COURSE GUIDE

ESM 206
COMMUNITY PARTICIPATION IN ENVIRONMENTAL MANAGEMENT

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INTRODUCTION

The study of Community Participation in Environmental Management is basically concerned with the involvement of individuals, groups and communities in the affairs of managing the environment they live in. Community Participation in Environmental matters is today being emphasised globally because of the realization of the necessity to involve the stakeholders in the conception of a lasting solution to their problems.

Various human activities aimed at improving the socio-economic well-being of man have contributed enormously to the degradation of the environment. Any attempt to redress or arrest the problems must necessarily involve the major stakeholders, if it must be sustainable and stand the test of time. The involvement of communities in managing the
various activities in their environment today is appreciably a global order in incorporating host communities in decision making in any developmental activities that may affect their environment.

This course as conceived and put forward for students with interest in environmental issues will facilitate the understanding of the various concepts community participation and sustainable development and how they relate to the management of the environment.

Most importantly, new and advancing tools that aid participation of communities in environmental issues provide the needed knowledge for a better and proper management of the environment.

WHAT YOU WILL LEARN IN THIS COURSE

This course carries two credit units.

This course guide tells you briefly what to expect from this course material. The study of community participation in environment management may be described as a novel approach to solving practical problems facing vulnerable communities.

The concept of participation, rational for participation and community are broad areas that will describe the behavioral pattern of individuals and groups towards issues of achieving a common goal. They are linked together to provide a common ground to understanding the concept of Environment and Management. Participation being the focal point of the course, its type, standard elements and spaces for engagement will be examined and its rationale discussed.

The issues and importance of Environmental management are discussed, as it relates to Sustainable development concepts. The rational for continuity in resource use, its influence, types amongst others explains and justifies the need of sustainability in environmental management.

Community Participation, it components, advantages and disadvantages, and importance were examined. Communication a key tool in achieving community participation was discussed: its importance, purpose, role and process were greatly emphasized.

Community involvement in Natural Resource Management showcasing the concept of participatory planning and Co-management was also discussed.

The various mode and techniques of participation: Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA), and their activities and importance in community decision making were mentioned and discussed.

The problems and solution of community participation in environmental management were highlighted and discussed. Institutions and organization that do play significant role in environmental management issues were identified and explained.

The Contribution of Science and Technology to the environmental issues was discussed. Scientific and Technological Tools that will aid and facilitate the proper understanding of environmental issues among communities were identified and discussed.

COURSE AIM

The course aims to provide a good understanding of the involvement of a community in the better management of its environment.

COURSE OBJECTIVES

After going through this course, you should be able to:

- Explain the concept of community, Participation, Environment and Management.
- Explain the types sustainability.
- Explain the concept of Community Participation.
- Appreciate the sustainability of environment
- Relate the involvement of community participation in achieving environmental sustainability.

- Identify the various techniques used in participation.
- Identify the tools provided by Science and technology to understand environmental management.
- Explain the need for environmental management.

WORKING THROUGH THIS COURSE

This course has been carefully put together bearing in mind the need for a basic guide to understanding the importance of participatory approach to solving environmental issues as well as management the environment among communities. Concerted efforts have been made to ensure adequate explanation of basic concepts and issues of importance in the work. You are advised to spend good and quality time to study the course and ensure that you attend tutorial sessions where you can ask questions and compare your knowledge with that of your course mates.

COURSE MATERIALS

You will be provided with the following materials: A Course guide Study Units. In addition, the course comes with a list of recommended text books which are not compulsory for you to acquire or read, but are essential to give you more insight into the various topics discussed.

STUDY UNITS

The course is divided into 15 units. The following are the study units contained in this course:

Module 1

Unit 1 Definition of Terms
Unit 2 Concept of Participation
Unit 3 Rational for Participation

Module 2

Unit 1 Sustainable Development
Unit 2 Types of Sustainability
Unit 3 Justification for Environmental Management

Module 3

Unit 1 Concepts of Community Participation
Unit 2 Communication as a tool for Community Participation

Module 4

Module 5

Module 1

In unit one you will be taken through the definition of Community, Participation, Environment and Management. In the next two units concept of participation where you will be taken through the elements, forms of participation and the spaces of engagement and rational for participation are presented.

Module 2

In unit one, you will be taken through the definition and concept of sustainable development. Here the importance of sustainable development, its various approaches and factors that influence it were highlighted. Unit 2 introduces the four types of sustainability as human, economic, social and environmental. And lastly unit 3 gave the justification of environmental management through it principles and strategic goals.

Module 3

In unit 1 you will learn about the concepts of community participation: going through its definition, components advantages and disadvantages and importance. Unit two will give you on insight into the role of communication in community participation. Its definition, importance, purpose, role and process were highlighted.

In Unit three the concept of community based natural resources Management is introduced to provide the relationship between community and environmental.

Module 4

In unit 1 and 2 you will be taken through the mod e and techniques of participation. You will learn more on the various activities involved in these techniques. While unit 3 provides you with the problems and solution of participation in environmental management.

Module 5

In unit 1 you will learn about the various institutions and organizations involved in environmental management issues. Unit 2 will provide the insight to the private organization that are solely involved in the issues of environmental management. While unit 3 takes you through the role of science and technology in enhancing and proper ensuring environmental management.

TEXT BOOKS AND REFERENCES

The following textbooks are recommended for further reading:

Anyawu C.N. (1999) Introduction to Community Development. Gabesther Educational Publishers, Ibadan.

Musa, S.D. (2005) Sustainable Grassroots Development: A Major challeng e of Globalisation. In Menegbe, A.D. (ed) The Humanities and Globalisation: The *African perspective. Aboki Publishers, Makurd i.*

Onokerhoraye, A.G. (1991), Perspectives on Environmental Public Policies in *Nigeria. Benin City*

Reid, J.N. (2000). How People Power Brings Substantial Benefits to Communities. USDA Rural Develop ment Office, Office of Community Development, Washington, DC, USA.

UNDP (1999) Capacity Building for Environmental Management: A best practice guide. UNDP, New York.

ASSESSMENT

There are two components of assessment for this course. They are the Tutor marked Assignment (TMA), and the end of course examination.

TUTOR-MARKED ASSIGNMENT

The TMA is the continuous assessment component of your course. It accounts for 30% of the total score. The TMAs will be given to you by your facilitator and you will return it after you have done the assignment.

FINAL EXAMINATION AND GRADING

This examination concludes the assessment for the course. It constitutes 70% of the whole course. You will be informed of the time for the examination.

SUMMARY

This course intends to provide you with the knowledge of how the involvement and participation of communities in Environmental Management. By the end of this course you will be able to answer the following questions:

- What is community, participation, environment and management?
- State the basic concepts of a community as a social science concept.
- Discuss any two advantages of participation in community development
- Explain the need for sustainable development and identify the most appropriate for environmental management at community level.
- Explain any two types of sustainability.
- Identify the major strategic goals in environmental management.
- Describe any four components of community participation
- Identify the roles of communication in community participation.
- Discuss how participatory planning and management can aid better environmental management.
- Highlight the techniques of PRA and RRA
- Suggest possible solutions to the some problems of community participation.
- Discuss the relevance of any two scientific and technological tools in environmental management.

We wish you success in this course and hope that you will have a better understanding of the participation of various communities in managing their environment.

Best of Luck

MAIN COURSE

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MODULE 1 BASIC ISSUES OF PARTICIPATION

Unit 1 Definition of terms
Unit2 Concept of participation
Unit 3 Rational for participation

UNIT1 DEFINITION OF TERMS

1.0 INTRODUC TION

This unit starts by exposing the reader to basic issues in this course; such issues include the concept of Community, Participation, Environment and Management. Thereafter, the key concept which is Participation will be elaborated. This will give the reader the necessary basic knowledge about import key issue that will be discussed in this course.

2.0 OB JECTIVES

At the end of this lecture, you are expected to be able to;

(i) Define Community
(ii) Mention the characteristics of a Community
(iii) Define Participation
(iv) Define Environment
(v) Define Management

3.0 DEFINITION OF BASIC CONCEPTS

3.1 COMMUNITY

WHAT IS COMMUNITY?

According to Anyawu (1981) A Community is a group of people who communicate and *reside in the same geographical area. Such a group of people may be a village, a family, tribe but the people must have common basic conditions of life*

A fundamental characteristic of a community in the definition above is that regardless of the number of its people or geographical spread, they must be binded by certain principles. This view was also shared by Machaver and Page (cited by Anyawu 1999). The Community must posses a shared territory, beliefs, bonds of fellowship, common. Culture, set standards and administration.

It is now clear that a community comprises of individuals that make up groups, and must interact on a daily basis. Roles are assigned to these individuals and groups for proper coordination of the community s set goals for it is expected that the community should meet the needs of its people through sharing of common interest, common problems and pursuing a common objective in order to have a common identity.

A Community is also defined as a number of families residing in a relatively small area within which they have developed a more or less complete socio-cultural definition added with a collective identification by means of which they solve problems arising from living in the same area.

The four (4) important variables they identified are:

(i) number of actors
(ii) awareness of action
(iii) goal of action and
(iv) recipients of action.

Another authority has also attempted to define Community from a populist and social group angle, stating that,

Community may be just a few hundreds, in others, some thousands of people may be living and working in a village, clan or neighbourhood having a special sense of belonging. A community embraces an area of social living marked somewhat by social coherence. Its bases a re locality and community sentiment. Machaver and Page (cited by Anyawu 1999).

