PROVISION OF INFORMATION TO USERS AT THE UNITED NATIONS ENVIRONMENT PROGRAMME HEADQUARTERS, NAIROBI

BY

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DECLARATION

DECLARATION BY CANDIDATE

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ABSTRACT

Efficient and effective provision of information services is essential to the success of an organization since it improves decision making, enhances efficiency and provides a competitive edge to any organization both big and small. Quality provision of information services is something that information providers cannot ignore anymore in any organization. The aim of this study was to investigate the provision of information services to users at UNEP with a view to identifying the gaps that may be addressed to enhance provision of information services at UNEP and to adopt a model for effective and efficient provision of information services. The specific objectives of the study were; identify information services available at UNEP; determine the information provision methods applied at UNEP; identify the information needs and information seeking behaviour of users at UNEP; establish the range, sources of environmental information and information resources available at UNEP; determine which tools are used for the collecting, storage, and dissemination of information; establish the challenges affecting users at UNEP in accessing the relevant information and make practical recommendations to the challenges affecting users at UNEP for more efficient and effective provision of information to the UNEP information user community. This study was based on two models; the Wilson's theory of information behaviour (1996) and the Niedźwiedzka's (2003) new model of information behaviour. Data was collected from one hundred and fifteen users including sixty researchers, forty five students and ten senior managers of UNEP. Qualitative and quantitative research methods were used where data was collected using semi-structured interview schedules and document review. Data was analyzed thematically using qualitative data analysis technique. The study identified some gaps in the provision of information services at UNEP. Among the

significant findings is that the level and standards of information provision and services at UNEP is limited occasioned by among other factors lack of understanding of user needs when developing the information resources at UNEP. Among the major recommendations of this study is that the information professionals should enhance the quality and level of information services at UNEP. In addition, information managers should do their best to understand the information needs of the users and align them to the generation of information resources to enhance more efficient dissemination of information.

DEDICATION

To my Dear wife Alice,

Daughter Bernice and Son's, Elvis and Jeff

Thank you all for the sacrifice and support

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LIST OF ACRONYMS AND ABBREVIATIONS

CFCs	Chlorofluorocarbons
DTIE	Department of Technology, Industry and Economics
FAO	Food and Agricultural Organization
GDP	Global Domestic Product
GHG	Green House Gases
GMO	Genetically Modified Organism
GPS	Global Positioning System
ICT	Information Communication and Technology
IPCC	Intergovernmental Panel on Climate Change
ITU	International Telecommunication Union
JCU	James Cook University
MDGs	Millennium Development Goals
NGO	Non-Government Organization
OARE	Online Access to Research in the Environment
QDA	Qualitative Data Analysis
UN	United Nations
UNALIS	United Nations in Africa Library Information System
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Social and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlement Programme
UNHCR	United Nations High Commissioner for Refugees
UNIC	United Nations Information Centre
UNICEF	United Nations Children's Fund
UNIFEM	United Nations Development Fund for Women
WHO	World Health Organization
WMO	World Meteorological Organization

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Chapter 1

Introduction to the Study

1.1. Introduction

Most managers would agree that good information is essential to the success of an organization. It is important to note that today the importance of information services in general as a vital resource for national development is unquestionable. If an organization is to survive and prosper, it must understand both its own internal workings and the nature of the environment to which it has to adapt and respond. Access to right and timely information, improves decision making, enhances efficiency and provides a competitive edge to the organization which knows more than the opposition.

The importance of information services in general in any organization as an important resource which requires management support is agreeable. The biggest challenge today is to enable transfer of information from the creator to consumer and making sure it is used by the consumer. The transfer of information from the producer to the consumer needs to be accelerated as well as improving the access to information at the right time and in an appropriate form.

1.2 Background information

1.2.1 United Nations Environment Programme (UNEP)

United Nations Environment Programme (UNEP) is the United Nations system's designated entity for addressing environmental issues at the global and regional level. Its mandate is to coordinate the development of environmental policy consensus by keeping

the global environment under review and bringing emerging issues to the attention of governments and the international community for action (UNEP 2007). UNEP is guided to achieve this by its mandate and objectives which emanate from:

a). UN General Assembly resolution 2997 (XXVII) of 15 December 1972;
b). Agenda 21, adopted at the UN Conference on Environment and Development (the Earth Summit) in 1992;
c). the Nairobi Declaration on the Role and Mandate of UNEP, adopted by the UNEP Governing Council in 1997;
d). the Malmö Ministerial Declaration and the UN Millennium Declaration, adopted in 2000; and
e). recommendations related to international environmental governance approved by the 2002 World Summit on Sustainable Development and the 2005 World Summit (UNEP, 2007)

UNEP was established after the 1972 UN Conference on the Human Environment, held in Stockholm, Sweden, proposed the creation of a global body to act as the environmental conscience of the UN system. In response, the UN General Assembly adopted Resolution 2997 on 15 December, 1972 creating:

a). the UNEP Governing Council, composed of 58 nations elected for four-year terms by the UN General Assembly, responsible for assessing the state of the global

environment, establishing UNEP's programme priorities, and approving the budget;

b). the UNEP Secretariat, with its headquarters in Nairobi, Kenya, to provide a focal point for environmental action and coordination within the UN system, headed by an Executive Director, with the rank of UN Under-Secretary-General; and

c). a voluntary Environment Fund to finance UNEP's environmental initiatives, to be supplemented by trust funds and funds allocated by the UN regular budget (UNEP, 2006)

The Stockholm Conference marked the formal acceptance by the international community that development and the environment are inextricably linked. It prompted a growing body of research that has greatly improved understanding and awareness of critical environmental issues over the past three-plus decades, and it provided the impetus for new national, regional and international environmental legislation worldwide. In the subsequent two decades, a proliferation of environmental conferences endangered species, controlling the movement of hazardous wastes have occurred and the most successful and well-known Convention from this period was the 1987 Montreal Protocol of the Vienna Convention for the Protection of the Ozone Layer, an example of international environmental cooperation whose inspiration reverberates to this day.

1.2.1.1 UNEP around the world

UNEP's global base is in Nairobi, Kenya. It is one of only two UN programmes headquartered in the developing world (the other is UNEP's sister agency UNHABITAT,

which is also located in Nairobi). Being based in Africa gives UNEP a first-hand understanding of the environmental issues facing developing countries.

UNEP's global and cross-sectoral outlook is reflected in its organizational structure, its activities and its personnel. UNEP staff comes from nearly 100 countries. About one-third of UNEP's approximately 1,000 staff members live and work in Nairobi; the rest being located around the world in more than 28 cities in 25 countries.

UNEP has a major office in Paris, France, where the Division of Technology, Industry and Economics (DTIE) is headquartered. UNEP DTIE also has branches in Geneva, Switzerland, and Osaka, Japan, (UNEP, 2007).

UNEP is the voice for the environment in the UN system. It is an advocate, educator, catalyst and facilitator, promoting the wise use of the planet's natural assets for sustainable development. The organization works with many partners, including UN entities, international organizations, national governments, non-governmental organizations, business, industry, the media and civil society (UNEP, 2007)

UNEP's work includes:

a). Assessing global, regional and national environmental conditions and trends.
b). Developing international and national environmental agreements and legal instruments.

c). Strengthening institutions for the wise management of the environment.

d). Integrating economic development and environmental protection.

e). Facilitating the transfer of knowledge and technology for sustainable development.

f). Encouraging new partnerships and approaches within civil society and the private sector.

1.2.2 UNEP's role in communicating environmental information

As stated above UNEP is the voice for the environment. Its main mission "to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations", guides it in achieving this noble task (UNEP 2007).

UNEP works with many partners: United Nations entities, international organizations, national governments, non-governmental organizations, business, industry, the media and civil society. Having a role like to facilitate the transfer of knowledge and technology for sustainable development, it has to lead, be seen to be leading in advocating for all ways to manage our resourceful environment and help stop global warming which brings about climate change.

The international community needs to be able to evaluate, predict and respond to existing and emerging needs if it is to effectively address the environmental issues of the twenty-first century. According to UNEP organizational profile, it is supposed to provide access

to environmental data and information and help governments to use environmental information for planning for sustainable development.

UNEP through its Division of Communication and Public Information communicates its core messages to all stakeholders and partners, raising environmental awareness, influencing attitudes, behaviors, and decisions related to the local and global environment. It also disseminates UNEP's environmental messages through the media, the internet, audio visual and printed products, events such as World Environment Day, and environmental awards like Sasakawa Prize, Champions of the Earth and Focus on Your World Photographic competition (UNEP 2007).

1.3 An overview of environmental information in Kenya

Kenya Environmental Information Network (KEIN), 2008 says that Environmental Information (EI) is very essential to national development issues such as poverty alleviation, food security, and improvement of quality of life, economic planning and natural resources management. It also plays a significant role in regional integration and international cooperation. Consequently, environmental Information is very critical to the development of various sectors of the economy such as Petroleum, Solid Minerals, Forestry, Agriculture, Transport and Aviation, Environment, Tourism, Population Census, Education, Health and Water Resources. It is no wonder then that in the developed countries unlike the developing countries; most planning and decision-making processes are based on EI, which is now applied to obtain solutions to a wide variety of economic, social and environmental problems.

Kenya, like many other developing countries, is yet to gain the ground it is expected. We still find many Kenyans who are ignorant of the fact that the management of environment can determine their peaceful future and co-existence of conflicts instead. Availability of environmental information can help in harnessing and enhancing access to information and knowledge so as to support the management of Kenya's environmental resources as assets for sustainable development.

KEIN, a project initiated by United Nations Environment Programme (UNEP) together with the National Environment Management Authority (NEMA) has been given the responsibility of ensuring that Kenyans all over the country are assisted in accessing environmental information in the country. It helps in establishing a vibrant network of Environmental Information enhancing optimal use of environmental information as a vital resource to inform decision making at all levels of national planning to promote sustainable development (KEIN 2008).

Currently, environmental information is acquired and stored mostly in analogue form by various agencies of government such as Ministries of Environment and Mineral Resources, NGOs and by the private sector for their own use and applications with problems of unnecessary duplication, lack of accessibility, and varying standards and formats. There is no coordinated production, management and dissemination of geospatial datasets and other forms of information that are commonly used by many agencies. Neither is there any policy for data quality, access, sharing and exchange (KEIN 2008).

Environmental Information is a critical national resource considering its vital role in monitoring of desertification, erosion, flooding, pollution, degradation etc. According to KEIN (2008), the effective use and application of environmental information to the national development will assure among others:

a). Efficient and sustainable national planning and development;

b). Improved national revenue generation;

c). Effective inventory and monitoring of the environment;

d). A boost in agricultural production;

e). Efficient exploration and distribution of petroleum resources;

f). A boost in Tourism;

g). Efficient political administration of the nation;

h). Improved Health-Care, Educational and Sports facilities planning, development and delivery.

The above will translate to enhance development and better health standards which is a boast to the economy since growth in areas like tourism and agriculture will be realised.

1.5 Statement of the Problem.

UNEP Agenda 21, (2004), indicates that in sustainable development, everyone is a user and provider of information, which includes data, information, appropriately packaged experience and knowledge. The need for information arises at all levels, from that of senior decision makers at the national and international levels to the grass-roots and individual levels

One of the objectives of Agenda 21 was to establish supporting mechanisms to provide local communities and resource users with the information and know-how they need to manage their environment and related resources in a sustainable manner, applying traditional and indigenous knowledge and approaches when appropriate. A proper gauge to this is by understanding the information services and the quality of their provision. Use of electronic systems to enhance provision of information in many organizations today has facilitated better delivery to the users. Not many users however are informed of what information systems they can identify with and use comfortably to meet their information needs.

In the world today, users of environmental information are increasing by the day. These users depend on information generated by UNEP and other institutions to cater for their information needs. At UNEP, however provision of information services at UNEP is not up to the expected standard. The information materials generated are not in line with the information needs of users thus production of numerous publications which few users can benefit from. It is thus necessary to enhance the provision of information and the related

information services to these users which formed the basis of this study. The accuracy, currency and format of the information provided at UNEP cannot be compromised if the satisfaction of these users will be guaranteed. In addition there is no significant link between these materials and the localized information needs of users. During the 9th session of African Ministerial Conference on Environment (AMCEN) held in Kampala July 2002, it was recognized that the absence of adequate and relevant information was a major constraint to environmental management planning and implementation of global and regional conventions in many countries in Africa. The information needs of users at UNEP require thorough understanding in order that the information resources generated are relevant to these needs. For these users to participate in environmental decision-making, they need to have access to the right information, whereas the absence of this critical resource is a big obstacle to sustainable and effective decisions.

1.6 Aim of the study

The aim of this study was to investigate the provision of information services to users at UNEP and to adopt a model for effective and efficient provision of information services at UNEP.

1.7 Specific objectives of the study

The specific objectives of the study are to:

a). Identify the information services available at UNEP and the level of satisfaction of customers with the services.

b). Determine the information provision methods applied.

c). Identify the information needs and information seeking behaviour of users.

d). Establish the range of information resources available.

e). Determine which tools are used for the collecting, storage, and dissemination of information.

f). Establish the challenges affecting users at UNEP in accessing the relevant information.

g). To provide practical recommendations to the challenges affecting users at UNEP.

1.8 Research Questions

In order to achieve the above objectives, the following research questions have been formulated to guide the study:

a). What information services does UNEP provide to its users?

b). What standards of information provision does UNEP apply?

c). What is the range of information required by users who visit UNEP?

d). What is the range of information sources and resources available to users at UNEP?

e). How does UNEP supply information for sustainable development in Kenya?

f). What are the hindrances to provision and access to information at UNEP?

g). What practical steps can be applied to overcome these hindrances?

1.9 Assumptions of the study

This study will be carried on the basis of the following assumptions:

a). Users at UNEP do not get access to accurate information since their needs are not known.

b). There is a possibility of providing improved access to information at UNEP when the whole range of information sources available are identified and documented and they are in line with information user needs.

1.11 Scope and limitations of the study

The study focused on the users of information resources at the United Nations Environment Programme headquarters in Nairobi.

UNEP has two categories of users, Internal and External users. The internal users include staff members of the institution who are not information providers. These were Divisional Directors, Professional Staff, General Staff, Junior Professional Officers, United Nations Volunteers, Consultants and Interns. The study targeted these users who formed 40% of the study population.

The external users consisted of researchers and university students (from both the local and international universities. Also in this category were staff members of other UN agencies who rely on the information sources from UNEP to make related decisions. This formed the remaining 60 % of the users.

Since UNEP is an international organization it was expected that some users who are not based in Nairobi would form part of the research population. However this was not practically possible given the distance involved and schedules of work of these users, due to the geographic time difference.

1.10 Significance of the study

Environmental information is a critical resource to the world today. All countries, Kenya included are making more than 80% of their decisions based on the environmental management. The increased significance in which environment has taken the lead in many management decisions means that more people need to access accurate and relevant information in a timely manner. This study was expected to have significance in two fold; theoretical and practical. On the theoretical front, the study was intended to create an understanding and appreciation of information services at UNEP headquarters in Nairobi. Understanding the range of information services available will be of significance to the policy makers, decision makers and users of this information. The study was also expected to enhance effective and efficient utilization of information resources which further led to efficient services by various information providers at UNEP.

Climate change and environmental conservation has never been taken seriously by the world like today. There is a lot of information generated from various quarters that are aimed at creating knowledge and awareness in the field of environment. Kenya has just experienced a long span of drought, which was largely caused by encroachment of water

towers and cutting down of trees. On a practical view, availability of such information will be of great significance to generations to come in preservation of environment and effects of some human related activities to their lives. Repackaging this information in a manner that all users will benefit from is of critical importance. It is envisaged that the study will enable the policy makers and information professionals in the field of environment to put into consideration the needs of their users before they disseminate this knowledge and information.

Most of the information, knowledge and systems available in the field of environment originate from the developed world and their use is targeting the developed world problems and users. There is not much harnessed from the developing world including Kenya, and the study can help stakeholders in the information field to identify and document information resources available elsewhere and appropriate to the Kenyan users.

The study will help link the information creators both in the developed and developing world with the relevant users based on the needs of these users. This study has been done when the whole world is expected to attend a global meeting headed by the United Nations at Copenhagen Denmark in December 2009, to discuss issues to do with the world state of the environment and to put in place protocols or guidelines that countries must follow to ensure environmental sustainability. If access to environmental information was not important then this meeting would not have the backing it has from almost all countries in the world. The fact that developing countries are at least for one

talking with one voice as how to adapt and get things better in the environmental circles underscores this importance.

Many environmental information generating institutions do not have the capacity or knowledge of how to properly coordinate its production and management until the intended user benefits to the maximum from this information. Through the leadership of UNEP, many environmental information generators will learn this process and thus put in place proper mechanisms to harvest and store information and datasets for current and later use. In addition since many environmental information consumers have incomplete and inaccurate information regarding the health and environmental effects of particular products, the UNEP could intervene and provide reliable information to users. The results of this study therefore, can be replicated by other institutions dealing with the environment.

1.12 Definition of terms

Climate **- It is the** long-term statistical average of weather conditions**,** (James W. 2007)

Climate change **-** It is the change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which in addition to natural climate variability is observed over comparable time periods", (IPCC, 2006).

Greenhouse gases **-** They are the chemical compounds found in the Earth's atmosphere that allow sunlight to enter the atmosphere freely, absorb this infrared radiation and trap the heat in the atmosphere, (Energy Information Administration, EIA, 2007)

Climate variability **-** The fluctuation about the mean temperatures over a long period of time, (James W. 2007)

Environmental Information **-** It is the non-exhaustive list of environmental elements such as air, water, soil, environmental policies, programmes and legislation, (UN ECE, 2000)

Global warming **–** It is the increase in the average measured temperature of the Earth's near-surface air and oceans since the mid-20th century, and its projected continuation, (Berne Emma, 2008)

***Sustainable development* –** It is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but in the indefinite future, (United Nations, 2007)

***Information* -** Data that has meaning and can be used for decision making. Information is anything that is capable of being perceived, which includes written communications, spoken communications, photographs, art, music and anything that is perceivable.

***Information needs* -** It is an individual or group's desire to locate and obtain information to satisfy a conscious or unconscious need. The 'information' and 'need' in 'information need' are inseparable interconnection. Needs and interests call forth information, (Wikipedia, 2008)

***Cognitive needs* -** They rise as an attempt to find sense out of phenomenon, but also can be stimulated by common, non-utilitarian curiosity, (Wilson, T.D. 1996).

***Information behaviour* -** It is the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking, and information use, (Wilson T.D, 2000)

***Intervening variables* -** Numerous significant determinants of information behaviour which can be personal, role-related or environmental, (Wilson, T.D. 1996)

Integrated Information Systems - An expansion of a basic information system achieved through system design of an improved or broader capability by functionally or technically, relating two or more information systems, or by incorporating a portion of the functional or technical elements of one information system into another, (Sci-Tech Dictionary, 2003).

Information Seeking Behaviour - It is the purposive seeking for information as a consequence of a need to satisfy some goal, (Wilson T.D, 2000)

Chapter two

Literature Review

2.1 Introduction

This chapter discusses the theoretical framework which is appropriate for this study. The chapter goes on to review literature that is related to the field of interest in this study. The literature reviewed generally brings out the importance of information as a resource and why users need to have access to it, as well as the relationship between information and the various aspects of environment which is the main concern of the mother agency, UNEP. The literature is reviewed to gain an understanding of methodologies and findings from earlier studies related to provision of information to users.

The literature reviewed is intended to bring out the link between information, information needs and decision making, sources of information, and access to information by the users. Literature on climate change which has a global concern to the world is also reviewed and importance of users accessing this information which can help them adapt to or tackle climate change is also brought out.

2.2 Theoretical framework

Theoretically, information behaviour is one of the richest research areas in the field of library and information science. Since the calls for conceptual enrichment within the field of information behaviour in the post-1978 literature, much effort has been expended to generate new theories and develop new models of human information behaviour. There has also been a paradigm shift from focus on the system to focus on the user. During the

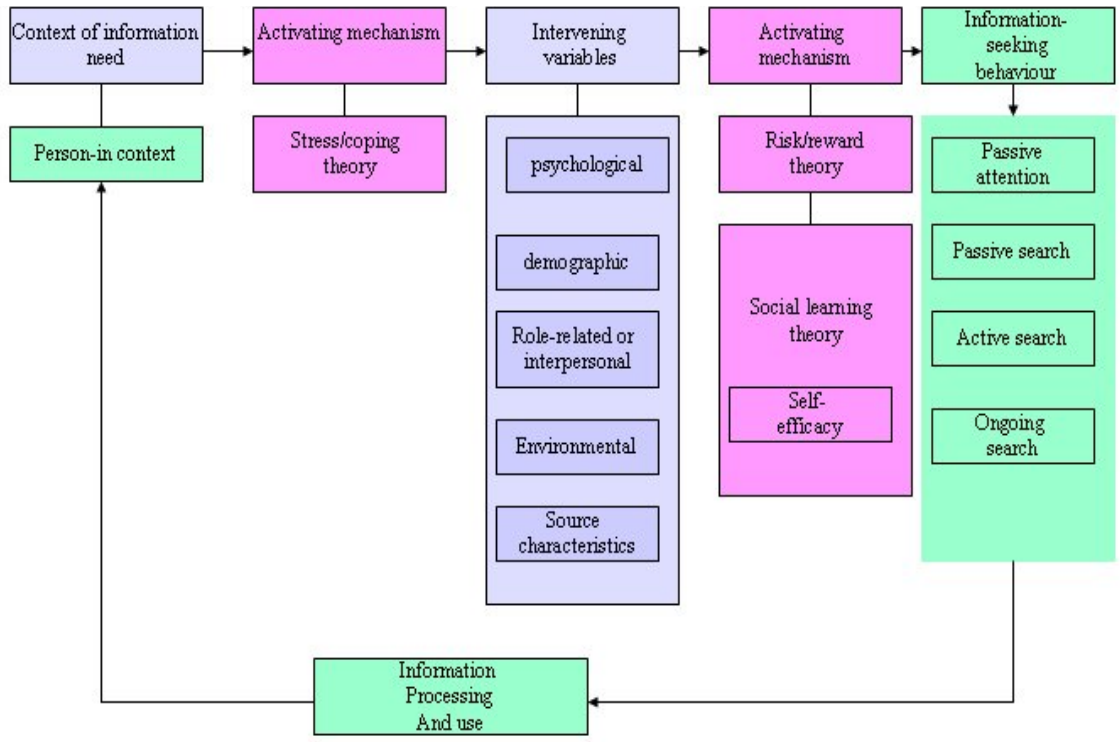
sixties and seventies the focus of the studies was rather on the system and researchers tried to understand the users and their needs through the study of the system or the resources used. Since the paradigm shift, researchers have paid more attention to the user and their characteristics. Different approaches have been adopted for the study of information behaviour of users and new methodologies have been developed or adopted from other fields such as social sciences, (Jamal 2005).

In this study the researcher has mainly applied the theory of information behaviour and more so the Wilson, (1996) model of Information behaviour and its modifications from various people. The new model of information behaviour as designed by Niedźwiedzka (2003) is also applied.

The concepts founding Wilson's original model were presented in 1981 and its variation was presented in 1999. Wilson's model is one of several employed models in research concerned with information use and users. These models present the relationships among theoretical propositions and processes connected with identification and satisfying one's information needs, simplified. Most of the information behaviour models borrow a lot from psychology and thus we have most of them grouped under cognitive, social, socio-cognitive or organizational perspective models. Wilson's model falls mainly in the socio-cognitive perspective which underlines the influence of the social environment on a person's knowledge. In this kind of perspective, there is an assumption that information behaviour strongly depends on the processes of social learning.

Most of the former models however perceived information seeking, searching and use as associated with the different stages of a problem-solving process, the stages being: problem recognition, problem definition, problem resolution, and (where needed) solution statement. Wilson's revised model of 1996 (**Figure 1**) shows the cycle of information activities, from the rise of information need to the phase when information is being used. It includes various intervening variables, which have a significant influence on information behaviour, and mechanisms which activate it.

Figure 1: Wilson's general model (1996)



Source: Wilson T.D (2005)

2.2.1 Components of Wilson's Model of Information behaviour

a). The context of information

Niedźwiedzka (2003) notes that Wilson's model assumes two propositions; first, that information needs are secondary needs, caused by primary needs, which in accordance with definitions in psychology can be defined as physiological, cognitive or affective. Cognitive needs arise as an attempt to find sense and order in the world, and are the realization of a need to explain and make sense out of phenomena, but also can be simulated by common, non-utilitarian curiosity. The rise of a particular need is influenced by the context, which can be the person (him or herself), or the role the person plays in work and life, or the environments (social, political, economical, technological, etc.). This is an ideal situation at UNEP. The primary need for users at UNEP is management of environment. To them how this information is translated to information is a difficult issue. Rarely do they realize that information is the primary need they need for management, and probably this is why there is no much emphasis to the information provision which is in line with the specific needs of the users.

Olechnicki and Załecki, (2000), in relation to the personality feature of the Wilson's model opine that individual features form a unique personality and strongly determine information behaviour of an individual. He also notes that personal characteristics influence choice and hierarchy of information needs, and how strong they are. This relates well in this study since at UNEP different levels of staff members, namely professionals and general staff who are likely to seek information in very many ways, and this can greatly affect the way this information is presented by the organization.

From Wilson's model, one can deduce that in spite of individual features, the information needs of the same persons can vary depending on the changes in environment. The features of the roles a person plays in life, including professional roles, are the effect of the behaviour patterns established in a society for the particular role, for example, mother, leader, manager, environmentalist or member of a particular group. Certain roles indicate specific information needs.

b). Intervening variables

Wilson, (1996) drawing upon research from various fields (psychology, sociology, decision-making, etc.), points out numerous significant determinants of information behaviour. Like the factors influencing the occurrence of information need, they can be of a personal, role-related or of environmental nature.

The personal variables include psychological and demographic variables. Among the psychological variables are outlook on life and system of values, political orientation, knowledge, style of learning, emotional variables, attitude towards innovation, stereotypes, preferences, prejudices, self-perception (self-evaluation of knowledge and skills), interests, and knowledge of the subject, task, information or search system. UNEP in a way characterizes the information in terms of who is it they will help. Some materials could be strictly towards women, youth and the environment, both of which the content is determined by the personality that is targeted. Demographic variables include sex, age, social and economic status, education and job experience, etc. In his model

Wilson separates psychological and demographic variables. The information resource at UNEP too as mentioned earlier can be geographically biased. There are some systems and resources which are specifically for developed countries due to their cost and packaging.

The role a person plays (usually there are several, including professional role) situates an individual in a particular place in a social system and in an organization. This creates certain opportunities and barriers in access to information. Role-related or interpersonal variables encompass job character, requirements, regulations and limitations; standards and patterns of behaviour established (in a particular professional category); the place a person occupies in organization or whole system of organizations; a typical hierarchy of values; and level of responsibility.

Environmental variables, which can be analyzed on a country, local or organizational levels, include legislation, economical situation, and level of stabilization, organizational structure of a sector, information culture, IT technology, localization of information sources, type of organization, organizational culture. There is a great application of legislation in determining the users of information. Technology comes in due to the systems that have been put in place to enhance information access. The issue of legislation is important especially to electronic access to information which requires controls owing to copyright rules among other legislation.

2.2.2 Mechanisms that activate information behaviour.

In his model, Wilson notes that not every need gives an incentive to undertake activities leading to seeking information. One of the activating mechanisms, according to Wilson, can be explained by a stress/coping theory. In this theory, Wilson says that an individual does not engage in seeking activities if he or she is convinced that the possessed knowledge is sufficient to understand the situation and make a decision. If a user lacks such conviction, the stress connected with danger of making a mistake, trespassing social or legal norms occurs, the bigger the stress the bigger is the motivation to look for information, up to a certain point where the stress paralyses such activities.

The risk/reward theory according to Wilson, (1999) explains why in some situations, people seek information and some do not, and why certain information sources are more frequently used than other. In UNEP there could be preferred sources of information, of which the research revealed, which depends on the amount and nature of perceived risk resulting from giving up information seeking. This risk can be of unnecessary expenditure and time loss, especially so in the developing countries where budges are too minimal.

a). Acquiring, processing and use of information

Wilson (1999) notes that among many models of acquiring information there are passive attention, passive search, active search and ongoing search. Passive attention mode of information from the environment can be for example when the TV or radio is on. Without person's intention and purpose to look for information he/she is able to

assimilate some information. Passive search applies to those occasions when a particular type of behaviour results in acquisition of information that happens to be relevant to the individual. The third, active search, takes place when a person actively seeks out information. The fourth, an ongoing search, means continuing search carried out to update or expand area of information.

Information obtained by a user is then processed, becomes an item of person's knowledge, and is used, directly or indirectly, to influence the environment and, as a consequence, create new information needs.

However this model is not an end to itself because, since its inception it has been criticized by various researchers, among them Niedźwiedzka, Barbara**,** (Niedźwiedzka 2003), says that Wilson's model cannot be used to describe managers' information behaviour, since managers basically are not the end users of external information from organization or computerized information services, and they acquire information mainly through various intermediaries. Therefore, the model cannot be considered as a general model, applicable to every category of information users. This is true at UNEP as well since not all users go out to seek information on their own. We have users especially Directors of various departments who depend upon their juniors to seek for and acquire relevant information for their needs.

Niedźwiedzka's new proposed model encompasses the main concepts of Wilson's model, such as: person-in-context, three categories of intervening variables (individual, social

and environmental), activating mechanisms, cyclic character of information behaviors, and the adoption of a multidisciplinary approach to explain them. However, the new model introduces several changes. They include:

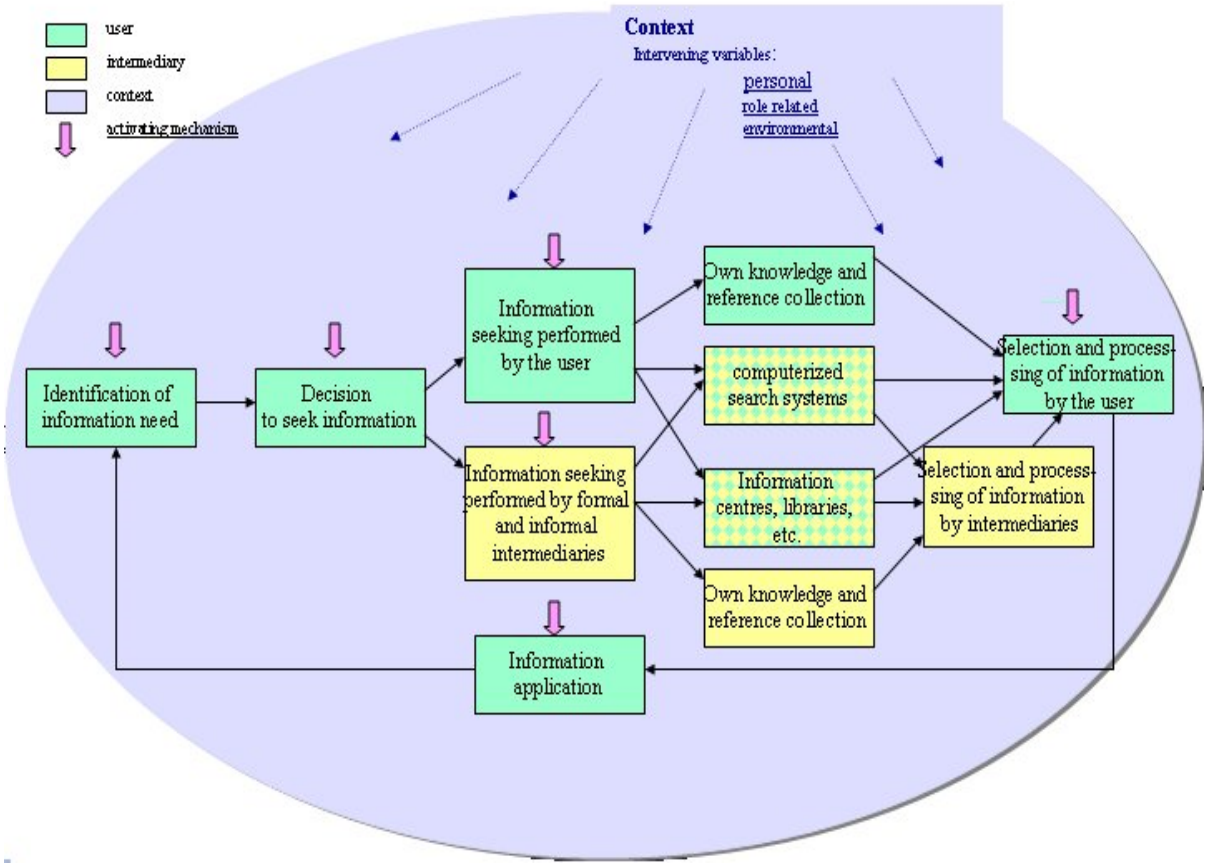
a). identification of 'context' with the intervening variables;

b). immersion of the chain of information behaviour in the 'context', to indicate that the context variables influence behaviour at all stages of the process (identification of needs, looking for information, processing and using it);

c). stress is put on the fact that the activating mechanisms also can occur at all stages of the information acquisition process;

d). introduction of two basic strategies of looking for information: personally and/or using various intermediaries

Figure 2: Niedźwiedzka's new proposed model (2003)



Source, Niedźwiedzka, B (2003)

This new model shows two basic strategies of information seeking:

a). a user seeks information personally, or

b). a user uses the help or services of other people.

