INVOLVING THE PEOPLE IN LAKE MANAGEMENT: VALUES, EDUCATION AND PARTICIPATION

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TABLE OF CONTENTS

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I.   Introduction

The purpose of this Chapter is to discuss the issue of involvement of the people in the management of lakes: values, education and participation.

I.1.   Importance of Lakes and Wetlands

Water is life. Clean water is indispensable for all living beings. In many regions of the world, the supply of drinking water depends on healthy lakes. Lakes and wetlands are among the world's most important yet threatened ecosystems. They are a precious part of our cultural and natural heritage, providing a rich resource for many human interests and activities, as well as being habitats that support a vast diversity of animal and plant life. Lakes and wetlands store rainfall, subsequently releasing water gradually into the ecosystem. They improve the water quality by storing nutrients and toxic substances in their plants and sediments. They are a source of renewable resources, such as reeds for construction, fish for human consumption and pasture for grazing livestock. They are also important for leisure activities. Above all, they are an essential source of freshwater for communities both on the lakeside and beyond. For these reasons, it is imperative that everything possible should be done to manage lake resources in a sustainable manner for the present generation and for posterity.

Sustainable lake management requires involvement of the people at all levels. The bio-physical world forms the basis for economic and social development, and there are numerous interactions between political, economic, social and bio-physical dimensions. Environmental issues have historical, political, economic, cultural and other social dimensions; they affect the bio-physical world but also the social systems, which depend on them. Implicit fact is that people's personal lives are affected by environmental issues in many, often hidden, ways.

I.2   Water Issues in the Global Scenario

Water once revered for its life-giving prosperities, has become a commodity. Water is not just a basic human need. It is also a basic need for the management, restoration and enhancement of ecosystems, which people and their cultures, though ecologically dominant, are just one component. Especially important is the management and restoration of wetlands, which are at risk throughout the world. It is often taken for granted and continuously and routinely exploited. Human use of water throughout the world has led to dried up and polluted rivers, lakes and groundwater resources. Portable water is becoming increasingly scarce. It is also predicted that water abstractions will increase by 50% in developing countries and 18% in developed countries by the year 2025.

Though a dynamic resource, water is a finite one. Only 3% of water on Earth is drinkable, portable fresh water. That means 97% is not fresh for consumption, and of this 90% is salty seawater. Water is also unevenly distributed around the world. With 60% of the world

population, Asia, for example has only 36% of global runoff, while South America with 6% of the world's people has 26% of the world's runoff (Postel, 1996:10) Even more glaring in the Amazon's contribution of 20% global runoff while in Africa, the Congo river contributes 30% of the continent's total runoff (Gleick, 1993:4) It was further reported at the 2000 Stockholm Water Symposium that:

> 'One third of the world's population lives in countries with some level of water stress, a number that could increase to two thirds by the year 2025. Twenty percent of the world's population in 30 countries faces water shortage, a figure that could rise to 30% of the world's population in 50 countries by 2025. One thousand freshwater fish species – and 1000 bird species – have been pushed to the edge of extinction by contamination of water…. An unacceptably large portion of world population – one person does not have access to safe and sufficient sanitation. Each year at least 3-4 million people die of water-borne diseases, including more than 2 million children'.

While emphasizing the finite nature of global supply of fresh water, experts also emphasize that rapid in creases in use since the end of the Second World War are not sustainable. World wide demand for water is said to be approaching limits of renewable supply. The gap between the global and demand and supply of water is rapidly closing. Available water resources per person globally have been on a sharp decline over the past four decades. Significant variations exist among regions and countries that generally reflect the asymmetry of population growth impacts.

Growth in human members globally has affected demand for water because the immediate biological needs humans has for water because of increased demands for food and other economic goods and services, which require water for production. To meet the demand for increased services and goods have been significant increases in cultivation of food and non-food products under rain fed irrigation conditions. This has led to an increase of the rate of abstraction of ground and surface water resources. Moreover, with the rate of abstraction of ground and surface water resources. Moreover, with urbanization an increasing. number of households are added to the network of potable water reticulation service leading to a significant expansion in domestic water use. Demand for water for non-agricultural purposes has also seen significant growth in the commercial and services sector.

The rise in demand for water leads to large quantities of water being abstracted as mentioned above. Also large amounts of waste and affluent discharge are being generated and disposed of into watercourses. Pollution reduces the amount of water suitable for use by degrading its quality. This leads to either total withdrawal or loss of water useable or creates the need for extra resources to be invested in clean up treatment to recover water purity.

The importance of water to humans and for development in the world particularly in Africa cannot be overemphasized. This means Africa, in order to meet its increasing water demands, needs to adopt integrated water management backed by vigorous water conservation programs at all levels and types of education.