A Community therefore becomes effective when its people become conscious of their common problems and are conceptually motivated for a collective bargain while being responsible to formulate common objectives around these common problems.

3.1.1 Characteristics Of A Community

(1) Shared Territory:

A Community must exist in a territorial area that conveniently accommodates its
members in order to develop their ways of life.

(2) Shared Beliefs:

For a community to exist in unity, its people must adhere to common idea, OBJECTIVES, attitudes and values.

(3) Common Culture:
Every community has its defined custom and tradition; appreciated and jealously guided and protected by its members. Such customs and traditions are transferred from one generation to the other within the community.

COMMON ADMINISTRATION

A Community has a unique administrative leadership responsible for making laws and ensuring that such rules and regulations are followed by community members. Equal measure of discipline as a form of punishment is carried out on offenders. In the vein, same those who abide and bring glory to the community are rewarded. The administrative process is necessary to bring order to the community

3.1.2 Community as A Social Science Concept

The social science concept of the community recognizes it as the tool for socialization for an individual relying basically on the neighborhood as the vertical plane on which democracy can be nurtured. The concept has four (4) principal approaches.

- THE QUALITATIVE APPROACH

This approach recognizes the community as a place to live, but more concerned with how condusive the environment is for the people in terms of the nature of the area, the type of people already residing there, the family life, the prevailing opportunities, the climate, where facilities for development are available, the facilities for improvement etc. All these and more would determine the quality of the community as a habitable locality.

- THE ECOLOGICA L APPROACH

This approach examines the community from the point of view of space and physical location. Normally people take time to see that the environment is beautiful to their taste and level of exposure. In the sp irit of beautifying their environment, participate in all activities that will meet their human desires. At the completion of such community projects which may be either the construction of a community well. Building a school, they feel a sense of pride, a sense of fulfillment and a sense of pride to have participated in the process.

- THE ETHNOGRAPH ICAL APPROACH

The peculiar culture and traditional belief of a people in a define geographical location is of utmost importance. This

approach is concerned with those peculiar beliefs such as choice of food, indigenous fashion, marriage, burial rites and administrative system. These numerous factors help to mirror the peculiarity of individual communities within the larger community and help to provide an enabling environment for mutual tolerance among ethnic groups.

- THE SOCIOLOGICAL APPROACH

This approach conceptualizes the community as a social system, it thus places attendant interest on the social relation standard of the community and how it fits into the larger social system.

There are five characteristics of this approach.

1. Focuses on social interaction
2. Studies the interdependence of the social units.
3. Identification of activities responsible for the continued existence of the community.
4. Define the geographical spread and boundaries of the communities
5. Studies resistance capacity and techniques from both internal and external forces.

3.2 Participation

Participation is a development strategy that has been tested and adopted as a useful tool that would assist a people not only to identify priority needs, but also to partake in the planning, implementation and evaluation of community projects that are expected to improve the lives of such communities.

In principle, it means that any development project meant for a community must elicit the cooperation and absolute involvement of the stakeholder s. The idea implies that the success of a community project no matter how sincere, rely completely on the degree of involvement of its people. It is a fundamental process of exchanging thought and also a method of communicating ideas and feelings. It is a means of expressing freedom of the choice of living and being responsible.

According to Raymond (1974) Participation relates to the identification of needs, the *exposure of defects in the system and the mobilization of new resources . Further* researches confirm that participation goes far beyond simple interaction between council officials and the beneficiaries of their initiatives. It involves positively engaging the people and their leaders in making contributions on projects that would be relevant to the development of their communities.

3.3 Environment

An environment is defined as a system comprising earth s living thing and this global skin of air, water, and soil within their habitat.
Other definitions states that the environment as the sum total of the condition within which organisms live. The environment is the product of the joint interaction of living things and of the physical and chemical constituents of the Earth surface. It is a source of livelihood about 90% of the population.

3.4 Management

Management pervades all human activities. It is found in the homes, churches, government organizations and any economic under taking by people

All great leaders of history were managers, managing countries, managing wars, or managing other people s effort.

The development of management dates back to the days when people first attempted to accomplish goals by working together in groups. With the advent of practiced agriculture man ceased roaming to hunt and collect nuts, then came settled existence and the beginning of small villages.

Management is the act of working with people to determine, interpret and achieve *organizational objectives by performing the functions of planning, organizing, staffing, leading and controlling*

4.0 CONCLUSION

It is important at this point to appreciate the fact that the community is the heart, the soul, and lifeblood of all human societies. Communities provide mutual support and love in times of celebration and times of crisis. This can happen effectively when they work together rather than when they work as individuals in the management of activities and the utilization of resources in the environment.

5.0 SUMMARY

We have learnt that

1. A community must have people who reside legally in a geographical area with common problems and culture.

2. Communities have 5 main characteristics shared territory, common beliefs, common culture, shared bond of fellowship, and common administration.

3. There are four (4) approaches to viewing community as a social sciences concept

4. Participation is the involvement of a community in development project

5. Environment is a system that encompass all resources such as air, land, water and soil and that is therein.

6. Management is the act of working with the group of people to determine detail objective in the utilization of resources.

6.0 TUTOR MARKED ASIGNMENTS

1. Define the following: community, environment, participation and management
2. Enumerate the characteristics of a community
3. State the basic concepts of a community as a social science concept

7.0 REFERENCES/FURTHER READING

Anyanwu C.N (1981) Principles and practice of Adult Education and Community Develop ment. AbiPrints Publishing Ltd

Anyanwu C.N (1992) Community Development: The Niger ian Perspective. Gabesther Educational Publisher s, Ibadan

Anyanwu C.N (1999) Introduction to Community Develop ment. Gabesther Educational Publishers, Ibadan

Raymond, P(1974) Community Ideolog y : An essay in applied Social Philosophy.Routledge and Kegan Paul Ltd. London and Boston

UNIT 2

CONCEPT OF PARTICIPATION

1.0 INTRODUC TION

This unit will help you acquire basic understanding of the various elements participation.

2.0 OB JECTIVES

At the end of this unit, you should be able to:

- State the elements of participation
- Differentiate between forms of participation

3.0 MAIN CONTENT

3.0 Elements of Participation

Brinker hoff and Gold smith (2001) defined Participation as a process which stakeholders shape and share control over development initiatives. Important elements of participation are the process character as opposed to one off participatory events; stakeholder (including all societal actors) and the understanding of a form of joint policy making.

The four standard elements of participation are:

a. Rights
b. Structures
c. Legitimacy
d. Capacity

3.1 Forms Of Participation

There are basically 2 forms of participation, the formal and informal participation.

FORMAL PARTICIPATION

Emery Brown (1955) described formal participation as activities in formally organized groups. However Gilbert Hardee (1949) was of the view that, Formal participation consist *of taking part as a member, attendant, contributor, committee member or officers of a named group. Membership of these groups is by choice and not compulsory and at least one face to face meeting is called for .*

Formal participation being the activities of formal groups thus requires holding of for al **m**eetings and ensuring that members

abide strictly to the rules and regulation of the group or organization the interactive session is open only to members.

INFORMAL PARTICIPATION

Activities in informal participation does not require formulated procedures that would coordinate group behaviours, there are no elected leaders, leaders emerge based on the

situation on ground, these are no formal meetings however members may come together at regular intervals and activities carried out might not undergo any planning Ojobo (2006) stated that, Informal social participation is used to describe non-organized or *informal but recognized groups. Thus when people make social contacts o r take part in activities in their neighborhoods, friendship groups or family get-together, they are said to have engaged in informal social participation.*

3.2 Spaces For Engagement In Participation

The spaces opened for engagement in participation is a very important factor to be consider. are two possible spaces for engagement, the first is the invited spaces which is usually created from above by government and donor agencies where roles and ideas are imposed on the people invited. The second type of spaces are chosen, taken and through demanded collective action from below.

In her view, Ojobo stated that, whatever their origins, spaces for participation are not *natural, power relations shape them* .

She went further, to state the reasons why the following questions must be examined as follows:

(i) What spaces and mechanisms exist for participation?
(ii) Who is creating these spaces and why?
(iii) Who fills these spaces?
(iv) Do the new spaces carry within them the trucks of previous social relationships, resources and knowledge?
(v) What prevents long established patterns of power from being reproduced?
(vi) Who speaks and for whom?
(vii) Who is heard?
(viii) What can be done to ensure that the spaces available for participation are taken, owned, and utilized by the community for their own development?

Ojobo s idea of participation is bottom-up where the citizens in the community have to access relevant information that will

assist the people transcend the planning, execution and utilization stage of the project to having their own spaces and voices in order to promote transparency and accountability.

4.0 CONCLUSION

Formal and in formal participation are activities formulated based on either organized or non-organized procedure.
Participation is grouped into two their differences have been elaborated. It is also advantageous for citizens within a community to participate in community based projects..

5.0 SUMMARY

This unit has focused on the forms of participation within community formal and informal participation it also emphasizes the salient characteristics of these two forms of participation and how this tools can be actively employed in a community.

6.0 TUTOR -MARKED ASIGNMENT

- Enumerate the basis for ms of participation
- Differentiate between the two forms of participation
- List any two advantage of participation in community development.

7.0 REFERENCES/FURTHER READING

Emory, B (1955) Informal Participation of active Participants. Rural Sociology Vol 13-20

Gilbert, H (1949) A scale for measurement of social participation. Rural Sociology

Ojobo, A (2006) Making poverty in Riverine Communities. A paper delivered at the National Conference for Riverine Communities in Nigeria. Lokoja, Nigeria.