According to Niedźwiedzka a user can choose one, the other, or both of the strategies. A fully independent user applies his knowledge, available sources and interacts with search systems and information services (uses databases, catalogues, archives, search-engines etc.). Such a rare user also selects and processes the acquired information personally.

Probably much more often people use also various intermediaries and their services (information specialists, subordinates, co-workers), and utilize the effects of their information seeking and processing (we might call this person a semi-independent user). A user can also almost entirely depend upon intermediaries, and he or she acts independently only at the stage of mental processing of information. It was said 'almost' because economics of information behaviour probably makes an individual use sources that are at hand and appropriate without using a mediator. But essentially it is an intermediary who engages in systematic information activities: asking, seeking and searching, for this kind of user.

Managers according to Niedźwiedzka belong to the second category. They predominantly turn to the various intermediaries to obtain necessary data and evidence. They usually do not the time to do the information seeking, and thus prefer to get final product while the process is done by the intermediaries.

2.3 Data and Information

Data is a Latin word used to describe a collection of natural phenomena descriptors including the results of experience, observation or experiment, a set of premises or information within a computer system. This may consist of numbers, words, or images, particularly as measurements or observations of a set of variables (Wikipedia, 2008)

Information on the other hand can be defined as data presented in readily comprehensible form to which meaning has been attributed within the context of its use. In a more

dynamic sense, information is the message conveyed by the use of a medium of communication or expression. Whether a specific message is informative or not depends in part on the subjective perception of the person receiving it (Reitz, 2007).

Information is an elusive concept and there is a continuing debate about its meaning and about its relationship to its correlates such as knowledge, expertise, the learning process and cognitive psychology. For the purpose of this study, we will use the term in its widest sense to cover all kinds of facts and understanding having a bearing on organizational management. This could include numerical data, factual knowledge, narrative accounts, opinions and evaluations. We also need to be clear that information has meaning only when perceived and interpreted by the human recipient. Information is raw material for the mind, which uses it to develop skills, knowledge and, ultimately perhaps, wisdom. It is an irony however that though we live in an information age, there is no definite definition of information to date.

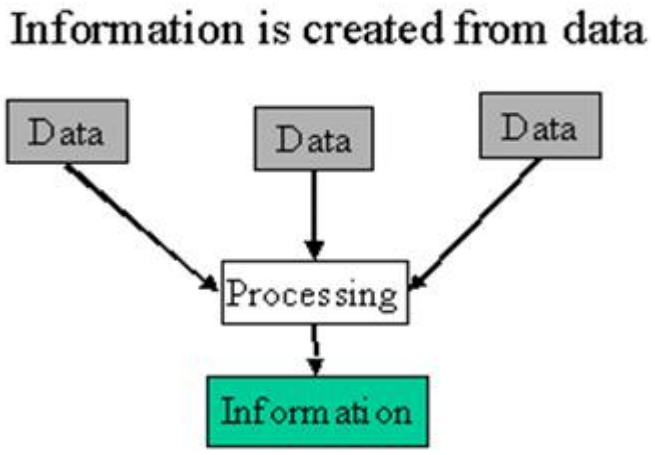
Information tells us something and is meaningful. Information is always about something, that is, it always has a context. If we take away the context the information loses its meaning and becomes random data. The above data on its own doesn't tell us anything. Hence, information always has context and meaning to the recipient/user receiving it. However one thing is sure that, practically speaking, any organization needs information both its own internal processes, in order to ensure effectiveness and efficiency, and about its environment, in order to respond and adapt to the actions,

attitudes and decisions of external agencies such as governments, competitors and social groups (Kaye, 1995).

In everyday language, data and information are used interchangeably. For example, the Oxford American Dictionary (2007) defines data as: "facts or information to be used as a basis of discussing or deciding something." At the same time information is defined as "facts told or discovered or facts to be fed to a computer". In both definition, data and information are assumed to be one and same concept.

But these terms have radically different meanings in the information processing or management literature. Data are collection of observations, which may or may not be true. Thus data may not be facts. Data become information when they are processed. To process data one needs to clean the data from errors and reduce sources of unreliability, analyze data to make it relevant to decision at hand, and organize data in ways that help understanding.

Figure 3: Relationship between data and information



Source: Integrated Information Systems, 2007

2.3.1 Importance of information

The value of information can be addressed from different perspectives. Top managers see the value in decision making and operational management. Some researchers emphasize the monetary value of information and argue that the cost of a professional user's time and effort to obtain information elsewhere far exceeds the cost of providing a library or an information system (Griffiths and King, 1993; Keyes, 1995). The value of information lies in its use for competitive corporate strategy. It should be used for competitive advantage of the organization. The ability to acquire, manipulate, interpret and use information makes it possible for organizations not only to survive but also to be ahead of their rivals.

Information in electronic form is capable of generating even more value. Bothma (1996) points to some properties of electronic information among the most important factors for its added value. For example, at present, by synthesizing text, voice, and images an increasing number of multimedia resources are generated; hundreds of thousands of job opportunities are created, even in developing countries. This has created considerable added value.

A good summary of this is captured by Carnegie Mellon community, 2010 in the article, the importance of information as below:

Figure 4: The importance of information

Source: Carnegie Mellon University Computing Services, 2010

2.3.1.1 Information as a basic need

Information is a basic need that is essential for the development and survival of library and information centres. With information, it is possible to alleviate information poverty, ignorance and illiteracy for better and meaningful life in the information world and the society in general. In this information or knowledge age everything that an information manager does depends entirely on information. This means that without information then the information manager's thoughts, feelings as well as actions have no meaning and value in the information world and the society at large.

2.3.1.2 Production factor

Today information is regarded as a factor of production just like land, labour and capital. Information is a key and central factor in an economy. The new facet of life in the knowledge economy has brought better means to work and increase production in library and information centres. This can be clearly seen in the economic revolution with new ideas to do information work like wired systems and total quality management. All these approaches to increased information work operations depend on quality information. Information managers require timely and reliable information in order to serve the needs and demands of the clients well. Additionally, information managers need information to plan in order to introduce new information products and services, train staff, budget for resources and manage information services effectively and efficiently.

2.3.1.3 Management factor

Information is a major or key factor in management of resources in organizations and countries. Normally library and information centres, organizations or countries compete well in the information world thus developing socially, economically, politically, culturally and technologically. The sharing and dispensing of information becomes a key component to the success of library and information centres as well as their parent organizations. At senior management levels (reliable and timely) information is vital to planning and strategic decision making. It is believed that many of the difficulties associated with decision making and problem solving are information based. Information such as development, trends in financial issues, human resource changes would be of interest to top information managers who are developing policies and determining long range goals in organizations.

2.3.1.4 Growth and stability

In this information or knowledge age the role of information in the society is paramount for continued growth, stability and peace. Information is the vital factor upon which any society depends, acts and operates. Information and knowledge sharing and dissemination are now essential in creation of wealth and change. Managers' adequate participation in organizations, in terms of development, growth and security all depends upon the ability to use information as a tool in all aspects ranging from planning to management practices.

Other importance of information includes:

a). Information is used to reduce the level of uncertainty.

b). Information is used for planning.

c). Information is a means of communication.

d). Historical information helps us to recall and refer to our past performance.

e). Information is an aid to simplification.

f). Information is important in forecasting of events

2.3.2 Access to Information.

In most countries today, governments are amending their constitutions to make sure that they have incorporated an act that gives constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights. Unlike in the past, information is becoming an important tool of trade and communication as well.

Though there are still some hindrances to free access to information, it is a fact that, in information society everyone is expected to have access to the right and accurate information which should enhance his/her decision making. Internet has made this easier, since even if the governments would put regulations, internet is free and enormous information can be retrieved in a very short time.

Through the internet we can access newspapers, encyclopaedias, e-books, commercial sites, online databases for research work among other services that today's user can benefit from right from his or her office or home.

Development in Information and Communication technologies are promising and delivering new opportunities for the exchange of ideas and access to information. In addition to the convenience that these technologies bring to people's lives, they can significantly enhance democratic processes by promoting freedom of expression, interaction and information sharing. The technology has made many urban areas around the globe to have internet connections; news networks broadcast 24 hours a day, libraries have added to their services online catalogues and are also involved in major digitization programmes to make their collections more accessible (UNESCO, 1999).

The Internet has evolved over the past ten years to become an information provider of incredible importance. While the utopian future envisioned by early Internet pioneers has not yet come to pass, great advances have been made in terms of extending Internet access around the world and creating mechanisms through which information can be quickly and cheaply retrieved. The internet today can be used as a means to convey information of public interest. Using internet it becomes essential for public institutions using electronic networks to guarantee access to all information and services deemed of public interest.

2.3.3 Barriers to information access in Kenya

Environmental professionals who form a bulk of the user group being studied in this research need access to current information and world literature to carry out their tasks effectively. This involves quick and reliable access to world environment literature, learning modules and discussions with colleagues world-wide. It also requires skills and the ability to store and retrieve information. The use of information communication technology (ICT) offers the possibility of access to information at any time and from anywhere. However there are several barriers that have hindered free access to information especially in the developing world, Kenya included.

2.3.3.1 Infrastructure

Kenya's infrastructure is still lacking in handling large amounts of information and knowledge resources, especially resources that are in electronic form. Access to ICT facilities is a daily struggle for most institutions that are just barely managing to maintain access to print resources to be able to meet the daily requirement. Surveys done by the World Bank and UNCTAD indicate low levels of IT diffusion throughout sub-Saharan Africa (Mutula, 2001).

In sub-Saharan Africa, government agencies are still operating in a paper based environment. Most countries are still struggling to even make the policy decision to move to an electronic environment in daily government operations. In a study by Kaaya (2004), it was found that there was slow adoption of e-government services in the three East African countries of Kenya, Tanzania and Uganda. This slow pace was attributable to

"resource constraints, lack of pressure from governments, and lack of demand from potential users" (Kaaya 2004). This was also compounded by unreliable facilities such as electricity and telephones.

Kaaya (2004) also notes that the most intriguing thing is that the citizenry has not yet realized the power of the digital media to demand that most government services and policies be made available to them via the internet for faster and broader dissemination. Access to computer facilities is essential in enabling the users to make use of the free information available globally. Though staff at UNEP may have the advantage of having reliable and good computer facilities, majority of the outside users do not have this privilege. Without enough computers, it is impossible to get sufficient access time. Without sufficient software facilities, for example memory, speed of computers and storage, it is hard to download or use electronic information in an organization.

While a wealthy individual might use a solar powered laptop with a satellite up linked broadband connection to access digital information, this is likely to be feasible for very few researchers and students alike and particularly those in developing countries. Infrastructure is thus essential and must include basic infrastructure telecommunications, computers and software (Byrne 2003). Telecommunications infrastructure is very vital in this case and can be a source of choke points at which information services can become unavailable through lack of capacity, unreliable service, unsustainable cost, corporate policy and political control. Users in developing countries enjoy high powered bandwidth

for both international and domestic connection which is not the case with developing countries (Greenspan, 2002).

2.3.3.2 Funding constraints

Access to information resources is a continuous process. To implement an effective and efficient information access policy, there is need for commitment at both the institutional and national levels that they are willing to invest in what is required to facilitate this access. It would be buying computers, improving infrastructure, ensuring access of this information among other issues, the efforts which entails that financial resources be committed to this.

Many public libraries in Africa have been cutting down on book and periodical subscriptions, the reason being there are no adequate funds. This is the same trend even in academic and special libraries which are supposed to be repositories of knowledge and information.

The increase especially of the prices of digital/electronic information resources has pushed many institutions, especially in libraries and information centres to stop purchasing online journal as well as print journals. These libraries and institutions depend on donations who give the priority areas where their funds will be spent in. Most of the relevant and accurate information resources are never free. The people who are able to access them are those that are able to pay the subscription fees, while those who cannot are never able to access the information they need.

2.3.3.3 Education skills

All the equipment, connectivity and super software in an institution will be useless unless there are adequate skills to use them. Basic computer skills are of course necessary, but are not sufficient. Use of technical information resources requires high levels of literacy and the development of information literacy (Byrne 2003).

Advanced skills are required to manage systems and to be able to create and make available information. Without those abilities users remain just consumers and not creators of information.

Language is also a big barrier to access of important information. The dominance of a few languages on the internet continues to privilege those users who are fluent in those dominant languages. Conversely it marginalizes those who are not conversant with those languages. Though it is being emphasized that Kenya is an English speaking nation, not everyone who would require environmental information knows English. Provision of information in local languages except for those side translations which do not meet the quality standards is rare. UNEP only translates information materials to UN recognized languages and not local languages. As Odini (1995) notes, while linguistic and cultural diversity is part of the world's cultural wealth, it is also an important barrier in communication. He continues to note that an information service should be based on the language which is known widely by the users.

2.3.3.4. Local content

Lack of language ability can also make it very difficult to contribute to the international debates and scholarly literature. This is because although they could be having the knowledge and information which is mostly local they are unable to put it into international perspective thus missing out the international link. Publications in little understood languages are usually ignored unless translated or cited by publications in the major languages (Byrne 2003). Without language it is impossible to adequately convey concepts within the cultural context of the society. A lot of grey literature exists in the rural areas, together with traditional knowledge on some issues, but they cannot be of help since they have not been translated into major languages.

Emphasis on the leading information sources has an effect of privileging those in the better recognized and richer countries and institutions; it is definitely easier for them to publish than those outside the mainstream.

2.3.3.5 Intellectual property

Intellectual property is used to restrict access to cheap copies of information and to inhibit innovation building on proprietary materials. The cost of intellectual property reduces access to databases, scientific articles, photographs and music, while worries about legal action inhibit efforts to create improved or creatively modified versions of existing works. Intellectual property is supposed to promote innovation but often slows it by creating intellectual monopolies and by reducing the "intellectual commons"—the public domain-which is the foundation for inspiration and innovation (Martin 2002).

2.4 Information provision

Providing right and accurate information to the users is a basic need many organizations have tended to overlook. It is not just about giving the printed materials that contain the mission, vision and mandate of the organization; it calls for extensive research to make sure that once users get the information, they can make the rightful decisions as expected. The difference between organizations in their achievements of their objectives is determined by how dynamic the information providers are in looking for new ventures and ways of accessing the most accurate information on a particular theme.

Leach (1999) defines information provision as how information is "put across", or "transmitted" and "disseminated", "transferred" "diffused" or "communicated". Leach (1999) also observes that information has been recognized as an important factor in the development process. There are many users who still swim in the same problems which other underwent more than 20 years ago and solutions found. However without informing the users that such solutions exist, then they would never be able to move forward. Linking this to information needs institutions need to work to help the users to find approaches and structures that can satisfy their information needs.

Since information is an important factor in development, providing the same will even accelerate it. Wakelin and Simelane (1995) point to the importance of information provision in "capacity building" and in "empowering communities" and argue that a lack of information acts as a barrier to development. Information provision has been termed a

"formidable factor" in determining whether developmental efforts in Africa are successful or not (Adimorah 1995).

The reason that there exist the rich and the poor, or developed, developing and under developed countries is the availability of information. Effective and efficient availability of information to users will propel faster development. This can be seen to be true since as we know, though agrarian revolution started in North Africa and Middle East, the countries where such historical revolutions started are still poor, the reason being low passage of information to the future generations which means non-sustainability of such developments.

The perspective of this research is that of the provision of environmental information that is created at UNEP to the external researchers and students alike would be of much significance and beneficial to the world. Issues like global warming and climate change and its effects would be easier to handle and deal with if such information is accurately provided to all the levels of users.

2.4.1 Ethics of information provision

Sartzetakis et al (2009), defines ethics as professional standards of conduct. There are many ethical issues that information providers must deal with when providing information in their respective areas including libraries, information centres and archives and documentation centres. Information providers in academic and public institutions have a responsibility to make sure the information they are giving is accurate and reliable

and that they are providing this information equally to all members of the population. Smith (2002) outlines the following as some ethical issues which are important to consider when providing information in every centre which engages in provision of information.

2.4.1.1 Quality of Service

The prospect of empowering scientists, researchers and the general public, by the provision of widely accessible environmental information leads naturally on to the issue of the quality of information that is being provided (Williams, 2002). An information provider's main task is to provide information. A large part of an information provider's job requires researching information for users. The user relies on this information to be accurate, which must be from a reliable source. It is important therefore that the information provider always conduct complete and careful research in order to satisfy his/her users.

The easiest and least time consuming thing to do would be to conduct the research, find some kind of information and give it to the client by the deadline (Mintz 1991). However, the information provider must ask himself/herself if it is truly professional to present the client with information that has been thrown together in order to meet the time limit Sometimes it is necessary to tell the client that, in order to provide them with the best information available on that topic the deadline will have to be extended. It is the duty of the librarian to provide the best available information to their users. Doing

otherwise could reflect badly on the librarian, the organization and the profession (Mintz 1991).

Information providers are held responsible for the quality of information they provide. The organization for which the information professional works is also held responsible. Ethical decision regarding the quality of the information provided protects the good name of the information professional as well as the organization.

2.4.1.2 Equity of Service

Many libraries have diverse types of users who utilize their information services. In some cases it is an acceptable practice to place the needs of the primary users above those of the secondary users, where the primary users are those that are frequent, for example the staff members. Though this can be the fact to many libraries, it does not eliminate the problem of making sure all users especially the primary users are receiving equal services, (Smith 2002). If this is the practice especially in libraries which are usually associated with organizations that have a hierarchy of staff, it can cause some ethical dilemma.

2.4.1.3 Conflict of Interest

When it comes to information provision and the whole career of information providers, conflict of interest is a reality. It is not surprising to find an instance when an employee of the organization approaches the librarian with the request to help them research information for a project that is unrelated to their work. This employee may offer to pay

the librarian for their time. There is nothing unethical about agreeing to do research for someone for pay outside of work. However, the librarian must make sure that "outside of work" is where this freelancing remains (Smith 2002). The biggest problem that information providers face with freelancing is how to avoid having it interfere with their duties at work (Hauptman 1988).

In some special libraries like medical or law firms, the information provider may at times be asked of medial or legal advice besides the information requirement. There may be a thin line between guiding a user and giving out advice in these types of libraries and the provider must be keen not to jeopardize the credibility of his/her organization.

2.4.1.4 Confidentiality

All the library organizations stress the importance of protecting the client's privacy. In special libraries this can be a tricky situation depending on who is determined as the client, the individual or the organization? Suppose the head of the organization wants to know what the employees are researching- does the employer have the right to that information or do the employees still have the right to privacy? There is no clear way to resolve this issue. This is an instance when the information provider will have to look at the policies and values of the organization and ultimately make the decision of what they feel is the right thing to do. This decision should be made keeping in mind the consequences and if the decision is fair to all those involved (Blanchard 1988). It would be acceptable to divulge this information if the employees were aware of it, but the information provider should never make it a practice to share information with the employer without the knowledge or consent of the employee.

2.4.1.5 Personal Ethics

In some instances, an information provider may be asked to provide information that goes against his/her morals or personal ethics. At such times, the information provider may be in a dilemma as the action to take. If for example a client (lawyer) asks a librarian in a legal library to research for him information which he can use to defend a person who has done a heinous act, what should the librarian do? The evidence against this person is overwhelming and the librarian is convinced the person is guilty and would rather not play a part in defending them. The librarian may consider actions such as these to be morally unethical and against their better judgment as a person. If the professional codes are adhered to it calls for the librarian to remain neutral and provide the information to the client (Alfino 1997). This does not mean that the librarian should strive to eliminate any feelings they may have about particular issues. It simply means that librarians should be aware that these are personal feelings and they should be able to put these feelings aside in order to effectively do their job (Alfino 1997).

2.4.2 Factors affecting provision of information

2.4.2.1 Quality of information

As Smith (2002) notes above quality of information provided to user is one of the ethical issues that must be considered at all times when providers give information to users. With an increase in technology comes the need for librarians to be aware of how to authenticate online resources and the limits of electronic resources as a whole (Diamond 2001). Many information providers will blindly go to the internet to get information, but the quality of the same cannot be guaranteed since there is no review of the content. If

such information is directly given to users without proper editing and consultation, the user will never have quality information and thus poor decisions will be made based on the poor content of information. This is especially important when instructing clients on how to use electronic resources and the Internet to research on their own.

2.4.2.1 Quality of print materials

Besides the quality of content and considering that many users especially in the developing world are still very much relying on printed materials, provision of information through such methods as printed books, journals will depend on the materials themselves. DHS (2003) notes that key components of all publications are, who it is for, what is it about who produced it and when they did so? It should tell people where to go and what to do next. It should include any other sources of information, services or advice. It should tell people of their rights and eligibility criteria and other formats available and how to obtain them. With these in mind the quality of information provided will be guaranteed.

2.4.2.2 Infrastructure

The growth of internet has brought enormous changes in the field of information provision. There have been so many changes than many of us can follow. At the click of a button, anyone in any part of the world can access any type of information that they need from health, finance, politics, terrorism and many others. The expansion of the internet has brought another phenomenon, the use of digital villages. Despite the many advantages of internet growth and the fact that a number of developed countries are much

into digital villages, African countries are yet to take full advantage of this concept, (Alemna et al 2005).This is mainly because of the unavailability of infrastructure that is very much required for the establishment of digital libraries. This will for sure affect the quality and content of information provided to the users who come from these areas.

2.4.2.3 Economic and commercial issues

These mostly affect the publishers and other stakeholders in the trade of information provision, who may be worried that having internet and other digitization procedures is having a negative effect on their business. Thomes (2003) explains that though information technology is able to provide access to information for more users than before, the economic benefits of this has not been encouraging. Publishers have been complaining for a license agreement with users so that the publishers would have some economic and commercial benefits when users utilize their resources. This has made many publishers to increase the costs of relevant content of information and inaccessible to many needy users.

2.4.2.4 Legal issues

Virtually everyone is in one way or the other involved in the information industry, either when producing it or a consumer. With these in mind various legal issues have risen in the recent past over legality of what either a consumer or producer does with information. This has brought the necessity to have a global legal system supporting market for electronic documents especially, which can allow for proper functioning of free market forces. The issue of intellectual property rights protection has also been in the picture.

With the growth of the internet it has become meaningless to control information flow using national borders. Alemna et al (2005), notes that, it has become impossible for an individual nation to assert any kind of national control over the product or to protect the intellectual property rights that are represented by it. This gives rise to other control systems in order to stem the abuse of their intellectual property which further complicates the issue of information flow.

2.4.3 Standards of information provision

Whenever an information provider thinks of providing an information service, there are key elements that will make his/her clients always want to come back. These standards differentiate between serious information providers and the quacks. Sandwell Library (2006) summarizes these standards as follows:

a). An information service which is available to all the community regardless of race, creed, age, ability, gender or sexual orientation, reflecting the users' cultural, educational, leisure, social and work needs and protecting their confidentiality.

b). A high quality information and referral service providing accurate, timely, unbiased and appropriate information

c). A service that people living, working or studying in a particular area can regard as the first and obvious point of call for information.

Though the above can be understood differently, it is important to note that an information service will only pass the sale of being the best and not just average for users is several considerations are met, for example, it has to be:

a). An information service that is available to all members of the community regardless of age, gender, sexual orientation, race, creed or ability;

b). An information service that reflects the users' cultural, educational, leisure, social and work needs and protects their confidentiality;

c). A high quality general public information and referral service providing accurate, timely, unbiased and appropriate information;

d). Local access across the whole of the library authority area to a coordinated, seamless, integrated and responsive information network provided by working in partnership with other organizations as appropriate;

e). Public access points that utilize all appropriate media, resources and technology, and that are physically arranged to suit the effective use of the new media to provide information.

2.4.4 Role of information provision as a policy statement in the field of environment

The role of information provision in complementing traditional environmental policies has been recognized by Tietenberg and Wheeler (2001). Smith (2002) says that environmental policies provide a number of examples of products and processes that generate damages to individual consumers and to the environment. Smith (2002) continues to say that balancing human needs with the health of consumers and the natural environment may be the most pressing global concern of the twenty-first century. Consumers are becoming more and more concerned about products containing substances

that are toxic, carcinogenic or in general harmful to them in their everyday use and at the same time dangerous to the environment.

In the current awareness of environmental sustainability and the importance of preserving it, access to environmental information to users has become almost a mandatory issue.

Glasgow University, in the Environmental Information Regulations 2004 defines, environmental information as measures and activities affecting, or likely to affect, or intended to protect the state of the elements of the environment and the interaction between them. These include administrative measures, policies, legislation, plans, programmes and environmental agreements. This kind of definition explains why environmental information covers a wide coverage of topics such as: the environment itself, including air, water, earth and the habitats of animals and plants things that affect the environment, such as emissions, radiation, noise, and other forms of pollution policies, plans and laws on the environment

Just as it is important to have information policies in any other field, environmental information provision will be better if organizations such as UNEP can provide for policies to govern the provision of such information. Aarhus Convention (2001) indicates that everyone has a right to receive environmental information that is held by public authorities ("access to environmental information"). This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment.

Aarhus Convention is an example of an environmental policy that can assist govern information provision. Where such policies do not exist, many users have a hard time to access the all relevant information.

2.4.5 Information services in the 21st century

The world today has become more of a networked society. We have quite often heard that the world today is a global village. Anybody everywhere is able to access whatever kind of information is needed by the click of a button. Many observers have commented on the revolutionary changes which information and communications technologies (ICTs) are heralding – changes sometimes likened in scale to the impact of the Agricultural and Industrial Revolutions or of the invention of the printing press (Toffler, 1980). Whether this would be true or not, Brophy, (2000) continues to illustrate that the impact of ICTs on the library and information sector will almost certainly be profound: indeed major change is already with us. Enterprises like the Internet Bookshop and Amazon have demonstrated the power of e-commerce, while the World Wide Web has introduced a wide audience to some of the tools of information retrieval. In these circumstances, both practitioners and researchers need new models with which to analyze and respond to these changes, and to help them plan – and to some extent create – the information and library services of the future.

Brophy notes that the impetus for the development of information science came from the recognition, in particular after the Second World War, that the huge amounts of scientific information being generated, together with advances in knowledge which made that

information outdated rapidly, made new approaches to information management essential. Scientists and technologists needed a tailored service which would select the wheat from the chaff, or at least indicate in which haystack the needle might be hidden. The establishment of the Institute of Information Scientists in the UK in 1958, as Brophy (2000) underlines provided the framework for the recognition of this new approach.

With the development of the internet and other networked environments which make information services better to provide, then it should enhance the original idea of providing information services and not necessarily do away with it. The modern information service should set itself to first secure the right information in the right form is sent to the right people and, second, to arrange that facts of however diverse origin which may bear upon any particular topic should be correlated for the study of that topic. This should be irrespective of whether one is using internet or the traditional printed books and journals.

The emergence of other tools like the internet has revolutionalised an information service which would otherwise might formerly have been able to rely almost entirely on its own collections, it is now necessary to consider the vast range of networked information services, including the web, other Internet sources and commercial data services, along with traditionally published sources and a plethora of other 'information objects'. Not only this, but digital objects may be dynamic and subject to almost continuous updating and change. Taken together this richness of information objects forms an 'information universe' which can be accessed in response to a user's query. This has further brought the establishment of digital libraries in every centre and not just in the libraries as it used

to be the case. A commercial firm can for example set up a digital library with limited space but be able to serve all its clientele around the world. Some have even gone further and applied the use of their IT technicians to man such centres. Though this has happened, and as Brophy (2000) notes, the question that remains is as to how information, access to it, and its exploitation, are to be organized and managed. This will by far still advocate for the use of a library as the best place where user oriented information services can be offered.

The dynamism and change in the field of information services and information provision, has also affected the role of the traditional librarian. Stoss (2000) indicates that today's librarians find themselves in roles far removed from the traditional roles as cataloguers, indexers, and collection caretakers. Their skills are needed to collaborate with researchers, policy makers, educators, administrators, and executives as they;

a). Evaluate software for data and information management
b). Develop profiles of information products, research projects, business plans
c). Oversee the production of reports, reference books, Web sites, and other information tools
d). Develop and maintain databases
e). Write articles and reports
f). Provide training in the use of manual- and online data and information systems
g). Develop marketing strategies for the effective delivery of products and services

Some of these skills will need the librarian to get back to school if he/she has to serve the expected users well, without which most of the users would opt to do things for themselves, without necessarily visiting libraries or information centres.

2.5 Information needs

Information is the gap in a person's knowledge that, when experienced at the conscious level as a question, gives rise to a search for an answer (Reitz, 2007). In a library setting for example, if the need is urgent, the search may be pursued with diligence until the desire is fulfilled. Persons with information needs often end up at the reference desk of a library where it is the responsibility of the reference librarian to determine the precise nature of the need, usually by conducting an informal reference interview, as a basis for recommending relevant sources. The concept of 'information need' is central to the study of the user in the context of him being a communicator, information seeker, a recipient and user of information

Williams et al (2002) opines that an assessment of information needs would be a prerequisite for the design and implementation of information systems whose rationale is after all to service those needs. How good the needs of users are met will determine how good information provided, will flow to the users and also the level of use for that information. Information needs can be related to educational activities, to research activities, to professional activities, to recreation activities, to cultural activities or to personal development. Borrowing from psychology, Wilson, T.D notes that Information needs are qualitatively similar to other basic 'human needs'. In psychology for example, needs are divided in to the following types:

a). physiological needs, such as need for food, water, shelter etc,

b). emotional or 'affective' needs, such as the need for attainment, for domination, etc,

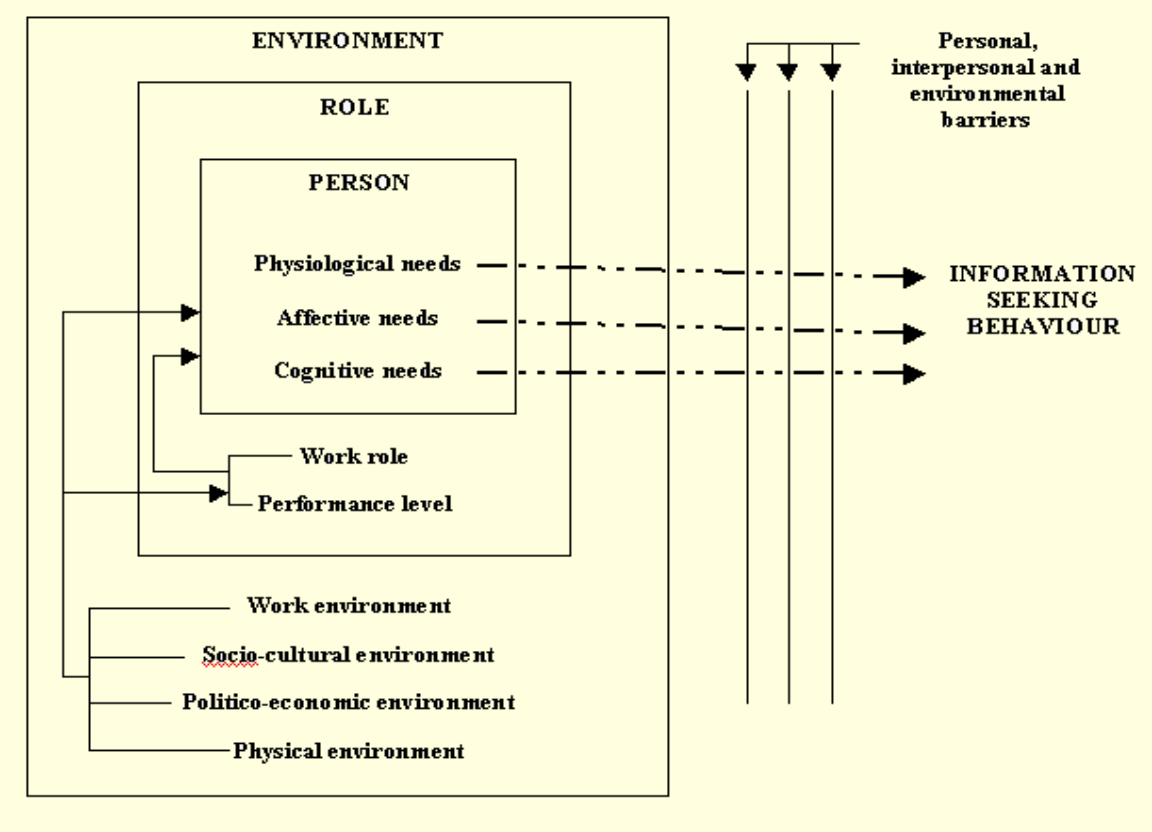
c). cognitive needs, such as the need to plan, to learn a skill, etc.

This relationship is well described by Wilson, where he notes that:

> *"Taking the three categories of personal needs, it will be quickly recognized that they are inter-related: physiological needs may trigger affective and/or cognitive needs, affective needs may give rise to cognitive needs, and problems relating to the satisfaction of cognitive needs (such as a failure to satisfy needs, or fear of disclosing needs) may result in affective needs (Wilson, 2000)*

These inter-relationships are expressed in Figure 4, which shows that, as part of the search for the satisfaction of these needs, an individual may engage in information-seeking behaviour".

Figure 5: Relationship between human needs and information needs



Source: Wilson, T.D, on User studies and Information needs, 2006

This does not suggest that some affective or cognitive need will immediately 'trigger' the response of information-seeking. Many factors other than the existence of a need will play a part: the importance of satisfying the need, the penalty incurred by acting in the absence of full information, the availability of information sources and the costs of using them.