As population increase, the sustainability of human use of water ultimately depends on people adapting their behavior to the water cycle. Human societies manage their uses of land, as well as water, in an integrated, comprehensive manner, in ways that maintain the quality and quantity of water suppliers both for people and for ecosystems that support them (Moyo, 1997:138)

These factors give lakes and wetlands their value, which are listed below.

I.3.   Values of lakes and wetlands:

1)   *Aesthetic value*:   the awesome beauty of the lakes – nature's creation
2)   *Recreational value*:   a place to have leisure, sporting and relaxation activities
3)   *Scientific value*:   a fertile ground for research on nature's gifts
4)   *Educational value*:   a place for educational purposes on wonders of nature
5)   *Ecological value*:   an area for biodiversity conservation and medicinal plants
6)   *Economic value*:   provide economic resources such as fishes for humans
7)   *Ritualistic value*:   an area for ritualistic activities, such as places of worship

In order to manage and conserve lakes sustainably, we must take into account the above values. Of fundamental importance is the fact that sustainable management of the lakes involves close interactions between humans and the lakes, and between humans and other humans. However, individual humans themselves must also have their own values which govern their interactions with other humans. There are 12 higher human values which are fundamental to the well-being of humanity as a whole. These are described below

II: THE CORE LIVING VALUES:

II.1.   The Core Values Described
The 12 higher values mentioned above are hereby described as Cooperation, Freedom, Happiness, Honesty, Humility, Love, Peace, Respect, Responsibility, Simplicity, Tolerance, and Unity – are core values fundamental to the well being of humanity as a whole. They will touch the core of the individual, perhaps inspiring positive change, which can contribute to world transformation. The World will automatically become a better place when each individual becomes a better person.

The Principle and Philosophy of value-based education is to address the universal aspects of Spiritual and Moral Values as a basis for living one's life. The value statements are designed to encourage the learner to think about, reflect on, understand, realize, assimilate and practice the 12 core values.

1)   Cooperation: It is based on faith, love, trust and understanding. It is not a bargaining game in which one person's success is achieved at the expense of another's. Real cooperation takes place when there are good wishes and pure feelings for each other. The highest cooperation is to partake of God's task; and in return He will cooperate with you forever.

2)   Freedom: Freedom stress in the mind. Understanding the self is the key to freedom. The more one understands the self, the earlier it is opt be liberated from waste. Freedom is to experience the true essence of one's being – and that is peace.

3)   Happiness: There is happiness when each moment is used in a worthwhile way. Happiness is such nourishment that it can transform a person from weak to powerful. It makes difficult things easy, heavy things light. To remain happy and share happiness with others is the greatest act of charity. No matter what happens, your happiness should not be lost
.

4)   Honesty: Speak with honesty and you will get a chance to learn. The one who is honest will speak about themselves first, not about others. Others won't get impressed by your words, or even by your face, but by your honesty nod truth. To speak that which you think and to do that which you speak is honesty.

5)   Humility: Humility is dedication to the extent that no acknowledgment is sought for the self. Humility allows you to learn. There is great strength in humility. It never holds on to anyone for support. Everyone bows down to those who bow down first. Humility is not subservience but greatness. It is visible when there is love. Have love for humility. It helps you to remain happy.

6)   Love: Where there is love, there is a world. Love looks on all with a vision of equality. Love is all giving without any thought of a return. A heart that has love is able to accommodate the whole universe and still has space for more. Selfless love is truly unlimited, it forgets and forgives the weakness and sees only beauty and specialties in everyone.

7)   Peace: Peace is the original quality of the self. In its purest form, peace is inner silence. It consists of positive thoughts, pure feelings, and good wishes. To have peace you need patience. When you art peaceful, you create an atmosphere of peace. Peace in the world can only be realized when there is peace in the minds of man.

8)   Respect: True respect is valuing one's own existence and the existence of others. It is not connected to a person's role, social position, nor his capacities or talents. It is the awareness that everyone has value. Everyone is unique. When there is respect, there is understanding, giving and taking on the basis of love. Only when you give respect do you earn the respect of others.

9)   Responsibility: The world's stage and we are all actors. Each actor plays a unique part and He is responsible for his own actions. Responsibility means playing out part accurately no matter what the task may be. Each one of us has a huge part in creating a better world. Just respond to the abilities within you and become responsible.

10)   Simplicity: Simplicity is identifying and being comfortable with those elaborate circumstances, which shape our lives without worrying or making matters complicated. It requires facing any complexity with a plain and simple mind. Simplicity starts with the self and overflows to everything else around us. A life lived in simplicity is a satisfying live which inspires everyone yet possessed by one.

11)   Tolerance: When there is tolerance, you are able to remain quiet and happy inside. One who has tolerance has the power to accept and accommodate all situations. Only when you are content internally can there be tolerance. When you are content, then just like a mother who has love for her child. There is no limit to tolerance.