UNIT 3

1.0 INTRODUC TION

This unit will build on unit 2. This unit will help you know the needs for how it participation can help and in development.

2.0 OB JECTIVES

At the end of this unit, you should be able to:

- Enumerate the needs for participation
- State any 4 reasons why participation could jeopardize development.

3.0 MAIN CONTENT

3.1 Rationale for Participation

1. Participation confirms that community p laces high priority on the programme/project
2. Participation has both political and economic advantage
3. Participation legitimizes the approach to be taken and promotes accountability from the higher level of government and from local workers.
4. Promotes mutual respect and recognizes the important role of every human being.
5. Create self-sustaining communities with a sense of political and social responsibilities.
6. Participation will speed up the process of social change.
7. Participation results in better decision compared to ideas nurtured by non-indigenes or professionals.

However Goldbath (1961) gave seven reasons why p articipation could jeopardize development.

(1) Those opposed to programmes may wreck good plans intended for successful execution of the programmes.
(2) There may be lobbying of local vest interest at the expense of the total programme of the larger community.
(3) Those involved in the participation exercise may not be truly representative.
(4) Local citizens cannot directly improve the situation substantially in its physical aspect.
(5) Such involvement may not receive higher official support and may have little or no influence of larger or official decision.
(6) Local participation prolongs the planning process and the people may become impotent with the delay.

(7) In the final programme, there may be a great difference between the hope and reality and even goals conflict may ar ise.

4.0 CONCLUSION

For meaningful development to take place in any community, the importance of community participation cannot be over-emphasized.

5.0 SUMMARY

This unit has provided the necessary importance of participation, institution of development project, it has both political and economic advantage, it promotes accountability and others. It also emphasized that not involvement, high lobbying and other will jeopardized development.

6.0 TUTOR- MARKED ASIGNMENTS

Enumerate how participation can inhibit development.

7.0 REFERENC/FURTHER READING

Goldbath, L (1961)Argument for and against Citizen Participation in P. Spell gal (Ed) urban renewal No.27

Ojobo, A (2006) Mak ing poverty in Riverine Communities. A paper delivered at the National Conference for Riverine Communities in Nigeria. Lokoja, Nigeria.

MODULE 2 CONCEPTS OF ENVIRONMENTAL MANAGEMENT

Unit 1 sustainable development
Unit 2 types of sustainability
Unit 3 the rationale for environmental **management**

UNIT1 SUSTAINABLE DEVELOPMENT

1.0 INTRODUC TION

This unit will deal with sustainable development as it affects the environment. You get would a general over view of sustainability in our peculiar environment and the basic factors of environmental sustainability.

2.0 OB JECTIVES

At the end of this unit you are expected to be able to:

(i) Define sustainable development.
(ii) Identify the best approach to sustainability
(iii) Enumerate and explain various factors that influence sustainable development.

3.0 MAIN CONTENT

3.1 Definition of Sustainable Development

Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability relates to the continuity of economic, social, institutional and environmental aspect of human society, as well as the non-human environment.

Sustainable Development is also closely linked with continued material development, some and stakeholders prefer to use terms like sustainability . Sustainable prosperity and sustainable genuine progress .

3.2 Concepts of Sustainable Development

Values vary greatly in detail within and between cultures, as well as between academic disciplines (e. g. between economists and ecologists). The introduction of social values to sustainability

goals implies a much more complex and contentious debate, and those focused on ecological impacts tend to strongly resist non-ecological interpretations.

Some see at the heart of the concept of sustainability a fundamental, immutable value set that is best stated as parallel care and respect for the ecosystem and for the people within. From this value set emerges the goal of sustainability; to achieve human and ecosystem well-being together. Seen in this way, the concept of sustainability is much more than protection environmental in another guise. It is a positive concept that has as much to do with well- achieving being for people and ecosystems as it has to do with reducing ecological stress or environmental impacts.

At its least, sustainability implies paying attention to comprehensive outcomes of events and action insofar as they can be anticipated at present. This is known as full cost accounting, or Environmental accounting. This kind of accounting assumes that all aspects of a system can be measured and audited (Environmental audits).

Environmental accounting can be a limited biological interpretation as in ecological analysis, or may include social factors as in the ICLEI Triple Bottom Line standards for urban community accounts.

At most, sustainability is intended as a means of configuring civilization and human activity so that society, its members and its economies are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, and planning and acting for the ability to maintain these ideals in a very long term typically at least seven generations.

None of these extended definitions, however, ever deny or down play the importance of the ecological interpretation of sustainability as defined by the science of ecology itself. All advocates of sustainability accept that ecological, not social, factors, are the most measurable and universal indicators of sustainability.

3.3 Importance of Sustainable Development

Sustainable Development is important because all the choices we pursue and all the actions that we make today will affect everything in the future. We need to make sound decisions at present in order to avoid limiting the choices of generations to come. For example, if we continue wasting water and polluting the dwindling supply of freshwater, we leave the future

generation with no other choice than to desalinate saltwater or treat contaminated water for their consumption and daily use. We can also be assured that, if that happens, all life depend that s on clean freshwater will become extinct.

The same also goes with the supply of soil that we currently have. Without proper care, our soils can easily lose quality enough that they will no longer be able to encourage growth and sustain life. I f that happens, future civilizations will be void of crop and other natural sources of food. They will then have no choices but to create man- made sources for nourishment and sustenance.

3.4 Top- Down and Bottom-Up Approaches to Sustainability

A top down approach is one where an executive, decision makers, or other person or body makes a decision. This approach is disseminated under their authority to lower levels in the hi**e**rarchy, who are, to a greater or lesser extent, bound by them. For example, a structure in which decisions either are approved by a manager, or approved by his authorized representatives based on the manager s prior guidelines, is top-down management.

A bottom-up approach is one that works from the grassroots from a large number of people working together, causing a decision to arise from their joint involvement. A decision by a number of activists, students, or victims of some incident to take action is a bottom-up decision. Positive aspects of top-down approaches include their efficiency and super b overview of higher levels. Also, external effects can be internalized. On the negative side, if reforms are perceived to be imposed from above , it can be difficult for lower levels to accept them (e.g. Bresser Pereira, Maravall, and Przeworski 1993). Evidence suggests this to be true regardless of the content of reforms (e.g. Dubois 2002). A bottom-up approach allows for more experimentation and a better feeling for what is needed at the bottom.

3.5 Factors That Influence Sustainable Development

1. Participation and ownership. Get the stakeholders (men and women) to genuinely participate in design and implementation. Build on their initiatives and demands. Get them to monitor the project and periodically evaluate it for results.
2. Capacity building and training. Training stakeholders to take over should begin from the start of any project and continue throughout. The right approach should both motivate and transfer skills to people.
3. Government policies. Development projects should be aligned with local government policies.

4. Financial. In some countries and sectors, financial sustainability is difficult in the medium term. Training in local fundraising is a possibility, as is identifying links with the private sector, charging for use, and encouraging policy reforms.
5. Management and organization. Activities that integrate with or add to local structures may have better prospects for sustainability than those which establish new or parallel structures.
6. Social, gender and culture. The introduction of new ideas, technologies and skills requires an understanding of local decision- making systems, gender divisions and cultural preferences.
7. Technology. All outside equipment must be selected with careful consideration given to the local finance available for maintenance and replacement. Cultural acceptability and the local capacity to maintain equipment and buy spare parts are vital.
8. Environment. Poor rural communities that depend on natural resources should be involved in identifying and managing environmental risks. Urban communities should identify and manage waste disposal and pollution risks.
9. External political and economic factors. In a weak economy, projects should not be too complicated, ambitious or expensive.
10. Realistic duration. A short project may be inadequate for solving entrenched problems in a sustainable way, particularly when behavioural and institutional changes are intended. A long project, may on the other hand, promote dependence

4.0 CONCLUSION

Sustainable development has been presented as an important aspect of environmental management, in which participation is a major part.

5.0 SUMMARY

This unit has focused in the general concept of sustainable development which includes the definition. The need for a sustainable development, its approaches (Top-down and Bottom-up) and as well as the various factors that influences it.

6.0 TUTOR- MARKED ASIGNMENT

- Define Sustainable Development
- Explain the need for sustainable development and identify the most appropriate for environmental management at community level.
- Enumerate any 3 factors that may influence sustainable development.

7.0 REFER ENCES/FURTHER READING

Ministry of Foreign affairs of Denmark (2007) Community Based Resource Management. Technical Notes 2007 Danida

UNIT 2 TYPES OF SUSTAINABILITY

1.0 INTRODUCTION

This unit will deal with the types of sustainable development as it affects the component of envir**on**ment.

2.0 OB JECTIVES

At the end of this unit, you are expected to be able to:

a. identify the various types of sustainability
b. explain the types of sustainability

3.0 MAIN CONTENT

3.1 types of sustainability

The four types of sustainability include human, economic, social and environmental. All four are required to maintain the entirety of life on earth. Although interconnected, it is important to note the differences of each in terms of its nature and requirements

3.2 Human Sustainability

The very basic need of human sustainability is good reproductive health and safe childbearing. Those that reproduce have the responsibility of caring for their children, giving them access to proper education, and promoting their health and wellbeing. At some the point, children should have enough skills and knowledge such that they can sustain their way own of life. It is at that point that they become considered as productive human well capital as as individuals that can go through the process of reproduction and rearing. As long as this process is maintained at a rate that all human systems can support, human sustainability should be no cause for concern.