So, information-seeking may not occur at all, or there may be a time delay between the recognition of the need and the information-seeking acts, or, in the case of affective needs, neither the need nor its satisfaction may be consciously recognized by the actor, or a cognitive need of a fairly low level of salience may be satisfied by chance days, months or even years after it has been recognized, or the availability of the information may bring about the recognition of a previously unrecognized cognitive need. These factors are represented in Figure I above as personal, interpersonal, and environmental barriers to information-seeking.

Siatri (1999), in her research, evolution of user studies indicates that information need is a term closely related to the concept of information seeking behaviour. A user recognizing an information need, articulates it into a question, or, request which is conveyed through formal or/and informal channels of communication and information systems, in order to receive a response (verbal written, visual) which will satisfy that need. The decisions concerning which communication channels and information systems will be used, as well as in which way and how they constitute the information seeking behaviour of a user. This is cemented further by Wilson who says that in the field of information science, the different senses of information needs are more or less related to the basic needs. Thus:

a). The factual content, or subject data, or a document may satisfy cognitive needs, in fact this is the usual sense in which we think about the use to which information is put. However, it may also satisfy affective needs such as the need for security, for achievement, or for dominance.

b). The channel of communication, particularly the choice of oral channels may well be guided by affective needs as much, if not more than, by cognitive needs. For example in seeking information from a superior someone more interested in being recognized and accepted as a particular kind of person than in the actual subject content of the message, in other words he may be seeking approval or recognition. The transfer of information to others may also be done for affective reasons, for example, to establish dominance over others by reminding them that you are better informed and, therefore, in some sense superior;

c). The physical document may satisfy an affective need as when someone collects rare bindings because of their beauty, or illustrated books for the same reason. Under extreme circumstances documents may serve physiological needs as when someone on the park-bench covers himself with newspapers to avoid freezing to death (Wilson, 2000). In this case the newspaper is not used as an information source but as a protection against biting cold.

Leckie et al (1996) while researching on information seeking habits of health care providers, attorneys, and engineers, found out that there are seven variables that are important when it comes to information seeking of professionals:

a). Accessibility—ease of use and availability of a source

b). Cost—how much effort and expense are involved with a source

c). Familiarity—previous success using a source

d). Packaging—convenience and usefulness of a source

e). Quality—accuracy and level of detail in a source

f). Timeliness—source's capacity to provide information when it is needed

g). Trustworthiness—reliability and helpfulness of a source

Most of these can be applied across the field as factors that many users in various fields would think about before they go about seeking for information.

Hjørland (2007), notes that Information needs are related to problems and an important issue is how problems are understood, delimited and formulated. University lecturers for example, advise their Masters and PhD students, on how to formulate a research problem which can be considered for a thesis topic. This process of problem formulating is related to information needs: are there too much or too little information about a topic to make it researchable within the given time-frame and resources available? Moreover it is worth noting that what users believe they need represent their subjective understanding of their need. This subjective understanding is reflected in their information-seeking behaviour.

2.5.1 Information needs and Information Seeking Behaviour

In his book "*Information Seeking"* Johnson (1996), indicates that there is hardly any management activity that does not involve active or passive information seeking. Information seeking is the first step in bringing about individual or organizational change. It helps prepare and lead managers to action. Even after action, information seeking continues in order to reconfirm the validity of the action taken and give a feeling of control over events.

He continues to say that managers also need to understand the workers' information seeking behaviour. If the information that a worker is receiving is well understood, the perspective of the worker is understood. It is then possible to encourage the worker to be more productive. Historically, managers have been expected to "motivate" workers through that. They try to motivate workers by informing them and helping them participate. Thus understanding the information seeking behaviour of workers is one of the first step of how one can motivate them, and enable them get the relevant information that they are looking for quickly and accurately. It will also enable you to avail only the relevant information materials they need.

Wilson (2000) defines information seeking behaviour as the purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with manual information systems (such as a newspaper or a library), or with computer-based systems (such as the World Wide Web). Wilson also says that information seeking behaviour is the ‘micro-level’ of behaviour employed by the searcher in interacting with information systems of all kinds. It consists of all the interactions with the system, whether at the level of human computer interaction (for example, use of the mouse and clicks on links) or at the intellectual level (for example, adopting a Boolean search strategy or determining the criteria for deciding which of two books selected from adjacent places on a library shelf is most useful), which will also involve mental acts, such as judging the relevance of data or information retrieved.

From these definitions it is clear that, information seeking behaviour is not accidental. There has to be a reason why one is seeking for information. This is greatly determined by the information need of a user.

Information seeking behaviour is a growing trend, especially after 1970s. In the early years most research work focused with system use rather than user behaviour. Since the 1980s there has been a shift towards a "person centered" approach, rather than a "system-centered" approach. This has been accompanied by a switch from quantitative methods to qualitative methods (Wilson, 2000). This earlier researches also brought several models which dwelt with different portions of information seeking behaviour.

2.5.2 Barriers to Information Seeking

Though information seeking is a subject which many librarians and information professionals are keen to develop, there are many reasons that hinder information seeking in organizations. Johnson (1996) gives the following as barriers to information seeking:

a). Time. Managers may not have the time to search comprehensively for the needed information. The more decisions managers have to make, the less time they have to investigate each decision.

b). Decision making characteristics. Employees often use less than optimal decision making procedures. Instead of having a comprehensive list of alternatives they rely on a short list. Instead of postponing decisions until all information is

collected, they decide as they go; often breaking the search process before necessary information is collected.

c). Structural barriers. Organizations restrict access to some information. Only specific groups within the organization have access to this information. This is often done for security purposes. Sometimes it is done to enable work units to focus their attention on single tasks and allow other units to address other tasks. Sometimes this is done in order to make some decisions more consistent with organization priorities. When organization decentralize decision making and remove structural barriers to information, workers have more freedom in decision making and may follow various decision making procedures. One purpose of restricting access to information is to make sure that the organization applies consistent criteria to similar decisions.

d). Cultural factors. Cultural factors draw the line between curiosity and intrusiveness. These factors restrict information seeking by making some topics taboo or requiring the person to follow particular rituals for getting certain information. Both the society and the organization affect the culture and manner in which employees seek information. Organization cultures that value formal communications, which encourage group consensus and enforce hierarchical ranks are more likely to restrict information search and innovation on the part of their employees.

e). Organization policies and rules. Certain organization policies and rules may restrict information seeking behaviour. For example, policies on privacy of employees restrict access to information on use of employee assistance programs.

f). Individual impediments. Employees may prefer to remain ignorant about some issues in order not to choose sides on some issues. Employees may not have the cognitive ability to process large amount of information.

g). Technical issues in search procedures. Employees may not be aware of sources of information or procedures for access to these sources.

h). Cost of search. Both the monetary cost of search as well as the cost of thinking (tolerance of uncertainty until some future time) may restrict search for information.

i). "Not part of my job". Employees may not be motivated to seek information because it is not in their job description.

j). Fear of the unknown. Employees may not seek information, especially feedback about their work, because the information may be negative.

2.6 Information sources

Information source is any resource that responds to user demand for information, including information products and services, people, or networks of people and computer programs. Information sources can be seen as the persons, groups, and documents from which data are obtained. Sources of information are generally categorized as primary, secondary or tertiary depending on their originality and their proximity to the source or origin. For example, scientific information moves through a dissemination cycle. Initially, findings might be communicated informally by electronic mail, and then presented at meetings before being formally published as a primary source. Once published, they will then be indexed in a bibliographic database, and repackaged and commented upon by others in secondary sources. The designations of primary, secondary

and tertiary sources differ between disciplines or subjects, particularly between what can generally be defined as the sciences and the humanities. Primary sources for critic studying the literature of the Second World War are different from those for a research scientist investigating a new drug for arthritis. The critic's primary sources are the poems, stories, and films of the era. The research scientist's primary sources are the results of laboratory tests and the medical records of patients treated with the drug (James Cook University Library, 2008).

2.6.1 Documentary sources

Documentary sources are the sources which are in form of a document. They are documented either in a book, video, CD, DVD and/or any other medium. In the recent past many users have had many varieties of documentary sources which are divided into primary, secondary and tertiary sources.

2.6.1.1 Primary sources

A primary source is a document or other sort of evidence written or created during the time under study, or by one of the persons or organizations directly involved in the event. Primary sources offer an inside view of a particular event. Primary sources are original documents and can also include excerpts or translations of those documents, as long as no editing has been done. They are original materials which have not been filtered through interpretation, condensation or often even evaluation by a second party.

Primary sources according to SFU library, (2008) include; Speeches, Letters, Minutes, Interviews, News film footage, Autobiographies, Official records, Email contact, gazetteers, Survey, timelines, perpetual calendars, Observation of object (animate and inanimate).

Others include journal articles, monographs, reports, patents, theses, diaries, letters, photographs and poems.

2.6.1.2 Secondary sources

A secondary source interprets and analyzes primary sources. Secondary sources are one step removed from the main event. Secondary sources are less easily defined than primary sources. What some define as a secondary source, others define as a tertiary source. Nor is it always easy to distinguish primary from secondary sources. A newspaper article is a primary source if it reports events, but a secondary source if it analyses and comments on those events. In science, secondary sources are those which simplify the process of finding and evaluating the primary literature. They tend to be works which repackage, reorganize, reinterpret, summarize, index or otherwise "add value" to the new information reported in the primary literature (JCU, 2008).

Generally secondary sources have the following characteristics;

a). They describe, interpret, analyze and evaluate the primary sources

b). They comment on and discuss the evidence provided by primary sources

c). They are works which are one or more steps removed from the event or information they refer to, being written after the fact with the benefit of hindsight.

Examples of secondary sources according to James Cook University, JCU library, (2008).are:

a). bibliographies

b). biographical works

c). commentaries

d). dictionaries and encyclopaedias

e). indexing and abstracting tools used to locate primary and secondary sources

f). journal articles, particularly in disciplines other than science

g). monographs (other than fiction and autobiography)

h). newspaper and popular magazine articles

i). review articles and literature reviews

j). textbooks

2.6.1.3 Tertiary sources

Tertiary sources consist of information sources, which is a distillation and collection of primary and secondary sources. They can be said to be twice removed from the original, they include encyclopaedias, fact books and almanacs, guides and handbooks. Some secondary sources such as indexing and abstracting tools can also be considered as tertiary sources.

James Cook University Library (2008) gives examples of tertiary sources as:

a). almanacs and fact books

b). bibliographies (*may also be secondary*)

c). chronologies

d). dictionaries and encyclopaedias (*may also be secondary*)

e). directories

f). guidebooks, manuals etc

g). handbooks and data compilations (*may also be secondary*)

h). indexing and abstracting tools used to locate primary and secondary sources (may also be secondary)

i). textbooks (*may also be secondary*)

2.6.2 Non Documentary sources

Non documentary information sources are those that are not documented in book form or on a paper. They include among others; photographs, videos and films, Artefacts and material culture, oral discussions between professional colleagues among others.

2.7 Environmental information

2.7.1 Definition of environmental information

Information is one of our most fundamental resources for environmental protection. It is the basis for awareness, education, understanding, empowerment and participation. It

influences the values, attitudes and behaviours necessary to solve environmental problems and sustain natural resources.

According to **United Nations Economic Commission for Europe** (UNECE's) Aarhus Convention of 1998, environment information is a non-exhaustive list of environmental elements: air and atmosphere, water, soil, land and landscape, biodiversity including genetically modified organism (GMOs), and their interaction. It covers policies, plans, programmes, legislation, environmental agreements likely to affect environment, and economic analyses used in environmental decision-making as well as environment-related human health and safety, (United Nations Economic Commission of Europe, 1998).

Gavin et al, (2001) say that environment information is the range of information needed for environmental management, including information on social and economic factors, in addition to information specifically on environmental phenomenon.

With the range of definitions we can conclude that environmental information can therefore include or be found in,

a) Documents, leaflets, reports, books, notes, data sets, memos, meeting notes, post cards or in fact anything written down;
b) Pictures, maps, plans, designs, models, video, posters, diagrams, sketches, graphs, illustrations;

c) Tape recordings, answer phone recordings, recorded presentations, dictaphone tapes, compact discs;
d) Any type of computer file, word-processor file, database, spreadsheet, computer models (including. 3-d models), specially written bespoke programs, calendars, emails, archived web pages/sites, temporary or cached files, still images, video images, computer generated images;
e) Any other material form – that is, other forms not widely available, or not yet developed or invented;

2.7.2 Access to environmental information

We live in an information age, and our future will be significantly influenced by how we put information into good use. Computer-based information technology has brought out vast amount of information which has been accelerated by the growth of internet services in many areas in the world.

With increasing public recognition of substantial environmental problems in the 1960s and 1970s, came growing demands for reliable environmental information. When many governments established ministries of environment and environmental protection agencies, such developments led to new demands for environmental information. Businesses became interested in environmental information when they realized that it might affect consumer behaviour, when they had to comply with new legislation and environmental regulations. The demand of environmental information did not just focus on governments, but also on the civil societies and NGOs. Both these have been the

driving force on both the supply and demand of environmental information, (Denisov, 2001). In Kenya Greenbelt movement has propelled the demand for environmental information by professionals both in Kenya and worldwide.

Denisov, (2001) continues to argue that the fundamental idea that the access to environmental information leads to an improvement of the state of the environment is based on the following considerations:

a) An effective legal protection for citizens requires that relevant decision making information is available to them. Access to environmental information provides each individual with the possibility to control the compliance with environmental law and to point out deficits in the implementation. Hence, the right to access environmental information leads to a decentralized and effective control of governmental activities by the public.
b) The right to access the data increases transparency and allows a better public participation in governmental decisions. Therefore, access to environmental information is an important step to participation and democratization of the environmental legislation.
c) Knowledge regarding the state of the environment is not limited to public authorities; hence this leads to an increased public acceptance of measures for the protection of the environment. This leads to a better awareness of environmental issues in the general public.

d) The general right of publication of environmental information should discourage potential polluters of the environment, because this bears the risk of publication of their activities.
e) The International Conventions and directives dealing with access to environmental and spatial information provide wide comparable principles regarding the access to environmental information. This facilitates trans-national activities to protect the environment from pollution and prevents competitive distortion.

The Aarhus Convention is guided by the following principles that there should be;

a) Transparency and accessibility of info systems
b) Public dissemination of international agreements, laws, policies, strategies, programmes and action plans relating to the environment
c) Pollutant release and transfer registers
d) Increased access to information through Internet
e) State of environment reports (max 4-year interval).

The application of the principles of this Convention has made many European countries to be ahead of other countries in the world as far as dissemination and use of environmental information is concerned. This definitely would explain why America, Asia and Africa still look reluctant to adhere to some of the rules of disseminating environmental information. It could also explain why Europe is the largest funding

institutions of UNEP today since they understand the importance of environmental information access.

2.7.3 Factors that influence access to environmental information

FAO, 2009 indicates that accessibility of information is a common theme as far as information is concerned. FAO continues to say that level of access of information in any institution depends on economics, politics and education. Access to any type of information can be said to be dependent on four facets:

2.7.3.1 Physical access

Though in this digital age many believe that physical access to information is not essential with the assumption that information is all available over the web, this assumption is far from the truth. Not all information is available over the web, and not everyone in the world and especially so in developing countries has access to the web. This outlines the importance of having libraries and other resource centres to cater for such users. The physical access will allow users to get information in form of print pamphlets, distributed through local agents, radio broadcasts, rural libraries with books and magazines on environment of local interest. Physical access means that people can access information where they are located and when they need it.

2.7.3.2 Virtual access

Virtual access supplements and enhances physical access. It relies on physical infrastructure such as telecommunication networks, telecenters and libraries. Electronic

information has potential to reach a wide range of users as networks become more robust, mobile telephone ownership expands and computer literacy increases. The 2007 survey by IFLA Expression on access to information showed that the amount of content in local languages appears to be related to level of internet access. According to the 2007 indicators from the International Telecommunication Union, only five inhabitants in every 100 are internet users in Africa compared to 14 in Asia and 41 in Europe and America.

2.7.3.3 Intellectual access

This refers to how information is presented linguistically and stylistically. Uhlir (2004) says that language is one of the largest challenges facing access to information. Policy information normally does not appear in the local language of the users, thus most of them do not have access to information in their local languages and dialects.

2.7.3.4 Social access

McNamara et al (2002) indicates that information is a critical part of the "lifeblood of economic and social interaction". Those who have it have power. Access is shaped by social forces such as level of education, community structure, family dynamics and gender. Access is limited if literacy level is low, so education for all expands access to information in general. Sensitivity to family and community structure is needed to ensure that those that can use information get it. Some family members and community control the flow of information. On a larger scale institutions such as UNEP should control and

be selective of whom they share information with since this will mean whether it reaches other audiences or not.

2.7.4 Environmental Information and Decision making

The environment belongs to everyone and it is everyone's responsibility to maintain it. Information is one of our most fundamental resources for environmental protection. It is the basis for awareness, education, understanding, empowerment and participation. It influences the values, attitudes and behaviours necessary to solve environmental problems and sustain natural resources. Information on the environment should have the widest possible availability (Demsey, 2001).

EIR (2009) defines environment information as the state of elements of the environment – such air, water, soil, land, landscape and natural sites, flora and fauna, including cattle, crops, GMOs, wildlife and biological diversity – and it includes any interaction between them. EIR (2009) also defines environmental information as measures and activities affecting, or likely to affect, or intended to protect the state of the elements of the environment and the interaction between them. This includes administrative measures, policies, legislation, plans, programmes and environmental agreements.

Stoss et al (2000) opines that ready and reliable access to data and information is increasing in importance as an integral part of the environmental decision-making process. Research results, regulatory requirements, policy, initiatives, and increased public awareness and concern about the issues related to global climate change have a

dramatic impact on constituent groups. Project managers, business leaders, research scientists, policy analysts, program administrators, elected officials, educators and their students, and the concerned citizen need efficient, effective, and equitable access to data and information to adequately address their issues related to climate change.

Stoss adds that the need for new data and information products, new publications and documents, new reference and referral services, and new data and information delivery services is a challenge for today's information professionals. Providing such services and programs for this multidisciplinary audience is a huge task for UNEP and fostering a greater cross-disciplinary exchange of information, resources (materials and expertise), and ideas is necessary if we have to give relevant resources to our users.

Policy-makers and development planners need information to assist them to make correct decisions concerning living standards, policy formulation, marketing of products and services, access to markets, provision of good health and learning among others. It is important therefore to undertake a study and find out extent to which this information is available. Accurate and timely information is essential to decision-makers and the general public and its availability will assist in sound environmental management. In Kenya today, we can consider ourselves to have vast environmental information resources, but the question that begs for answer is, does everyone researchers, students and the general public claim to have access to environmental information? Do people make sound decisions concerning the environment due to the right amount of information they receive?

Aarhus Convention which was signed at Aarhus, Denmark, on 25 June 1998 and came into force in 2001 advocates for among other things, access to environmental information for sound decision making. It says “everybody has the right to participate in environmental decision-making. Arrangements are to be made by public authorities to enable the public affected and environmental non-governmental organizations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, these comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it ("public participation in environmental decision-making").

In Kenya, for example, it may sound a big favour to tell the general public that when they need to make sound environmental decision, access to information which can help them to do that is their right. However the government and others in this field have always used the Secrecy Act to hinder people from accessing such information. Until recently for example, it was not possible to know who was behind the destruction of the Mau Water Complex Tower. Though the destruction started in the 1990s and much information was available in this regard, it took the effects of drought and drying rivers for policy makers in the government to release such information to the public.

Through the use of such laws as secrecy act, the public are denied the information even when it is available. Aarhus Convention notes that, one of the reasons why information may not be accessed is if the public authority to which the request is addressed does not

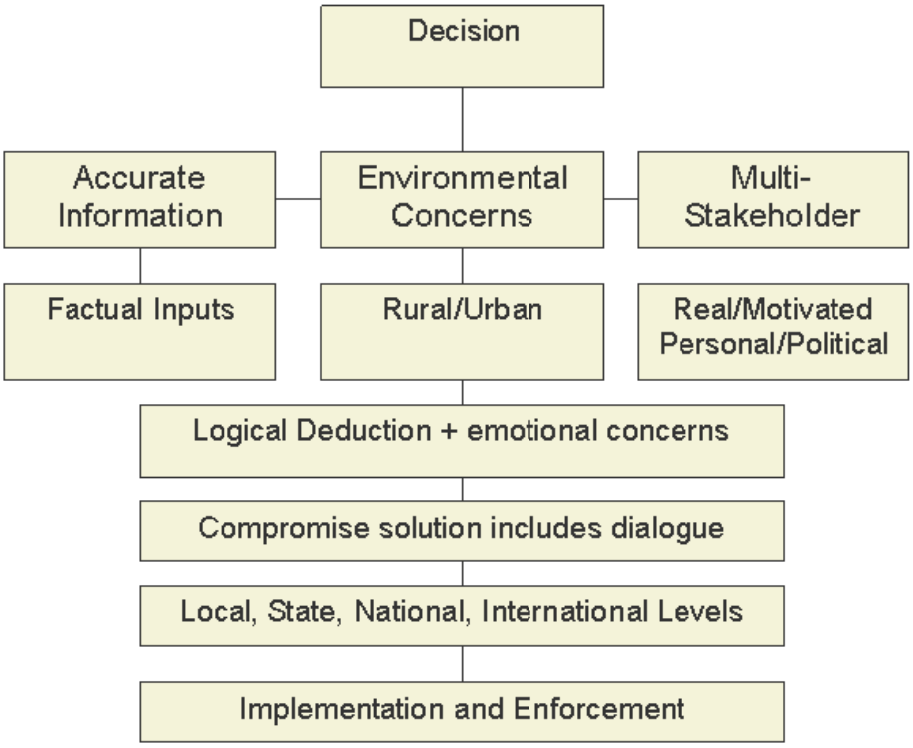
hold the environmental information requested or the request is manifestly unreasonable or formulated in too general a manner (Aarhus Convention 2001).

Article 5 of the Aarhus Convention indicates that in the event of any imminent threat to human health or the environment, whether caused by human activities or due to natural causes, all information which could enable the public to take measures to prevent or mitigate harm arising from the threat and is held by a public authority is disseminated immediately and without delay to members of the public who may be affected. It also advises that mandatory systems are established so that there is an adequate flow of information to public authorities about proposed and existing activities which may significantly affect the environment (Aarhus Convention 2001). Though this sounds good to read and implement, little of this can be said in Kenya. Applying such noble ideas by both the government and international organizations such as UNEP will help restore the tattered environment and enable everybody to participate in decision making at the right time, before disasters overwhelm us.

Since information is an important economic value which dictates how we do things, it is important to continually collect and disseminate this information to the rightful stakeholders. Timely access to information already collected requires strengthening existing capacities in collecting, storing, analyzing, retrieving and dissemination of information.

Information is a vital resource whether it is environmental, financial, health, agricultural, commercial, business, agriculture or trade. A good example of using environmental information for decision making can be borrowed from the below diagram as used in Sherdukpen Community Conservation Area in India.

Figure 6: Environmental Information and Decision making



Source: Meghalaya Environment and Wildlife Society, 2001

Environmental information for decision making has long been on the international political agenda, but it gained special attention at the Earth Summit in Rio de Janeiro in 1992. The Rio de Janeiro declaration contributed to renewed interest in this kind of

application of environmental information. This declaration pointed among other issues that environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available.

In sustainable development and by extension environment, everyone is a user and provider of information which includes data, information, appropriate packages, experience and knowledge. The need for information arises at all levels, from senior decision makers at the national and international levels to the grassroots and individual levels. The Agenda 21 report continues to say that there already exists a wealth of data and information that could be used for the management of sustainable development. Finding the appropriate information at the required time and at the relevant scale of aggregation is a difficult task. Information within many countries is not adequately managed, because of shortages of financial resources and trained manpower, lack of awareness of the value and availability of such information and other immediate or pressing problems, especially in developing countries. Even where information is available, it may not be easily accessible, either because of the lack of technology for effective access or because of associated costs, especially for information held outside the country and available commercially.

One of the main objectives of Agenda 21 was to strengthen local, provincial, national and international capacity to collect and use multi-sectoral information in decision-making processes and to enhance capacities to collect and analyze data and information for decision-making, particularly in developing countries. This underlines why the developed countries should strive to assist the developing countries, with the cooperation of international organizations, establish supporting mechanisms to provide local communities and resource users with the information and know-how they need to manage their environment and resources in a sustainable manner applying traditional and indigenous knowledge and approaches when appropriate. This is particularly relevant for rural and urban populations and indigenous, women's and youth groups. If this is done then relevant decisions will be made right from the grass roots and the challenges of climate change will be adequately catered for at all levels (UNDESA, 2004).

2.8 Climate change

2.8.1 Definition of climate change

Environment Canada (2008) defines climate change as the change in climate over a time period that ranges from decades to centuries. The term refers to both natural and human-induced changes. Climate change according to Inter-Governmental Panel on Climate Change (IPCC, 2007) refers to a change in the state of the climate that can be identified (for example using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change cannot be experienced over a short duration of time. It is a statistically significant

variation in either the mean state of the climate or in its variability, persisting for an extended period.

Climate Change North (2004) defines climate change as the average weather that a given region experiences. When we speak of climate change on a global scale, we are referring to changes in the climate of the Earth as a whole, including temperature increases (global warming) or decreases, and shifts in wind patterns and precipitation. Climate change and global warming are inseparable. In actual fact these two terms are used at times interchangeably since when climate change occurs, we are bound to have global warming as well. In general we are able to measure and define climate change by the degrees of temperature rise the world has experienced.

Ogola (1997) opines that climate is the mean condition of the atmosphere in terms of elements such as solar radiation, temperature, pressure, precipitation, humidity and wind; and their variations at a given locality over a long time span (climate change).

Scientists have proved that the average temperature of the earth's surface has risen by 0.74 degrees C since the late 1800s. It is expected to increase by another 1.8° C to 4° C by the year 2100 - a rapid and profound change - should the necessary action not be taken. Even if the minimum predicted increase takes place, it will be larger than any century-long trend in the last 10,000 years.

Wirth (2003) notes that, unprecedented changes in climate are taking place and if we continue with our present course, life on earth will be extricable altered. He continues to say that, for millennia, the earth's climate remained minimally changed where early humans thrived, living on abundance of plants and animals, some of which they domesticated for their own use. They cooked their own food and warmed their dwellings largely with wood. Human activities had little more than local impacts.

In October 2007, the Nobel Peace Prize was awarded jointly to former US vice-president Al Gore and to the UN Intergovernmental Panel on Climate Change (IPCC) with a citation "*for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for the measures that are needed to counteract such change*". The award recognizes that climate change represents a threat to mankind on a similar plane to violent conflict and war, and indeed can lead to a breakdown of peace because of the increased competition for the earth's resources (ITU-T, 2007).

2.8.2 General causes of climate change and global warming

One of the greatest challenges facing humankind today is environmental degradation with its many consequences which include human-induced climate change. Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use (Ogola, 1997).

The principal reason for the mounting temperature change is a century and a half of industrialization: the burning of ever-greater quantities of oil, gasoline, and coal, the cutting of forests, and the practice of certain farming methods.

These activities have increased the amount of "greenhouse gases" in the atmosphere, especially carbon dioxide, methane, and nitrous oxide. Such gases occur naturally - they are critical for life on earth, they keep some of the sun's warmth from reflecting back into space, and without them the world would be a cold and barren place. But in augmented and increasing quantities, they are pushing the global temperature to artificially high levels and altering the climate. Eleven of the last 12 years are the warmest on record, and 1998 was the warmest year ever (IPCC, 2008).

There has been debate over the cause of rising global temperatures. Some argued it was a natural fluctuation, whilst others that it was caused by human activity. However in February 2007, an international panel of experts (the Inter-Governmental Panel on Climate Change) concluded that:

a). Global warming is occurring.

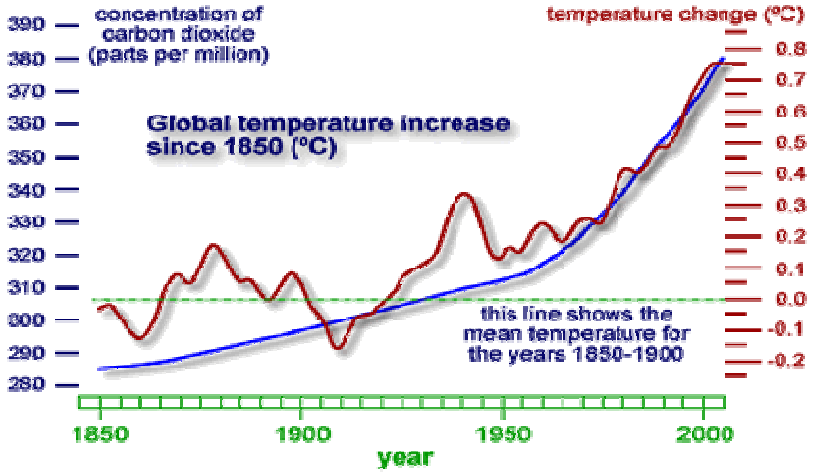
b). Increase in global temperature is a result of human activities.

c). Given current trends, temperature extremes, heat waves, and heavy rains will continue to escalate in frequency. The earth’s temperature and seas will continue to rise into the next millennium.

These climate change effects are due to an increase in greenhouse gases in the atmosphere. These gases come from the burning of fossil fuels, forest destruction and

agriculture (rice field cultivation and the keeping of livestock). Water vapour in the atmosphere also plays a role. The graph below shows the link between increasing levels of carbon dioxide in the atmosphere and global temperature change, by the year 2000.

Figure 7: Levels of carbon dioxide in relation to global warming



Source: Practical Action, 2008

From different literature it is evident that the main cause of climate change is the human activities, especially so the introduction of high levels of carbon dioxide, methane, nitrous oxide and fluorocarbons which bring about global warming.

Most parts of the world have experienced a gradual warming in mean surface temperature of between 0.3°C and 0.6°C since about 1860 when systematic recording of climate began. However, most of the warming occurred between 1910 and 1940 and in the last 20 years. The last century has been the warmest in at least 600 years (Ogola, 1997).

The atmosphere that surrounds Earth is composed of a thin layer of naturally occurring

gases. This crucial layer protects the planet from the heat of the sun and the cold of space and keeps Earth at a life-sustaining temperature through a process called the greenhouse effect. Radiant heat and light from the sun passes through the thin atmosphere to the planet itself. Some of this energy warms the ground and waters of Earth and then reradiates back into space through the atmosphere. Some of the sun's energy though, gets trapped by the atmosphere. This heat and light does not reradiate into space. Instead, it warms Earth's air, which would otherwise be a frigid zero degrees Fahrenheit

Berne (2008) argues that global warming occurs when certain gases, called greenhouse gases thicken the thin layer of atmosphere, trap too much heat inside and further warm the ground, oceans, air and clouds. The primary green house gas is carbon monoxide. Though there are about 30 others. Some of these are present in the air, land, and oceans naturally; others have been created by humans.

2.8.3 Climate variability and change in Kenya

There has been increased appreciation of the role that climate plays in the lives of Kenyans in recent years. This awakening has been occasioned by an increase in intensity and frequency of occurrence of extreme climate events such as severe droughts and flooding. These extreme events have had negative socio-economic impacts on almost all sectors such as health, agriculture, livestock, environment, hydropower generation and tourism. They have caused increased demand for more specialized and accurate weather and climate predictions and advisories (Muchemi, 2004).

Most of the natural disasters that occur in Kenya are weather related. Such disasters have occurred with increased severity and frequency in recent years. It became necessary to develop a mechanism that would help the country adapt to these extreme events of climate variability.

Table 1: Recent history of meteorological disasters in Kenya.

Year	**Type of disaster**	**Area of Coverage**	**No. of people affected**
2003	Flood	Budalang'i	28,000
2002	Landslide	Meru, Murang'a, Nandi	2,000
1999/2000	Drought	Widespread	4.4 million
1997/98	El Nino floods	Widespread	1.5 Million
1995/96	Drought	Widespread	1.41 million
1991/92	Drought	Arid/Semi Arid zones	1.5 million
1985	Floods	Nyanza/Western	10,000
1983/84	Drought	Widespread	200,000
1982	Floods	Nyanza	4,000
1980	Drought	Widespread	40,000
1977	Drought	Widespread	20,000
1975	Drought	Widespread	16,000
1971	Drought	Widespread	150,000

Source: "National Policy on Disaster Management", Muchemi, (2004).

Climatic variability is especially pronounced and important in the dry land regions that encompass roughly two-thirds of the African continent, an area home to roughly 50 million or so Africans, a population typically far poorer than those in higher rainfall areas in Kenya for example Eastern and North eastern provinces are the hardest hit areas when it comes to weather changes and climate variability.

Muchemi (2004), notes that the issue of climate change and furthermore global warming is of global concern today. Many people from North to South, East to West can feel and live with adverse effects of climate change. Mountains like Mt Kenya has had its snow peaks melting, thus causing rise to sea levels and unpredictable rainfalls. Droughts in eastern part of Kenya and flood in the western part have become numerous today. The real effects of climate change are being felt all over the country and concrete measures need to be taken to avert this trend.

Key personalities who have expressed their voices over the issue of climate change include Al Gore, Professor Wangari Maathai, all who have said over and over again that unless climate change is checked the whole world will suffer the consequences. Many public universities are engaging in training on environmental studies. These universities in Kenya namely; Moi University, Egerton University, University of Nairobi, Jomo Kenyatta University, Kenyatta University and some few private colleges are keen on developing curriculum which are geared towards increasing knowledge in the field of environment.