12)   Unity: Unity is harmony within and amongst individuals. It is built from a shared vision for the common good. Unity is appreciating the values of each individual and their unique contributions. When there is the willingness within the self to accommodate others, unity blossoms. When I take the first step to mend fences, others will also change.

II.2.   Global Vision of Value-Based Lake Management Education: Building a better world through Education

The Global vision for Value-Based Lake Management Education is built around a few major objectives including:

- To ensure that people live in ways that preserve nature's ecological balance in an environment that is beautiful and clean;

- To ensure that he planet's natural and abundant resources are shared equitably and the basic human needs of all people are provided for;
- To ensure that all people have equal opportunities to realize their potential through an educational process that has human, moral and spiritual values at its heart.

- To ensure that life within the immediate family is living, caring and fulfilling and is the foundation for harmony within the broader human family;
- To ensure that there is respect, understanding and tolerance in al human relations;
- To ensure that people communicate openly and in a spirit of equality and goodwill;
- To ensure that social, economic and political injustice is ensured through honesty, responsibility and respect for the rule of law;
- To ensure that Government, as representatives of their people, are committed to their well-being;
- People participate cooperatively in efforts for a secure and peaceful world;
- To ensure that Science serves humanity and appropriate technology is applied to ensure sustainable development and enhance the quality of life.
- To ensure that all people enjoy freedom of expression, movement and belief while respecting the liberties and rights of others.
- To ensure that all people celebrate the joy of life;
- To ensure that Human Rights are respected and upheld and the dignity and integrity of all people is assured;
- In conclusion, the introduction of value-based education is unquestionably the most sustainable approach to complete citizenship building.

The development, promotion and implementation of a Value-Based Education responsive curriculum, curricula material and pedagogical process is likely to bring about positive change and constructive attitude toward all aspects of national development including water management, utilization and conservation. This new curriculum when applied in any form of educational process including Formal, Non-Formal and Informal Education would produce five (5) types of competencies:

- o Technical Competence in the sense of technical and technological know how and productive knowledge and skills which we acquire through types of learning.
- o Social Competence in the sense of our ability to live, work and collaborate with each other and together as socialized human beings.
- o Cultural Competence in the sense of our level of understanding and capacity to identify with a given cultural context with respect to values system, language etc.
- o Moral Competence in the sense of our level of integrity, honesty and self-respect.
- o Spiritual Competence as the foundation of humility in our daily interaction with society and nature.

Matrix of Value-Based Management Approaches, Underlying Human Values and Teaching Techniques

Some Key Water Management Issues	Value-Based Dilemma	Value Based Solution	Underlying Human Values
1 A social issue Lack of safe water and basic sanitation facilities could be life-threatening to all-poor and rich alike. How could water and sanitation be made accessible and affordable to the poor in the cities?	Am I willing to share the cost of providing water to the poor in the slums? This may mean that I will have to pay a higher price for water than I do today.	Yes, I care for my poor neighbour. I am ready to pay a higher price for water when I am convinced with will help extending water supply to poor neighbourhoods. I will afford it by cutting down my Entertainment expenses.	-LOVE: Caring for and Sharing with others. -RIGHT CONDUCT: Self – sacrifice; Respect for others; Service to others
2 Another social issue How to deal with corruption in Management Issues Daily life which ultimately affects sustainability of services in cities	Should I pay the high water bills every month or make a deal with the meter reader who offers to under-read it or tamper with it so that I can pay a flat rate that will be less costly to me.	Yes I will pay for the actual cost of water I consume. If I follow Unscrupulous means, this will set a Bad example for my children, whom I want to see grow up as responsible Citizens	TRUTH: Truthfulness RIGHT CONDUCT: Honesty PEACE: Integrity Self-respect
3 A conservation issue How to deal with profligate wastage of water in households	Should I stop watering my gardens and washing my cars during summer months when scarcity of water affects the city? I can afford the water bill and I want my garden to be green and my car to shine even if it may mean less water available to others	Yes, I should take every opportunity to conserve water, even if it means a little inconvenience to me and even so I can afford a higher water bill. Water is a gift of God but it is given in trust to us. While we enjoy this Gift, we have no right to waste this Precious resource.	RIGHT CONDUCT: Proper utilization of resources. -PEACE: Self discipline -NON VIOLENCE Awareness of responsibility Toward common good -Readiness to co-operate -Fellow feeling -Sense of social justice
4 An economic governance issue How to promote the concept of water as	We are told that water is a gift of God. Then	Yes I have an obligation to pay for	-RIGHT CONDUCT

a social and economic good?	why are we asked to pay for water? Water in the river and in the wells, after all, belongs to everybody and should be freely available to all.	water I consume. Water is a limited resource, to be shared by many users. Each must pay according to his need and ability, to cover the cost of Supply. Nothing is absolutely free in nature.	Respect for others needs NON-VIOLENCE Awareness of responsibility Toward common good -Readiness to co-operate -Fellow feeling -Sense of social justice

III.   Perceptions on "Environment" and the Nature of Environmental Issues

III.1   Defining the concept of environment

People define 'environment' differently based on the perspectives they hold. Our conceptualization is that 'environment' is a social construct, to which we give diverse meanings based on our vantage points. It symbolizes interacting social and ecological processes. The bio-physical world forms the basis for economic and social development, and there are numerous interactions between political, economic, social and bio-physical dimensions.