3.3 Economic Sustainability

In simple terms, economic sustainability is having a set amount of capital for a certain period. Those who consume that capital must also conserve it so that they will enjoy continue it to towards the end of the specified period. This means that we must preserve all our resources as we consume them so that human beings in the future can enjoy them as well. To achieve this, we must regenerate our resources at a rate that is equal to or faster than consumption.
our

3.4 Social Sustainability

Social capital is an important aspect of sustainability because it is through communities and civil societies that humankind can easily and inexpensively work together. Without proper levels of social cap ital, it can easily deplete and violence as well as mistrust can take over.

When that happens, societies and everything else that depends on them will be Through destroyed. proper maintenance of and adherence to laws, rules, and values that societies has de**ve**loped for the common good, social sustainability can be achieved.

3.4 Environmental Sustainability

Environmental sustainability is important because it involves natural resources that human being s need for economic or manufactured capital. Materials taken from nature are used for solutions that address human needs. I f nature is depleted faster than it can regenerate, human being s will be left without raw materials.

Furthermore, environmental sustainability also involves ensuring that waste emissions are at volumes that nature can handle. I f not, all human and other living things on earth can h**a**rmed be to the point of extinction.

All four types exist within each other s realms. We, as humans are considered individually as private goods whose values is defined by our level of health, skills, knowledge, and education, leadership. We exit within the economy as economies exist entirely within societies. Societies, in turn, exist totally within the realm of the environment. Considering this, we n**ee**d to make sure that we manage all aspects of human life within economies and in a societies manner that will not destroy the environment that everything on earth is dependent on.

4.0 CONCLUSION

Sustainability as an important concept manifest itself in different spheres of the environment.

5.0 SUMMARY

The four types of sustainability include human, economic, social and environmental sustainability.
These four types of sustainable development relate human activities to their immediate environment and its resulting consequences

6.0 TUTOR -MARKED ASIGNMENT

1. Enumerate the types of sustainability
2. Explain any 2 types of sustainability

7.0 REFERENCES AND OTHER RESOURCES

Ministry of Foreign Affairs of Denmark (2007) Community Based Resource Management. Technical Notes 2007 Danid a

UNIT 3 JUSTIFIC ATION OF ENVIRONMENTAL MANAGEMENT

1.0 INTRODUC TION

This unit will focus on the need for environmental management, and on how it is links specifically to both sustainable development and community participation.

2.0 OBJECTIVES

At the end of this unit, you are expected to be able to:

- State the need for environmental management
- Identify and exp lain the participation of environmental management
- Enumerate the strategies goals in environmental management.

3.0 MAIN CONTENT

3.1 Justification for Environmental Management

Today, the environment is facing continuous pressure from the population it carries. The search for economic independence by man y individuals, groups, community, and nations have resulted in the continuous degradation of the environment. This state of the environment is most responsible of the gory stories of environmental problems we all face today; issues such as famine, drought, global warming emergence of infectious diseases flood and erosion are all environmental. This calls for a better education on how the environment can be properly managed.

3.1 Principles Of Environmental Management

Environmental management provides a framework for a group of people to manage its environment both opportunities and risk s and to document and communicate its environmental plans and programmes. There are five key principles for the management of the local environment. They include:

1. Local government commitment
2. Planning and compliance
3. Enabling systems
4. Performance and Accountability
5. Measurement and Improvement.

1. LOCAL GOVERNM ENT COMMITMENT

Commitment from the local government to improve environment performance and establish policies for the purpose is very important:

- Obtaining political support
- Developing policy
- Integrating into operational system
- Showing environmental leadership

A strong commitment from the local government to be inclusive, develop political support, or show leadership will necessitate the involvement of the community. A prudent local government will initiate community participation in order to ensure broad commitment from all residents of the city.

2. PLANNING AND COMPLIANCE

The local government plans and implements proactive programmes to identify and address environmental problems and correct deficiencies in the local environment.

- Comply with environmental laws/regulations
- Prepare for emergencies
- Prevent pollution and conserve resources

The planning of environmental management systems needs to include views of the community and residents in order to ensure its success and become effective. It will be through participation (meetings, seminars, hearings etc) that views of the community can be incorporated.

3. ENABLING SYSTEM

The local government develops and implements the necessary measures to enable various urban stakeholders to perform their tasks and implements their programmes/projects on the environment.

- Provide opportunities for learning
- Support with standards, systems, programmes
- Information management, communication and documentation.

4. PERFORMANCE AND ACCOUNTABILITY

The local government needs to develop measures that address environmental performance of all urban stakeholders, and ensure full accountability of their functions.

- Instill responsibility, authority and accountability
- Develop performance standards in consultation with all actors.

- Keep actions and processes transparent

It will be essentially through effective community participation that good performance and accountability can be built. A decentralized approach where all actors play their role to achieve overall goals and objectives, works best when effective participation is linked to effective performance and accountability.

5. MEASUREM ENT AND IMPROVEM ENT

The local government develops and implements programmes to assess progress towards meeting its environmental goals and uses it to improve its environmental performance:

- Developing an evaluation programme
- Gather and analyze relevant data
- Compares its performance with other local governments
- Incorporates continuous improvement

Measurement and improvement of environmental measurement processes can be done to established indicators and parameters. But it is third party views particularly coming the from community that will lead to better performance and improvement. This can be generated through good community participation.

3.2 Strategic Goals In Environmental Management

i. Strengthen the capacity of environmental institution at local, national and regional levels, particularly in regard to monitoring and enforcement mechanisms.
ii. Improve environmental management by promoting public participation and involving all stakeholders.
iii. Increase decentralization of responsibility for environmental management and provide sufficient autonomy to carry out roles.
iv. Arrest and control encouraging environmental problems by taking an integrated and holistic approach to environmental challenges.
v. Increase public awareness of environmental issues and promote changed in attitude and behaviour towards greater sustainability.

4.0 CONCLUSION

Environmental management, its justification, principles and basic strategic goal have been discussed. Environmental management is a necessity if certain environmental phenomena are to be properly checked.

5.0 SUMMARY

This unit has focused on the needs for environmental management. As various environmental problems are impending the survival and development of living in components their environment, there is a need to study the various principles of environmental management in order to address these issues through the achievement of the strategic goals.

6.0 TUTOR- MARKED ASIGNMENT

- List and explain the various principles of environment management
- Identify the major strategic goals in environmental management.

7.0 REFERENCES/FURTHER READING

UNDP(1999) Capacity Building for Environmental Management: A best practice guide. New York

Onokerhoraye, A. G (1991) Perspectives on Environmental Public Policies in Nigeria, Benin City

MODULE 3 COMMUNITY PARTICIPATION

UNIT 1 THE CONCEPTS OF COMM UNITY PARTICIPATION

1.0 INTRODUC TION

This unit will help you to acquire the basic understanding of community participation, its definition, components, advantages and disadvantages, and importance in environmental management.

2.0 OB JECTIVES

At the end of this unit you should be able to:

- Define community participation
- State the components of community participation
- Enumerate at least 4 advantages and disadvantages of community participation
- Relate the importance of community participation to environmental management

3.0 MAIN CONTENT

3.1 Definition of Community Participation

Community participation can be loosely defined as the involvement of people in a community in projects to solve their own problems. People cannot be forced to participate in projects which affect their lives but should be given the opportunity where possible. This is held to be a basic human right and a fundamental principle of democracy. Community participation is especially important in emergency sanitation

programmes where people may be unaccustomed to their surroundings and new sanitation facilities.

3.1 Components of Community Participation

- Needs Assessment expressing opinions about desirable improvement, prioritizing goals and negotiating with agencies.
- Planning formulating objectives, setting goals, criticizing plans
- Mobilizing raising awareness in a community about needs, establishing or supporting organizational structures within the community.
- Training participation in formal training management skills.
- Implementing engaging in management activities; contributing directly to construction, operation and maintenance with labour and materials; contributing cash towards costs, paying of service or membership fees of community organizations.
- Monitoring and evaluate ion participating in the appraisal of work done, recognizing improvement s that can be made and redefining needs.

Most emergency sanitation programmes tend to be designed and executed by the relief agency; however, this does not mean that the community is unable or unwilling to participate in some or all of the activities outlined above.

3.2 Advantages and Disadvantages of Community Participation

ADVANTAGES OF COMMUNITY PARTICI PATION

The following are some of the main reasons why people are usually willing to participate in humanitarian programmes:

- Community participation motivate people to work together people feel a sense of community and recognize the benefits of their involvement.
- Social, religious or traditional obligations for mutual help.
- Genuine community participation people see a genuine opportunity to better their own lives and for the community as a whole.
- Remuneration in cash or kind.

There are often strong genuine reasons why people wish to participate in programme. All too often aid workers assume that people will only do anything for remuneration and have no genuine concern for their own predicament or that of the community as a whole. This is often the result of the actions of

the agency itself, in throwing money or food at members co**m**munity without meaningful dialogue or consultation. Remuneration is an acceptable incentive but is usually not the only or even the primary motivation.

DISADVANTAG ES OF COMM UNITY PART ICIPATION

The following are some of the main reasons why individuals and/or community may be reluctant to take part in community participation.

- An unfair distribution of work or benefits amongst members of the community.
- A highly individualistic society where there is little or no sense of community.
- The feeling that the government or agency should provide the facilities.
- Agency treatment of community members if people are treated as being help less they are more likely to act as if they are.

Generally, people are ready and willing to participate; the biggest disincentive to this is probably the attitude and actions of the agency concerned. Treating people with respect, listening to them and learning from them will go a long way toward building a successful programme; it will also save time and resources in the long run and contribute greatly to programme sustainability. Field workers who expect member s of the affected community to be grateful for their presence without recognizing and empathizing with them as people may satisfy their own egos but will have little other positive effect.