The whole issue about climate change has not dawned in many Kenyans minds. They are still to get the relationships between what they are going through and climate change. Everyday people are defending themselves on why they need to encroach on important ecosystems for farming reasons, burn charcoal for fuel, use the dwindling levels of water for irrigation purposes as well as pour industrial effluents to rivers. None seem to know or albeit ignorance that without proper management of our environment there will be no future. Professor Wangari Maathai has once and again said that "nature is very unforgiving", when it retaliates, it does it very harshly. Conflicts have risen due to scarcity of natural resources like water and clean air. As millions headed to Beijing for Olympics in 2008, many environmental diehards cancelled their flights and chose not to participate because of the intense air pollution in that city. Availability of environmental information to all decision makers as well as to common man will help advance the solutions we can all come up with.

2.8.4 ICTS and climate change

Information and Communication Technologies (ICTs) are undoubtedly part of the cause of global warming as witnessed, for instance, by the millions of computer screens that are left switched on overnight in offices around the world (ITU, 2007). ICTs however can also be part of a solution. As said before there are a number of different causes of climate change, some of which are naturally generated (for example, variations in solar radiation, volcanic activity etc). However, man-made climate change is of major concern since it is the leading cause of progressive and accelerating warming of the planet, as a result of the release of greenhouse gases (GHG), primarily carbon-based emissions. The primary

sources of GHG are energy production and consumption, transport, buildings, land-use change, waste management and ICT contributes about 4 per cent of total GHG.

ITU, (2007) notes that there are several things that stakeholders can use ICTS as a solution to the climate issue and global warming than a problem;

2.8.4.1.ICT use in monitoring climate change

The science of climate change, which has developed over the last century, has benefited greatly from the parallel development of ICTs. The typical locations for climate research such as the polar ice caps, glaciers, volcanoes, the ocean bed or the upper layers of the atmosphere are inhospitable and remote monitoring and data collection using ICT equipped sensors (telemetry) is essential for research, (ITU, 2007). Even more useful has been the development of aerial photography, satellite imagery, grid technology and in particular the use of global positioning by satellite (GPS) for tracking slow, long-term movement, for instance of glaciers.

In addition to monitoring the effects of climate change, ICTs have also proved invaluable in computer modelling of the earth's atmosphere. Meteorological services are among the most demanding users of the world's fastest supercomputers, and produce progressively more sophisticated general circulation models of climate (ITU 2007).

2.8.4.2.ICTs for mitigating the local effects of climate change

ITU, (2007) notes that the impact of global warming on the world's climate to date is relatively small compared with what can be expected in the future, even if the increase in GHG is stabilized. The IPCC, in its 4th assessment report, predicts a rise in average temperatures of 1.4-5.8° C and a 3 per cent reduction in global GDP by 2030. However, the results are likely to be highly uneven in their distribution, with low-lying coastal areas (for example, small island developing states, Bangladesh delta, Netherlands) at risk because of rising sea levels; sub- Saharan Africa at risk due to desertification; a growing number of environmental refugees and increased pressure on sources of fresh water and on vulnerable ecosystems such as coral reefs, tundra, coastal wetlands etc.

Several countries have called for the use of telecommunications/ICTs for monitoring and management in emergency and disaster situations for early warning, prevention, mitigation and relief. A good example is the tsunami early warning systems for the Indian Ocean, following the tsunami of 26 December 2004.

2.8.4.3.ICTs and concerted action against global warming

The key to combating global warming is to stabilize and eventually reduce the emission of GHG. In some areas some gases like chlorofluorocarbon (CFC) gases have reduced to 20 per cent of their 1990 levels by 2004. This is not the same with carbon dioxide which has continuously grown by around 80% (ITU 2007). The Bali conference of December 2007 however laid out measures in which developing countries will adhere to in order to curb the emission of carbon dioxide and the result of carbon neutral climate came up.

Reducing carbon emissions will require changes in lifestyle and behaviour, but changes in management practices can also have a positive impact. ICTS can however help in a way in:

- **Directly;** Reduce the ICT sector's own energy requirements
- **Indirectly;** through using ICTs for carbon displacement
- **In a systemic way;** by providing the technology to implement and monitor carbon reductions in other sectors of the economy

The three combinations form a very useful framework that the International Telecommunication Union is pushing for mitigating the effects of global warming (ITU, 2007).

2.8.4.4. ICTs and dissemination of climate change and environment information

ICTs when used for dissemination and communication can be effective means of providing environmental stakeholders with huge amounts of relevant and timely information. For example network of radio stations which have flourished in Kenya, using a combination of digital satellite receivers and conventional FM radio technology improve access to information for sustainable rural development. Girard, (2003) indicates that the innovative use of internet based information in conjunction with other media such as radio has the potential to increase the inclusion, feedback and discussion on environmental information. Social networking and other communication tools also have the potential to increase feedback and discussion. This sharing and collaboration could

lead to the wider and more rapid uptake of the information content in the field of environment.

The growth in the use of mobile phones even so in the developing countries, has been described as “explosive”. There are more than twice as many mobile owners in developing countries as in industrialized countries and subscriber growth rates are 25 percent per year, and double that is in Africa, (Heeks and Jagun, 2007). This phenomenal growth can be utilized to disseminate not only environmental information but also other types of information which can fasten economic growth.

2.8.5 Impact of climate change in Africa

Ogola (1997) notes that climate change would result from the increased emission and subsequent concentration of gases referred to as greenhouse gases in the atmosphere due to human activities. Increased concentration of these gases would cause global warming accompanied by a shift in rainfall patterns. Consequently sea-level rise and shifts in food production, water resources, biodiversity, fisheries, health and human settlement; and energy demands could occur. Rapid changes in climate will result in changes in the composition of ecosystems; some species will benefit while others will be unable to migrate or adapt fast enough and may even become extinct. Land presently not available for agriculture could, with increased temperature and rainfall, support crops.

Although Africa, of all the major world regions, has contributed the least to potential climate change because of its low capita fossil energy use and hence low greenhouse gas emissions, it is the most vulnerable continent to climate change because of widespread

poverty which limits capabilities to adapt. The ultimate socio-economic impacts of climate change will depend on the relative resilience and adaptation abilities of different social groups. Much will depend on the coping abilities and mechanisms used by governments and households over the next 50 years or so. Such abilities are determined by political stewardships (Hulme, 1996b).

Watson (1998) continues to say that several climate regimes characterize the African continent; the wet tropical, dry tropical, and alternating wet and dry climates are the most common. Many countries on the continent are prone to recurrent droughts; some drought episodes, particularly in southeast Africa, which are associated with El Niño-Southern Oscillation (ENSO) phenomena. Deterioration in terms of trade, inappropriate policies, high population growth rates, and lack of significant investment, coupled with a highly variable climate—has made it difficult for several countries to develop patterns of livelihood that would reduce pressure on the natural resource base. Under the assumption that access to adequate financing is not provided, Africa is the continent most vulnerable to the impacts of projected changes.

Africa contains about one-fifth of all known species of plants, mammals, and birds, as well as one-sixth of amphibians and reptiles. These species compose some of the world's most diverse and biologically important ecosystems such as savannahs, tropical forests, coral reef marine and freshwater habitats, wetlands and mountain ecosystems. These globally important ecosystems provide the economic foundation that many Africa countries rely on by providing water, food, and shelter (WWF, 2007). However, because

of climate change, these ecosystems and the livelihoods that depend on them are threatened.

Climate change is real and happening now. The average global surface temperature has warmed 0.8°C in the past century and 0.6°C in the past three decades (Hansen *et al*., 2006), in large part because of human activities (IPCC, 2001). A recent report produced by the U.S. National Academy of Sciences confirms that the last few decades of the 20th century were in fact the warmest in the past 400 years (National Research Council, 2006). The Intergovernmental Panel on Climate Change (IPCC) has projected that if greenhouse gas emissions, the leading cause of climate change, continue to rise, the mean global temperatures will increase 1.4 – 5.8°C by the end of the 21st century (IPCC, 2001).

The effects of climate change such as rising temperature and changes in precipitation are undeniably clear with impacts already affecting ecosystems, biodiversity and people. In both developed and developing countries, climate impacts are reverberating through the economy, from threatening water availability to sea-level rise and extreme weather impacts to coastal regions and tourism. In some countries, climate impacts affect the ecosystem services that communities are largely dependent upon, threatening development and economic stability. Future impacts are projected to worsen as the temperature continues to rise and as precipitation becomes more unpredictable.

One region of the world where the effects of climate change are being felt particularly hard is Africa. Because of the lack of economic, development, and institutional capacity,

African countries are likely to be among the most vulnerable to the impacts of climate change (IPCC, 2001). Climate change impacts have the potential to undermine and even, undo progress made in improving the socio-economic well-being of East Africans. The negative impacts associated with climate change are also compounded by many factors, including widespread poverty, human diseases, and high population density, which is estimated to double the demand for food, water, and livestock forage within the next 30 years (Davidson *et al*., 2003).

Global warming is already affecting Africa. The Intergovernmental Panel on Climate Change (IPCC) predicts that, "the effects of climate change are expected to be greatest in developing countries in terms of loss of life and relative effects on investment and economy" It describes Africa, the world's poorest region, as "the continent most vulnerable to the impacts of projected change since it is not able to adapt due to the rampant poverty levels across Africa (Hulme, 2001).

The United Nations Secretary General on a message to the youth in World Youth Day 2008, noted the following,

> *"Though the science of climate change is complex, the facts are simple: our world is heading towards trouble. I saw this last year when I visited the Antarctic, where age-old ice is melting much faster than we originally thought it would. Left unaddressed, climate change could cause an unravelling of the progress that has been made towards achieving the Millennium Development Goals, and could also have serious implications for peace and security. Unless we make radical changes in the way we*

live, by the time the youth of 2008 reach my age, the world may well have become a rather inhospitable place."

This shows the seriousness of global warming and climate change to the whole society today.

Most of these effects have been seen in Africa, for example, Mt Kenya, Mt Kilimanjaro have had their ice caps melting over the recent years, their heights are reducing by the day. Climate change can be difficult and bring adverse effects; dinosaurs if they weren't extinct would confirm this. The prevailing theory is that they didn't survive when a giant asteroid struck the earth 65 million years ago, spewing so much dust into the air that sunlight was greatly reduced, temperatures plummeted, many plants didn't grow and the food chain collapsed. What happened to the dinosaurs is a rare example of climate change more rapid than humans are now inflicting on themselves, but not the only one. Research on ice cores and lake sediments show that the climate system has suffered other abrupt fluctuations in the distant past. Although scientists are still analyzing what happened during those earlier events, it is clear that an overstressed world with 6.6 billion people is a risky place to be carrying out uncontrolled experiments with the climate.

The current warming trend is expected to cause extinctions. Numerous plant and animal species, most of them are in Africa, already weakened by pollution and loss of habitat, and are not expected to survive the next 100 years. Human beings, while not threatened in this way, are likely to face mounting difficulties. Recent severe storms, floods and droughts, for example, appear to show that computer models predicting more frequent "extreme weather events" are on target (UNFCCC, 2008).

The average sea level rose by 10 to 20 cm during the 20th century, and an additional increase of 18 to 59 cm is expected by the year 2100. (Higher temperatures cause ocean volume to expand, and melting glaciers and ice caps add more water). If the higher end of that scale is reached, the sea could overflow the heavily populated coastlines cause the disappearance of some nations entirely (for example Islands State of Maldives), foul freshwater supplies for billions of people, and spur mass migrations.

Agricultural yields are expected to drop in most tropical and sub-tropical regions - and in temperate regions too - if the temperature increase is more than a few degrees Centigrade. Drying of continental interiors such as the African Sahel is also forecast. These changes could cause, at a minimum, disruptions in land use and food supply. And the range of diseases such as malaria which is predominant in Africa may expand.

Global warming is a "modern" problem - complicated, involving the entire world, tangled up with difficult issues such as poverty, economic development and population growth. Dealing with it will not be easy, ignoring it will be worse.

Watson et al (1998) discussed the following as the adverse effects of climate change that affect Africa:

2.8.5.1. Terrestrial Ecosystems

In Africa today, tropical forests and rangelands are under threat from population pressures and systems of land use. Generally apparent effects of these threats include loss of biodiversity, rapid deterioration in land cover, and depletion of water availability through destruction of catchments and aquifers. Changes in climate will interact with

these underlying changes in the environment, adding further stresses to a deteriorating situation. A sustained increase in mean ambient temperatures beyond 1°C would cause significant changes in forest and range-land cover; species distribution, composition, and migration patterns; and biome distribution. Many organisms in the deserts already are near their tolerance limits, and some may not be able to adapt further under hotter conditions.

2.8.5.2. Hydrology and Water Resources

Of the 19 countries around the world currently classified as water-stressed, more are in Africa than in any other region—and this number is likely to increase, independent of climate change, as a result of increases in demand resulting from population growth, degradation of watersheds caused by land-use change, and siltation of river basins. A drop in water level in dams and rivers could adversely affect the quality of water by increasing the concentrations of sewage waste and industrial effluents, thereby increasing the potential for the outbreak of diseases and reducing the quality and quantity of fresh water available for domestic use.

2.8.5.3.Agriculture and Food Security

Except in the oil-exporting countries, agriculture is the economic mainstay in most African countries, contributing 20-30% of gross domestic product (GDP) in sub-Saharan Africa and *55%* of the total value of African exports. In most African countries, Kenya included farming depends entirely on the quality of the rainy season—a situation that makes Africa particularly vulnerable to climate change. Increased droughts could seriously impact the availability of food, as in the Horn of Africa and southern Africa

during the 1980s and 1990s. Changes in ocean dynamics could lead to changes in the migratory patterns of fish and possibly to reduced fish landings, especially in coastal fisheries which would directly affect the food reserves in Africa.

2.8.5.4. Coastal Systems

Several African coastal zones, many of which already are under stress from population pressure and conflicting uses, would be adversely affected by sea-level rise associated with climate change. The coastal nations of many African countries have low-lying lagoonal coasts that are susceptible to erosion and hence are threatened by sea-level rise, particularly because most of the countries in this area have major and rapidly expanding cities on the coast. Kenya has had its share, when Tsunami hit the far Asia, Mombasa was affected though at a low magnitude but this explains that no country is safe from the effects of climate change.

2.8.5.5. Human Settlement, Industry, and Transportation

The main challenges likely to face African populations will emanate from extreme climate events such as floods (and resulting land-slides in some areas), strong winds, droughts, and tidal waves. Individuals living in marginal areas may be forced to migrate to urban areas (where infrastructure already is approaching its limits as a result of population pressure) if the marginal lands become less productive under new climate conditions. Climate change could worsen current trends in depletion of biomass energy resources. Reduced stream flows would cause reductions in hydropower production, leading to negative effects on industrial productivity including power fluctuations and

costly relocation of some industrial plants. Management of pollution, sanitation, waste disposal, water supply, and public health, as well as provision of adequate infrastructure in urban areas, could become more difficult and costly under changed climate conditions.

2.8.5.6. Human Health

Africa is expected to be at risk primarily from increased incidences of vector-borne diseases and reduced nutritional status. A warmer environment could open up new areas for malaria; altered temperature and rainfall patterns also could increase the incidence of yellow fever, dengue fever, and trypanosomiasis. Increased morbidity and mortality in sub regions where vector-borne diseases increase following climatic changes would have far-reaching economic consequences.

2.8.5.7.Tourism and Wildlife

Tourism, one of Africa's fastest-growing industries is based on wildlife, nature reserves, coastal resorts, and an abundant water supply for recreation. Projected droughts and/or reduction in precipitation in the eastern and southern Africa would devastate wildlife and reduce the attractiveness of some nature reserves, thereby reducing income from current vast investments in tourism.

2.8.6 Communicating climate change information

Climate change became a major political and public issue which made governments to request UNEP and World Meteorological Organization (WMO) to establish an Intergovernmental Panel on Climate Change (IPCC) to:

a). assess the scientific information that is related to climate change issues;

b). asses social –economic impacts; and

c). formulate realistic response strategies for the management of climate change.

The information IPCC provides is based on scientific evidence and reflects existing viewpoints within the scientific community. The comprehensiveness of the scientific content is achieved through contributions from experts in all regions of the world and all relevant disciplines including, where appropriately documented, industry literature and traditional practices, and a two stage review process by experts and governments. Because of its intergovernmental nature, the IPCC is able to provide scientific technical and socio-economic information in a policy-relevant but policy neutral way to decision makers (IPCC, 2008).

The IPCC provides its reports at regular intervals and they immediately become standard works of reference, widely used by policymakers, experts and students. The findings of the first IPCC Assessment Report of 1990 played a decisive role in leading to the United Nations Framework Convention on Climate Change (UNFCCC), which was opened for signature in the Rio de Janeiro Summit in 1992 and entered into force in 1994. It provides the overall policy framework for addressing the climate change issue.

Climate change is a very complex issue: policymakers need an objective source of information about the causes of climate change, its potential environmental and socio-

economic consequences and the adaptation and mitigation options to respond to it (IPCC, 2008).

Cox (2006) says that it is impossible to separate our knowledge about environmental issues from communication itself. He further reiterates that, the way we communicate with one another about the environment powerfully affects how we perceive both it and ourselves and, therefore, how we define our relationship with the natural world. Communicating the message about the environment well has a lot of implications to all of us. That is why we should ensure that the message is communicated in a more acceptable manner. The images and information people receive from friends, popular films, the news media and books play a powerful role in influencing not only how we perceive the environment but also what actions we take.

While actions relevant to climate change are occurring at a variety of scales in the public and private sectors, evidence shows that traditional means of communicating climate science continue to be largely ineffective at reaching the broader public and stimulating behavioural/personal, organization/institutional change all over the world. This therefore means that better ways of communicating this information needs to be invented and adapted as soon as possible.

According to Cox (2006), there are different approaches that we can apply to ably communicate the environmental message, namely;

a). Citizens and community groups: Everyone has a role to play. We do not have to wait for the next door neighbour to take action which I should have done in the first place.

b). Environmental groups; these range from grassroots and community groups, to regional and national environmental organizations for example Greenbelt Movement in Kenya, World Wide Fund for Nature in the international arena. These groups should be encouraged to do effective environmental communication.

c). Corporate and business lobbyists

Though most of the times they would be opposing rules that will endanger their businesses, when used positively they will help take the message far and wide.

d). Anti-environmentalist groups

Many will find it difficult to believe that these groups can help in communicating environmental information. Some believe that the protection of environment will affect their jobs and economy, thus the opposition.

e). Media and environmental journalism.

We can't overemphasize the role the media can and have played in the protection of environment. From covering stories of encroachment of forests, industrial pollution, charcoal burning and tree planting the media has been at the forefront championing the importance of conserving the forests.

All these groups will help in passing the environmental and climate change message across the globe and governments should utilize their expertise to ensure everyone has the right information to make right decisions.

2.9 Summary

Since information is an important aspect in the world today whether in the finance, economic growth or even in democracy, the value of providing quality information to users cannot be underestimated. Provision of information services forms the backbone of many information centres and libraries including the UN library at Nairobi and this fact was well discussed in this review. In this chapter the researcher has endeavoured to look into key and related areas in the field of information provision. Issues like information resources and their relevance were discussed as well the importance of understanding the needs of users in determining the type of information materials they need access to.

Sources of information and their relevance to information provision has also been reviewed as well as access to information with emphasis to environmental information, barriers to accessing information and factors affecting provision of information. Other important areas like climate change, access to climate change information, impact of climate change in Africa, environment information and decision making have also been reviewed in this chapter. The field of environment under which UNEP's mandate rotates is becoming an important field as categorized by many international meetings being held in many countries for example the just concluded Copenhagen Meeting on Environment whose theme was to develop an international protocol to replace the Kyoto protocol.

Owing to this factor, issues like global warming were also discussed in this review explaining the effects and causes of the same and how the availability of information in this area has helped people to adapt to the changes that are brought about by climate change.

Since information provision heavily depends on several factors which includes information needs, literature on information needs and information seeking behaviour have been reviewed and their relevance to information seeking and provision. It is a field where so much is still being written as to improve why some people behave in a certain way when seeking their information. All this is driven by the information needs of the individuals. The researcher also reviewed some relevant literature on the field of information needs including the model used for this study. Due to the dynamics of this area, the researcher will continue to look for more relevant information in this area and will update the review periodically.

Chapter three

Research Methodology

3.1 Introduction

This chapter describes the research methodology that was used in this study. It discusses the research design, study population, sample and sampling techniques, data collection methods and tools, procedure for data collection, and the data analysis method that was used in this research.

3.2 Research Design

This study investigated the provision of information to various categories of users at UNEP. Since the study involved getting in-depth information about information provision, information seeking and use and in this case requires a social and cultural phenomenon, the researcher felt that a qualitative research design was appropriate for the study. Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena (Myers M, 1997).

Since it was important in this study to collect data from various category of users, for example it was important to know what information they needed, from who, how and why they use it, what information users collect, using which method, how they store, and use it, one method was not sufficient to collect this kind of data, thus the importance of combination of qualitative and quantitative methods. To be able to meet some specific

objectives of this study like determining how many computers are available for use by the staff members, quantitative research methods were applied too.

This study utilized interviews and documents reviews to gather the qualitative data needed. Ewing's (2003) notes that qualitative researchers can be found in many disciplines and fields, using a variety of approaches, methods and techniques. There has been a general shift in research away from technological to managerial and organizational issues, hence an increasing interest in the application of qualitative research methods. On the other hand qualitative research has its roots in social science and is more concerned with understanding why people behave as they do: their knowledge, attitudes, beliefs, fears, etc. (for example, why do environmental researchers prefer to be involved in decision-making about their environmental conservation and sustainability). Qualitative research allows the subjects being studied to give much 'richer' answers to questions put to them by the researcher, and may give valuable insights which might have been missed by any other method. Not only does it provide valuable information to certain research questions in its own right but there is a strong case for using it to complement quantitative research methods, (Ewings, 2003).

3.2 Study Population

In statistics, a statistical population is a set of entities concerning which statistical inferences are to be drawn, (Wikipedia, 2008). Population is the collection of items of interest in research. The population represents a group that you wish to generalize your research to. Populations are often defined in terms of demography, geography, occupation, time, care requirements, diagnosis, or some combination of the above. In this

study the population was defined in terms of occupation and demographic terms. In order to answer the research questions in this study, it was necessary to get data from the expected users of the information that UNEP generates. The users utilized the information and information resources available at UNEP for decision making.

The researcher divided the population into three major categories; Policy makers or senior managers, external researchers and the university students. In addition the researcher considered the information professionals who acted as research informants. Majority of the users at the United Nations library and UNEP at large are the scientific researchers and university students from various public and private universities. The researcher used the library statistics to have a clear view of the population who use the UNEP information. In the period of this research, the average monthly statistics for the library users was two hundred (200) students and one hundred and fifty (150) students. The senior managers targeted for this research was 20 based on the number of Directors and Senior Program officers at UNEP. This was the composition of the study population for this research, with a total of 390.

The table below illustrates this:

Table 2: Composition of Study Population at UNEP

Designation	**Population**	**Percentage**
Senior Managers	20	5.4
University and College Students (students doing their study during the research period)	200	54.1
Scientific Researchers	150	40.5
Total	**370**	**100.0**

As part of the study and so as to understand the issue of information provision at UNEP well, the researcher included the information staff to be part of the research as informants. This group was necessary since they are the ones involved with the day to day running of information services, besides creating and disseminating information. The table below summarizes this as follows:

Table 3: UNEP information staff population (Research Informants)

Staff category	**No. of staff**	**Percentage**
Information officers	8	20.0
Web Designers	14	35.9
Chief Librarian	1	2.6
Information Assistants	12	30.8
Other librarians	4	10.3
Total	**39**	**100**

The first categories of senior managers are involved in design of organizational policies and direct creation of information strategies at UNEP to make decisions. Their everyday role rotates around management of information. They are responsible for the enhancement of organization image, both within and without.

The second category included professional researchers and environmentalists based in various non-governmental organizations and inter-governmental organizations. The researcher also targeted researchers who were based at UNEP and doing different levels of research, government researchers and other free lance researchers. Most of the scientists in this group come into the organization through the library to access and use information.

The third category of population included students both from universities and colleges based in Kenya and to some extent other international colleges. The higher population of students targeted were those of universities close to UNEP namely Nairobi, Kenyatta, Kenya Methodist university, Aga Khan university, Moi University Nairobi campus and Kenya Teachers Training College, which neighbours UNEP. However other international students especially those who had come to UNEP as interns from external universities were targeted.

3.4 Population sampling

Berge (2007) indicates that the logic of using a sample of subjects is to make inferences about some larger population from a smaller one – the sample. Since this is a qualitative research, the researcher applied non-probability sampling techniques. According to Keya,

et al. (1989), sampling involves selecting some elements of a population, having similar features to the underlying population, as representative of the total population so as to make certain observations of these elements and make conclusions regarding the entire population. Patton (1990) observes that qualitative inquiry typically focuses in depth on relatively small sample, even single cases (n=1).

Patton (1990) continues to say that, there are no rules for sample size in qualitative inquiry, and that the sample size depends on: what one wants to do; the purpose of the inquiry; what will be useful; what will have credibility; and what can be done with available time and resources. This study applied these aspects considerably, and consequently due to its qualitative nature, only a small sample size was required.

In this research and considering the area of concern in the study, different sampling techniques were used to seek for information from specific groups in the population. These were quota, census, and sampling methods. Paneth (2002) explains that when we sample a population, we will be able to tell the validity of the results, which could be both internal and external. For internal validity, we are able to tell the extent to which we can be sure that the results of our study sample is valid and real. He says of external validity, it will assist in showing extent to which we can be sure that the results of our research sample can be generalized to other samples.

In the study the population was divided into three strata:

a). Senior Managers

b). Scientific researchers

c). University Students

The senior managers included the directors and programme Officers. Being the top managers at UNEP, they are responsible for all the policies the organization uses for information creation, storage and dissemination. They are recognized as key people who can give important data which is informative. Given the nature of their work, more time was needed to ensure that at least a good sample size was obtained. Realistically no sampling method was used but census was rather applied to get the sample size. In this case five divisional directors and five senior programme officers were interviewed making a total of ten interview respondents in this stratum.

For the student and researchers population, the researcher randomly selected 30% of the target population that is, thirty percent of 200 students and thirty percent of 145 researchers, with the researcher selecting the students depending on which university they represented, and what subjects they were undertaking. A well represented population of all the universities targeted was defined with thirty percent of the students population being considered adequate for this research, thus 45 students were selected for the interview.

As far as information officers and librarians were concerned, who as mentioned before were only considered as informants, to assist in gathering more data, the researcher's intention was to collect as much relevant data as possible and thus targeted to interview

all the information officers and librarians. Thus the population sample for this was thirty nine (39).

The below table summarizes the entire sample data used in the research:

Table 4: Summary of respondents

Strata	**Sampling method used**	**Sample size (n)**
Senior Managers	Census	10
Scientific Researchers	Random	60
University Students	Random	45
Total		**115**

Target population of informants (Information Officers and Librarians)

Information Officers (Informants)	Purposive	**39**
Total		**39**

3.5 Data Collection Methods

In view of the in-depth nature of the study, data was collected using interviews and documentary evidence. These two methods which were complimentary to each other led to comprehensive and reliable data. The interview schedule was semi-structured to allow for flexibility so that questions can be answered fully.

3.5.1 Documents review

Many organizations have documents which can be used to trace their history, govern their operations and even show the current status of the organization. Oka and Shaw (2000)

point out that documentary evidence is one of the best methods of collecting qualitative data. With this in mind, this technique of data collection was used to complement the other methods used in this research.

During this study the researcher reviewed the UNEP annual reports which are both in print and electronic. The UNEP annual reports are comprehensive reports that narrate UNEP's activities throughout the preceding year. These reports are printed in the six different UN languages. The researcher however reviewed only the annual reports printed in English. The annual report mainly highlights the year's main areas of concern, issues to do with funding, governance and information on various countries which are member states of UNEP. The information includes contacts information and what each country contributed to UNEP in the previous year among other key points. The reports also show significant achievements during the period under review.

In addition to the annual reports UNEP publishes topical publications. These are publications written and edited by various UNEP officers around the world on a particular theme like climate change, global warming, disasters and droughts among others. The researcher reviewed key publications on climate change, ICTs and climate change, environmental communication, environmental information, and sustainable development by UNEP.

The researcher also reviewed statistical reports that were available at the library, especially those which contained environmental data. There were other statistical reports

that were of importance to the study like rivers, lakes, forest cover, ice melting statistics and emissions from various countries. This was important to the study for comparative purposes between Kenya and other countries.

On another front the researcher reviewed statistical reports from the library which were of key importance in understanding the trend of researchers and students who frequent the library, what time, and the topics of research. The researcher also reviewed website statistics of UNEP and the library to understand the usage of the websites both by external people and the UNEP staff members. This was of great importance in gauging the frequent visitors, repeat visitors and checking which times users visit the websites most according to the statistics.

3.5.2 Face to face interviews

Guion (2006) says that an in-depth face to face interview is a discovery-oriented method that is well suited for describing both program processes and outcomes from the perspective of the target audience or key stakeholder.

This method was chosen as the main data collection method. In this study there was necessity of in-depth understanding of the process of information flow, information services provided at UNEP and also if information needs of users at UNEP were considered when offering such services, as well as the challenges which users come across when accessing information from UNEP. This data collection tool was used since the researcher thought it would provide not only the highest response rate, but also very

high quality data. The goal of the interview was to deeply explore the respondent's point of view, feelings and perspectives. In this sense, in-depth interviews yield information.

An interview is a series of questions a researcher addresses personally to respondents. An interview may be structured (where you ask clearly defined questions) or unstructured, where a researcher allows some of the questioning to be led by the responses of the interviewee (Alby, 2005). The researcher applied the semi structured questions during the interview process. This made the interview in-depth which is an excellent tool to use in discovering the user's needs of a population. Since the goal of interviews is to deeply explore the respondent's point of view, feelings and perspectives, in-depth interviews yielded that kind of information (Guion, 2006).

The interview method was the most appropriate here, especially because the main sources of such data were external users and to an extent the UNEP employees themselves. Indeed, Busha and Harter (1980) agree that the interview is always the best method for collecting data about the respondents themselves – their experiences, opinions or attitudes, their reactions to trends and developments, and their knowledge.

In a qualitative research, interview seeks to describe the meanings of central themes in the life world of the subjects. The main task in interviewing is to understand the meaning of what the interviewees say. A qualitative research interview seeks to cover both a factual and a meaning level, which was sought in this study. Interviews are particularly useful for getting the story behind a participant's experiences and since the experiences

of users were required, then it was a good way of getting this vital information. The researcher pursued in-depth information around the topic for example some questions which would not be answered through an interview schedule (Valenzuela, 2003).

In essence, in-depth interviews involved not only asking questions, but systematic recording and documenting of responses coupled with intense probing for deeper meaning and understanding of the responses. Thus, in some cases, it was important to do some repeated interview sessions with the target audience in this study. The researcher involved one individual at a time to provide a more involving experience.

In a semi structured interview which was also applied in this research, it is possible to penetrate behind answers, follow up unexpected clues, redirect the inquiry into more fruitful channels on the basis of the emerging data, and modify categories to provide for a more meaningful analysis of data (Nsubuga, 2000).

In this study the researcher applied the following to ensure that quality and relevant data was collected:

a). **Semi-structured Format.** The researcher allowed questions to flow naturally, based on information provided by the respondent. Though the researcher was guided by the schedule, the flow of the conversation was dictated by the questions asked and those omitted, as well as the order of the questions. This was used to probe and prompt the interviewees for more specific and in-depth information due to its versatility

b). **Seek understanding and interpretation.** The researcher tried to interpret what was heard, as well as sought clarity and a deeper understanding from the respondent throughout the interview.

c). **Conversational.** The researcher encouraged a conversational role, though to a lesser extent since the researcher was expected to be more of a listener.

d). **Recording responses.** The researcher recorded the responses, typically using written notes such as field notes and/or tape recorder.

e). **Record observations.** All the non-verbal behaviors were observed and recorded on the field notes as they occurred.

f). **Record reflections.** The researcher also recorded his views and feelings immediately after the interview.

3.6 Data Collection tools

3.6.1 Interview schedules

To aid data collection during his research, interview schedules were developed. The use of interview schedules made it easy to standardize the questions. The goal of the interview was to deeply explore the respondent's point of view, feelings and perspectives. In this sense, in-depth interviews yielded information. Information provision, information services delivery, information needs, information-seeking behaviour, information access and flow, the role and impact of information on climate change activities, constraints on accessing information, and suggestions on how to solve the information gap were the issues of assessment.

In total the researcher designed four interview schedules. Three interview schedules were for the direct research respondents in the groups of Senior Managers, Scientific Researchers and University Students. One other interview schedule was prepared purposely for the information staffs that were not grouped with other respondents. The Information officers were considered as informants and thus required their own types of questions especially to help understand the information provision techniques at UNEP. The schedules were all semi-structured since they would help get in-depth information from the interviewees. However the questions in each schedule were different so that diverse information can be collected from each group.

3.7 Data presentation and analysis

This section dealt with organization, presentation and analysis of data collected. Since most of the data collected were of qualitative nature, qualitative data analysis was heavily applied. However since there were some quantitative data being sought in the research, some quantitative analysis was done, though not very detailed.