To avoid the 'environment' is anything and everything, our suggestion is to develop a framework for understanding 'environment' which takes as its departure point a critical understanding of environmental issues. Environmental issues have historical, political, economic, cultural and other social dimensions; they affect the bio-physical world but also the social systems, which depend on them. Implicit is that people's personal lives are affected by environmental issues in many, often hidden – ways.

III. 2. Perspectives on Lake Management Education

Impressive progress has been made during recent years in arousing widespread awareness on environmental issues. Awareness leads to analysis of problems, identification of solutions and thus to appropriate action.

A significant development is the growth of regional cooperation among organizations of countries in the Southern Africa, Southeast Asia and South Asia. There are a growing number of instruments for concerted action at sub-national, national, regional and global levels. These could become powerful instruments in meeting such challenges as land degradation, water pollution, species extinction, acid rain, ozone depletion, carbon dioxide build-up, disposal of toxic and nuclear wastes and help focus attention on methods of promoting sustainable livelihood security for the poor, and thereby arrest the influx of environmental refugees into towns and cities.

Mrs. Gro Harlem Brundtland, then Prime Minister of Norway and Chairman of WCED, reminded us "more people will be added to the planet in the next few years. She emphasized the need for "new concepts of management that both preserve the essential sovereignty of the

individual, his culture, community and nation, and permit the degree of management at the regional and global level needed to guide our common destiny on our one earth".

Promotion of grassroots-level people's associations for sustainable development is essential. This promotion will need the support of three major groups. The first is government. National and where appropriate, provincial governments will have to develop incentives and disincentives to promote conservation-based development.
Secondly, the mass media will play a key role in promoting the proper use of national assets and preventing their abuse. Thirdly, and most importantly, the public will have to be the principal agents for effective promotion of the development.

Unfortunately, grassroots-level people's associations which help to mobilize community activities in the sustainable use of land and water, in the conservation of flora and fauna and in the prevention of atmosphere and terrestrial pollution, do not exist in most countries. In most developed and in some developing countries, non-governmental organizations perform those tasks with varying degrees of success. However, NGOs tend to remain unique organizations with specific limited functions and thus do not become universal. This is why we should take steps to promote associations for sustainable development at the village level in each country.

Schools, Colleges and universities should take the lead in spearheading this movement. In most developing countries, youth below the age of 21 years constitute over 50% of the population. The future not only belongs to them but also depends on them. Therefore, starting with the village school, educational institutions can become the meeting places for these associations for sustainable development. The agenda for debate and decision in their meetings could include such items as

(i)   Promoting a symphonic system of agriculture, which would lead to a continuous improvement in productivity without harming long-term land and water production potential.
(ii)   Meeting village fuel wood and fodder requirements
(iii)   Providing safe drinking water for all.
(iv)   Upgrading degraded lands.
(v)   Ensuring the livelihood security of village people who do not own land, livestock, trees and other assets.

Village-level associations can join to form provincial and national federations. National federations for sustainable development could in turn assemble to form a global federation that might meet every five years for a progress review.

III.3.   Application of the above Perspectives to the Management of World Lakes

More broadly, lake regions must be seen and understood in terms of numerous competing socio-economic, political and environmental characteristics and issues. All who live in the regions are stewards of a finite resource that must be managed sustainably. In a certain sense, the residents are also participants, directly or indirectly, in a very large scale institutional experiment reconciling economic and geo-political boundaries with hydrologic ones. Though the experiment

began little more than a century ago, the successes and failures in governance and resource management that are learned in the regions will likely have global applications.

III.4. Develop a clear, coherent and consensus-based understanding of "sustainability."

As a concept, "sustainability" provides a point of reference for many decision makers in the lakes. While the broad definition provided by the Bruntland Commission is instructive, a coherent understanding is lacking which compromises its applicability and usefulness. A consensus-based working definition is needed to inform management and policy processes.

IV. INDIGENOUS KNOWLEDGE FOR LAKE MANAGEMENT AND ENVIRONMENTAL EDUCATION PROCESSES

IV.1. Significance of indigenous knowledge in lake management

Water education should not be about water in isolation but about water and its significance to people and biodiversity referred to by Pike, Selby & Greig (1987:30) as the 'permeability of boundaries'. Water should also be a resource that can be used to challenge our thinking about education.