Community participation can contribute greatly to the effectiveness and efficiency of a programme; the crucial factor in its success is the attitude of agency staff in the field. If do staff not treat people with respect or are seen to favour particular individuals or group within a community, this can have a highly destructive effect on participation. For this reason it s **i**mportant to identify key representatives and groups within the affected population early.

3.3 Importance of Community Participation

There are five principles that illustrate the importance of community participation.

1. Choices and preferences on quality of life and lifestyle are made at the community, household and individual levels. These choices and preferences have a direct impact on the local environment, as well as long term indirect impacts, sometimes for beyond the physical boundaries of the community.

2. It is important to maintain subsidiary of decision making; local daily decisions need to be taken at the local and community levels. A daily decision at the individual and community help in maintaining the scale of decisions and ensures that commitment is built at the appropriate level.

3. Community participation calls for clear commitment and involvement of all members of a community in various joint activities. Focusing on different aspects of the localenvironment will provide rallying point that can build commitment and involvement from the community

4. Community participation pools resources and diverse skills and working strategies from within the community. Pooling resources and diverse skills particularly enables a complex issue such as management of the local environment.
5. Checking and corrective action through monitoring/evaluation can be done by and for the community itself. Ensuring that the environment is healthy and e **th**at views of the community are included in the management processes is critical community participation enables and facilitates the process of environmental monitoring.

4.0 CONCLUSION

Relationship between community participation and environmental management has been stressed. You must realized that community participation should be an integral part of a viable and appropriate planning and management of your environment.

5.0 SUMMARY

This unit had discussed the general concept of community participation. It focused on the definition of community participation, the components of community participation, its advantages and disadvantages and as well as its importance to environmental management.

6.0 TUTOR-MARKED ASIGNMENT

1. Define Community Participation
2. List the components of community participation
3. Explain any 4 components of community participation

4. Enumerate 4 advantages and disadvantages of community participation
5. State any 4 importance of community participation and relate these four to environmental management

7.0 REFERENCES/FURTHER READING

Simanowitz, A (1997) Community Participation/Community-Driven Paper presented at the 23rd WEDC Conference with theme Water Sanitation for All: partnerships and Innovations. Durban

Reid, J.N. (2000). How People Power Brings Substantial Benefits to Communities, Rural USDA Development Office, Office of Community Develop ment, Washington, DC, USA.

UNIT 2 COMMUNICATION AS A TOOL FOR COMMUNITY PARTICIPATION

1.0 INTRODUCTION

This unit will deal with the concept of Community Based Natural Resource. This will help you to acquire the basic understanding of community based natural resource management, Participatory planning and management and co-management in environment in the perspective of community participation.

2.0 OB JECTIVES

At the end of this unit you should be able to:

- Define communication
- Mention the importance of communication in community participation
- State the various roles of communication in community participation.

3.0 MAIN CONTENT

3.1 Definition of Communication

Communication has a variety of definitions, however, there are key words common to these definitions such as, it is a process, transfer or flow of idea/information, channel of transfer, sender and receiver and feedback.

The communication process therefore focuses on the;

(i) sender of the information
(ii) medium of transmission of the message
(iii) receiver and
(iv) feedback from the receiver.

Egunyomi (2000) added that, Communication is often conceived as the transmission of information. It means the inter-change of ideas, feelings, thoughts or experiences to other people. People need to know what? Why? When? Who? and Where? of the place they function. Egunyomi (2000) was also convinced that communication should be continuous and can also serve several other functions such as;

- transmission of information and knowledge among people to ensure cooperation.
- Motivates and directs people to do things they may ordinarily not want to do.
- Moulds attitudes that will enhance positive behaviours.

IMPORTANCE OF COMMUNICATION

Communication is a tool for connecting people in an organization or community in order to achieve a common goal.

3.2 Purpose of Communication

The primary purpose of communication is to effect a change by influencing action, whether positively or negatively. Communication is important for the internal functioning of an organization or community because of its role in harnessing the synergies to function well. Communication is needed.

- To lead, direct, motivate and create a climate in which people want to contribute.
- To coordinate performance
- To bring together both human and material resource in a most effective and efficient manner.

3.3 Role of Communication in Community Participation

To maintain a good social working relationship with the people of a project community on programmes meant for the improvement of their livelihoods, effective and efficient communications is very essential.

Communication for community participation has transcended more information exchange. It is an unconditional tool for educating and sensitizing the people with the hope of arousing their
interest, cooperation and support.

3.4 Process of Communication in Community Participation

1. For a successful communication process in community participation, the nature of the message must be factored in, the acceptance of the message by the recipients is greatly determined by the social, economic, and cultural compatibility with them

2. The language, channel or medium of communication adopted must be suitable to the recipient of the message. It must also embrace the indigenous method of communication of the people

Moemeka (1990) posited that, Any communication message which completely ignores the values that underline the context in which the people communicate cannot produce the attribute and behavioural changes necessary for community development .

4.0 CONCLUSION

The role of communication in community participation has been emphasized. You must have realized that effective communication among groups can lead to the achievement of a common goal.

5.0 SUMMARY

This unit had discussed the general concept of communication in community participation. It focused on the definition of communication, the purpose and importance of communication and its role in community participation and how it effect the achievement of common goal in environmental management.

6.0 TUTOR- MARKED ASIGNMENT

1. Define communication
2. Enumerate 5 importance of communication
3. Discuss the processes of communication
4. Identify the roles of communication in community participation.

7.0 REFERENCES/FURTHER READING

Egunyomi, D (2000) Contemporary Issues in Organisation and administration. Holand Publishers, Ibadan

Moemeka, A (1990) The Mass media Communication and Rural Dwellers: Towards the effectiveness of Development Messages, cited in Oso and Adebayo (Eds) Communication and Rural Develop ment in Nigeria. Millennium investment Ltd, Lagos

UNIT 3 COMMUNITY BASED NATURAL RESOURCE MANAGEM ENT

1.0 INTRODUC TION

This unit will focus on Community Based Natural Resources Management (CBNRM) as a development strategy in environment management (Resource Conservation and Good Governance)

2.0 OB JECTIVES

At the end of this unit you are expected to know:

- The basic concept of community based natural resource management
- Define co-management and relate it to environmental management
- Identify participatory planning and management in environmental management.

3.0 MAIN CONTENT

3.1 Community Based Natural Resources Management

3.2 Concept of CBRNM

The concept of CBRNM is related to a variety of terms, including participatory, community, community based, collaborative, joint and popular natural resource management. These concepts are often used interchangeably, but may also be used with the intention to emphasize specific characteristics of related approaches. Thus, the concept of CBNRM tends to be associated with approaches where the focal unit for joint natural resource management is the local community. Sometimes, it has also been applied to designate approaches local where communities play a central but not exclusive role in natural resource management (Rotha et al, 2005).

In practice, CBRNM is mostly about ways in which the state can share rights and responsibilities regarding natural resources with local communities. At one end of the scale is community participation in protecting, for instance, a national park, without actually involving them in park management. At the other end of

the scale is a complete handover of ownership of land and natural resources from the state to communities. Between these two extremes are joint management models, where representatives of the state, acting within the terms of negotiated contracts, manage a state-owned natural resources (for example a lake or forest reserve) together with one or several communities.

3.3 Participatory Planning and Management

3.4 Co-Management

Co-Management (CM) of natural resources is used to describe a partnership by which two or more relevant social actors collectively negotiate, agree upon, guarantee and implement affair share of management functions, benefit and responsibilities for a particular territory, are or set of natural resources. The advantage of this definition is that it covers different ways in which the planning and implementing authority over natural resources can be shared among various types of social actors, thus refraining from any a prior i indication of which model is the most appropriate.

4.0 CONCLUSION

The concept of community based natural resource management and how it relates to environmental management, participatory planning and management and co- management has been enumerated. You must have realized therefore that the involvement of the community in resource/environmental management would help in the achievement of common goal in sustainability.

5.0 SUMMARY

This unit had discussed the general concept of community based natural resource management. It focused on the involvement of communities in natural resource management through participatory planning and management and indicated how co-management can effectively enhance environmental management.

6.0 TUTOR MARKED ASSIGNMENT

1. Explain community based natural resource management
2. Define co-management
   Discuss how participatory planning and management can aid better environmental management.

7.0 REFERENCES/FURTHER READING

Ministry of Foreign affairs of Denmark (2007) Community Based Resource Management. Technical Notes 2007 Danid a

MODULE 4 TECHNIQUES OF PARTICIPATION APPRIAISAL

UNIT 1 MODE AND TECHNIQUES OF PARTICIPATION

1.0 INTRODUCTION

In this unit, you will learn about the Participatory Rural Appraisal (PRA) which is one of the techniques employed by Non Governmental Organization particularly in mobilizing communities for development projects.

2.0 OBJECTIVES

At the end of this unit, you should be able to

- Define participatory rural appraisal (PRA)
- Understand and explain the various PRA activities.

3.0 Participatory Rural Appraisal (Pra)

Participatory Rural Appraisal (P RA) is an approach used by non-governmental organizations (NGOs/CBOs) and other agencies involved in international development. The approach aims to incorporate the knowledge and opinions of rural people in the planning and of management dev**e**lopment projects and programmes that have direct impact on the environment.

3.1 Pra Activities

3.1.1 Participatory Mapping

This involve the use of transect walks, Social Maps, Resource Maps and Venn Diagram to identify and show the location of resources and facilities, group interactions, location of resources and inter-relationships.