Lewins, et al, (2005) point that Qualitative Data Analysis (QDA) is the range of processes and procedures whereby we move from the qualitative data that have been collected into some form of explanation, understanding or interpretation of the people and situations we are investigating. The idea behind this was to examine the meaningful and symbolic content of qualitative data. During QDA, the process usually involves two things, writing and the identification of themes (coding) which was aptly applied in this research.

3.8.1 Writing

Writing in research involves writing about the data and what you find there. In many cases what one will write may be analytic ideas. During the study researcher wrote these views in analytical form. The researcher designed the following themes to aid in data analysis:

a) Information provision.

b) Information needs of users.

c) Information sources.

d) Tools for information collection.

e) Information services.

3.8.2 Coding into themes

Looking for themes involves coding. This is the identification of passages of text (or other meaningful phenomena, such as parts of images) and applying labels to them that indicate they are examples of some thematic idea. At its simplest, this labelling or coding process enabled the researchers to quickly retrieve and collect together all the text and other data that was associated with some thematic idea so that they can be examined together and different cases can be compared in that respect.

The researcher then evaluated the usefulness of this information against the objectives of the study and research questions. This was followed in this research as much as it was practically possible.

3.9 Summary

This chapter endeavoured to bring out the procedures and methods the researcher used to collect meaningful data that can stand the test of the study. Through the application of proper instruments, quality data was collected which helped achieve the set objectives and attain unambiguous results at the end of the research. Because of the qualitative nature of the study, only a small sample size of the institution under investigation was selected, but which was considered to be sufficient to allow generalisation about the study population to be made. The researcher collected data from three types of groups namely; scientific researchers, university students, senior managers and information professionals. Tools used to collect data were found to be appropriate in enabling extensive and intensive data about each of the institutions to be collected. The chapter has also discussed the method used to analyse the answers elicited from respondents, that is, the Qualitative Data Analysis (QDA) method as described by derived Lewins, et al, (2005), and which is recommended for such kind of research such as the current one.

Chapter Four

Data Presentation, Analysis and Interpretation

4.1. Introduction

In this chapter data collected from the respondents is presented, analysed and interpreted. Data presentation is basically descriptive; while analysis is based on the study objectives so that it particularly focuses on specific issues related to the provision of information and information services to users at UNEP and was done thematically.

Data has been presented, analysed and interpreted under the following major areas: analysis of respondents under study, provision of information and information services, information needs of users, information sources, electronic information systems, and information services at UNEP, dissemination of climate change information as well as information and research. Additionally, respondents' views on the effects of information on environment management as well as use of ICTs in information dissemination were also included.

4.2 Analysis of respondents under study

The total number of people that were targeted for interview was one hundred and fifteen. However after interviewing all the senior managers, and sixty percent (69) of researchers and students, the researcher stopped the interviews since the saturation point was reached. No more new data was forthcoming and considering this scenario the researcher was satisfied with this number. All the interviewees were asked questions relating to their positions, area of specialization, professional qualifications and the related areas to do

with the level of awareness and type of information services they utilise at UNEP. Another related area of the interview was whether their information needs were being met by these information services. These questions were designed to help the researcher gain an insight into the provision of information and information services of the respondents and the relevance of the information sources they utilise at UNEP.

The scientific researchers interviewed in this study comprised of both local and international researchers, with a fraction of these working at UNEP. The local researcher respondents were more than the international ones, which though it worked better for the study was not designed to be so. Most of the local researchers interviewed were linked to various Non Governmental organizations and universities. However quite a number were also from the government offices and this was a plus since they would help identify whether there are benefits of information provided by UNEP to the government. Interviewing external researchers especially, was important since the researcher wanted to find out what information goes out to the public, barriers they go through in accessing the environmental information, the tools that are available and helpful to them during their research and sources of information available at UNEP and its various departments, all of which are discussed later in this chapter

The scientific researchers' interviewed were researching on important environmental topics, for example global warming, climate change, health and the environment and agriculture. These topics were significant in that with one of the objectives being to establish the environmental sources of information available at UNEP and their

significance, this group of researchers were key to getting data relevant to achieving this objective.

The students interviewed in this study were either doing their undergraduate, masters or PhD degrees. Most of them were also researching on materials to use for starting up or completing their articles and dissertations, which they were already undertaking with both national and international universities. All the universities where these students came from were either having some environment department or were giving courses which were relevant to this study, for example agriculture, forestry, fisheries, land degradation, energy systems and technology innovation.

The senior managers interviewed in this study were more linked to policy formulation, decision making and departmental management at UNEP. They together with programme managers had the final say on any major decision made by their relevant juniors, including those in the area of information provision. Though they did not have to micromanage every department, they were regularly briefed on any eventualities within the institution. Of these senior managers interviewed, 4 were from the level of senior program officers while the rest 3 were in positions of directors. One of the senior programme officer interviewed, was a former chief of the library and thus was a very key person as far as information management at UNEP is concerned. He is still very instrumental in the field of information policy since he is still working on research and management of projects which have some importance to the organization.

The information professionals as mentioned before were not grouped together with the rest of the respondents. They were treated in a special manner since; as would be the case, most of them work directly in the creation and provision of information and information services at UNEP. In the course of collecting the data and to make sure that this group was relevant, the duties of the information professionals were sought and were as follows:

a). Track, research and analyze information on assigned topics/issues; gather information from diverse sources and help to assess news value and/or potential impact, as well as to evaluate the effectiveness of information campaigns;

b). Draft/compile a specific type or types (for example print, broadcast, etc.) of information communications products for target audiences including press releases, media packets and reports, brochures, briefings, video clips, newsletters, websites, etc.;

c). Organize the clearance, production and distribution of information material; In consultation with others, identify and propose information opportunities, activities and approaches, taking into account the situation/topic and target audience;

d). Identify key contacts/constituencies and opportunities for strategic partnerships to facilitate communication efforts and maintain working relationships with the same; organize or participate in the organization of conferences, seminars, press briefings, interviews, etc.;

e). Prepare briefing materials for senior officials prior to their participation in such events and respond to a variety of inquiries and information requests internally and externally; prepare related correspondence.

An analysis of these duties showed that most of them were related to provision of information and information services to users at UNEP, the media and those who came to seek for information from UNEP. Most of the information officers were found to be computer literate, something the researcher though had to do with the type of work they did. It was clear from the interviews that their work sometimes involved research not only from printed materials but also electronically.

The library staffs interviewed in particular were found to be keen in offering library services to the users who visited the library. It was however importance to note that the study found that not all users accessed the library as the focal point for information resources. Some chose to go direct to particular information officers especially if the information need was of a technical nature than what the librarians would handle. Most of the information staff interviewed had at least a diploma certificate. Several of the information officers interviewed had media liaison skills, which could be related to the tasks they handled. From the internet department, the two staff interviewed were found to possess lots of content and knowledge management skills.

4.3 Provision of information to UNEP users

Being the main aim of this research, provision of information and information services at UNEP was of critical importance. From the data that was collected during the interview with the policy makers and information professionals, it was evident that UNEP has in a way established mechanisms of providing information to its users. Information came out as an important component in environment conservation as it was envisaged in this study. Through the question to senior managers whether UNEP provides information to its users, nine of ten (90%) senior managers agreed that UNEP has enormous resource of information which it creates for the purpose of use by its users. The senior managers also agreed that, the institution had tried to put up some mechanisms to help disseminate this information to its users, seven out ten (70%) senior managers were aware of some mechanisms already in place for information creation and dissemination.. The information professionals on the other hand, being the custodians of this information and the ones in charge of disseminating it, informed the study that users come to UNEP to seek for information especially information to do with environment conservation and sustainable development. All information professionals interviewed noted in one time or the other that they have encountered users (students and researchers) seeking information from them directly or through the set up information channels such as library and media centre.

4.3.1 Information types available at UNEP

This study revealed that UNEP has different types of information that it provides to its users. While seeking answers to this question, the information professionals informed the study of the following as information types available at UNEP.

Table 5: Information types available at UNEP

N=10

Information type	**Number of positive responses**	**Percentage**
Climate change information	10	100
Forestation and deforestation	9	90
Global warming	10	100
Threatened species	5	50
Pollution	8	80
Carbon emissions	6	60
Disaster and conflicts	8	80
Environmental governance	5	50
Harmful substances	4	40

***** Multiple results

The scientific researchers were also asked to state how much they were aware of the information types available at UNEP. The results were as follows:

Table 6: Information types researchers are aware about

N=42

Information type	**Number of positive responses**	**Percentage**
Climate change information	26	63
Forestation and deforestation	40	96
Global warming	42	100
Threatened species	21	50
Pollution	26	63
Carbon emissions	31	75
Disaster and conflicts	28	67
Environmental governance	18	42
Harmful substances	10	25

***** Multiple results

Given the above scenario, it was clear that though the senior managers and information professionals would otherwise say UNEP provides these types of information to the users, the number of researchers who are aware of the same was not as high as would be expected. The case was even more serious with the students, who unlike the researchers who were mostly basically carrying out research in the field of environment; the students had other interests apart from environment. The students' awareness of the types of information that UNEP provides was thus lower as shown in the table below:

Table 7: Information types students are aware about

N=31

Information type	**Number of positive responses**	**Percentage**
Climate change information	14	44
Forestation and deforestation	22	70
Global warming	27	87
Threatened species	7	22
Pollution	23	74
Carbon emissions	16	52
Disaster and conflicts	18	57
Environmental governance	11	35
Harmful substances	11	35

***** Multiple results

From the results it is evident that more awareness needs to be created if the amount of information generated by UNEP will be well utilised by the users, where the utilisation heavily depends on how much they know about it.

4.3.2 Information services at UNEP

As part of this study, the researcher desired to identify the various information services that UNEP offers to its users. The information professionals (who assist in provision of information services) and who acted as informants to the study, the scientific researchers and students as respondents were very vital in getting the relevant results. The

information professionals interviewed gave a variety of information services, especially given through two information focal points namely the library and the division of communication and public information, which was in charge of internet, audio visual news and media. The following were indicated as information services available during the time of research:

Table 8: Information services available at UNEP

N=39

Information service	**Location (focal point)**
Current awareness service through news	Division of Communication and Public Information (media unit)
Selective Dissemination of Information	Library
Loan services	Library
Interlibrary services	Library
Support services (photocopy, scanning etc)	Library
Internet and cyber services	Library
Reference services	Library
Guided tours	Library
Online research services	Library
Social networking's forums	Internet unit
Web services	Internet unit and the library
Audio visual services	Internet unit

From the table above, it is very clear that the library is an important component of UNEP as far as provision of information and information services are concerned. The internet unit and other departments within UNEP though they do some activities which are

information related, are not according to the study known as information providers. According to the scientists and students for example, the library was a major information source since as one of the researcher noted, it was in the library where information queries were asked and answers/solutions got within the expected time.

Satisfaction of users to the provision of the information services was also sought in this study. The students and researchers were involved as respondents. The reason of checking this was to ensure that information services provided by UNEP and its other offices, met the expected information need of the users. The following were the results achieved for this question:

Table 9: Satisfaction level of researchers to provision of information services

Information service	**Positive responses**	**Percentage**
Current awareness service through news	30	71
Selective Dissemination of Information	14	33
Loan services	18	42
Interlibrary services	31	75
Support services (photocopy, scanning etc)	24	58
Internet and cyber services	27	63
Reference services	36	87
Guided tours	16	39
Online research services	37	88
Social networking's forums	28	67
Web services	23	54
Audio visual services	18	42

*Multiple responses N=42

Table 10: Satisfaction level of students to provision of information services

N=31

Information service	**Positive responses**	**Percentage**
Current awareness service through news	24	77
Selective Dissemination of Information	22	71
Loan services	12	39
Interlibrary services	18	58
Support services (photocopy, scanning etc)	22	71
Internet and cyber services	27	87
Reference services	26	84
Guided tours	21	68
Online research services	30	97
Social networking's forums	7	23
Web services	16	52
Audio visual services	12	39

* Multiple responses

From the tables above, the level of satisfaction by the two groups of respondents (students and scientists) is diverse. For example, the students seem to be more satisfied with the provision of reference services in the library with 84% affirming to this. This could be explained by the fact that these services are free of charge and most students do utilise the opportunity to do their assignments and projects besides doing research. The other service the students seem to be satisfied with is the guided tours with a level of 68%. This according to the librarian in charge of the service involves taking the students

for a tour of the UN complex in Nairobi and getting some experts in particular field to speak to them after the tour. This service the students noted was a very enlightening session where they interact with the United Nations staff members and its activities.

The scientists on the other hand were more satisfied with online research service with a satisfaction level of 88% followed by the reference service where 87% were satisfied. One can draw a relationship in these two services and the satisfaction level since as scientific researchers; they are interested with the accurate source of information for their subject of research. The online services which according to the reference librarian is a service that involves helping the researchers in searching for information using online databases, online journals and other online resources. These services which are free to the scientists enable them to get resourceful information free of charge compared to external sources where they had to pay thousands of shillings to the service vendor.

One researcher respondent agreed with this by saying:

> *"Since in our area we need to be more focused on practical solutions, assistance from the librarians in searching the internet not only helps access right information but also relevant information from the various subject based online resources"*

One such resource was the Online Access to Research in the Environment (OARE) which as explained in another section of this study, has become an important online resource for

environmental information in the developing countries. Many of the researchers interviewed in this study were either members of organizations which had subscribed to this portal or had access to the online articles through the library at UNEP.

One researcher noted the following as regards to OARE, which was well representative to all responses:

> *"We have not seen an information source which gives us all what we need in the field of environment as OARE. It has a lot of information which is current on handling various challenges of the environment and many of us researchers are benefiting from it"*

As one student aptly put in the quote in the quote below, availability of information services in the library has resulted in many of them being able to meet deadlines of their academic projects.

> *"We feel privileged to have UNEP library within our vicinity as it not only gives us diverse types of information, it is current, the services at the library are also at par with what we are looking for"*

The reference services which the researcher's accessed and utilised included statistical information on environment, dictionaries, encyclopaedias, yearbooks, abstracts, indexes and almanacs. The specialized reference service is utilized by staff members from for UN

agencies namely; UNEP, UN-HABITAT, UNDP, UNIC, UNHCR and UNIFEM as well as external scientific researchers.

Other information services that UNEP offers according to the documents reviewed in this study include:

4.3.2.1 The environment in the news

This is a current awareness service, where the information officer from Division of Communication and Public Information, sends by mail the relevant news from the Executive Director of UNEP or other regional heads to all UNEP staff all over the world. The service besides being sent to an existing mailing list is also hosted on the UNEP website where people can download and read at a later date.

4.3.2.2 UNEP intranet

UNEP utilises the technology of the Intranet to securely share any part of the organization's information or operational systems with its employees. Though the intranet has not been there for a long time, it has become a key resource for UNEP staff members to acquaint themselves with information coming from the organization. From the interviews conducted the following were given as some of the advantages that UNEP has been able to achieve through the use of the intranet:

- Enhanced productivity
- Timely dissemination of information
- Improved communication at all levels

- Cost-effective ways of information dissemination
- The intranet has promoted common corporate culture; every user views the same information within the Intranet.
- Enhance collaboration with information easily accessible by all authorized users, teamwork is enabled.
- Immediate Updates which has worked well especially when dealing with the staff members. The intranet has been a tool to provide to the staff members with "live" changes, that they are never out of date.

4.3.2.3 The UNEP Website

UNEP has a functional and updated website. UNEP uses this website as a communication tool both within and without. Various information resources are posted on the website for easier dissemination. The website assists in dissemination of the following information resources. The website is arranged on a thematic manner to enable different types of users to access the type of information they need for example governments, scientists, students and researchers.

a) Executive Director's speeches

Important speeches by either the Executive Director of UNEP or his deputy are always posted on the UNEP website for easier accessibility by the users. The speeches are available both as text and as audio visual materials. This service is very important for reference purposes.

b) Press releases from the Office of the Executive Director

This is a service for disseminating through the media important decisions taken by the Executive Director, senior managers, the donors and member countries of UNEP as well the launch of major publications or any item that can be considered to be news. The press releases are prepared by the UNEP spokesperson or the senior information officers of various divisions and regional offices.

c) Really Simple Syndicate (RSS)/Pod casts

The RSS feed allows the users and readers to receive, automatically and at no extra cost, the latest news articles published on UNEP's website. The RSS feeds (streams of free content from editorial Internet sites) contain titles of articles and hypertext links pointing to the full article. It is a very easy, practical and free means of permanently notifying the readers and users of UNEP websites about their favourite news topics. Since the RSS feed is updated automatically the readers are not obliged to visit a website to check for updates. Podcasts on the other hand are radio shows automatically delivered over the Internet to the readers/user's computer. The UNEP Podcast is a new global radio service focusing on the environment.

d) Multimedia facilities

The multimedia services have become an important service for UNEP especially when it comes to linking the technology and communication in dissemination of information. Through the use of short films, audio visuals, public service announcements (PSAs), video news releases, web casts and co-productions the organization is able to reach to a

wider audience who admire this kind of information resources. This is especially for broadcasting purposes both locally and internationally.

e) Mailing lists to schools and colleges

The Division of Communications and Public Information has compiled a list of schools and colleges who are primary recipients of the children and youth publications i.e. magazines, newsletters which are produced purposely for the youth. Every time there is a new publication, a new event/occasion which the organization feels the students need to know, the list is used for further dissemination. Some of these events include Youth change, clean up the world and World Environment Day where these youth are invited to participate and thus have a chance to exchange information. Starting at an early age enables them to grow with an environment conscious mind, which helps them when they take up leadership positions.

4.3.3 The United Nations library

In addition to the services and systems UNEP has, the library is also key component in the information processing and dissemination of information. This researcher desired to find out the services that it gives to the users that visit it. This research showed that the library is one of the main points of dissemination of UNEP publications. The library receives at least two copies of every publication that UNEP publishes as outlined by the UNEP publishing policy besides buying its own collection. Though the library essentially serves all other UN agencies based in Nairobi, the research showed that a large part of the collection is in environment. The collection is composed of reference materials

(yearbooks, encyclopaedias, and statistical reports), monographs and other print materials in various subjects. The cataloguer in the library indicated that staffs have catalogued a wide variety of electronic resources, including CD-ROMs, Videos, and DVDs, diskettes, online services, electronic journals, monographs, research papers and grey literature.

The library collection is arranged using an internal classification system It features high-demand subjects in the field of environment such as environmental conservation, climate change, energy, atmosphere, disasters and as well as general literature in other related fields. Besides the environmental collection the library also houses collection from other fields of UN related areas like human settlement, slum upgrading, children, human rights, peace and development, poverty eradication and millennium development goals (MDGs). The collection is shelved in an alphabetical manner following the various subject headings in the areas.

The library has a system **(UNALIS)** which assists in quick retrieval of both the bibliographic information of the materials stored in the library and also the full text publications from UNEP and other UN agencies. Most of the publications especially from UNEP and UN-Habitat are available in electronic version and also as e-books especially the ones for sale. The electronic versions are downloadable both from the UNEP website and the library catalogue. Among other modules that UNALIS has are; Online Public Access Catalogue (OPAC) which assists people outside the complex to search for materials within UNEP. The library staff assists the researchers in not only

using the library system to search for books and other materials but also in the general use of the internet. One researcher noted that;

> *"I do get assistance in using the library system, especially in searching for books in children rights. The library staffs also assist me since I am not very computer literate to use the internet to download materials from the internet"*

Besides the help the researchers get in using library services, the library staffs assist them in answering complex questions at the reference desk. Research also showed that one of the main services that the library gives is reference services. Users get help from the library through the Internet, instant message, email, and by telephone. (Telephone reference is normally limited to questions that can be answered within 10 minutes). The reference librarian from time to time assist in searching online databases, get relevant information to answer the various questions arising from the information needs of the users and also either sends these articles to users by mail directly from the internet or scans them if they are on print materials.

Another service that the library offers is selective dissemination of information and the current awareness. The reference librarian does online searching on a particular topic especially when there is an international meeting and/or conference where people need to know what is available in the library. These SDIs are sent by mail to all the staff members in the library's mailing list as well as hosted on the library website. These services are well appreciated by the users especially the senior staff members. One senior

manager noted that this requires to be done often in order to help many UNEP staff members know what is new in the library. He said;

> *"This service should be improved as when it is not done then users will never know what the library has"*

Though the library is ahead in application of ICT, it has not however embraced new technologies which are common to new researcher's especially young people. Features like blogs, You Tube, Twitters and other social networking online services common with researchers outside still need to find their way and be integrated to boost the service delivery to such kind of clientele.

The library too has a library website. The website's URL is http://www.unlibrary-nairobi.org. The website helps the users to learn about resources, procedures and activities; use it as a virtual library to look at the information resources on the Web and help other libraries look at this Web site for information that the Library can provide.

Data and information in the website have been organized in a manner comprehensible to the people for whom the data and information were intended. Resources on the website include information about the structure and organization of the library, catalogues, library services, links to other libraries, university resources, discipline-specific Internet resources, various online databases, and electronic journals.

4.4 Information sources at UNEP

Availability of information in any organization depends much on the information sources available to users. If users have access to many diverse and current sources, then their needs will be met easily and adequately. However if these resources are not accessible to users then their information needs can take a while to meet. The researcher attempted through the interviews to identify the various information sources that UNEP has, which users can make use of to gather information. The researcher decided to divide the information sources according to conventional types available in the information field; documentary and non-documentary sources. The following were identified as types of information sources available at UNEP:

4.4.1 Non- Documentary sources

The format of information source was a key consideration to determine its accessibility at UNEP. This type of information sources were more preferred by the senior managers, especially the oral types of information sources. The senior managers often attached great importance to news, ideas and professional gossip picked up in the course of business dealings or at conferences, trade shows and exhibitions. As senior managers noted, which was well represented by a quote from one of them was that these types of information sources was not tampered with, was original and dependable.

> *"Our time is limited and we normally may not get enough time to peruse through large volumes of documents, but having informal meetings and holding table discussions during conferences assist us in passing the message across"*

The non-documentary types of information sources also helped establish contact with many organizations and people as indicated in the response below from one of the senior managers:

> "*The fact that many of us meet at the meetings acts as an attachment and bonding point to us. If I were just to read, I may not necessarily …….*

One reason given for this was that they were unaltered and most of the times updated. These types of information sources also helped establish contact with many organizations and people. The value of this source of information was high if the recipient perceived that few people are in possession of it or that it is supplied in confidence. Basically most people relied on friends, social and professional acquaintances as their primary source of information and advice.

4.4.2 Documentary sources

This research revealed that UNEP has numerous documentary information sources. Some of these include recorded videos, CDs, DVD, podcasts, photos and printed materials like books, journals and newsletters. Of core importance to note is that the senior managers relied quite a lot on the videos, CDs, and DVDs especially when desiring to transmit data and information to a wider audience.

4.4.3 Print resources

The findings from this research especially from reviewed documents, which were largely by reviewing the documents available, indicate that UNEP has enormous printed resources available in the library and in other offices which have been written and published by UNEP. UNEP being a recognized publisher in the field of environment, books, periodicals, reports which included annual reports, atlases and yearbooks were available. These publications were centrally located at the library though every division had its own resource centre to cater for immediate needs for such publications. Other related libraries in the field received copies of flagship publications according to the set publishing policy. These publications were also displayed well in various places for easier access especially during international meetings to attract users who would wish to buy them.

The external researchers commended the availability of UNEP annual reports in various languages. Other print resources available at UNEP and published by UNEP include journals, topical or subject based newsletters, press releases, atlases and periodicals. Out of these materials some are printed with some clientele in mind for example Tunza and our planet magazines which are designed and published for the youth.

UNEP also works in collaboration with other UN agencies like, World Health Organization, Food and Agricultural Organization and others to co-publish materials which are relevant to an area in which both UN agencies have key interest. Of such example was environment and health which was relevant to both WHO and UNEP; the

field of forestry management which was critical to both UNEP and FAO; sustainable development and urban planning where UNEP and UN-Habitat work together and thus many books and reports have been published in these areas..

This was amplified further by the following statement from the senior librarian;

> *"In the library we have diverse information resources to cater both for our own staff within the United Nations fraternity and the external researchers as well. We endeavour to ensure that all our users are satisfied."*

4.4.4 Electronic information sources at UNEP

The librarians in the library specifically informed this research that United Nations Environment Programme has several online information sources. These include among others, library online catalogue, online journals, commercial databases, selected websites on environment and human settlements issues. Most of the online materials are accessible to users through paid up subscriptions. UNEP through the library has an arrangement with other United Nations agencies especially the libraries where they negotiate through consortiums for fair prices from the vendors in order to make these key online resources accessible. The UN consortium which is in charge of acquiring and managing the use of these resources is based in New York and only willing agencies that pay some annual fees are members of the consortium. The main vendors of these resources were Science Direct, EBSCO, Economic Intelligence Unit, Encyclopaedia Britannica, Proquest and JSTOR. Below is a summary of these online resources available at UNEP;

a). Online library catalogue

b). Online journals

c). Online commercial databases

d). Various divisional websites on environment

e). Intranet

f). Environmental Portals

g). Online videos

h). Online databases

The online databases which are subscribed for through the UN consortium range in prices and duration of access. Some are flexible in terms of accessibility for example some are accessed through the Internet protocol address while others are accessed through the usernames and passwords. The duration of subscription ranges from 6 months to 1 year. These databases provide access to additional resources for full-text information on a variety of subjects for example legal, environment, climate change and other general news. These online databases help the users to locate publications, citations, documents, proceedings of relevant meetings by various organizations. These databases as the librarians and other information professional working with the databases informed the research that the following were the databases available for users at UNEP.

a). Dawson

b). Directory of Open Access Journals (DOAJ)

c). EBSCO, Environment Complete

d). Economist Intelligence Unit

e). Encyclopaedia Britannica

f). Encyclopaedia Universalis

g). Lexis Nexis

h). Science Direct

i). Scirus

j). United Nations Official Documents System

k). Yearbook of International Organizations

From the above database list, the researchers were familiar with the use of Lexis Nexis and Proquest for news search, Economic Intelligence Unit for country reports and Science Direct for general scientific areas of research which include environment among others. The use of the online databases by the scientific researchers on their own was quite minimal as explained by the table below. The specific reason was that most required passwords which were a reserve of the library. However some required extensive training in order to use them well and were assisted by the librarians and other information professionals alike who were keen to recommend them as good services which should be improved and many researchers be taught how to use them on their own.

A well representative statement from one librarian summed up this as noted below**:**

"At this age we ought to be in line with the technology. We do not just want to offer services that people are used to, we desire too to offer what other higher ranking libraries are offering their users and that includes, online databases for research and access of articles which are otherwise not available locally"

Table 11: Number of researchers who had used online databases on their own

N=42

Online resource	Number	Percentage
Lexis Nexis	12	29
Proquest	9	21
EIU	21	50
Science Direct	14	33

* Multiple responses

Table 12: Number students who had used online databases on their own

N=31

Online resource	Number	Percentage
Lexis Nexis	12	39
Proquest	10	32
EIU	12	39
Science Direct	15	48

* Multiple responses

UNEP also subscribes to individual online journals through the library, especially if the journal in question is not available at the consortium contract. Various departments for example DEWA, DEPI within UNEP have the freedom to subscribe to their own services if the ones through the library are not sufficient to them. This is especially so for those

resources which are so expensive for the library to afford through the consortium. However as the research showed the external researchers and students alike were not fully aware of the online resources available in the library. One reason for non-utilization of these resources was given as high cost bills, most of the resources were charged per session used, that is the more the users, the high cost as one librarian noted:

> *"the cost of subscribing to these online resources is enormous and we do not have a huge budget. Sometimes we have to pay with the money allocated for books since though as a UN library only one or two agencies pay for those subscriptions"*

This research found out that, Internet has become an important tool for research within the organization. Every staff member's computer is connected with high speed connections to the internet. UNEP utilizes satellite technology to connect to the internet and not through limited ISPs in Kenya, besides the plans to have fibre optic connectivity were at an advanced stage during this research. The researcher noted that it is almost mandatory for every staff to have access to internet access since beside the use of internet for research purposes, the networks were also necessary for internal communication. Usage for internet for research purposes was quite significant and many respondents indicated that they prefer it since they are able to get updated information as compared to other resources. The fact that all users who come to the library are never charged for use of internet services makes it an accessible resource for users who do not have money to pay for such services from commercial vendors.

Though the internet access and services are free, the library is not overwhelmed as the case would be. This was well explained by the senior librarian who noted that the issue of accessing the UN complex and by extension the library has become a big task due to stringent security restrictions that have been introduced. UNEP like many other UN agencies has become a target of terrorists' attacks, which has made it to raise the security awareness thus the strict access conditions. Not all the public are allowed easy entry into the complex to make use and benefit from the enormous resources available. The librarian commented that there should be some further considerations for people who are willing to come to the library otherwise it would easily become a ghost library. The students both from the university and other colleges have the easiest time accessing the library. Other users who are not students require prior booking (24 hours) by a staff member, which is straining and uncomfortable to both the staff members and the users. One student captured this through the statement below:

> *"users from outside who are not students get a lot of hardships when trying to access this place. Unless you have a student identity card, the security officers will never allow you in, sometimes you have to call in advance for prior booking which may not be easy for everyone, considering that it is also out of the city centre"*

4.4.5 Relevance of UNEP information sources to users

The information sources and systems discussed above have been instrumental as far as creating, storage, disseminating of information to users and meeting their information needs are concerned. Though UNEP creates information which many would feel has a lot of international relevance in the world today, without a local dimension, then Kenyans would not be able to identify themselves with it. Seventy one percentage of the scientific researchers interviewed felt that the information resources available at UNEP were of much significance to them. More than half of the researchers, fifty eight percent felt that there is a lot of western type of information available as compared to local information which was largely missing. A good example which was quoted was the case of drying wetlands in Kenya.

Many researchers lamented that they come to the library to seek for documented information on the effects of global warming and climate change in Kenya. Most of them indicated their frustrations when they realise that they can easily get information about Europe and America but not about Kenya. The students likewise noted that most of the information they come to seek for is to help them advance in their individual careers, more so to help accomplish their projects, most of which are local and also prepare for examinations. Twenty seven students, sixty one percent of the population felt that the information resources available at UNEP were sufficient to their fields of study. Though it could be related to the low research levels of Kenyans on one hand, UNEP has a share of the blame since it needs to have at least the documentation relevant to Kenyans. Mau forest is a case in point where little is available though it is such an important topic to

Kenyans. With all the national and international interest on the subject there is not enough documentation on it. UNEP being the leading agency in environment and together with the Kenyan government in the conservation and rejuvenation of Mau forest, enough resources should be in the UN library and other public libraries where Kenyans can access this information.

As an indication to how the resources can be relevant, one researcher highlighted the following:

> *"The importance of the information resources we get at UNEP cannot be overemphasized. It is clear knowledge that what UNEP offers if well managed and formulated further can be of great benefit to users especially who are in the developing world where UNEP has a great influence"*

One student also noted that these resources are quite beneficial to their academic work by saying:

> *"Our academic programmes and subjects require extensive research, some materials we cannot get in the local public libraries. If we were to get from private libraries, it would cost us a lot of money, which we otherwise get for free at UNEP especially the online resources which are more updated and relevant to our studies. Sometimes even our own lecturers refer us to UNEP for particular publications which are easily available".*

The table below summarises the results of information relevance to users as indicated by scientific researchers.

Table 13: Relevance of UNEP information sources to users as indicated by scientific researchers and students

Researchers **N=42** Students **N=31**

Online resource	**Number positive results**	**Percentage**
Scientific researchers	30	71
Students	19	61

Rotich (2001) states that, in recent years many people have changed their negative perception of wetlands, and tremendous progress has been made towards a true recognition of their important functions and values. More needs to be done at all levels of society to make decision-makers and the public be further aware of the importance of wetlands for biodiversity conservation and people's well-being. Most important is to generate adequate scientific information through research, inventory and monitoring on wetlands. This information should be easily accessible and in a format that wetland resource managers, planners and users can apply.

Rotich (2001) adds that, capacity building through training of wetland users, managers, planners and scientists is important for sustainable management of the resources.

Integrated planning of wetlands using ecosystem through a participatory and multi-disciplinary approach is another important strategy forward. Developing the correct policies, institutional, legal and administrative frameworks and being able to enforce relevant laws and regulations is important for sustainable management of natural resources. This is the key information that should be easily accessible at UNEP library and the other depository libraries in Kenya. As it has been observed above this information is what the local researchers feel goes along was in meeting their environmental information needs to solve local problems and especially what has been published by local researchers.

4.5 Accessing information at UNEP

Accessing quality information is a good way of ensuring concrete decisions are made by various stakeholders both within and outside UNEP. One of the main objectives of this research was for the researcher to identify the methods that these stakeholders, especially the target population use to access the information at UNEP. The following results were identified:

4.5.1 Information access by external researchers

This research found out that researchers are able to access information from UNEP through various methods. Some of them are self initiated methods while others are what UNEP has already set up. The table below gives a summary of these methods;

Table 14: Summary of Information access methods by scientific researchers

N=42

Information seeking method	**Number**	**Percentage**
Using online search engines like Google, Alta vista, yahoo	39	93
Library online catalogue	19	45
Using the internet for research	36	86
Library books	35	83
Reference desk	30	71
Print journals at UNEP	24	57
Card catalogues	9	21
Browsing UN agencies websites for thematic information	28	67
Newsletters	21	50

From the results above, it is clear that the use online search engines were the highest ranked method of information access among researchers. Asked why they prefer this resource, a response which was a representative of the researchers was noted as follows:

> *"Internet is the most informative and current source of information today. You can get information of any type and location does not matter, something which is common to physical libraries"*

The use of books is also quite high among the researchers which could be attributed to the fact that many researchers as shown by a comment from one of them, the books are not easily available in other libraries given their scientific approach:

"The kinds of books we get here at UNEP are not easily locally available. They are quite detailed and practical since most of them are written by scientists who are not necessarily based in Kenya"

The use of various UN agencies websites by researchers as information sources seemed a better way of getting thematic information based on what each UN agency does. This can be attributed to the fact that most websites have electronic documents which the users make use of, when books in that area are not available.

