information Research* 10(2), paper 214, available at: <http://informationR.net/ir/10-2/paper214.html>
- Morino, M. (1994). Assessment and evolution of community networking. In: the *Apple Conference on Building Community Networks*, Cupertino, California, May 3, 1994.
- Neelameghan, A. (1955). Abstracting services in the medical sciences. *Annals of Library Science*, 2(3), 89-96.
- Neelameghan, A. (1981). Information transfer: a third world perspective. *IFLA Journal*, 7(1); p. 8-18.
- Neelameghan, A., & Prasad, K.N. (comp.) (2003-2004). Social informatics: a select bibliography - Part 1,2, 3, and 4. *Information Studies*, 9(3-4), 147-310; 10(1-2), 1-

- 519.
- [PEACESAT](http://www.peacesat.hawaii.edu). <http://www.peacesat.hawaii.edu>
  - Rodda, A. (1991). *Women and the environment*. London: Atlantic Highlands, N.J. Zed Books.
  - Rose, J. (2000). Multipurpose community Telecentres in support of people-centered development. *Information Studies*, 6(1), 5-28.
  - Scollon, D. (2001). Survivors: For Borneo's People, It's Not Just a TV Show. *Earth Island Journal*, 15(4), 2000-01, Winter; p. 10.
  - Seshia, S., Garoupa, C., Lenzer, B., & Gulati, N. (eds.) (2005). *Traditional wisdom in natural resources management - the only way to conserve*. Dehra Dun, India: Rural Litigation & Entitlement Kendra, 230 p. illus.
  - Shiva, V. (2000). *Staying alive: women, ecology and development*. London: Zed Books.
  - Sprague, S. (2004). Maya People of Guatemala Recover after Generations of Oppression - Central America. *Native Americas*, Spring, 54-59.
  - Upadhya, P.V., & Ravichandra Rao, I.K. (2001). Rural community development information service and related aspects: a literature review. *Information Studies*, 7(3-4), 191-250.
  - White, W. D. (1994). Outreach program for the information highway: designing programs for all. In: *NIT (New Information Technology) '94, 7th International Conference, Planning the Global Information Infrastructure*, Alexandria, Virginia, November 18-20, 1994.
  - Witten, I.H. (2001). Vision of the digital library. *Digital libraries: dynamic landscape for knowledge access and management. The 4th International Conference of Asian Digital Libraries*, 10-12 December 2001, 3-15.

***Bibliographic information of this paper for citing:***

Neelameghan, A. & Chester, G. (2006). "Environmental Knowledge and Marginalized Communities: The Last Mile Connectivity." *Webology*, 3(1), Article 24. Available at: <http://www.webology.org/2006/v3n1/a24.html>

**[This article has been cited by other articles.](#)**

Copyright © 2006, A. Neelameghan & Greg Chester