The themes focused upon on this section centers on the contests and shifts within ideas around indigenous knowledge. A major part of the discussion is given to sharing views on the role of indigenous knowledge in environmental education through the following subsections; status and identity, history and future, values, teaching methodology, collapsing barriers between the school and home, a moral voice for conservation and institutional mediation.

IV.2. Status and Identity

In his exploration of power/knowledge in teaching and research Popkewitz (1991:15) advises that we do not lose sight of "the relational and social embeddedness of knowledge in the practices and issues of power, especially within the school context, and in the process paints a picture of how perceptions around practices that relate to indigenous knowledge pushed indigenous knowledge into the margins. In the statement I quote here Bauman was referring to the process of nation and state building, which led to modernization. He wrote that:

Diverse communally sustained group memories were suppressed and supplanted by a unified curriculum, aimed at the preservation of the 'shared national heritage'.

Communal traditions, customs, festivals, rituals were redefined as residues of ignorance and prejudice and replaced with a uniform calendar of national festivities and authoritatively set 'national usages', or wrenched from communal administration and then adapted and invested with new global meaning (Bauman 1995:235)

By opening up the indigenous knowledge debate these suppressed group memories can be explored not as 'residues of ignorance and prejudice', but with an aim of giving them respect and 'local meaning' and encouraging them to talk to our contexts through open curricula.

According to Semali's observation, based on experience of education in Africa (1996:15):

African students are immersed from birth in a cultural setting that values the authority of elders and emphasizes practical knowledge. On the other hand, they are schooled in a system in which teachers do little to make classroom lessons relevant to life in African village communities, and in which the authority of elders is devalued and undermined.

The picture that Semali paints of African education is true to a certain extent. Two of the community elders pointed out that schools devalue their knowledge, while one of the teachers maintained that though the elderly have a role in education their involvement within the school should be minimal. The interviewed students, teachers and elderly community members lamented the loss of 'respect'. On one hand, respect was the vehicle for 'casting' students into certain identities which were central to promote an educational system that upholds the notion of students as receivers of knowledge. According to Giddens (1992:85);

Life-planning presupposes a specific mode of organising time because the reflexive construction of self-identity depend as much on preparing for the future as on interpreting the past, although the 'reworking' of past events is certainly always important in the process.

IV.3. Contests and Shifts around Indigenous Knowledge

Indigenous knowledge may be seen as a shifting, complex, and contested social construct. One may see indigenous knowledge as "a way of life and different from school education in that school educators use school as a platform from which they can claim their uncontested knowing". Others contend that "all knowledge is indigenous" and that the new focus on indigenous knowledge as a concern transforms indigenous knowledge into "privileged knowledge was "radically challenging myths, fables, stories that are fragmented and varied". According to O'Donoghue, most writings about indigenous knowledge present many conceptual weaknesses and contradictions. His views are summarized by Tick (1996:12) as:

- Distinguishing 'indigenous' and 'western' as two types of knowledge is not only potentially ridiculous, but also counterproductive for those who believe that indigenous knowledge has a contribution to make to sustainable development.
- There is actually nothing new about the rhetoric and practice of indigenous knowledge.
- The strategy of archiving indigenous knowledge runs counter to the very concept of indigenous knowledge

Numerous responses from proponents of indigenous knowledge followed and these are the key points that emerged:

- Any type of knowledge is a process of trying to understand our environment,

- There are many problems that arise in the contrasting or equating of indigenous knowledge with either scientific or western knowledge,
- Indigenous knowledge is practical knowledge
- Knowledge making is an on going creative process,
- The complexities in the defining of indigenous knowledge are evident in earlier debates,
- Indigenous knowledge is multi-faceted

The recognition of indigenous knowledge as a multifaceted concept suggests that it is a personal construct, which cannot be encapsulated by one definition. The views expressed here are all important and not only central to the explaining of issues around indigenous knowledge as practical knowledge. This argument is in line with environmental education theoretical debates that challenge the dominant belief in the 'written word' as authority or what we see as final (Lather 1991). It could be this practical side of indigenous knowledge that has contributed, at times, to the promotion of indigenous knowledge as the panacea for all developmental projects e.g. Campfire (see Sibanda 1999). This notion could push indigenous knowledge further into the margins, if such developmental projects fail to deliver the expected economic benefits.

IV.4.   Source of Indigenous Knowledge

Central to the indigenous knowledge debate are the characteristics of an indigenous knowledge source have already shaped, and continue shaping, education, particularly now when scientists are challenged to look beyond the confines of their laboratories for medical solutions to environmental health problems. They are shared with readers, so that they are able to refine them for the development of process models, which might shed light to clearer understandings about/ for indigenous knowledge.

Agrawal (1999:5) in his exploration of indigenous knowledge acknowledges earlier anthropologists, such as Levi-Strauss etc., as proponents of indigenous knowledge, as their writings form par t of the wealth of indigenous knowledge. He advises (1995:3-5) that we tread carefully and critically in dealing with all issues related to indigenous knowledge, especially if we lack clarity on the motives behind the resurgence and opening up of the indigenous knowledge debate promoted by the like of Levi-Strauss, Levi-Bruhl, Malinowski, Boas, and other anthropologists. Such exclusive debates have evolved to be inclusive of the so called 'indigenous'.