3.1.2 Ranking Exercise

This is the use of Problem and Preference ranking s to understand the problems of each group and their preferences on a subject matter.They involved pair-wise ranking, direct matrix ranking and wealth ranking.

3.1.3 Trend Analysis

This time- line analysis brings out information for example on the status of a watershed its and resources and usage over time. It also brings out information on the prevailing livelihood patterns within the same time frame. Seasonal Calendar s and daily Activities Chart can be used in this regard.

3.1.4 Consolidation and Analysis

Problem Tree and Strength, Weaknesses, Opportunities and Threat (SWOT) Analysis can be used as a tool to understand the problems as perceived by the various stakeholders, knowing the existing land use, soil, land and water management approaches especially their weaknesses, what could be improved for sustainable management and issues militating against these.

3.1.5 Stakeholders Analysis

This holistic PRA tool can be used to gain an understanding of a study area by mean assessing of the various interests of the identified stakeholders in managing the watershed for provision of requisite services. Most importantly, this tools assisted in identifying conflicts, reasons for such, its effect on resource use and strategies for mitigation and/or reduction.

3.1.6 Direct Observation

This is an obtrusive measure to visually observe the present activities (farming practices, living patterns etc) being carried out that affects watershed management. Peoples behaviour would also be observed. This survey method helped as a cross-check of people s responses to questions and complement data generated from the various interviews.

4.0 CONCLUSION

The meaning of PRA and how it is used in mobilizing communities for developmental problems have been discussed. You now know that PRA incorporates the indigenous knowledge and opinion of the target communities into the design and management of community based projects.

5.0 SUMMARY

This unit has focused on the mode and technique of participation especially the participatory rural appraisal (PRA) and its various activities. PRA is particularly used by nongovernmental organizations and other agencies engaged in international development.

6.0 TUTOR -MARKED ASIGNMENT

1. What do you understand by participatory rural appraisal (PRA)
2. Explain the different PRA activities

7.0 REFERENCES/FURTHER READING

Mashi, S. A (2007) Research Methodology. GEO 705 Course Monograph, Department of Geography, University of Abuja

UNIT 2 MODE AND TECHNIQUES OF PARTICIPATION II

1.0 INTRODUCTION

Another technique of participation Rapid Rural Appraisal (RRA) is the focus of this unit. You will learn about the genesis, definition and advantages of the RRA.

2.0 OBJECTIVES

At the end of this unit, you are expected to have understood

- The genesis of the RRA
- Definition and techniques of the RRA
- The advantages of RRA

3.0 MAIN CONTENT

3.1 Rapid Rural Appraisal (Rra)

Rapid Rural Appraisal (RRA) methodology owes much of its early development to Farming Systems Research and Extension as promoted by the Consultative Group on International Agricultural Research Centers (CGIAR), RRA was developed in response to the disadvantages of more traditional research methods, including: the time taken to produce results, the high cost of formal surveys and the low levels of data reliability due to non- sampling errors. McCracken et al (1988) defined RRA as an approach for conducting action-oriented research in developing countries.

3.2 Definition of Rra

Unfortunately, there is no general accepted definition of Rapid Rural Appraisal (RRA), RRA is more commonly described as a systematic but semi- structured activity out in the field by a multidisciplinary team and is designed to obtain new information and to formulate new hypotheses about rural life.

The techniques of RRA include:

- Interview and question design techniques for individuals, household and key informant interviews
- Methods of cross-checking information from differ ent sources
- Sampling techniques that can be adapted to a particular objective

- Methods of obtaining quantitative data in a short time frame
- Group interview techniques, including focus-group interviewing
- Methods of direct observation as site level, and
- Use of secondary data sources.

3.3 Rra Activities/Advantages

RRA is a set of techniques that can be applied as a preliminary stage when surveys embarking of on farmers. The technique essentially involves an informal, rap id, exploratory study of a specified geographical area design to establish an understanding of local geographic conditions, problems and characteristics. They can provide basic information on the feasibility of beginning a survey project in an area, particularly when one is intending to survey an area about which little is known.

With RRA the researcher acts like an explorer, making a brief survey of the horizon before plunging into the depths of the research from which the wider view is no longer possible. I f the researcher observes keenly at the start, the reminder of the survey process stands a better chance of success and time will not be wasted.

Without RRA a researcher may find himself surveying the wrong area, collecting the wrong type of information, asking the wrong people, and precious time and funds can be lost backtracking.

The appraisal can produce, at a minimum cost, a rich description of life in the faring co**m**munity and an understanding of local Geographic characteristics that will be invaluable in ensuring that the right areas and people are surveyed and that appropriate questions are **a**sked

4.0 CONCLUSION

The RRA owes its development to Farming Systems Research and Extension of the Consultative group in International Agricultural Research Centres (CGIAR) and it was developed in response to the disadvantages of more traditional research methods.

RRA is defined as a systematic but semi-structured activity designed to obtain new information and formulate new hypothesis about rural life

RRA can be applied as a preliminary stage when embarking on survey of farmers to provide basic data on feasibility of project. Finally, with RRA the researcher acts like an explorer but without it a researcher may survey the wrong area.

5.0 SUMMARY

This unit has as its focus; the RRA which is a technique used essentially in the rural areas to obtain new information and formulate new hypothesis about rural life. The unit also exp lain how the technique can be useful in ensuring that the rig ht area and people are surveyed and **a**sked the right questions in a development oriented exercise.

6.0 TUTOR -MARKED ASSIGNMENT

1. What is Rapid Rural Appraisal (RRA)
2. Highlight the techniques of RRA
3. Enumerate the advantages of RRA

7.0 REFERENCES/FURTHER READING

Mashi, S. A (2007) Research Methodology. GEO 705 Course Monograph, Department of Geography, University of Abuja

Chambers, R. (1983) Rural Development: Putting the Last First. Longman, Londres, Ang leterre.

UNIT 3 CONSTRAINTS TO PARTICIPATION IN ENVIRONMENTAL MANAGEMENT

1.0 INTRODUCTION

Community participation in environmental management, like any other human activity, has its own challenges. This unit examines some of the challenges and their solutions.

2.0 OBJECTIVES

At the end of this unit the student is expected to understand

- The problems of community participation
- The solutions to the problems of community participation.

3.1 Solution to Problems Of Community participation in environmental management.

3.1.1 Provision of Basic Education to Citizenry

The opportunity for Basic education should be provided for all citizens. I f the majority are educated, they will have a more positive disposition towards innovations and can then be easily mobilized.

3.1.2 Enlightenment Campaign

There should be enlightenment Campaign through various medium, Radio, Television, Newspapers and Public shows to change people's attitude particularly to make them drop retrogressive ideas and traditions

3.1.3 Community Empowerment

The people should be empowered through provision of credit facilities, aids and grants to enable them embark on self help projects which have direct bearing on their environment.

3.1.4 National re-orientation

Agencies and organizations should be established to re-orientate the populace and help fight vices like corruption, self centeredness, insincerity among others. These agencies should be saddled with the responsibility of encouraging the people to be hardworking, patriotic, honest, dedicated to duty and responsible.

3.1.5 Problems of Community Participation In Environmental Management

The problems of community participation in the process of development include some of the following:

3.1.6 High level of illiteracy

Education makes people amenable to positive change and innovations; it opens up their minds so that they can think wide. There is a preponderance of illiteracy of rural communities in Nigeria. They sometimes are suspicious of initiatives/innovations from the extension workers. They see the educated people as always scheming to take undue advantages of their situation.

3.2 Tradition

Majority of the rural population are still strongly attached to their tradition and can do anything to protect it. For an example, in some communities it is traditional to the male chi**l**dren to go and fend for themselves from very early ages. These children roam the about in village or even go to the urban centers to beg for food and money leaving no early room **for**mal education. The mass literacy officer therefore faces an arduous task convincing them to send their children to school. Children in some communities are traditionally believed to be gifts from God and seen also as assets to the parents, the people therefore see the Health Officer preaching family planning as a joker.

3.3 Poverty

Our rural people are largely poor peasant farmers who still practice subsistence agriculture. Community participation especially in projects that are capital intensive therefore becomes a problem. Take for an example, the rural electrification projects where generating sets are installed to provide electricity to the community. Many communities find it difficult to maintain the engine, it is either that they are broken down and there is no money to buy spare parts or that there is no fuel to operate the engine.

3.4 Nigerian Factor

This has to do with corruption, selfishness, insincerity, etc. In the contemporary society, Nig**e**rian values like honesty, patriotism, dedication to duty and so on are fast becoming lan**d** unfashionable ideas. This situation constitutes serious constraints to community participation. The community development

officers for example, are expected to visit the various communities regularly and write monthly reports on the various community development projects. The situation today is that community development offers write their reports from their various houses without visiting the communities as expected. In the same vein most of the funds that are meant for various projects in the rural communities end up in various pockets of the government officials at the detriment of grass root development.

4.0 CONCLUSION

Efforts have been made to explain some of the problems of community participation in environmental management and the ways out of the problems highlighted.

5.0 SUMMARY

This unit essentially discussed four of the problems militating against effective community mobilization viz high level of illiteracy, tradition, poverty and Nigerian factor. Solution like provision of Basic education, enlightenment campaign, community empowerment and National reorientation were also discussed.

6.0 TUTOR MARKED ASIGNMENT

1. Discuss some of the problems of effective community mobilization.
2. Suggest possible solutions to the problems of community participation.