Though access to information in every organization is vital to decision making, it will rarely go without challenges being met. During the research, it was found important to ask the scientific researchers of the challenges they face while they go about seeking information at UNEP. The following were the barriers listed:

a). Poor access to local content

b). Poor dissemination strategies

c). Keeping up with new information/knowledge trends which means, UNEP serves a specialized clientele who demands the state-of-the art information and has to embrace knowledge management

d). High specialization levels of the users implying that some information resources may be acquired only for some few users only;

e). High rates of being obsolete due to rapidly evolving knowledge dynamics;

f). The deadly disease of keeping local research findings under the table, denying others access and therefore leading to the same research being re-done, which is quite common in Kenya.

g). Inadequacy of trained information professionals (colleagues who are at par with the researchers)

The solutions to these challenges however have been discussed as recommendations later in this report.

4.5.2 Information access by students

The situation for students as far as accessing information at UNEP is concerned is not much different from the scientific researchers. To achieve the objective of information provision and access, the students interviewed were asked to identify ways in which they get information generated from UNEP. The table below summarises this:

Table 15: Summary of Information access methods by students

N=31

Information seeking method	**Number of positive responses**	**Percentage**
Using online search engines like Google, Alta vista, yahoo	31	100
Library online catalogue	16	52
Using the internet for research	27	87
Library books	19	61
Reference desk	18	58
Print journals at UNEP	12	39
Card catalogues	7	23
Browsing UN agencies websites for thematic information	23	74
Newsletters	12	39

All the forty five students interviewed used the internet search engines as their preferred method of seeking and accessing information, with 100% response rate. More students however seemed to prefer use of online search engines as compared to scientific researchers. Just like the researchers fewer students preferred using card catalogues for information seeking, and this could be explained probably by the fact that the library was already automated and the online public access catalogue was available through the internet. However the use the OPAC was also not high since only 52% of the students were using it. Asked why they do not prefer the use of card catalogues the students noted that this was an old technology and most of them want to be in the new technology:

"the use of card catalogues is an old technology, and the new technology in the library makes life a lot easier"

The same student noted that:

"the use of computers has also risen even in schools, the lecturers also refer us to electronic books and documents, which means they have to access the internet to get such information"

However the use of OPAC was also not high since only 52% of the students were using it. The use of the printed journals was also very low, and the students were asked why so, and the explanation was that most of the journals available were out of date, with the most recent dated 1999. This discouraged many students from using them since they were not sure of getting current information in them. A statement from the students as indicated by one of them summarises this:

"You would expect journals to be updated if they are to help users at UNEP. UNEP needs to invest more in updated printed journals, since that is what we prefer to use"

4.6 Information needs of users at UNEP

Information needs in this research, were taken to mean the driving force behind which the researchers and staff members go out of their way to seek for information. Hjorland (2007) argues that the main purpose for which information systems are set up is to fulfil some needs for documents and information for users or potential users. Such needs may, be related to training activities, research activities, professional activities, recreation

activities, cultural activities or personal development. This research draws a link to what users believe they need represent their subjective understanding of their need. Many factors other than the existence of a need will play a part in triggering information seeking: the importance of satisfying the need, the penalty incurred by acting in the absence of full information, the availability of information sources and the costs of using them, and so forth.

4.6.1 Information needs of environmental researchers

Information has become the tool for authority and an important factor for development. People depend on information in social, cultural, political and scientific and technological fields. Over the course of the last few years there has been an internet revolution; one which changes the way we interact with each other and the way in which we use data. Many e-resources have emerged, providing a means for users of the internet to also be creators, providing a platform for data exchange hitherto unprecedented. As a consequence, there is a wealth of information now available to research scientists.

As discussed previously, most environmental researchers accessing UNEP's information prefer using internet, electronic databases, which they say are updated and easily available. This was highlighted by many respondents who felt that with the technology advancing and everyone being able to search the internet, with the price of many print publications skyrocketing and the internet becoming almost free, their information needs have continued to change over time. Of the sixty respondents, fifty three agreed that Internet has become a necessity in their day to day work. Two respondents said that they

were not using the internet but they receive the information through emails from friends. Only one respondent noted that he does not prefer internet, instead he prefers printed materials like books. The drive to use internet by researchers seemed to be a conception that it will meet their needs faster than any other method. The researchers sometimes also did not fully understand their needs and they thought that the internet will help them know these needs and get information to satisfy the needs.

Without proper development of information provision standards, this mine of information can be inaccessible to researchers, relevant data proving either too hard to find amongst the vast amounts of information out there, or worse still proving unsubstantiated or erroneous due to a lack of validation. This was well represented by a statement from one researcher which noted that:

> *"To be honest sometimes I almost lost to tell my information needs. With the technology going the way it is going, I have to rely on information professionals to help me identify both my information needs and solutions for the same. I got such a person at UNEP Library who cares to know what I need every time through thorough some email alerts, if these technology wasn't there I would go to the internet blindly looking for information I am not sure which"*

Though it was difficult for the researchers to clearly tell their information needs from the data collected, the following were noted to be the needs of environmental researchers visiting UNEP and its information resources:

a). Information technology as applied in the environmental circles

b). Environmental education

c). Climate change adaptation information

d). Environmental awareness

e). Environmental adaptation in Kenya

f). Career support in the field of environment

g). Updated information with local dimension on environment

h). Local drought statistics for pastoralists

i). Sustainable development information

j). Environmental governance in Kenya

This research established that researchers who visit UNEP need a great deal of assistance from the information experts on searching for information. Over 80% of the external researchers agreed that the library staff assist them quite a lot when they are carrying out their research. This may be linked to the fact that provision of technical information is not easily understood and not all users have the technical knowledge and mechanisms of gathering relevant information. One thing which the researchers noted is that as the number of websites online grows by around 7 million per month, it is becoming increasingly difficult to get relevant information. Not least in this respect have the information needs of environmental scientists changed; they now have to discover from amongst all of this information the relevant information for their research and thus the need for help from information professionals.

The external researchers also confirmed that the UN library is of much significance to them. The enormous information resources like computers, online and print resources were of much help to them. The research established that the nature and quantity of information available and useful to the environmental researchers has changed over time. The fact that everyone can easily upload information to the internet has lowered the quality of such information being accessed by environmental researchers.

4.6.2 Information needs of students

Hjørland (2007) notes that information needs may be related to educational activities, to research activities, to professional activities, to cultural activities or to personal development. In this research, it was identified that the information needs of students under study were related to their academics activities. The information needs of students were towards meeting their academic needs and were all related to the subjects they were studying in their universities. Besides, the information needs of the students also rotated around real issues affecting our country in terms of the environment matters, for example, drought, agriculture, floods, conflicts generated by fewer resources among others. Out of the 23 students respondents, 19 of them indicated that the information resources they had access in the library assisted them to meet such needs. Below is a summary of the students information needs as found out during the research:

a). Forest conservation

b). Controlling floods in western, northern, coastal and eastern Kenya

c). Conflict resolution

d). Global warming and its effects in Africa

e). Environment and technology

f). Sustainable living

g). Green farming

h). Pollution and carbon emissions

i). Energy production in Kenya

The students just like the researchers confirmed that they depend on the assistance given by the librarians to access and use the information they need from various sources with a 100% confirmation of this fact. This was especially when it came to searching for information using online databases. Most of them could use the search engines for example Google, Yahoo and Alta vista by themselves, which could explain the high number of students using the same in table 15 above.

4.6.3 Information needs of senior managers

The top management as earlier indicated is involved in the management of the organization. Through the interviews with senior managers, it was possible to note that information is a valuable asset that leads to organizational success. As Abdul Karim, (2004) notes whether information is regarded as a resource, or more dynamically as a force for change and development, it is clear that information can contribute to the achievement of organizational goals. These goals can be achieved through linking business strategy and information. According to Kirk (1999), a key factor in linking or aligning business strategy and information has been information technology, a tool

essential for business success in a global economy. Another factor is a well-structured information management process by which information and business strategy can be successfully integrated to provide continuous improvement and innovation.

Findings of this research indicate that UNEP being such an important international organization is expected to align its organizational goals with the information it generates and disseminates. The respondents expressed the opinion that the information needs of the senior managers should well match the information needs of the organization, since they are the mouth piece of the organization.

This research established that information needed by different managerial and operational levels varies in the time span covered, level of detail, source, and other characteristics over a broad spectrum. Unlike in the lower levels of management, the senior level managers were involved in getting data and information which was lengthy in span which means it covered a wide spectrum of areas. Responses from the managers interviewed showed that their needs were not very specific to an area but cut across almost all areas of the organizational operations. The needs were not very detailed as this is what the middle level managers had to implement. Their information needs were also more strategic, covering a long period of time. A well representative statement from one of the senior managers summarizes this:

> *"Our work rotates more on strategic management. We need information to strategize on the future solutions of current and future problems and that is why*

you see that we like gathering more information from conferences, workshops, meetings and a bit less from the books. This does not mean however that we do not read, we do but on specific areas of interest"

In terms of management of information needs, it was clear that the senior managers were all largely dependent upon their informal network of contacts for information. The managers sought information purposely for research purposes as opposed to meeting their daily chores. The work of these senior managers showed some common characteristics which probably are shared to some extent by senior managers in other settings. The work of all the interviewed managers was highly fragmented with many interruptions and changes of topic and emphasis. This simply meant that their area of coverage as regards to information requirement was quite wide as compared to other middle level and junior staff. An average of 70% of the senior managers interviewed favoured oral forms of communication either through telephone conversation and one to one talk. This was brought about by the fact that even those who sought to get some answers in various areas always consulted the senior managers through one to one interviews. The working day of senior managers was invariably dominated by a series of meetings which had been arranged in advance, with occasional *ad hoc* meetings being fitted in the remaining time.

Over 80% of the interviewed senior managers expressed their lack of time to go deep into various issues thus the reason for having line managers. They depended on the administrative assistants to know which emails they need to personally attend to. If there was none requiring personal attention, these emails were forwarded to colleagues in the

line of duty who would otherwise respond to them. They also indicated that any serious reading of documents, reports or other publications was likely to be done at home in the evenings or at weekends, if the time allowed.

The research also showed that the nature of their work required extensive research to make various critical decisions. Most of the data that the senior managers seemed to get and seek for was unstructured data: drawn from meetings, conversations, documents and presentations which they said was more valuable in managerial decision making. Most of the managers felt that they did not consult the library as regularly as they could due to their time constraints. They however underscored the importance of the library and especially so if it can help in provision of environmental management information. Most of the senior managers felt that the library can act as an alerting service to enable them capture important information through various online resources especially through Selective Dissemination of Information. In this case the library should go to them other than them coming to the library, something which was not happening at the time of this research. The former chief of library lamented that;

> "*since I left the library, no librarian has contacted me let alone other managers to check what are my information needs, neither have I seen any new information alerts on the websites or notice boards from the library"*

Senior administrators supporting the senior managers also came out as important players in the role of meeting the management information needs of their seniors. The nature and

extent of such activity was dependent on individual manager's specific roles within the organization and the level of responsibility delegated to them by senior management. Some, such as the personal assistants of the Executive Director obviously had a major role to play while others, such as administrative assistants of divisional directors, felt that their role was much less clearly defined and was more likely to be fulfilled on an *ad hoc* basis.

The information needs mentioned above have immediate and obvious implications for the library and information staff working at UNEP who offer information services for senior managers. Senior managers are busy people who are unlikely to add additional reading to their workload unless it is seen as essential. Any written material to their attention must be easy to assimilate; long reports should be preceded by a brief executive summary indicating the main conclusions rather than giving a précis of the report. Current awareness bulletins meant for them were easy and direct to enable them read within the shortest time. When called upon to prepare a report or policy statement the senior managers resorted to the networking aspect with their colleagues and friends who they think would be able to help them in that particular area. The research revealed that this was the best way in which information, opinion and advice at the top level was exchanged, with definite support from documents and committee papers. This could explain why the senior managers were always in meetings even getting them for interviews were a hard task.

This research found out that information is more likely to be used by senior managers if it is readily accessible, summarized, presented orally and from a source deemed as credible, which is trustworthy.

Below is a summary of the information needs of senior managers

a). Strategic information

b). Management information

c). Information dissemination needs

d). Supply of current information

e). Information research needs

4.7 Information systems at UNEP

One of the objectives of this research was to identify the information systems that are available at UNEP. This research showed that UNEP has various information systems which are designed to deal with various aspects of the organizational mandate. The information systems available at UNEP according to this research, that help the users and staff members to get access to and disseminate information and information products include:

a). A functional library system

b). An email system using lotus notes program

c). A functional organizational website

d). An employment management system

e). Human Resources system

4.7.1 Electronic Information systems available at UNEP

UNEP has applied a lot of information technology to ensure that the users are not only limited to physically accessing the information materials but also can access them electronically. The most significant way of doing this is by using various information systems, some of which are designed and developed at UNEP with users in mind. From the documents and information resources available, the following were found to be major systems that UNEP is currently using to disseminate information to the users. In addition to reviewing the documents available at UNEP, the information professionals were of help in identifying the following as the electronic systems available and being utilised at UNEP.

a). Ecolex

It is a comprehensive, internet-based information service on environmental law and policy.

b). Ecoinformatics

This system is used in the Department of Early Warning and Assessment (DEWA) and it helps application of information science and information technology to the environment to provide people with information to take responsible actions that result in protection of the environment and health.

c). GRID (Global Resource Information Database)

It is a small, global network of approximately 13 institutions (governmental, non-governmental and academic) that are centres of excellence in remotely sensed data gathering and have geo-spatial capability to manage this data.

d). GEO (Global Environmental Outlook) Data portal

The GEO Data Portal is the authoritative source for data sets used by UNEP and its partners in the Global Environment Outlook (GEO) report and other integrated environment assessments. The system was developed by UNEP, DEWA and used all over UNEP.

e). PEARL (Prototype Environment Assessment and Reporting Landscape)

It is an information system that provides governments and the international community with a comprehensive overview from both a thematic and geographic perspective of the various environmental assessments completed and being undertaken globally.

f). UNEP-DGEF Project Database

This is a repository of UNEP-Department of Global Environmental Facility (GEF) Projects (including Project Key Data, Project Financial Information, Project Cycle Status, contacts, reports, etc), (UNEP Dewa Website 2009).

g). Online Manual on Compliance with and Enforcement of MEAs

It is a searchable online tool based on the UNEP Manual on Compliance with and Enforcement of MEAs. It contains exhaustive commentaries to the 2002 UNEP Guidelines on Compliance with and Enforcement of MEAs, with information and

case studies on the whole life cycle of MEAs, including negotiation, implementation and enforcement activities, (UNEP Dewa Website 2009).

h). Trade Names of Chemicals database

This is a worldwide database of commercial trade names of chemical products containing ODS controlled under the Montreal Protocol and their alternatives. This service is designed to help customs officials and National Ozone Units control imports and exports of ozone depleting substances (ODS) and prevent their illegal trade.

i). OzonAction Multimedia Collection

The MMC is a searchable database of over 4,000 publications and information products related to the implementation of the Montreal Protocol. Its primary focus is technical and policy information related to the response of governments and industry to the phase out of ozone depleting substances (ODS). The collection also has some holdings related to economics and the scientific, environmental and health effects of ozone depletion.

j). Disasters Database

This database reflects selected accidents involving hazardous substances, although it is not comprehensive, it provides compelling evidence for the need for effective disaster prevention and response planning.

k). EST Databases

Listing of environmentally sound technologies (EST) related databases worldwide including management systems, for disaster prevention, production and consumption and water and sanitation.

l). OARE portal for environmental information

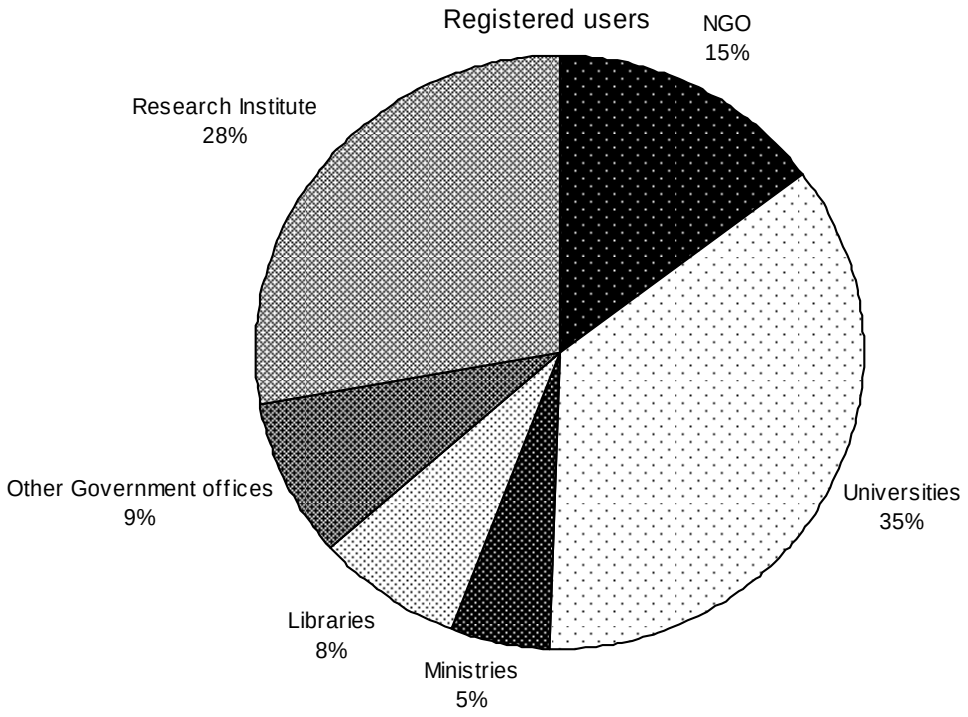
Online Access to Research in the Environment (OARE), an international public-private consortium coordinated by the United Nations Environment Programme (UNEP), Yale University, and leading science and technology publishers, enables developing countries to gain access to one of the world's largest collections of environmental science research.

Over 1,300 peer reviewed titles owned and published by over 340 prestigious publishing houses and scholarly societies are now available in more than 100 low income countries. The portal gives support to research in various disciplines related to the field of environment. Researchers from least developed countries are given access for free. These are countries whose per capita income is below $1,250. Countries where the per capita income is between $1,250 and $3,500 pay an annual fee of $1000. In Kenya for example, over 100 institutions libraries, government ministries, NGOs, Universities, Research Institutes have subscribed to OARE and are making much use of this resource. Several trainings have also been carried out in these institutions to train on how to search for information using OARE. The UN library has been very instrumental in organizing these trainings for the users. The following are some quotes from users who have found great use of OARE

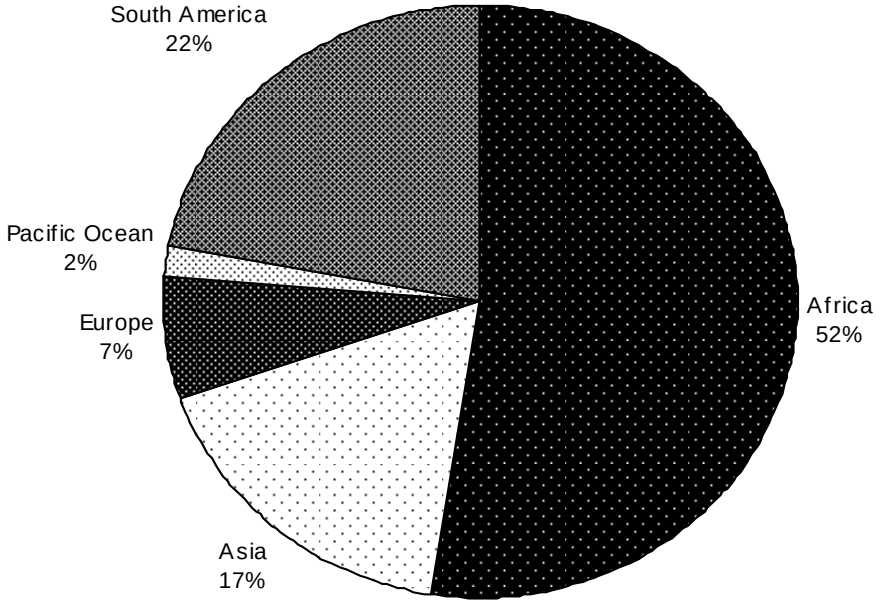
"Thank you very much. The amount and quality of information we can now access is just incredible. Nowhere in this part of the world could we have found so much information. It will really improve the speed and quality of our work. Thanks again."

"OARE will greatly improve scientific environmental research in developing countries and contribute to more effective policies and actions to safeguard our natural resources. We congratulate you for this outstanding initiative."

Graph 1: Number of registered users by December 2008



Graph 2: Registration statistics by region



The graph above shows that Africa has the highest number of people and institutions who have registered to OARE. The explained reason was that OARE is free for most of the African countries and since access to relevant information is hard in Africa without paying a cent, then this is a good move that can help open up the area to research and development.

The electronic systems have helped UNEP to forge ahead in areas like Geographic Information and Spatial Information systems, which assist in compiling reports like Kenya Atlas of Our Changing Environment. Most of the information systems especially the portals are searchable by users in order to get relevant information. The only challenge which seemed valid is that not many users outside are aware of these numerous

resources, as indicated by the low usage rate by external researchers of the information systems except the library system. Of the sixty external researchers interviewed, forty seven of them (79%) were very familiar with using the library system. Use of the other systems was quite minimal with 29%, 21%, and 50% of the researchers using Lexis Nexis, Proquest and EIU respectively, while 39%, 30% and 39% of students using the same systems respectively.

Table 16: Number of external researchers utilizing UNEP information systems

N=42

Information System type	**No. of researchers using the systems**	**Percentage**
Library system	33	79
Other systems	23	55

NB: These responses were multiple

4.8 Information Policies at UNEP

As noted earlier on, UNEP publishes a lot of informational materials. Users of UNEP information are scattered all over the world. UNEP is not confined to one location of users as the situation is in some local agencies whose clientele is defined. From the users interviewed in this research, the researcher deduced that the materials produced by UNEP target no one in particular. This can work for or against UNEP as far as information use is concerned. The main desire of UNEP is to have the relevant information to the world be disseminated to all users who need this information.

UNEP's publishing is governed by the UNEP publishing policy which defines and promulgates the basic principles governing publishing at UNEP and the procedures to be followed in the publishing. The publishing policy aims at among other things to improve the planning, coordination and harmonization of publication preparation and production in UNEP and assist UNEP's divisions in maintaining the high quality of content and appearance that is essential to underpin the role and status of UNEP as a corporate publisher.

The publishing policy as it is now has a well elaborate plan on how to publish and distribute its publications. It has among other things encouraged libraries and archives to receive at least two copies of its publications. However the libraries in mention here are UN libraries at New York, which acts as the depository for all archival material relating to UNEP's past publishing activities, UN Geneva library, and UN library at Nairobi. This enables the staff members within these offices to have access to all the UNEP's publications. Other libraries which are targets of receiving UNEP publications are UN depository libraries, based in University libraries and some national libraries.

The policy however as the research found out, is silent on pricing of UNEP publications, the prices are usually determined by the vendor who sells the UNEP publications. The policy also does not cover the issue of physical access to the library where researchers can have access to print copies of the UNEP publications. Most of the publications are in the United Nations six languages; English, French, Spanish, Arabic, Russian and

Chinese. If these publications or abstracts of these publications are in either Swahili, or any other local language, their absorption would be higher than it is currently. This would mean that even people down in the rural areas would find much use of these publications as they would be legible and readable.

A good example on this is the MDGs pamphlet which is available in six local languages, Kiswahili, Kiluhya, Dholuo, Kikuyu, Kikamba and Kikisii. The researcher carried samples of these pamphlets and during the interview process many of the external researchers were keen to carry a copy of the MDGs pamphlet even though it was not in the area of research they were doing. Most could identify the issues that the United Nations propagate through these translated materials. This can be replicated if the policy of UNEP allows translation into local languages.

The above notwithstanding, the organization does not have a comprehensive information management policy. The organization also depends much on the administrative agency, UNON for its Information Technology policy in the management of Information Technology resources for example computers. Lack of this comprehensive information management policy means that information flows are not managed as effectively as they ought to be within organization and between the organization and researchers and other users. One staff member noted that there needs to be a comprehensive information management policy beside the publishing policy, since there are many areas which have been left out by the existing policy. An example in this is a knowledge management policy which should be part of the organizational policy. It should handle more of the

knowledge creation, dissemination, storage, archives and records creation. The information professionals like librarians, archivist already in the organization should give a lead on this, quoting one manager,

> *"The information professionals should not wait for the management to initiate and come up with the information management policy; they should give the lead since they know what is expected besides just publishing of books"*

Since one advantage of having a policy in information developments is to exacerbate social exclusion, lack of it could further isolate the information have-nots from the rest of society. This is true especially following the complaints of local researchers who feel left out of the equation of creating knowledge and information as compared to western colleagues who may have the great opportunity. If there was a policy on how to promote each and every geographical area, then these local researchers would feel at par with their colleagues in the developed world.

4.9 Information and Communication Technology (ICT) use at UNEP

The research has revealed that UNEP is keeping in line with the technology. This is well seen from the number of computers available at the institution, level of computer literacy at UNEP, the prevalence of internet and online resources as the core information resources for the staff interviewed. All the 49 staff members interviewed (both senior and information staff), had access to a computer fully connected to the internet. If this is something to go by, it can be generalized that all staff members at UNEP have access to a

computer which is helpful in creating and disseminating information efficiently. The research indicated that most of the UNEP staff members joined UNEP having some knowledge of using computers. Probably this is because most of the staffs interviewed were in a way dependent on information and thus a computer was the best tool for information access. Also in most of the jobs advertised, it was a requirement for one to be computer literate in the kind of duties they performed, thus most had to acquire this knowledge before hand.

The Division of Communication and Public Information (DCPI) and Department of Early Warning and Assessment (DEWA) seemed to have competent and skilled staff members as compared to other departments. This explains why probably most of the systems mentioned above are located in these two departments. For example DCPI is the one in charge of maintaining the organizational website, while DEWA maintains most of the portals for data and information repositories.

Table 17: Number of computers at UNEP

N=49

Staff type	**Computer availability (all connected to internet)**
Senior managers	10
Information Staff	39
Total	**49**

Besides the use of computers at UNEP, other ICT equipments available include:

a). Fully operational audio/video studio used to create and edit videos and audio messages. UNEP does not depend on external resources to do video and audio production. The two staff members assisted by two interns have advanced skills in video and audio production.

b). Video conference equipment for participation in video conferences

c). All telephone headsets have teleconferencing facilities, to help UNEP staff in Nairobi to participate in teleconferences with outer offices

d). Plasma screens for presentation

e). Servers for storage of enormous information resources at UNEP

4.9.1 ICT's and environment Information dissemination

Improved access to global information networks and adequate capacity building are essential for disseminating information in Africa, according to Willy Currie (2004). Access to ICTs is a key theme in the WSIS Declaration of Principles and Plan of Action adopted in Geneva in 2003. The overall target is to 'ensure that more than half the world's inhabitants have access to ICTs within their reach' by 2015. The WSIS Plan of Action, calls for measures to 'ensure the systematic dissemination of information using ICTs in order to provide ready access to comprehensive, up-to-date and detailed knowledge and information, particularly in rural areas. Using ICTs to disseminate information it is important in the world today. Since UNEP deals with a diversity of user's needs, it needs the use of ICTs to ensure that the information generated is disseminated to the rightful users and in time.

UNEP at the moment utilizes ICTs well and still working on a number of networks which will help many more users access the information. For public use, the library has a cyber café which gives chance to researchers to use the internet facilities to search for relevant information, share this information and knowledge with others and be able to get updated information. The cyber has 24 working computers which are all connected to the internet. During important meetings however the cyber gets additional computers which the library pays for. During the research period, there were several international conferences organized by various UN agencies that used the library and other meeting facilities at UNEP. Due to the large number of delegates participating in these meetings the cyber has extra computers to assist the delegates' access the right information for the meetings, communicate adequately among other benefits. The users are not required to pay for these cyber services and that makes it an attractive place especially for students. The users utilize the cyber service for purposes of information searching, email communication by students, reading newspapers, online catalogue searching and social networks like facebook.

Table 18: Use of computers at the cyber in the library

Services	Number in one month
Online databases	638
Email	65
Academic reasons	55
Reading newspapers	46
Online catalogue	95
Social networks	15
Others	3
Total	917

The figures are based on user statistics in the month of July 2009

The use of the cyber at the UN library has brought about many advantages to the users which come with the utilization of computers and other ICT equipment for information dissemination for example powerful search utilities to locate information, better communication between colleagues through sending and receipt of e-mail messages and files, better access to a large and growing array of online journals and databases on various subjects and facilitation of online discussion forums thereby strengthening research and journal publications.

However, the users faced several challenges while accessing information from UNEP and particularly through the library. These challenges as enumerated by the researchers and students are as follows:

a). Security restrictions. Many respondents complained that there were severe restrictions to get to the library especially if one is not a student. One would require someone from the United Nations booking them in advance in order to come in to the library. This has denied many users a chance to come and utilize the resources at the UN library including the cyber café.

b). Electricity interruption was a constraint indicated by some respondents. Though there is a standby generator, power could be interrupted often, but good enough no one lost their data.

c). Not enough computers. This is usually aggravated during meetings when the library is usually closed or access is allowed to staff members and meeting delegates only.

4.10 Dissemination of climate change information

One fact that the research established was that communication at UNEP is regarded very highly. One senior manager said that, *"Routine communications is an essential and UNEP's major corporate priorities, it advances sharing of knowledge. He continued to say that internal and external communications go on all the times, whether the occasion is a meeting with a counterpart or the launch of a substantive publication"*. This underlines the importance to which UNEP attaches to communicating the right message to the relevant users. From the research it was evident that certain people within UNEP have specific roles in communications; namely the Executive Director, divisional directors and regional directors.

Climate change as the research found out is now widely recognized as the major environmental problem facing the globe. From the respondents answers it was clear that addressing climate change is central to the work of the United Nations. The backing the topic gets from the top leaders led by the Secretary General, the many international meetings including the recently held Copenhagen meeting in December 2009, area confirmation to this. The threat that climate change poses to peace, security and sustainable development led UN Secretary-General Ban Ki-moon to make climate change - what he calls "the defining challenge of our age" - one of the priorities for the UN system. For more than two decades UNEP has played a key role in United Nations efforts to address climate change and increase awareness among governments, the scientific and business communities, and the general public (UNEP Annual Report, 2008).

This research brought out the fact that, ready and reliable access to data and information is increasing in importance as an integral part of the environmental decision-making process. Research results, regulatory requirements, policy, initiatives, and increased public awareness and concern about the issues related to global climate change have a dramatic impact on various constituent groups. Project managers, business leaders, research scientists, policy analysts, program administrators, elected officials, educators and their students, and the concerned citizen need efficient, effective, and equitable access to data and information to adequately address their issues related to climate change.

From the data collected it was possible to identify types of researchers who frequent UNEP and especially the library looking for climate change information. These are primary users and secondary users. Primary users were professionals actively working in a field of study related to climate change. These professionals most often had ready access to data and information resources, had the technical abilities to understand and synthesize the data and information without interpretive assistance. They were basically experienced researchers. Not only did they have adequate resources and means to access them, they had the professional skills to analyze and evaluate the data and information resources available to them. Their biggest information need was to have a ready and steady stream of information to satiate their (research oriented) needs, which in turn are used to support their research agendas and programs.

Secondary users on the other hand were a distinct group of individuals, organizations, or institutions who lacked the in-depth and comprehensive skills to fully analyze and evaluate the scientific and technical data and information in a research or policy context (not scientific or technical "experts"). They had an acute need for data and information on climate change, and also they did not have the requisite analytical skills to directly evaluate the data. These users were extremely dependent on the documents and literature that had synthesized climate change data in analytical and evaluative forms. They were also highly dependent on the professional librarian to get their information. The library assisted such users in conducting climate change research, providing institutional support for library-access to climate change data and information resources, services, and products.

One objective of the research was to find out the role of UNEP in disseminating climate change information. Out of the forty two external researchers interviewed, thirty five (83%) noted that UNEP has a role to play in disseminating this type of information. Nine out of ten (90%) senior managers confirmed this. This leaves no doubt that many people expect UNEP to be giving the lead role in organizing, managing, and storing collections of data and information resources to do with climate change. Though there are other agencies all over the world and in Kenya too which assist in this noble task, the expectations of researchers for UNEP to be the custodian and disseminator of accurate climate change information is very high.