Another view that I encountered, shared by some researchers, is that of a new and developing pattern of indigenous knowledge appropriation, which has been influenced by global donor funding agencies, which encourage the idea of 'indigenous people' as the repositories of indigenous knowledge. This appropriation, evidenced by varied investigations and recordings especially within the medical and botanical field, developed as a result of an intensifying global concern for the deteriorating environment acce3lerated by industrial growth. Development agencies have immersed themselves within this appropriating of knowledge process for the sake of the indigenous and/or the environment, while researchers define appropriate language, approaches and process models accompanied by terms such as; top-down, participation, participatory learning activities, facilitation, community based natural resource management (CBNRM) perm culture, etc. This development discourse has, in turn, influenced ways of doing

research, teaching and learning, hence we hear of participatory action research, education for the environment etc., which increase researchers' interest in this knowledge context. Tooling of local communities to understand and investigate their issues such as those related to water has indicated that some communities find themselves with such tools while significantly struggling to have access to water. Research findings are also sometimes documented in databases for communities with no computers.

These are issues that environmental education planners, such as curriculum developers, textbook writers and resource developers and teachers need to consider. The issues of how students would relate to programs that draw on or highlight indigenous knowledge could either be met with rejection or be romanticized and idolized, especially if a particular group of students is considered as a source. This could lead to the popularizing of an abstracted, reified concept of indigenous knowledge rather than that of knowledge in flux.

IV.5.   Reification of Indigenous Knowledge

'Reification' as a concept, especially with regard to indigenous knowledge, need not only be seen in a negative light because it has facilitated new and refreshing debate about education. If the talk around indigenous knowledge had encouraged us to look into 'uncharted waters' with different lenses then it has relevance. Socially critical theory within environmental education provides the tools and encouragement for venturing into these 'uncharted waters' by encouraging us to break through the barriers that have blinded us from seeing beneath the assumptions (Fien 1993a & b). Reification gives people the feeling of tangibility which social critical theory challenges. Process sociology reminds us 'flux', which allows us to see the conceptual mobility that we rob phenomena of through reification.

In the artificial opposition camps that have been created between indigenous versus 'non indigenous institutional knowledge' is a constant bubbling of knowledge, which if engaged with without intentions of isolation, through documentation, systematic storage in databases and international archives could freeze into disuse (Cites, database systems). By indigenous knowledge being local and implicated in peoples lives, lives its dynamism and the right for people to make informed choices which come with breaking the barriers between the camps.

According to Agrawal (1995), in the past indigenous knowledge was formerly perceived as detrimental to development, yet suddenly it has been 'reborn' to emerge as the pivot of sustainable resource use. Inquiries on the need for the refocus on indigenous knowledge might also lead us toward more answers to some of the broader questions that relate to sustainable living. Agrawal suggests that perhaps we need to look closely at facilitating in situ. Conservation of knowledge by loosening the pressures of modernization and cultural homogenization aimed at international trade systems, which threaten environmentally benign lifestyles. Environmental education has a crucial role to play in this by opening up a window and providing powerful lenses for looking into the terrain of global commodified culture built on competitive resource use which is transforming indigenous knowledge into consumptive knowledge. However, socially critical theory views as presented by Fien (1993a & b) seek to empower environmental education practitioners to move beyond a state of action paralysis and respond with action first

by critically examining the undercurrents beneath these issues. Hence, the debating of a role indigenous knowledge within environmental education processes.

IV.6. Role of Indigenous Knowledge

Semali (1996:15), who is informed by her teaching experience in Tanzania, is of the view that "The rhetoric' of indigenous knowledge is important, because it encourages a discussion that has been suppressed for many years by dominant European centred educational systems", a view I support. The crucial role of the rhetoric according to her is to stimulate and facilitate the transformation of school curricula. Semali's views encourage one to explore, through research questions related to the one I have chosen to explore how present curricula can be transformed to have relevance to local environmental problems.

However, for a better understanding of means to, 'curriculum transformation', it is crucial that one tries to understand how the educators who are directly and indirectly involved position themselves within the indigenous knowledge debate.

IV.7. Recommendations for Lake Management and Environmental Education Practitioners

The recommendations made here are based upon the themes discussed above. These recommendations might raise more questions than gives answers.

- The starting point on the research topic is an understanding that issues around indigenous knowledge is multidimensional and complex. Teachers, curriculum and materials developers alike and students should therefore realize that the way the way the concept may be defined would be influence by the context of the definer.