7.0 REFERENCES/FURTHER READING

Musa, S.D (2005) Sustainable Grassroots Development: A major challenge of Globalisation in Menegbe, A.D (Ed) The Humanities and Globalisation: The Afr ican Perspective. Aboki Publishers, Makurdi

Tavita, R and Tuaumu, S (2004) Community Participation-becoming environmental stewards. Accessed from:http://www.mnre.gov.gov.ws/documents/forum/2005/6/Rosia%20 &20solia.pdf.

MODULE 5 ORGANIZAT IONAL ROLES IN ENVIRONMENTAL MANAGEMENT

Unit 1 institutions and organizations
Unit 2 non-governemental organizations/ community-based organizations
Unit 3 roles of science and technology in environmental management

UNIT 1 INSTITUTIONS AND ORGANIZATIONS

1.0 INTRODUC TION

The role and relevance of institutions particularly civil society, NGOs/CBOs, FBOs, private sector and environmental institutions in the management of the environment make up this unit. This will help you acquire the basic knowledge require to understand what institution/organization do and how they do them.

2.0 OBJECTIVE

At the end of this unit you should be able to understand

- The organizations involve in environmental management
- The role and relevance in environmental management.

3.0 The Organizations

3.1 Civil Society: The civil society contributes realistic information on the need of any particular programme and on proposed solutions. Civil societies benefit from I increased environmental awareness; from new opportunities for environmental training, education and involvement; from stronger institutional and regulatory frameworks; and from overall improvement of the environment.

3.2 Regional, National and Local Environment al and Social NGOs : NGOs are able to provide expertise; a regional, national or local overviews; and content support as well as organizational and logistic contributions. They benefit from participation in the networking system, from direct involvement in project preparation and implementation at national and local levels, from the increased visibility of environmental issues that are the focus of their

concerns and from financing opportunities for The private sector is able to provide a market-oriented view of the problems and solutions in environmental management. Companies benefit from joint collaborative efforts in dealing with environmental issues and participation, which allows for their perspectives to be integrated in the process.

3.3 Environment al Institutions: Environmental Institutions provide the know-how, research and expertise. They benefit from enhanced opportunities for networking arrangements, from the strengthening of national environmental management organizations and from direct support to specific initiatives.

3.4 Professional Net works: Professional Networks provide vital coordination at the thematic and regional level, and benefit from participation in the preparation and subsequent implementation of activities. They are involved in sharing experiences and exchanging information that enhances their ability to perform their own work and that improves coordination and cooperation at the regional and thematic levels.

3.5 National and Local Government s receive a number of benefits; greater awareness of the interaction between environment and development; better coordination between environmental planning and sectoral ministries and agencies; an enhanced understanding of environmental policy issues and of the requirements for improved environmental management and sustainable human development; greater involvement in regional cooperation and improved awareness of their potential to contribute to and benefit from it. And better access to the donor community. They are also able to identify other on-going initiatives at the national or local level, avoid which s waste or duplication.

3.2 International Organizations provide funding, knowledge and technical support, as well as an avenue to disseminate information and results. They act in response to the demands of the region or country and can facilitate the demands of a region or country and can facilitate the availability of the resources needed to improve environmental management. This allows the organizations to become less involved in day-to-day projects and programmes, and to make a longer-lasing contribution by working through independent development funds that cater to both governments and local organizations in the beneficiary country.

ACTIVITIES

These organizations utilize and convert inputs and resources at their reach to outputs or desire results. The implementation of various environmental management programmes are defined and analysed by these organization with support from both local and

external sources. However nine conditions helping in guiding the achievement of this programme effectively are:-

- Participation has to be seen in the context of well-defined sustainable human development and environmental management objectives that are consistent with societal values.
- Harnessing the required political and public will to change effectively the current visions of problems and the ways to address the issues.
- Participation extends not only to the development of knowledge, know-how and attitude of all stakeholders, but also to the establishment of participatory mechanisms and new organizational for ms leading to good governance.
- Initiated programme should emphasize the broad participation of all stakeholders at different levels.
- Activities should be based on identification of needs that is demand- driven and responsive to continual assessment, as needs change over time.
- Activities should bring about cross-sectoral coordination and the integration of environment and sustainable human development concerns.
- Activities should foster the easy access to and use of information

  Activities should address g ender and ensure that target groups of women gain access to and control over resources and participate fully in decision making.

4.0 CONCLUSION

You have been taken through the various institutions and organizations that are involved in environmental management at the community levels. You have also been taken through their activities.

5.0 SUMMARY

This unit has identified the various institutions and organizations in environmental management such as professional networks, civil societies, NGOs/CBOs and governmental organizations. Their general activities were also explained.

6.0 TUTOR MARKED ASSIGNMENT

1. Explain the role of institutions and organization in environmental management
2. Highlight the conditions that facilitate the success of the activities of the various organizations.

7.0 REFERENCES/FURTHER READING

UNDP(1999) Capacity Building for environmental management: A Best Practice Guide. New York, October 1999.

UNIT 2 NON-GOVERNM ENTAL ORGANIZATION/COMMUNITY BASED ORGANIZATIONS (NGOs/CBOs)

1.0 INTRODUCTION

The role and relevance of institutions or organizations, particularly NGOs/CBOs in

the management of the environment forms the focus of this unit. The unit will you help acquire the basic knowledge you require about what NGOs/CBOs do and they how do them.

2.0 OB JECTIVES

At the end of this unit you should be able to understand

- The meaning of NGOs/CBOs
- The role and relevance of these organizations
- The types of NGOs/CBOs

3.0 Roles of Ngos/Cbos In Environmental Management

Various governments in many countries today are decentralizing their services that have been responsible for promoting sustainable environmental management. Non-Governmental Organizations and Community Based Organizations are being called upon to take lead in providing these services in the short and medium term.

NGOs/CBOs differ in vision, mission and approach to development work, this is by informal th**e** fact that they don t have equal capabilities strength and interest in environmental issues.

Environmental-oriented NGOs/CBOs would provide knowledge of a specific area and suggest numerous possibilities that development can change or impact on its status quo. Such NGOs/CBOs will identify the problem areas of the target community and proceed to contribute to the design, organization and implementation of protective measures. This must be done with the active participation of the local people.

In this way NGO compliments development operations such as measures to control water run-off in irrigation projects, road projects to enhance accessibility, construction of communal or family latrines such as the global recognition of November 20th of every year as world toilet day.

Because of the flexible and independent nature of NGOs/CBOs, they can criticize risky and non-conventional policies of the government either to the entire citizen or a particular community. It is believed that NGOs/CBOs are free from political pressure and as such can challenge inefficient or corrupt government structures or personnel. A close example is the coalition of all NGOs/CBOs working in Benue State (in Nigeria) called BENGO-NET.

BENGO-NET actively participated in the electoral process in the state in 2003 and challenged the results of the election where necessary. The coalition also requested for the yearly budget of the state government, which was initially ignored by the government. But as BENGONET began to enjoy the recognition, support and trust of the people in the stat, gov**e**rnment was forced to yield to their request and with time, began to invite their representatives for input when decision on a policy direction is about to be made.

It is important to point out that government official funding of NGO activities can jeopardize the independence of such NGOs/CBOs.

To properly understand the roles played by NGOs/CBOs in environmental management, it is more appropriate to divide for easier comprehension the NGO community into two
The groups: first group is called relief and welfare, while the second group comprising community development and institutional building NGOs/CBOs are collectively called development NGOs/CBOs.

3.1 Types of NGOs/CBOs

3.1.1 Relief and Welfare NGOs/CBOs

This group came to being as a response to voluntary action to support and give sucor vi**c**tims of to war, drought, poverty, flood etc .

In 1987, 63% of NGOs/CBOs in the USA rely predominantly on material aid (Smith 1987), whereas the measure of resource given to relief and welfare in other countries is quite smaller compared to that of the US.

The current succession of natural and man- made disasters around the world have raised strong emphasis on the role of relief work and has encouraged the influx of NGOs/CBOs in this area. Examples of international relief NGOs/CBOs are the Red Cross, Brand Action, Action Aid etc.

3.1.2 Development Ngos/Cbos

The difference between these groups and that mentioned above is that development NGOs/CBOs design or initiate long-term measures on change. They achieve this by building the capacity of local peop le for sustainable development and becoming better managers of their own destiny.

In their traditional way of providing technical assistance, participation to NGOs/CBOs meant involving the beneficiaries in the planning, implementation and evaluation of projects the wit **h**ope of enjoying community acceptance and the target communities making good use of resources and new technologies transferred to them. It is expected that increase in participation will translate to increase in wider coverage and proper use of available resources.
NGOs/CBOs play a major role in community mobilization in environmental management. Community mobilization is the effort by a group, particularly NGOs/CBOs to encourage ormotivate people to participate in their programme activities NGO s first-step to achieving community mobilization programmes is to identify community leader s so as to establish a solid relationship between the NGO and the community. Next is to identify the peop le s primary priority or problems and collectively decide what reinforcement strategy is most appropriate. Usually, issues concer ning sanitation provision are not considered a priority in disaster-affected communities. However, related issues such as food, water and health care are regarded as immediate needs. This is obviously due to a failure to link sanitation with health.

Communities can also be mobilized and their awareness raised on the sensitivity and importance of hygiene promotion.

As earlier mentioned, NGOs/CBOs are responsible for capacity building at community level in order to develop their skills and also boost their confidence.

3.2 characteristics of CBOS

(a) Reside within the target community and have local jurisdiction They are accountable to community members and the membership of the organization.
(b) They are actively engaged in community development work.