The researcher saw it was imperative to find ways that UNEP uses to disseminate climate change information. The following were ways suggested by respondents, especially the senior managers, who are policy makers at UNEP:

a). Awareness campaigns for example 'Unite to combat climate change' which is being led by UN Communications Group Task Force on Climate Change. Raising awareness among young people is also part of UNEP's responsibilities as the UN system lead agency on climate change. Since 2002, UNEP has supported the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat and Parties through national climate outreach programs in 15 countries, raising awareness, including for the media and the private sector, and a variety of information materials and graphic presentations, including simplified guides to the IPCC Third and Fourth Assessment Reports.

b). Use of climate change publications which include books, newsletters, children magazine, UNEP yearbook, Information kits all accessible through the various libraries and other resource centres around the UNEP offices

c). Press releases and news alerts on thematic climate change areas

d). Audio visual materials, for example podcasts, videos, photographs, posters, movies on children and climate change

e). Electronic Information resources for searching climatic information for example online databases

f). UNEP experts on climate change forum. This is an online forum where students, researchers can ask questions to experts on various subjects of climate change for example going carbon neutral, adaptation, food crisis among other

g). Partner's networks. UNEP collaborates with many partners to strengthen the ability of individuals, organizations and countries to combat climate change.

h). Guide on policy formulation on climate change. This brings about implementation of international protocols on climate change like Kyoto protocol, The Bali Action Plan

The following table gives a brief summary of the methods used to disseminate climate change information. The data was collected from the senior managers and information staff at UNEP.

Table 19: Methods of disseminating climate change information at UNEP as suggested by senior managers

N=10

Type	Respondents	Percentage
Awareness campaigns	7	70
Website and intranet	6	60
New letters and pamphlets	7	70
Books and publications	8	80
Working with media	5	50
DVDs and CDs	6	60
Pod casts and Web casts	3	30
Posters	6	60
Speeches and presentations	3	30
Reports	7	70
Email communication	10	100
Teleconferences with various parties	4	40
Online expert forums	4	40
Special events	3	30
Workshops	5	50

From the table above it is clear that email communication is the method mostly used by various staff to pass the climate change message. Everyone interviewed agreed to using email to disseminate the information. This could be explained by the fact that everyone at UNEP has a computer which is connected to a default lotus notes program and which is used as a tool for both internal and external communication.

Books and various types of reports also contribute a lot in dissemination of climate change information. Eighty percent of the respondents indicated that they have knowledge acquired through the use of UNEP books and publications. The use of teleconferences seemed to be quite low compared to others whereas it is a good method of information sharing. This however is used by the senior managers who desire to reduce the travel costs but can be a very expensive venture given the high costs of telecommunications in Kenya; however this can be insignificant compared to other methods which are being used by everyone for example email. Conferences on the other hand were usually organized as awareness meetings and many expatriates invited and the staff members only act as support staff for those conferences. Pod casts too seemed not to be used by many with most of the respondents who agreed to having used them were from the internet unit of Department of Communication and Public Information as well as Department of Early Warning and Assessment. These two divisions as earlier noted are leading in the use of systems for data and information exchange at UNEP.

UNEP has numerous newsletters and pamphlets which are easy to handle and faster in distribution. Almost each division had a newsletter or a pamphlet which it uses to periodically inform its users of new information. No wonder a 60% figure of respondents alluded to using them.

Speeches though regarded as important method of giving factual information; seems not to be used by many. The reason for this was explained by Senior Librarian. He noted that speeches are used by the senior people i.e. the Executive Director, Deputy Executive

Director, Executive Director's Spokesman, Divisional and Regional Directors to a less extent. Most of the speeches that have great value are the Executive Director's speeches. They are released later through the website, news section for greater public consumption.

Another means which the organization uses to disseminate information to the public is through the media. Occasionally UNEP organizes press conferences where local and international media are invited during launch of key publications, for example annual reports and also important topical publications Key personnel who include the Executive Director, Environmental experts address these meetings. They form part of the current awareness campaign by UNEP as most of these press conferences are attended by local media houses. Other means is through sending press releases to the media when an important event has happened. Most of these are printed and aired through media channels nationally and internationally.

Global warming and climate change has got some local effects as well. Issues like continuous droughts, drying of rivers and streams, floods, Mt Kenya ice cap melting, extreme weather impacts to coastal regions and tourism effects. WWF (2006), notes that climate change in Africa is not only a conservation problem but is also a socio-economic issue that must be dealt with at a global scale. One region of the world where the effects of climate change are being felt particularly hard is Africa. Because of the lack of economic, development, and institutional capacity, African countries are likely to be among the most vulnerable to the impacts of climate change (IPCC, 2001). The negative impacts associated with climate change are also compounded by many factors, including

widespread poverty, human diseases, and high population density, which is estimated to double the demand for food, water, and livestock forage within the next 30 years (Davidson *et al*., 2003).

With these problems in mind, the researcher desired to establish how UNEP is assisting the local community in accessing the necessary information on climate change, adaptation, preventing. Out of the 42 external researchers who were interviewed, 22 (52%) noted that UNEP is assisting the local people get local information on climate change. 4 (10%) researchers said that UNEP does not help in any way to pass local information. These four researchers said that UNEP is busy giving us generalized western type of information which has no local advantage.

Table 20: Summary of results on dissemination of climate change information with local content

UNEP and local climate change information dissemination	**Number**	**Percentage**
Supports	22	52
Fairly supports	16	38
Does not support	4	8

Critical area where the research identified a gap in the dissemination of climate change information with local content is in food security. This could have been necessitated by the fact that the research was conducted when there was massive drought within the country, and thus many researchers felt that if such information as how to grow adaptive crops would be disseminated far and wide, then farmers would use it to reduce hunger

and famine. More than half (58%) of the respondents noted that information on adaptability of farmers in the trends brought about by climate change is not adequate. Thus an authority in the field will help many farmers understand the times; grow foods that are relevant to the times as well as ways of bringing back the right environment by forestations. One researcher commented that:

> *"I would expect FAO and UNEP to work together to assist African farmers know what to do next. Most of the researchers are too technical for the common man to understand. They should use basic explanations, may be through KARI, KEFRI to give us understandable information"*

4.12.1 ICTS and climate change

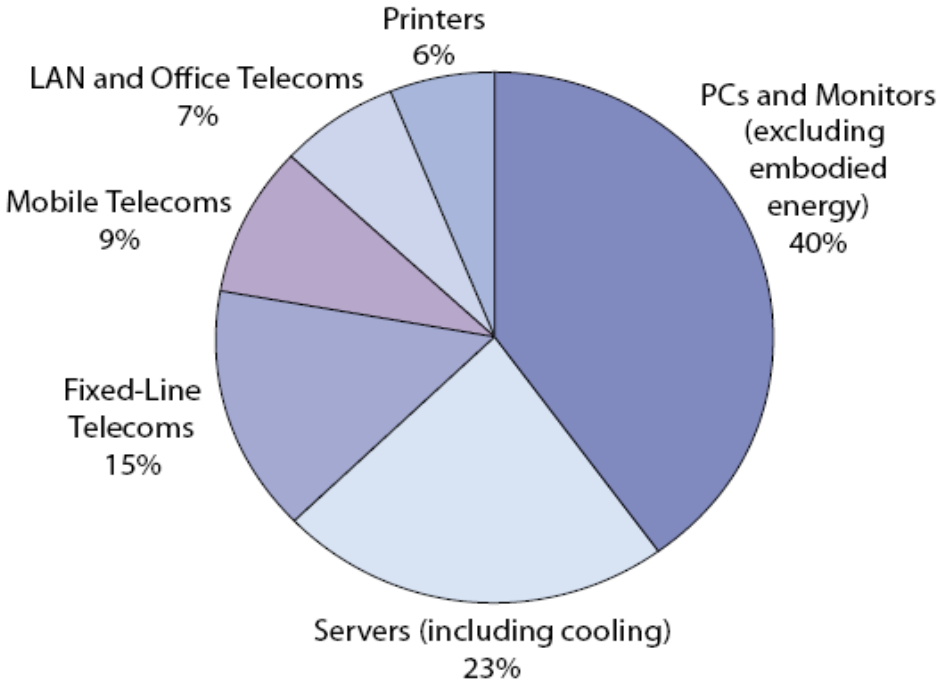
During this research, an attempt was made to try and identify the linkage between ICTs at UNEP and climate change. The researcher went further to note the positive impacts of ICTS in issues of climate change like adaptation, monitoring and mitigation. The following were the findings that came out of this research. Climate change as has been previously said is a threat to human life. Climate change represents a threat to mankind on a similar plane to violent conflict and war, and indeed can lead to a breakdown of peace because of the increased competition for the earth's resources, (2007 Nobel Peace Prize Committee). Though UNEP is at the moment trying to set up a comprehensive IT strategy for its functionalities, quite a lot is happening as far as utilizing the current technology to help support UNEP's Medium-term strategy in delivering tangible outcomes against UNEP's thematic priorities. It will outline our future aspirations for the

use of ICT to sustain and grow our organization as technology continues to evolve and the conditions and needs at UNEP change, (UNEP 2009). The research found out that over 80% of the activities done at UNEP involve the use of information technology.

A closer look at the documents available at UNEP showed that globally ICTs are seen to be two sided as it concerns to climate change. From one front, they are seen as contributors to climate change. Information and Communication Technologies (ICTs) are undoubtedly part of the cause of global warming as witnessed, for instance, by the millions of computer screens that are left switched on overnight in offices around the world. ITU (2008) indicates that it is estimated that ICTs (Information and Communication Technologies) contribute around 2 to 2.5 per cent of global greenhouse gas (GHG) emissions annually. These percentages are likely to grow as ICTs become more widely available.

Information and communication technologies have a critical role to play in combating climate change through the reduction of GHG emissions. The increased use of ICTs contributes to global warming, as witnessed by the millions of television sets and computers that are never fully turned off at night in homes and offices. But ICTs can also be a key part of the solution, because of the role they play in monitoring, mitigating and adapting to climate change.

Graph 3: Estimated distribution of global Carbon dioxide (Co2) emissions from ICTs.



Source: Kumar et al (2007) "Conceptualizing "Green IT" and data centre power and cooling issues"

UNEP being the lead in climate change and environment issues is expected to show the way ICTs are being used not as a source to global warming but to look for long term solutions to this world threat of climate change.

4.12.2. ICT use in monitoring climate change at UNEP

UNEP together with sister UN agency ITU has been utilizing ICTs in monitoring climate change worldwide. A review into existing information and documents revealed that ITU has assisted UNEP in setting up systems that can help monitor the change in the global weather patterns. Areas such as the polar ice caps, glaciers, volcanoes, the ocean bed or the upper layers of the atmosphere, are inhospitable, and places where remote monitoring and data collection using ICT-equipped sensors (telemetry) is being done. Even more useful has been the development of aerial photography, satellite imagery, grid technology and in particular the use of global positioning by satellite (GPS) for tracking slow, long-term movement, for instance of glaciers or ice floes.

The research also revealed that UNEP has come up with publications like Kenya Atlas of Our Changing Environment, which assesses Kenya's progress towards its own goals of improving the environment to achieve development goals; and delivers a stunning bird's-eye view of environmental change through the use of paired satellite images taken years apart. This cannot be possible without advanced systems to do this. Research revealed too that UNEP is utilizing the Geographic Information Systems (GIS) to manage the maps and data related information necessary for today's forecasting and other related fields which UNEP has a niche in.

4.12.3. ICTs and Clean Technology

Helping governments and the finance sector mainstream investment in sustainable energy and remove market distortions is a main focus of UNEP's work in the area of climate

change mitigation. From the documentation available at UNEP, it was clear that UNEP's Energy Branch (DTIE) is working on cleaner energy policy, technology and finance to create an enabling environment for sustainable energy – one which promotes reduced greenhouse gas emissions through increased energy efficiency and renewable energy use. The research showed that UNEP activities do facilitate access to energy markets and accelerate the development and dissemination of affordable clean energy technologies and processes. One senior manager at UNEP noted that the organization has all along been encouraging people and especially the frequent fliers to fly only when it is a must. Other methods like teleconferencing email has been encouraged to ensure less carbon is released into the air.

Another way that UNEP is helping in mitigation is through 'dematerialization', or the replacement of 'atoms' with 'bits'. An example of this is the current shift underway in the market for pre-recorded movies and music away from physical distribution (such as DVDs and CDs) to online delivery. Research showed that UNEP is using Podcasts and Web casts which are becoming more relevant and more utilized as compared to distributing videos through DVDs. Other areas that UNEP is helping a lot is in is moving away from paper-based to online publishing. As a matter of fact UNEP has established a policy where most of the documents are being released electronically through the websites as opposed to printed format. The senior librarian confirmed when he indicated that they have instituted a policy to reduce printing, print using back to back technology, recycle papers among other policies which are geared towards reducing the paper use.

Though printed format still exist but the use of more electronic materials will help in dematerializing.

One senior manager at UNEP gave a good example of the use of ICTs for disaster relief as the establishment of a tsunami early-warning and mitigation system for the Indian Ocean, following the tsunami of 26 December 2004, operating under the aegis of UNESCO's International Oceanographic Commission.

In June 2007, a policy to move towards a climate-neutral UN was announced, under the aegis of the UN Environment Management Group in which UNEP participates. Within the UN system, the United Nations Framework Convention on Climate Change (UNFCCC) has been climate-neutral since 2005 and the United Nations Environment Programme (UNEP) was to be climate-neutral as from January 2008.

4.12.4. ICTS and climate change adaptation

The impact of global warming on the world's climate will continue and is likely to be highly uneven, with low-lying coastal areas at risk because of rising sea levels; sub-Saharan Africa at risk due to desertification; a growing number of environmental refugees; and increased pressure on sources of fresh water and on vulnerable ecosystems such as coral reefs, tundra and coastal wetlands. Adaptation to climate change is thus a key necessity for the global community. 5 senior managers observed that UNEP assists the developing countries to develop the national strategies and capacities needed to promote sustainable development through the effective use of ICT networks, services and

applications. The managers explained that by disseminating relevant information, tools and training materials, UNEP supports raising awareness, improved policy-making and concrete actions to adapt to the effects of climate change. This includes the use of ICTs for environmental protection, waste management and in environmentally friendly supply chain management through various projects initiated across Kenya and in other countries.

The research established that UNEP has helped country teams to refine the logical flow that underpins their respective National Adaptation Programmes of Action (NAPA) documents, identify gaps in requisite data, and provide training in tools to supplement the information/data required to support the selection of NAPA priorities recommended for implementation.

4.13 Communicating climate change information

Whereas climate change information is extremely important in the world today, failure to access the same has widely contributed to poor governance and policy formulation in climate change sector. One objective of this research was to identify challenges that UNEP faces when disseminating climate change information. During the process of carrying out this research it was possible to deduce some of these challenges.

The UN library hosts thousands of collections on climate change. However many of these publications are done by professional publishers and not UNEP. This scenario has not helped to alleviate the biased and often skewed reporting on matters on climate change since most of these publishers may have an interest in mind. UNEP, since it is mandated

to assist the world on formulating policies that can help alleviate the problems associated with climate change should come out more vocal on its publications. It should also go an extra mile and ensure that these publications are easy to understand by even the low level researchers and common man who may not understand the technical jargon used by various publishers. Leaving it to other commercial publishers will not only water down the message but also make sure they are unaffordable by many people in the developing countries.

UNEP needs to have a better way of handling its numerous newsletters coming from various divisions. The researcher identified almost similar newsletters with the only difference being the originating division. A lot of needed resources can instead be used to publish better publications instead of duplicating efforts. The senior managers who are in charge of the publishing policy at UNEP needs to be more vigilant on this.

Besides publishing of books and newsletters, there needs to be a more comprehensive information management policy. The research found out that UNEP seemed to lag behind sister agency like UN-Habitat which well ahead in management of knowledge and information. The flow of information from creation to dissemination and even to archives seemed clear on UN-Habitat's side than at UNEP's side. One senior manager noted that, there is no information management policy at UNEP. Some key resources in information management like personnel, infrastructure seemed well organized at UN-Habitat. UNEP does not have an office that deals directly with wholesome management of information. DCPI and DTIE are focussed more on information creation and technology involved in

that process. However the management of information and knowledge to make it reliable and relevant is still afloat.

The lack of comprehensive information management policy was a key contributing factor to low level of information management personnel. UNEP, at the moment does not have an archivist nor a records manager. At best the organization has information officers and librarians. People who can identify the information needs of users at UNEP and external researchers were very few. The library was served by 5 librarians and one technical officer who take care of the OARE project. This number is very small compared to the information needs that arise in daily, both online and through the reference desk. The librarians end up staying at the reference or cataloguing publications at the expense of good research to help the researchers and other users.

Most external researchers noted that enough is not being done to incorporate our existing local content in the area of climate change into the mainstream publications of UNEP. One senior manager from Kenya noted that a lot has been written on the melting glaciers at the north and south poles than of Mt Kenya. Indeed he said that, "*people who live around Mt Kenya or Mt Kilimanjaro have no idea what is the cause of the reducing ice*. *No wonder you would still see people who think that burning the forests is beneficial to them as compared to planting trees to increase the forest cover"*. Another respondent noted that *"UNEP should work closely with the Kenyan government on how to educate people on causes of climate change some of them are 100% human caused and thus can be reversed"*.

Many local respondents were of the opinion that many Kenyans do not even have an idea of the relationship between climate change and issues like drought and floods which are a frequent occurrence nowadays. Most of them still thought that they are natural acts of God. Respondents went ahead to suggest that UNEP, the government and other partners need to do enough advocacy on this subject. If right information is disseminated to the public, individuals and communities can take advantage of opportunities and reduce vulnerabilities resulting from climate variability and change. UNEP's primary role in climate change is to give expertise for research and assessment. Outreach could be enhanced by targeting particularly vulnerable sub regions or groups, with strategies and materials especially suited to their needs. Ultimately, the information should be made available to planners at the community and corporate level, in formats that make it clear why the information is useful for the decisions they are making. William A. (2000) notes that, potential beneficiaries of climate information may be unaware that climate can affect their lives in ways that can be managed. This is very true to Kenyans.

The library being an important part of the information cycle needs to be more equipped. The materials available need to be more relevant to the local researcher as well as updated. The need for new data and information products, new publications and documents, new reference and referral services, and new data and information delivery services by environment experts is a challenge for today's librarians and information professionals. UN librarians are no exception, they need more technical skills to assist the environmental experts get the information they need and thus serve the environmental researchers as expected. The librarians need to learn the current trends of looking for and

disseminating environmental information to the large group of experts who frequent the library looking for information.

4.14 Summary

The study has revealed some findings which are important and relevant to the whole information management process at UNEP, right from policy formulation to dissemination. Of key importance to note is that UNEP generates large amounts of information which can be very useful to all the users the researchers and students alike as well as the government and other stakeholders in the field of environment if it is well managed. UNEP needs to facilitate the dissemination of this important information through the provision of information services to these users using various focal points situated at UNEP offices and beyond.

Chapter five

Summary of Major Findings, Conclusion and Recommendations

5.1 Introduction

This chapter summarizes the major findings and conclusions resulting from the study. In order to address the main goal of this study, a summary of the findings resulting from the data collected were identified taking into consideration the objectives of the study and the research questions that the study sought to answer. Recommendations have also been given, based on these results and conclusions, for enhancing provision of information to users at the United Nations Environment Programme, and thus, enhance decision making. Finally, the study suggests areas for further research.

5.2 Summary of Major Findings

This chapter has presented analysed, interpreted and discussed data that was collected at United Nations Environment Programme, UNEP. Data collected related to important factors for this research and were essential to understanding the subject of the research, including the information provision to users, information services available to users, information needs of users at UNEP, sources of information at UNEP, methods used at UNEP to disseminate environmental information, use of ICTS in disseminating climate change information and their effects and the challenges that UNEP goes through in the whole process of creating and disseminating environmental information to the general public and researchers alike.

The study found that UNEP generates a lot of information which it has tried to disseminate to its users using the existing methods. The usage of this important information especially in a world which is currently on everything the environment has or has not done, is not as high as it would have been expected. The usage of information was much hindered by many factors that were barriers to providing such information to the users. There are many gaps that need to be addressed if this critical information in this era will make a difference to the world and its inhabitants. Some areas need to be addressed more fully and urgently if information coming from UNEP will be meaningful and of value to the institution and the world at large. Consequently, some suggestions, from the respondents' own perspective, have been made which, if implemented either wholly or with amendments, could help to identify the needs of these users and thus give them reliable and accurate information which they will use for decision making.

5.2.1 Information services available at UNEP

The study found that provision of information at UNEP goes hand in hand with the information services available and that the users are able to utilize. From the findings of this research it was found out that a number of information services exist at UNEP which help many users to acquire relevant and accurate information to their field of research. These information services include current awareness service, selection and dissemination of information, reference services, loan services to staff members, online database research, cyber and internet services, guided tours, telephone and email query response and support services to users for example photocopy and scanning.

The information services available at UNEP go a long way in meeting the information needs of the scientific researchers, students, NGOs, government officers and also the UNEP staff members themselves.

The respondents informed this research that the level of satisfaction of these services is not as expected. Several factors as this research identified control the satisfaction of the users, for example, the fact that only UN staff members can utilize the loan services at the library was noted as one factor which needs to be addressed if the researchers will adequately utilize the information, information services and information materials available at UNEP. Many researchers expressed their desire to be part of the loop even when they are not staff members. The information contained at the documents that are at UNEP has more significance to the external users than the staff members who are allowed to borrow them. This is supported by the statistics of people who use books at a given time, where over 70% of the users of books at a particular day were external users.

Needless to say however, the information services are an important component in provision of information. UNEP needs to ensure that all users benefit from high quality information services regardless of their status in the society. More often than not the external researchers will show practical benefits after getting such information services as compared to the staff members. The external researchers and students are more engaged in practical projects which will bring good change in the environment circles around the world. Stuart (2005) notes that internet presumably, and ever-increasing reliance on computerized systems and electronic publications are the main difference between

information services of the previous years and the 21st century information services provision. With this in mind and as Stuart continues to say, user instruction and information literacy, quality assurance and quality improvement, co-operative reference services are some factors that any information vendor or reference centre needs to put in mind and practice if change will be seen. UNEP has no exception, though at some degree has embarked on some of them especially quality control in the publication they produce, more needs to be done to satisfy the ego of the researchers and students.

The tools that the librarians and information professionals have access to and the speed with which users can now access information from almost anywhere in the world: no waiting for the phone to be answered only to discover that the person who knows the answer is not available, or for letters to sit unanswered are some issues that must be addressed as a matter of urgency to restore the sanity of information services.

5.2.2 Range of information sources at UNEP

UNEP as the research has shown has diverse information materials which are accessed by users both locally and internationally. The availability of these resources has resulted in the major awareness that has occurred in the recent past of environmental matters.

The information sources at UNEP include non-documentary sources which were mostly oral and preferred by senior managers owing to their currency and informal nature and documentary sources which form a bulk of the information sources. The documentary sources include printed sources and electronic information sources. Though the resources still had their shortcomings, the printed publications were available in the library at UNEP Headquarters in Nairobi, which meant that many local researchers would be able

to utilize these resources. These printed resources however needed to have a more local approach in terms of translations and simplification of technical language used to explain some phenomena in environment. This could have in a way influenced the type and levels of researchers who visited the library.

Research showed that UNEP has also invested in information technology to ensure that what must be transmitted electronically is done so. The use of websites, multimedia technology, electronic information systems, and online databases for research, online portals and gateways is a significant development that has put UNEP in the technological map of information dissemination.

Information resources at UNEP were categorised according to themes and some of them according to the age group. Some information resources both print and online were specifically for children and youth. The website for example that targeted the children and youth had features that would make it attractive to this age group. The experts who were ever working on these websites were also in the youth age group. This by itself was a motivating factor to many young people to access information available in these resources. For example there were some online social networking features for example face book, twitter, and attached to them through which the young people would discuss issues on environment that affect their age group. As discussed in previously, if such important hints to the needs of such category of people were ignored, then they would not be available to be part of the sustainable environment campaign.

5.2.3 Information provision to users at UNEP

Respondents in this study revealed that UNEP is a major player in the field of environment and as far as providing environmental information is concerned. There are many categories of users who seek to use information which comes from UNEP. Majority of these users were represented in this research since the scientific researchers and students formed the bulk of these users. Provision of information at UNEP is done through various types of information sources. The availability of information to users' access has been argued by many scholars as been able to influence information needs of users in one way or the other. The availability and the format of information resources available at UNEP widely participated in ensuring that the users were either satisfied or not with the information they got from these resources.

Besides the availability of the information sources, their currency is also a key factor considered by many users. Many considered that they prefer to use the current materials as they would give the real picture of issues concerning the environment. Having current materials will also enable the users to get current and updated information no wonder the dissatisfaction of users with the state of print journals which were not up-to-date. There existed a big gap in the list of print journals available at the library. In order for the information provision to be efficient at every institution including UNEP, training and development for the information workers needs to be emphasized. Having below average information providers serving users like those at UNEP, will only make the users needs to be delayed, since the workers will never know the right information material for which need. While doing the study, the researcher identified that the information workers

especially at the library, though qualified will need more practical oriented training in their field. This will help add value to the information services and to the overall mandate of the institution.

All stakeholders in the field of environment are equally important. Every user will need to have access to information which can help him make a decision. The decisions made will be effective if they are made from a point of knowledge and this can happen if there is access to quality information. Though UNEP has worked tirelessly to ensure that information is received by the intended users in time all over the world, there are still some challenges in making the same available to the local researchers. Findings from this research indicate that the local researchers are far from being satisfied with the environment information they receive.

Availability of information resources especially in local languages was not as expected by the users. Most of the researchers would like to have these materials in local languages or better still in languages which are not very scientific as this would enable even the old people to understand and take control of the environmental conservation and adaptation unlike now when most of them rely totally on the experts to make even basic decisions, a good example in Kenya being the impact the Eucalyptus tree has had to the water levels in many areas in Kenya. Many rivers have dried up due to heavy consumption of water by these trees. If there were some information materials in local languages showing forth the impact of planting them, then farmers would not have planted them in the first place. However these materials are only available in English and thus translation and

interpretation is needed and which may not be accurate at times. Another example is the issue of Mau Forest Complex. The people will have to wait for politicians to interpret any policy for them to take action, whereas though ignorance could be there, if they read and understood the effects of encroaching and destroying a water catchments area, they would have avoided it.

The library available at UN headquarters has many environment materials which the users can access either to read or to borrow if they are UN staff members. Access to the library needs to be improved to enable the interested users to access these materials which are available at the library. The policy for borrowing materials may need some revision especially to allow non-UN staff members to borrow material even if through interlibrary loan policy with existing public libraries. This enhances further dissemination of the UNEP information to even the remotest areas of the country. Other libraries that need to be targeted include Non Governmental Organization Libraries, especially the ones that deal with environment and related areas.

Resource allocation is a key factor in accessing information. The number of staff available at any one time to assist the users find what they need, will directly influence the quality of information the users get. It is important to note that the number of information professionals especially at the library where the researchers frequently visit needs to be improved. Having less than 5 librarians to be in charge of the UN library is not only going to compromise the quality of work the researchers expect but also the morale of these staff members.

Use and utilization of online resources at the UN library was not yet to its highest expected rate. This was attributed to various factors including the stringent rules of physical access to the library to the minimal budget allocation to the library. The online resources today are a key to resourceful information and thus will assist the users adequately. Though UNEP has the best online resources compared to other organizations in Kenya, the use does not show this. Besides the external users, the usage of information resources at UNEP by staff members was also quite low. This was based on the number of staff members requesting for subject based articles in the library which at the time of the research was minimal to the requests received from the external researchers. When the staff members are not accessing and utilizing the information materials, rarely will they market the same to the external users and this becomes a vicious cycle. However when they access and utilize them properly, they will see the benefit of urging others to use them too.

5.2.4 Electronic information systems for information dissemination at UNEP

The ability to acquire, analyze, interpret, archive and disseminate data as well as, the capacity to generate information in support of decision-making and management of the environment is of vital importance to governments and other stakeholders involved in the management of the environment. This research has found out that the effectiveness of these various programs and other initiatives to address environmental problems and issues depends on their ability to share information across national, sectoral and disciplinary boundaries. Information systems and sources as mentioned above have made

the information created at UNEP move to a wider range of users both in the environment sector and others as well.

The use of Internet at UNEP for example has reduced the gap in between those who have the information and those who do not have. Though it has its own challenges, more benefits have been achieved in the use of internet at UNEP. The number of online articles requested through the library or through various information officers has been on an increase. Many users are now able to download journal articles, initiate questions and participate in discussions online. The use of web casts, podcasts and other audio visual products ensures that users do not have to be there physically to listen to a conference in environment. They can do this through the internet. Maps, images and posters for invitation to environment conferences are also downloadable through the internet. The advantage of it is that UNEP has ensured quality of these materials is enhanced and also making sure that everyone even with the least bandwidth can still download them.

By promoting access to knowledge, websites have promoted mutual understanding, an essential factor in preventing adverse environmental impact and bringing about sustainable development. The use of UNEP websites has allowed vastly more effective information dissemination outside the organization, and has enhanced capacity for networking and learning within or between UNEP and other organizations.

The use of email to disseminate information has been an important element to staff members within the organization. Many staff members as stated earlier have connection

to internet and thus their main mode of communication is internet. This makes dissemination of information faster and reliable and can reach to all corners of the world as far as internet connectivity is available. Press releases, media advisories are all sent through emails and this facilitates wider consumption.

The library has also implemented a library system which has an Online Public Access Catalogue. The OPAC enables the users to search for books, magazines and journal articles available at UNEP. This do not necessarily need to come to the library to do this, they can do it even at their homes. The availability of reserve feature enables the staff members especially to reserve books online and thus gives them ample time to make and follow up other decisions and borrow the book when they have time.

This research found out that UNEP subscribes to these resources through a consortium (UN Consortium) which enables them to negotiate good offers for these resources as compared to commercial prices. Though this benefit is there, the usage of these resources is not as expected both within the organization and to the external researchers.

A close look at the documents available at UNEP revealed that ICTs have an environmental cost and impact. Producing, using and disposing ICTs require materials and energy and generates waste; including some toxic waste in the form of heavy metals for example, this contributes to about 2% of global carbon emission. On the other hand, ICTs can mitigate environmental impact either directly by replacing actions with digital processes that are more environmentally friendly and efficient and/or by modifying

human behavior resulting in actions that reduce or eliminate environmental impact. The potential mitigating benefits of ICT use arise primarily in transportation (both in management and reduction), energy management (in the case of server management, smart buildings, etc.), production chain efficiencies by decreasing warehousing costs, inventories, etc., and waste reduction through dematerialization for example These are some issues that UNEP is taking head on to ensure they are part of the global solutions in the field of environment.

5.2.5 Information needs of users at UNEP

Information needs of environment researchers and users have changed over time especially due to influence of technology. The purpose of an information system is to fulfil some needs for documents and information for users or potential users. Respondents in this research revealed that there are numerous types of users who frequent and utilize the information generated and disseminated from UNEP. UNEP being an international organization is also reflected on the diverse users who are geographically dispersed. These users also have numerous information needs and these are what that drives them into looking for information from UNEP.

The needs of these external researchers were both basic and complex depending on the level of research one was doing. The emergence of internet and high level of technological change has greatly influenced the needs of such users. The external researchers especially desired the information content they were looking for within the

constraints of their skills and technological capabilities so that it was possible to access the needed information in order to fill the felt gap in their information cycle.

The needs of the external researchers were more practical and needed real time results. Some issues like information on how to adapt to climate change issues for example drought, famine and pollution was such an example. This categorically shows that if the needs of these users were met then clear and adequate results will be visible in UNEP and also in Kenya.

Information needs of students rotated around the desire for academic excellence. Most of the students interviewed indicated staff members at UNEP were especially focused towards making sure that the needs of the external researchers were met. That is why probably issues like training needs, media liaison, research, managerial seminars were coming as needs that the staff members desired could be met. This in fact shows that they were in need of acquiring more knowledge to handle the changing needs of external researchers. This research has found out that aligning information needs of users to the information resources will always bring positive results.

The link between information needs and information resources that the users access at UNEP was also visible in the way in which the library staff handled the many queries they received from users. The external researchers were supportive of the idea that the library staffs especially were giving them more support in their research. Though this depended on the researcher's level of education, most of them felt that the library staff

who understood their needs were able to give them better solutions. There was clear acknowledgement among the various information materials that were published with the user's needs in mind were more receptive. Some children series of magazines for example were part of the highly used publications. According to the Division in charge of that, the research found out that these publications were not even enough. The schools that were recipients of the youth publications were also the same schools that were participating in various activities organized by UNEP for example programs like Paint for the Planet, Tunza Global Youth Retreat among others. Most of the information was received through the youth magazines sent to them directly from UNEP. The research found out that ignoring the information needs of the users only hinders the benefits that such users would get from the information resources that are set for them.

The many gaps that exist in the provision of information to the users were directly linked to the non understanding of their needs. The information systems available at UNEP have been designed without proper analysis of the needs of users. Where the needs of the users were known the rate of satisfaction was high compared to when they were not known. Meeting the information needs of the various categories of users at UNEP depended much on the help they received from the librarians and other information professionals. In this case therefore, the library needs to establish a selective dissemination of information policy which can well cater for the information needs of the external users. This will raise the significance of the library to the outside community as well as make UNEP be part of the local research loop and many would appreciate its importance.

Language of the resources that are developed at UNEP was found to be a barrier in information access. Though most of the population could read and understand the UN languages namely English, French, Spanish, Arabic, Chinese and Russian, the use of local languages was not prevalent. While language diversity is part of the world's cultural wealth, it is also an important barrier in communication (Van 1984). As Odini (1995) notes information service must be based on a language which is known to the majority of the potential readers. Most books and other publications at UNEP are written in UN languages, and more prevalently English, which is the language that the information services are based. This definitely has its implications where the user whose language of communication is the mother will not be able to benefit as expected from the information services.