- The complexity presented by the indigenous knowledge concept, and issues that relate to identity, might influence teachers or other curriculum developers towards dismissing or ignoring the discussion of indigenous knowledge issues. In dealing with the rhetoric around indigenous knowledge, teachers could engage students in issues that have been marginalized yet relevant to the subject matter learnt. For instance, they could debate the role of myth and story in the conservation of water sources. Environmental clubs, for instance, could also rally against activities that are detrimental to their environment by highlighting and favoring past and present practices with minimal negative impacts, such as seasonal cropping as opposed to monocultural agricultural practices that pollute water collection points.

- Employing different and varied approaches for teaching and learning, when addressing indigenous knowledge in school contexts could illuminate the multidimensional nature of indigenous epistemology of everyday life (see Masuku 1999). The indigenous knowledge issues in a pedagogical context the abstract (theoretical) and practical dimensions should be illuminated as dynamic and process oriented so that the facets that had been submerged within the school curriculum such as myths, fables, folklore, stories etc., receive attention in ways that are more relevant to the learner. For instance, the Nguni belief that if one spits in a

bowl of shred washing water, the people who share the water will develop an eternal hate relationship contributed in minimizing water-transmitted diseases.

- In environmental education process, an incorporation of lessons with activities which encourage students to investigate indigenous practices within their communities, could throw up understanding that had become taken for granted such that their usefulness for environmental education processes had become shadowed. This cold be done through activities such as the one I was involved in of constructing a grain pit. We learnt that the Nguni were not the only group that constructed grain pits but the Sotho-Tswana ethnic groups of southern Africa and North American Indians did in earlier times.

- It is necessary to dispel the belief that indigenous knowledge practices are mainly the practices of Black people. For instance, most of the interviewees and participants in the study recognized indigenous practices as those of Black people. In order to dispel such a belief the use of examples such as the use of the Y shaped water divining stick and associated practices by the Afrikaner as proof of the existence of indigenous practices amongst other groups would be useful.

- We need to acknowledge that contemporary languages and developments have constantly reshaped practices of the past. It is unwise to become dismissive about indigenous knowing and experiences when discussion and investigation might lead to interesting understandings, which may contribute to the dynamic reshaping of knowledge.

- There is a historical dimension to every subject. If environmental education is to be recognized as a cross-curricular concern or phase organizer (Janse van Rensburge & Lotz, Tselane & Wagiet 1998), teachers could bring to the fore the historical environmental dimension within their subjects. By so doing they would be drawing the links between indigenous knowledge and environmental education processes.

- For history to become less perceived as a study of the 'past, and dead people' teachers can threat home, school and community histories as equally important. This approach to the teaching of history could bring about an understanding to students of their local environments and the historical practices that have sculptured it. Fien (1993:23) within a socially critical education for the environment advocates a 'reciprocal relationship between school and society in which formal education is both shaped by and responsive to the needs of society and in turn, helps to shape the society within the schools are part'.

- The study of ethics, an important part of investigating indigenous knowledge concerns, should not only be limited to religions studies by the exploration of a basic ethical rationale linked with environmental ethics could feature in all subjects taught at school. According to Fien (1993:16) education *for* the environment "…builds on education *about* and *through* the environment to help develop an informed concern for the environment, a sensitive environmental ethnic, and the skills for participating in environmental protection". In my view this could be achieved if all teachers could take on this as their responsibility.

- The teaching of values and their ethical analysis should be aimed at the development of critical skills in the student and the inculcation of a positive ethic for the environment. The strong links between dominant indigenous knowledge values such as respect and responsibility should be extended and promoted not only amongst human beings but also to the biophysical aspects of the environment.

- There is a need for parents and teachers to forge and commit themselves to an in-depth partnerships with regard to refining curriculum content and educational approaches for educational relevance to present day changes. Homework that encourages inputs from parents by questioning the everyday way of life may sharpen and contribute to the development of a critically reflexive community within the local environment of the school (see Fien 1993).\

- The home needs to be recognized by teachers and resource developers as a context where learning takes place. There is also a need for content learnt at school to be relevant to the context and environment of the learners and teachers need to learn and understand where their learners are coming from. This move might encourage parents to take a positive and active role in the teaching and learning of their children, and thus bridge the gap between the home and school as learning environments.

- Elderly people strongly felt that an important role that they have played in the past as educators in communities is now being ignored. The common view that they have rich experiences by virtue of their age supports them being given a role in education by providing the kind of history concerning the environment that is not recorded in historical documents. The Department of Education could encourage and support such involvement of the elderly especially when students conduct socio-historical environmental audits.

- The reading of the environment as text should be encouraged, and stories like the "Sweet Water" story and accompanying activities could be used and/ or developed to encourage student to be critically reflexive in investigation of issues related to their environment. Within a narrative theory (Noel Gough 1994) the use of this story created an excitement that encouraged student to think about environmental problems around their schools. In one of the schools which participated in the water week activities, an environmental club was formed as a response to school environmental problems.