4.0 CONCLUSION

You have been taken through the meaning, role and relevance of non Governmental organizations. The types of NGOs/CBOs have also been explained in this unit.

You should be able to clearly explain what NGOs/CBOs are and how they their carryout various operations.

5.0 SUMMARY

This unit has defined the operations of NGOs/CBOs particularly as far as environmental issues are concerned, how they serve as pressure group and influence certain government programmes and policies. The two types of NGOs/CBOs the Relief and Welfare and the Development NGOs/CBOs, were also explained.

6.0 TUTOR MARKED ASIGNMENT

1. Explain the role and relevance of the NGOs/CBOs in the society.
2. Discuss the two major divisions of the NGO community.

7.0 REFERENCES/FURTHER READING

Edwards, M (1996) NGO Performance- What B reeds Success? A study of approaches t o work in South Asia. SARO Briefing Paper No. 3 Kathmandu

UNDP(1999) Capacity Building for Environmental Management - A Best Practice Guide. New York.

UNIT 3 ROLE OF SCIENCE AND TECHNOLOGY IN ENVIRONMENTAL MANAGEMENT.

1.0 INTRODUC TION

This unit will expose you to the roles science and technology p lay in manage environ**ment**al how these roles are carried out and the medium through which they are executed.

2.0 OB JECTIVES

After studying this unit, you should be able to

- Explain the role of science and technology in environmental management
- Define remote sensing and its applications
- Define GIS and its components
- Discuss the specific contributions of science and technology tools in environmental management.

3.0 MAIN CONTENT

3.1 Science and Technology in Environmental Management

The role of science and technology in advancing the Global Earth Observation System of Systems .Because scientific and technological knowledge and research are so vital to our understanding of the global integrated Earth system, this document seeks to sensitize potential partners and relevant funding agencies to the important relationships between GEOSS and science and technology and the many societal benefits that GEOSS can provide. The beneficial result of many years of international investments that produced increases in (i) quantity, quality and communication of observations; (ii) research and understanding of atmospheric circulation including its interactions with the ocean and land; (iii) data assimilation methodologies; and (iv) computer capability and capacity

Global Earth observation activities are multidisciplinary and of benefit to several societal benefit areas. Scientific communities that are well established can help other communities emerge and develop.

A number of Earth observation activities address new topics or promote new approaches to outstanding issues. These activities should support the development of Earth observation systems and

related systems in areas of research where observing, monitoring and modeling systems are lacking or need to be improved

3.2. Identification of science and technological tools in environmental management.

a. REMOTE SENSING

Remote sensing can be defined as the collection of data about an object from a distance. Humans and many other types of animals accomplish this task with aid of eyes or by the sense of smell or hearing. Geographer use the techniques of remote s**e**nsing to monitor or measure phenomena found in the Earth s lithosphere, biosphere, hydrosphere, and atmosphere. Remote sensing of the environment by geographers is usually done with the help of mechanical devices known as remote sensors. These gadgets have a greatly improved ability to receive and record information about an object without any physical contact. Often, these sensors are positioned away from the object of interest by using helicopters, planes, and satellites. Most sensing devices record information about an object by measuring an object s transmission of electromagnetic energy from reflecting and radiating surfaces.

Remote sensing imagery has many applications in mapping land-use and cover, agriculture, soils mapping, forestry, city planning,. Archaeological investigations, military observation, and geomorphological surveying, among other uses. For example, foresters uses aerial photographs for preparing forest cover maps, locating possible access roads, and measuring quantities of trees harvested. Specialized photography using colour infrared film has also been used to detect disease and insect damage in forest trees.

The simplest form of remote sensing uses photographic cameras to record information from visible or near infrared wavelength

b. GEOGRAPHIC INFORM ATION SYSTEMS The advent of cheap and powerful computers over the last few decades has allowed for the development of softwre innov**a**tive applications for the storage, analysis, and display of geographic data. Many of these applications belong to a group of software known as Geographic Information Systems (GIS). The activities normally carried out on a GIS include:

- The measurement of natural and human made phenomena and processes from a spatial perspective. These measurements emphasize three types of properties commonly associated with these types of systems: elements. attributes and relationships.
- The storage of measurements in digital form in a computer database. These measurements are often linked to features on a dig ital map. The features can be of three types: points, lines, or areas (polygons).
- The analysis of collected measurements to produce more data and to discover new relationships by numerically manipulating and modeling different pieces of data.
- The depiction of the measured or analyzed data in some type of display maps, graphs, lists, or SUMMARY statistics.

COMPONENT OF GIS

A geographic Information System combines computer cartography with a database management system. GIS consists of three subsystems: (1) an input system that allows the for collection of data to be used and analyzed for some purpose; (2) computer hardware and software systems that store the data, allow for data management and analysis, and can be used to display data manipulations on a computer monitor; (3) an output system that generates hard copy map s, images and other types of output.

Two basic types of data are normally entered into a GIS. The first type of data real consists world of phenomena and features that have some kind of spatial dimension. Usually, data these elements are depicted mathematically in the GIS as either points, lines, or polygons that are referenced geographically (or geocoded) to some type of coordinate system. This type data is entered into the GIS by devices like scanners, digitizers, GPS, air photos, and satellite imagery. The other type of data is sometimes referred to as an attribute. Attributes are pieces of data that are connected or related to the points, lines, or polygons mapped in the GIS. This attribute data can be analyzed to determine patterns of importance. Attribute data is entered dir**e**ctly into a database where it is associated with element data.

3.3 Importance of Science and Technological Tools In Environmental Management

3.3.1 Better understanding of environment al process

In order to achieve the goals of GEOSS, formulated through societal benefit this ar**e**as, contribution of global Earth observations can only materialize through an understanding of

the physical, chemical, biological, and ecosystem processes going on above, on and inside the Earth s surface. This is a task for the scientific community and need s comprehensive Earth observation technologies. Every application of Earth observation that has been developed builds on such a scientific understanding. This understanding is what links the observations, both from space and in-situ, to models of how the global integrated Earth system works. This linking of observations and models to provide quantitative estimates and predications is a major task for the scientific community. It is also important to realize that this is usually a continuous process, where further scientific understanding in turn will further improve the applications. It is therefore essential that the scientific community be continuously involved in the improvement of existing applications.

3.3.2 Connecting disciplines and addressing complex issues

The social benefit areas typically require a cross-cutting scientific approach, building on information from a number of disciplines and data from different sources. The scientific community needs to address these multidisciplinary questions, where scientists from different fields must collaborate. It necessitates the involvement of scientists from relevant disciplines of both natural and socioeconomic sciences.

3.3.3 Developing models in order to provide forecasting capabilities.

The scientific understanding needs to be formulated to a large degree through models. These models are simplified simulations (approximations) to the actual processes and from the basis for testing the actual scientific understanding and for also developing forecasting capabilities. An essential p art of these models is how they make use of the observational data available. The scientific community has been developing more and more sophisticated (high-resolution) models and data assimilation techniques. This needs to be done for large sets of data from sources and with highly varying time and spatial scales. Traditionally these have models been addressing only a part of the global integrated Earth system, where the surrounding environment has been defined through some suitable boundary conditions.

3.3.4 Developing New Observation And Measurement Techniques

The scientific community has been creative in inventing new observation and measurement techniques. This requires a close

cooperation between the scientific agenda and technology development. An integrated approach to the development of new Earth observations that includes surface-based networks, systematic aircraft as well as satellites is needed. Within Earth observation from space, techniques like synthetic aperture radar (SAR) inter ferometry (InSAR). Altimetry and gravimetry are examples of techniques that have been able to facilitate applications of global Earth observation previously not considered possible.

3.3.5 Linking Observations Across Societal Benefit Areas

A major role of is to promote scientific connections between the observation systems that constitute the system of systems. Thus GEOSS will enhance the value of the observation from an individual component system by extending the application data across societal benefit areas. Such interactions should also promote the introduction of new scientific techniques and technologies in the component observing systems.

3.3.6 Identify Gaps in Observations, Research and Development

Through the definition of its overall goals, GEOSS emphasizes the need for increased scientific understanding to develop the necessary applications. By considering the application of observations across all the societal benefit areas, it should help identify gaps as well as overlap s in the observing systems in order to achieve an daoptimizd base in technical operational and funding terms..

3.3.7 Improve Access and Harmonization of In-Situ Data

Through GEOSS and its integrated observing components, the scientific community should have easy access to and make optimal use of data from different sources. In particular, the in-situ, aircraft and satellite observations are highly diverse, not necessarily standardized in terms of formats, etc and sometimes difficult to access. GEOSS will invest substantial efforts in data harmonization and better access.

3.3.8 Bridge Gaps between Science and Application

GEOSS has the potential to bridge gaps between the societal benefits relevant applications and the necessary scientific developments.

4.0 CONCLUSION

The capabilities of science and technology to effectively manage the environment using some peculiars tools have been addressed..

5.0 SUMMARY

This unit has explained the role of Science and Technology in environmental management particularly using Remote sensing and GIS. Also specific contributions of the RS and GIS tools in various areas of environmental management were explained.

6.0 TUTOR- MARKED ASSIGNMENTS

- Discuss the role of science and technology in environmental management
- Discuss the relevance of any two scientific technological tools in environmental management

7.0 REFERENCES/FURTHER READING

Foote, K.E and Lynch, M (2000) Geographic Information Systems as an Integrating Technology: Context, Concepts and Definitions. The Geographers Craft Project, University of Colorado, Boulder. www.colorado.edu/geography/gcraft/notes/intro.html