5.2.6 UNEP's Information management policy

UNEP has predominantly relied on the publishing policy to handle most of its information dissemination issues. At the moment UNEP lacks a comprehensive information management policy which would help consolidate all the information issues and would make the provision of information even better. Though the publishing policy has served the organization well this far, there are still some elements that will never be covered unless a comprehensive information management policy is implemented. The whole process of information creation to dissemination and possibly archiving will require a comprehensive information management policy. A good and comprehensive information policy will facilitate freedom of access to environmental information, giving

any person anywhere in the world the right of access to any information on the environment held by public authorities.

Some examples where UNEP could borrow a leaf from is the UN-ECE Guidelines on Access to Environmental Information and Public Participation in Environmental Decision-Making. The guidelines which developed into a Convention (UN-ECE, 1995) are a good example of policies that govern environment information management and if African countries would also have such and implement them then clear changes would be visible in the area of sustainable environment. The publishing policy should enthusiastically desire to make the publications more readable and reach a wide audience. With the advancement of technology, more materials need to be available electronically for users to access them easily. The use of CD-ROM for the most common and with local content can also be used a better dissemination method for them and a wider audience would be reached. This would help break the barriers of security which make many researchers not to access these materials at the UN library at Nairobi.

5.3 Conclusion

There are millions of information sources in the field of environment. Many of these sources also come from other locations besides UNEP. These information sources are depended upon by many users and researchers as well to access critical environmental information necessary to make critical decisions in the field of environment. While people have access to huge amounts of information, they typically need only a very limited subset of it to carry out their current task. In addition, with the introduction of

data repositories with potentially expandable schema (for example those available in knowledge repositories on the Web), the core challenge is to find and present relevant subsets of these for a particular end user. This research was aimed at finding whether UNEP creates and disseminates information relevant to the information needs of their users and if the users have access this information as expected.

The thesis of the report is that much of the information generated by UNEP is accessed by the expected users. Many researchers and students who were the main respondents of this study do have access to a certain percentage of this information. However their accuracy, format, effect and whether they were according to the needs of the users were the gist of this research. To test this and understand it more, the study examined a number of factors ranging from information provision, information services available at UNEP, information needs, information sources and systems, whose results have been used to compile this report.

In particular this research has demonstrated that information is a basic need and requires much understanding from both the professionals and the researchers in order to accelerate the dissemination of relevant information. Generating enormous information by institutions is one thing, but having this information utilized by the users is another thing altogether. If this information is generated without prior consideration of the information needs of users, it will only generate huge amounts of information which is non-usable and a waste of resources including time and money. Information needs are related to problems and an important issue is how problems are understood, delimited and

formulated. The research has shown that the kind of problems that are affecting our society as far as environmental issues are concerned and the problems we go through due to unsustainable environment has contributed to the increase in information needs of environmental researchers and other stakeholders in this field.

In order to enhance the standards of information provision at UNEP, information managers at UNEP need to invest more on people who can understand the needs of users and thus bridge the information gap that exists which has been brought lack of understanding of user needs. Equipping the information workers with adequate information and management skills will help achieve more in satisfying the needs of these users. They will also be able to offer excellent information services according to the expectations of the users. Skills like customer care, business development, technological awareness and knowledge management are therefore mandatory to information workers at UNEP. Findings have also shown that where the correct procedures of identifying the information needs of users were taken into consideration, the results were positive.

UNEP through the library supports users by providing various information services to the users, especially those who visit the library. These information services include selective dissemination of information, current awareness, internet and web services, online research services, guided tours and conference services. These services have endeared many users to the use of UN library, formerly known as UNEP library. The provision of information services at UNEP requires high skills since the users are technical in nature. This is something that the information workers at the library and other information

centres have tried to adhere to but research has found that it is not all adequate. More resources need to be availed and the information services need to be skewed towards the particular needs of the users. Providing accurate and relevant information to these users is not an option to the users, it needs to be enhanced.

A deliberate attempt was made as well in this study as to the effect of information dissemination on climate change. The study brought out the fact that information on climate change is vital in the world today where real threats exist in terms of floods, famines, sea level rise and dying rivers in our society. Managing climate change information and disseminating it as early as possible will enable many people form positive opinions towards eliminating any human factor that leads to climate change. The research has seen that, lack of local information on issues of climate change has negatively affected our reaction on this important topic and much more so have ignored it. The fact that the effects of Tsunami were not felt in Kenya makes many think that it can never happen. It is important to note that although prospective environmental researchers do not express the need for more information about the subject, they do appear to need greater familiarity with the information that already exists, and a better idea of how to use that information in both asking and answering important questions in their field of research.

Findings have been presented in the preceding section and it is desired that these have significant practical implications for all information managers and other stakeholders responsible for policy and decision-making at the institution under study, and by

extension in the Kenya government and environmental institutions, regarding importance of considering ethics of information provision, standards of information services, information needs of users while generating information that will be consumed by these users. In this way, more information materials will meet the desired needs of the targeted users, effective management of information at the organization under study and achieve greater efficiency in the making decisions that regard to environment and at the same time enhancing service delivery, recognising that many researchers who target UNEP as an information hub require such actions. Specific actions are requested through suggested recommendations discussed below.

5.4 Recommendations

Arising from the findings of this study, recommendations can be made which, it is hoped, can be used to address the gaps identified in the provision of information to users at United Nations Environment Programme (UNEP). The following recommendations are suggested, with due regard to their practicality and achievement.

5.4.1 The information professionals should do more to enhance the quality and level of use of information services

UNEP needs to effectively offer information services which can be relied on even in the 21st century. Traditional information services have been overshadowed by the availability of alternative sources of information such as the internet. With the internet available at every corner, through computers, iPods, mobile phones and other electronic gadgets been developed by the day, and this should serve as a wakeup call not only to UNEP but to

other agencies who provide some information services. Time when we could just offer average information services is over; we have to give excellent services which will make the users see the need of visiting our libraries and information centres. This will not come without heavy investment in the training of information workers and also creating awareness to the program managers to support information service development through financial and other logistical support, which may include training, exchange programs with other organizations, motivational programs for both staff and users in the information departments within their organizations.

The study also revealed that though UNEP through the library has great sources of information, the use of online resources is not yet as high as expected to an organization of UNEP's status. The main reason given though for the low use of these resources is the lack of proper awareness of their existence both within UNEP and to the external users. This has been made worse by the physical access restrictions to the UNEP offices and to other UN agencies given the situation of world wide security fears. The library should give a lead in developing a policy which can help even those who do not physically come to the library to benefit from these resources. The use of technology for example emails, websites, social networking forums could assist further this. The internal awareness is also necessary. As indicted earlier in the research, the staff members at UNEP and other UN agencies are poor users of the library and other information services. Many are not even aware of the existence of the online databases some of which they can access right from their desktops; no wonder the level of their use is also very low among the staff members. Having these resources some of which are paid subscriptions does not add any

value to the library. Services like SDI and current awareness should be improved further of what they are today in the library. What is available is only a shadow of what a UN library's service provision should be and this should be taken note by both the library management and the UN bodies in charge of management of libraries.

5.4.2 UNEP Senior Managers and information professionals should work hand in hand to improve the standards and ethics of information provision at UNEP

UNEP's managers and information professionals need to adhere to what Smith (2002) calls ethics of information provision. These include quality of service, equity, confidentiality, conflict of interest, professional code of ethics and personal ethics to ensure that information provision at UNEP is something many institutions can learn from. Putting the users ahead before generating information will definitely help arrive at information materials that area acceptable and usable by these users. There is no need of having millions of information materials and only a small fraction is usable. It is good to produce what you are sure will go a long way in alleviating the many environmental problems affecting our world through provision of accurate, effective and current information. Information disseminated to the users should be done in a manner in which all levels and types of users will feel comfortable utilizing the information. It should made be simple such that even those low level and non-educated users can also take part in making decisions of environmental sustainability.

The library should be at the forefront in identifying avenues for information dissemination, while not only depending on the set means at the moment. Participation in

local and international book fairs should be a norm and not just to go and sell publications but even to raise awareness of what UNEP has in terms of information resources. Once in a while it would be important to create workshops meant only to raise awareness of information products and inviting researchers, students and other users to participate and give their feedback. A feedback mechanism or what in many librarians has come to be known as a librarian service should be encouraged as a way of enabling the users to ask and give their opinions in terms of information and information services provision. This will assist UNEP and the library to identify the neglected areas which need to be addressed.

5.4.3 The library management should work to align information generated at UNEP to the user needs

There is need for UNEP to consider generating information which is meeting all the needs of the users. Environmental researchers have indicated in the research that their needs are often mistaken by information providers. It is recommended that UNEP should invest in understanding in details the needs of all the users in various locations so that the information and information sources will find ready use and assimilation. This will also help achieve practical steps in ensuring we have a sustainable environment. All the decisions made within the environment circles require accurate information and when needs are put in mind then the decisions will be in line with the local needs and desires of researchers.

5.4.4 Information professionals should continuously determine the information needs of users especially since the needs are highly dynamic.

It is recommended that UNEP managers should make concerted efforts to involve scientists, researchers, policy makers, educators, and environmental managers in future decision making as far as deciding which information materials are necessary for them and also in assisting planning, implementing, promoting, and evaluating information needs and sources. Much like their involvement with librarians in development of print and online collections of data and information, these same groups should be active partners with UNEP in bringing the most scientifically accurate information base to the attention of the public at-large, in levels appropriate for understanding the complexities associated with climate change.

It must also never be assumed that there is a class of employees and/or users whose views do not matter, even those deemed not to have the requisite expertise to contribute to the information management process. It is especially critical to engage the lower cadre in the decision-making process as much as the gate-keepers (namely regular staff members and researchers) since those are the ones engaged in the day-to-day fulfilment of the various diffusion activities. Besides, the professionals and experts in the field of environment should conduct qualitative user studies research aimed at gathering information on the knowledge and skills required to improve the communication process among the various user groups.

5.4.5 UNEP directors should provide an environment to design a strategic information management policy

This research found out that UNEP does not have a comprehensive information management policy. This has resulted to too many gaps being felt in the whole cycle of information processing. Some of these gaps have resulted to information sources not meeting the users' needs, some stages like archiving being ignored and the information professionals not being well equipped. It is recommended therefore that there should be efforts to formulate an implementable information management policy to govern all areas necessary in information management at UNEP which include among others information creation, storage, dissemination and archives management. Other issues like acquisition, loan polices, should be part of this comprehensive policy. It is recommended further that the librarians specifically who are leaders of the information resource centre should give a lead in formulating this policy. However all stakeholders should be involved in the formulation so that some aspects are not included which will be hard to implement considering that some of the stakeholders were ignored.

5.4.6 The library management should take a leading role in designing an information management policy

The lack of an information policy at UNEP can largely be attributed to lack of leadership by the information professionals. It is recommended that the librarians and other information professionals need to be in the forefront in championing the importance of information to the scientific community. The information professionals at UNEP should take the lead in formulating necessary policies that are needed in management of information at UNEP. Various managers need to be adequately informed of the

information resources available in the library and in the market besides being advised on the importance of supporting the library in all ways including budget, staff and equipment. These will open the big window for researchers to access UNEP and utilise the millions of information sources available both in print and also online.

The UN library on the other hand plays an active role in solving some of the access problems being experience by users whether they are within or outside the United Nations complex. The issue of interested users being denied a chance to use the information available at UNEP due to security issues should not be there as the case at the moment, where those users who are not students have a hard time coming into the library. This being the case, it is recommended that a fair policy of users who are willing to access the library should be established. The librarians, security managers and senior managers at UNEP should have a consultative meeting to see the way forward on this. The present case where only the students are allowed does not serve the interests of every user, as not all users are students. Further still, when it is practically possible, it is recommended that a branch of the UN library be opened closer to where the general public is for example the city centre. This will enhance more access to the environmental and other subject based materials available at UNEP as opposed to the moment where only a few are able to access. This should be part of the information management policy discussed above. It should not exist on its own.

5.4.7 The publications officers should ensure that publications printed/published at UNEP give relevant emphasis to local content

Access to the right information is a means of local and community empowerment, helping people enhance their capacity to sustain themselves. In the current age information has become a factor of production and leaving it out and non-access to the right information can hinder development or reduce the level of awareness. Since UNEP has its headquarters here in Nairobi, its effect on policy that governs environmental sustainability, then more is expected to be seen on the local scene as well. This cannot happen unless the users have proper access to materials with some local content besides the international content. Information with local translated content will be easy to understand by every level of the society. It is also easy to read and understand. At the moment it is only left to scholars and professionals in the field of environment to create awareness in the field of environment. It is therefore recommended that UNEP invests more on translating key publications to local languages and also work with various government and stakeholders to ensure easily understood literature is disseminated to the users. This can be done through newsletters, leaflets, Videos, DVDs, and through newspapers articles.

The language of communication and by far the language that information services are given should be based on a more accepted and widely used language like Kiswahili. Being the national language, it would be a better language on which to base information materials and services for the rural population, since its better understood and more commonly spoken in these areas, though unfortunately very few books are written in it.

The format of information materials produced at UNEP should also be looked into. Odini (1995) notes that the following methods can be used to package materials meant for rural population:

- Visual materials, especially posters, wall charts, photographs, arts and crafts, which will provide stimulation of learning by observation, which is characterisation of the rural community.
- Audio visual materials especially films, slides, videos and television
- Interpersonal communication, though group activities such as traditional ceremonies, songs, gestures, drama, oral poetry and story telling.

5.4.8 UNEP Information technology team should utilize the current technology to ensure reliable and efficient dissemination.

The use of Information Communication and Technology has well facilitated the information dissemination in many areas. It has now become easier and quicker to acquire information whether through the internet, intranet and other online resources. ICT's have an important role to play here. But ICT's can only be used for beneficial effect if people know about them and how to use them. It is clear however that ICT is growing and changing at a very high rate and anyone left behind by the technological change will not enjoy the fruits of such a change. It is recommended that UNEP should apply the latest and current technological manoeuvres in order to make information processing and dissemination easier, efficient and manageable. This will help do away

with some expenses which hinder the dissemination of information especially when using the old technology. With the arrival of fibre optic cable in Kenya, it is envisaged that application of ICT's in management of information will be much easier and cheaper and UNEP can take advantage of this to ensure even those at the remotest area of Kenya can access the information coming from UNEP. Although UNEP has utilized to an extent the current social networking services like Face book, Twitter and many others, there is still a large population of young researchers who have not yet being reached by the use of these services. Utilizing such current online features will definitely attract them and make them to be part of the environmental research and thus help maintain and protect our fragile environment.

5.4.9 UNEP Senior managers should enhance environmental capacity building

The end results of any efforts to improve environmental conditions rely on the actions of individuals and organizations in order to be fully effective. Capacity building includes efforts to increase public awareness of environmental issues and priorities, the development of professionals involved either directly or indirectly in the environment, as well as integrating environmental content into formal education. These programs provide access to information about disaster protection and mitigation as well as appropriate environmental management practices in general. This includes information about the weather, sustainable forms of land management such as agro forestry, sustainable agriculture, natural resource management, as well as information about market of agricultural commodity prices.

One issue which is a nightmare to the governments, environmental researchers and professionals is the issue of climate change. The effects of what many thought was a small time issue have cut across the whole world and some areas like Asia and Africa have been severely affected by the effects of climate change. Access to information and information resources on climate change will create awareness in many circles. However creating awareness and giving information in this critical area is one thing but what people do with such information is another issue altogether. It is therefore recommended that UNEP senior managers should organize more trainings and workshops on how to access and use the information widely available in the area of climate change. These trainings can target all levels of professionals, governments, students, farmers and every other stakeholder.

Besides the trainings and workshops, it is also recommended that the librarians at UNEP facilitate more of the current awareness and user education on environmental information. The library should come out strong and assist in this since there are information professionals training in this area and can be an asset to UNEP and assist the researchers and other users.

Continuing education and training of librarians with regard to the topics related to climate change and the resources and tools available, is an area needing support from global change research, policy, information programs, and from within the library community itself. This research recommends that workshops at annual, regional, and local meetings of professional library associations and consortia be further developed and coordination

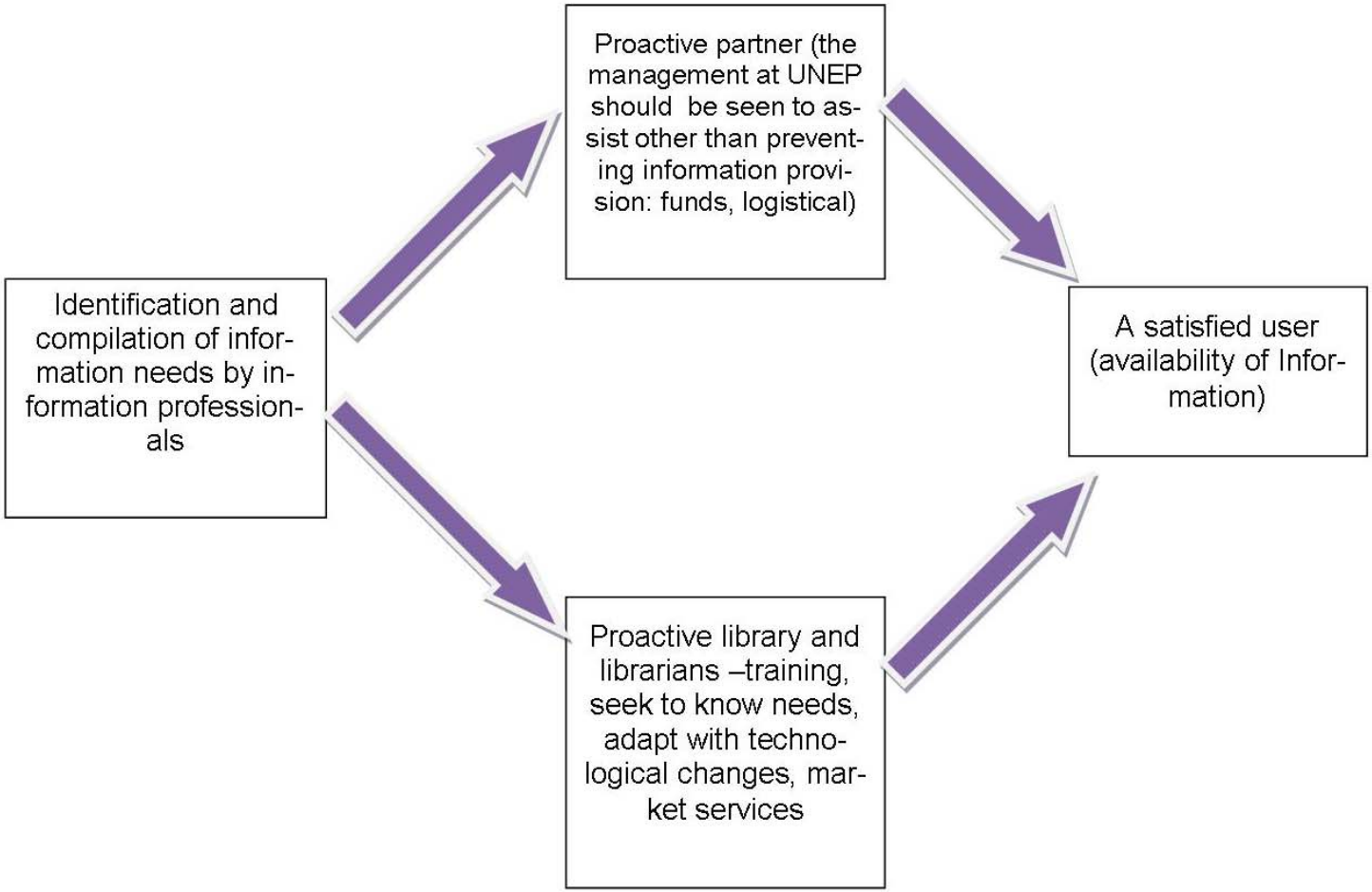
of these meetings should even be taken to national levels. Continued publication of articles in scholarly and professional journals and magazines also needs to be supported and encouraged as well as development and promotion of online tutorials for librarians which should be a priority for agencies producing the data and information resources like UNEP.

Public and private agencies, institutions, and organizations conducting research and developing policies must first set their respective agendas for continuing their efforts and develop the platforms and services necessary to gather, store, display, and disseminate the data and information resulting from their efforts. They must then find the means to support libraries and the library missions to share these repositories of data, information, and knowledge with the persons using libraries as a means for efficient, effective and equitable access to that information. This support should include grants for obtaining computer hardware and software, purchasing at reduced costs critical information resources for collections, training librarians on the availability and use of specific data and information resources.

5.5 Proposed model for information provision at UNEP

Given the various challenges that have been identified in the provision of information services to users at UNEP, the following model if adopted would enhance efficient and effective flow of information services to the user community. The suggested model has four major components which are discussed below:

Figure 8: Stephen's (2010) proposed model for information provision at UNEP



5.5.1 Identification of information needs

Song (2009) emphasizes that providing proactive information services requires careful examinations of current capabilities, user needs, and the direction for the future. In an environment where users already feel satisfied and content with current information services, information managers must start developing an innovative and sometimes a radical approach to reach out to users with new services. To do so, librarians should have a mechanism to monitor user needs which change continuously and ability to network with other campus units to meet their needs and expectations. Most information services and systems today are designed without proper analysis of user needs. Sometimes user analysis is referred to as difficult tasks and thus easily avoided.

As Grassian and Kaplowitz, 2001, notes information needs assessments don't have to be terribly complex interactions, "watching reference desk interactions or the behaviour of users in the library can give you a good idea of what is needed". With this in mind the UNEP information managers need to be more interactive with users, observe more on their behaviour and this can give a clue of what is expected. UNEP information managers can apply formal or informal needs assessment. Formal assessments according to Grassian and Kaplowitz are things like "surveys, interviews, focus group meetings, document analysis, usability studies, whereas informal assessments can be as simple as noting observations about patron/employee interactions at the reference desk, et cetera. UN should therefore endeavour by the help of the information professionals to develop a clear and complete understanding of the characteristics of your population through the information needs analysis.

5.5.2 Proactive partner

Most private libraries should engage their mother organizations to support them in the venture to serve the community. UNEP top management as the research has showed does not give adequate support to the library in the areas of finance and personnel. This is a matter that should be addressed and rather work with the library which is the major entry point to the organization by researchers and students. The library will enjoy high visibility to its users if the partner supports it. The management should actively seek the library for collaboration, and the library also maintains close communication channels with the management. The success of the library operations should be seen as a critical component by the organization for its success.

5.5.3 Proactive librarian

In the past while the users seek the library for collaboration and assistance, the library rarely actively marketed its value and services. Various reasons given for being reactive in serving the users range from insufficient resources, both personnel and budgetary which prevent the library from committing its resources to be a core collaborator. This kind of reasoning has to end with the new type of users. With the information available all over through the internet and the users sometimes feel they do not need the services of a librarian. This model proposes that a librarian should also serve the user community as a career consultant and provide individual counselling on identifying relevant information and applying such information to personal situations. In the past, the library provided resources for users to use (i.e. reactive provider), but it has now to engage with users

especially students in their career research process. This kind of new addition would make the library to be an expertise-based rather than collection-based institution.

In this new model, the librarian establishes an ongoing relationship with each user throughout his or her career or research programs. This is an issue that can work well as the research has shown that a large percentage of UNEP users are students. The librarian should initially spend a significant amount of time understanding the user's background and career goal. The librarian then works with the user not only finding information but applying it in helping them achieve their goals. For the librarian to be able to play this new role, he/she must possess relevant skills which are relevant to today's environment. Gone are the days when the librarian's role was just cataloguing, indexing, SDI, or any other skill in solitary. Skills like technical skills (troubleshoot new technology, online medium), communication, presentation skills, leadership skills, marketing among others must be in the librarians agenda if he/she become a proactive librarian Ahmad et al (2009).

5.5.4 Selection and use of information

The end result of having a proactive partner and proactive librarian is a satisfied user. When users have queries they will have adequate answers coming from the librarians. The librarians will on the hand have enough visible reasons to reach to the users to market their services. Having analyzed the information needs of the users, and developing materials which are in line with these needs will ensure high level of satisfaction by the users, who will in turn make the library to be their first focal point

when they are looking not only for information but also guidance in their various areas outside research.

5.6 Suggestion for further research

Provision of effective and efficient information services to users has come out to be an important factor in the information life cycle. From the time information need is identified and information generated is disseminated to the time the rightful user, right structures need to be put in place. Over time, and as the research has rightfully pointed, millions of information materials without prior consideration of information needs may prove to be a waste of time and important resources. One area which was slightly highlighted in the research but of equal importance to all of us is climate change. A lot has been said and many governments have put in place measures to follow in order to make a lot easier for the population to adapt to the effects of climate change. However one area which could be of significant importance is the effect in which provision of information related to climate change has helped to achieve this. This is an area which the researcher recommends to be studied further and such factors as to how providing information on climate change and related areas can assist in making life easier to live identified and recorded.

In Kenya one group which has suffered damages and disruption of life due to climate change effects, is the pastoralists. The extent to which the pastoralists in Kenya have access to right information on how to cope with this scenario, needs to be established, thus further research in this particular area too is highly recommended.

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LIST OF APPENDICES

APPENDIX A: Thesis timeframe

	Activities	2007			2008												2009												2010		
PHASES		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
1	Developing research concept, course work and exams	1	2	3	4																										
2	Developing research concept, course work and exams					1	2	3	4																						
3	Proposal Defence									1	2																				
4	Collecting Data											1	2	3	4																
5	Data organizational, analysis and interpretation															1	2	3	4												
6	Writing, typing, editing, reporting, collating chapters, submission																			1	2	3	4								
7	Thesis Defence																							1	2	3					
8	Corrections arising from defence and final submission																										1	2	3	4	5

APPENDIX B: Research Budget

Item	Requirements	No. of Items	Unit Cost (Kshs)	Total (Kshs)
1	**Key equipment**			
	Computer	1	80,000	80,000
	Printer/Photocopier/Scanner	1	20,000	20,000
	Stapler/Pins	1	500	500
	Recording Device	1	3500	3500
2	**Expendable supplies**			
	Printing paper	10	500	5000
	Storage medium (flash disk)	2, 1GB disk	2500	5000
	Printer toners/cartridge	4	1500	6000
	Pens	10	20	200
	Pencil	10	20	200
	Rubbers	5	20	100
	Rulers	2	10	20
	Clipping pins	1 packet	50	50
3	**Publication cost**			
	Photocopying	3	2000	6000
	Photocopying paper	5 reams	500	2500
	Binding cost	18 copies	100	1800
4	**Research Assistance**	3	3000 per month for 3 months	27,000
5	**Miscellaneous cost**	10% of the total		13000
6	**TOTAL**			170,270

APPENDIX C: Introductory Letter to Respondents

Dear Respondent

I am a Master's of Philosophy student at Moi University, School of Information Sciences. I am currently carrying out a study on provision of information services to users at the United Nations Environment Programme, UNEP headquarters at Nairobi.

The purpose of this study is to provide identify how environmental information generated at UNEP is provided to users and also how users at UNEP currently seek and use this information. I have selected you as a key person who can help gather the relevant information in the area of information needs and information provision at UNEP.

Your input to this study is therefore crucial in obtaining credible information in relation to this subject. I would like to know your opinion and attitude towards the way in which users are benefiting from the information they acquire in making their day to day decisions.

The outcome of the research will provide an insight in some of the problems these users go through in seeking for relevant information and how these problems can be avoided and/or solved in order to improve the working capability of these members.

I would like to assure you that all the results that you will provide will be treated with utmost confidentiality and will be used for the purpose of this research only.

Kind regards

Stephen M. Macharia

Mphil Researcher

APPENDIX D: Interview schedule for the Senior Managers

Information about the respondent

1 Personal information

i. Name
ii. Age
iii. Country of origin
iv. Professional Qualifications
v. Area of specialization
vi. Present position

_____
_____
_____
_____
_____
_____

2. What Institution/Department are you attached to?

_____
_____
_____

Others, please specify

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Information provision and information services

3. (a) What are some of the policies you have set to ensure that information is gathered, stored and disseminated appropriately to the relevant users?

_____

_____

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_____

(b) How do these policies help your users to get relevant information and timely?

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_____

4. (a) Do users come to seek information from UNEP?

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(b) What information do you think is important to UNEP users?

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(c) How does UNEP provide this information?

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5. How is the information that you gather disseminated to your users within and outside the organization?

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6. What is the size of information staff in the organization and how do they enhance provision of information at UNEP?

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7. How does UNEP facilitate national and international research using information provision?

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8. What would you consider to be the role of information in this era of climate change and other environmental challenges?

9. What are some of the clear impacts of the environmental information that UNEP disseminates to the users?

10. What category of users does the information generated from UNEP serve? What is the importance of UNEP being headquartered in Kenya, and what are the direct benefits to the local community as far as information availability is concerned?

11. (a) What is the effect of information on problem solving in the society?

(b) How does information provided by UNEP help alleviate poverty, curb effects of global warming, stop deforestation and many other environmental challenges in Kenya?

12. What role does UNEP play in trying to bridge the existing gap of information haves and haves not?

13. What are there set policies in information packaging and dissemination at UNEP?

14. (a) What are the languages that UNEP use to disseminate information?

(b) How does the information disseminated in local languages reach local community?

(c) What impact does the information disseminated in local languages have on local community?

15. What are some of the information services that UNEP provides to its users?

16. (a) What are the challenges hindering information gathering, storage and dissemination at organizational level?

(b) What are the solutions to these challenges?

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_____

17. What else would you like to add?

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APPENDIX E: Interview schedule for the Information Staff

Information about the respondent

1 Personal information

i. Name
ii. Age
iii. Country of origin
iv. Professional Qualifications
v. Area of specialization
vi. Present position

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_____
_____
_____
_____
_____

2. What Institution/Department are you attached to?

_____
_____
_____

Others, please specify

_____
_____
_____

Information Provision and Information services at UNEP

3. What kind of information users does UNEP have?

4. What type of information does UNEP provide to its users?

a. How do you provide information to your users?

b. Are you able to say which method is the most effective?

c. What method would be used if there were no limit on resources?

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5. What information sources do your users consult widely and regularly?

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6. How do you ensure they get them and are they readily available for them?

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7. In providing information do you take indigenous information into account?

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8. What kind of information do they get from these sources? How does the information they get help them?

9. Why do they prefer these specific sources?

10. What are some of the practical benefits users get by using information from UNEP?

11. What challenges do your users go through in trying to access information from UNEP?

How can these challenges be avoided considering the importance of your users?

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12. How does UNEP help the environmental researchers access environmental information,

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13. a. What are some of the information gaps that exist at UNEP?

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b. Can you suggest some of the solutions of sealing these gaps?

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14. What would be the main features of a tailor-made information service that you would wish was provided to or your users?

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15. What else would you like to say about UNEP's information creation and dissemination services?

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APPENDIX F: Interview schedule for the External Researchers

Information about the respondent

1. What is your present designation?

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   Others, please specify

   _____

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2. What Institution/Department are you attached to?

   _____

   _____

   _____

   Others, please specify

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   _____

Information needs and sources

3. What are some of the instances when you looked for significant information from UNEP?

   _____

3.1 What kind of information were you looking for?

3.2 Why you were looking for that information at that time?

3.3 What use did you get from that information?

3.4 What information sources did you consult for your information needs?

What are your exceptional sources and why?

3.5 What did you use the information for?

3.6 How long did it take you to find and obtain the information?

4 What other methods do you use to look for similar information from UNEP?

5. Why do you consider information from UNEP useful?

6. What other information services do you get from UNEP?

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How do you rate these services overall?

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7. What are some of the services the library at UNEP provides to you?

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8. What type of environmental information do you get from UNEP?

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9. What do you consider to be your information needs? Does UNEP help in meeting these needs?

10. How satisfied are you with the services you get at UNEP when it comes to information retrieval?

11. What are some of the challenges you have encountered in gathering and retrieving information from UNEP?

12 What needs to be done to address some of the challenges you have came across as far as information creation, storage and dissemination at UNEP is concerned?

13. What else would you like to add?

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APPENDIX G: Interview schedule for students

Information about the respondent

2. What is your present academic area?

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Others, please specify

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2. What university/college do you attend?

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Others, please specify

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Information needs and sources

4. What are some of the instances when you looked for significant information from UNEP?

_____

_____

_____

3.1 What kind of information were you looking for?

3.2 Why you were looking for that information at that time?

3.3 What use did you get from that information?

3.4 What information sources did you consult for your information needs?

What are your exceptional sources and why?

3.5 What did you use the information for?

3.6 How long did it take you to find and obtain the information?

4 What other methods do you use to look for similar information from UNEP?

5. Why do you consider information from UNEP useful?

7. What other information services do you get from UNEP?

How do you rate these services overall?

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9. What are some of the services the library at UNEP provides to you?

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10. What type of environmental information do you get from UNEP?

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9. What do you consider to be your information needs? Does UNEP help in meeting these needs?

_____

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_____

10. How satisfied are you with the services you get at UNEP when it comes to information retrieval?

12. What are some of the challenges you have encountered in gathering and retrieving information from UNEP?

13 What needs to be done to address some of the challenges you have came across as far as information creation, storage and dissemination at UNEP is concerned?

13. What else would you like to add?