- Without necessarily promoting he questionable view that some practices of the past were observed because they were for conservation purposes, teachers could encourage those practices with potential to enable an environmental ethic to be practiced. Mixed cropping and practices such as drip irrigation, appreciation of youth time rather than unplanned parenthood, creative storytelling etc., bearing in mind that indigenous knowledge practices have limitations and cannot be applicable to all situations and times could be tried.

- As much as we are living within technological information revolution there is still knowledge that is reserved and sacred, to be understood only by those answering a special call and this ins something teachers and learners need to understand. For such knowledge we cannot, and need not, employ our present ways of rational thinking and reasoning. This

is some knowledge related to traditional healing, witchcraft, haunting, etc. According to Le Roux (1998b:5), teacher need to create learning opportunities that enable outcomes such as, "Learners will be able to respect the right of people to hold personal beliefs and values".

- Environmental education resource developers should develop resources with careful attention to a number of aspects. Within the activities they suggest teachers use in their lessons, they could encourage less of the 'gloom and doom' alarmist stories that contribute to action paralysis for the environment. Rather encourage learners to find good stories and tell success stories, which may encourage them to achieve what they set out to in their environmental education projects. In this way they may be encouraged to understand that indigenous knowledge is also a creative storytelling process within which they can take part.

- Indigenous knowledge can promote an environmental and conservation ethic. Nguni people's surnames are a historical heritage with a totemic rule of respect, which regulates one's relationship with the surname *Ngwenya* (Zulu and Zwazi work for crocodile) are the guardian of the crocodile as a totem, which is, awarded the same status as an ancestral spirit. Almost all Nguni surnames have a totem. Therefore, the attaching of monetary value to all biophysical resources for instance, such as crocodile farming amongst the *Ngwenya* people could crate and encourage new uses where they did not exist or were once minimal. Environmental educators working within conservation institutions need to bring awareness to such practices and could encourage totemic adoptions of flora and fauna species.

- Striving to 'know the other' and 'know of the other' (Bauman 1993) is important for teachers, researchers and students in a transforming South Africa. The old South African past could reveal practices that have developed out of interactions that have become authentic to South Africa and form part of a shared heritage (see Mostert 1993). I am of the view that all teachers could strive towards 'knowing the other' and 'of the other'\

- Misunderstandings that emerge within indigenous knowledge explorations create a disequilibrium, which could be directed towards fostering conscious knowledge building, something, which has been obstructed in he past by the authoritative use of the textbook.

- According to Bauman (1993:147), it is, "the misunderstanding that requires explanation, makes us pause and think, sets minds moving, triggers the process of conscious knowledge building'. Within misunderstandings and conflict between nature conservation institutions and their neighbours one of the interviewees saw indigenous knowledge as a tool for creating a sense of the value for conservation.

It is recommended that environmental education researchers continue to explore the relationship between indigenous knowledge understandings and environmental education processes.

V.   DEFINITIONS OF EDUCATION: FORMAL, INFORMAL, NON-FORMAL

V.1.   Definitions

Education is a process which promotes the creative and critical integration of citizens. Environmental education is a training process, helping people to acquire basic concepts about the characteristics and needs of the environment in order to enable them to carry out actions which will preserve it.

Effective education is not about literacy but about having the right attitude towards the environment, for instance to feel ownership of everything around you; and to have a protective attitude to it.

The need for education is not solely in local communities at grassroots level. There is an urgent need for people in positions of power to be educated. There is a need for both bottom-up and top-down education.

There is a need to give women access to education, but they must also be involved in setting the curriculum.

V.2. Operational Concept of Education

In the early seventies, the International Commission on the Development of Education (ICED) started an effective educational revolution as it adopted a concept of education that equates it broadly with LEARNING regardless of where, when or how: Defined as such "Education embraces much more than the conventional academic skills and subject matter" (UNESCO, 1972).

- Therefore, Education is being operationally interpreted as: Learning to be; Learning to learn; Learning to create; Learning to transform; Learning to do; Learning to self protect and protect others; Learning to think and Learning for peace etc.

- Along the same lines, in 1996, UNESCO revisited the 1974 International Standard Classification of Education (ISCED) according to which: "Education comprises organized and sustained communications designed to bring about learning."

- "Learning is defined as any change in knowledge, skills, attitude, behaviour, understanding and/or capabilities which can be retained and cannot be ascribed to physical growth or to the development of inherited behavioural patterns"

- Now, the fundamental question here is about whether or not schools can deliver all these aforementioned types of learning? The answer is of course a big NO.

As a result we have, in total agreement with Phillips Coombs (1973) and Znaeicki (1930), come to a new understanding of Education as a multi-dimensional concept including: 1) Formal Education, 2) Non-Formal Education, 3) Informal Education and 4) Self-Education

V.3. Formal Education:

According to Coombs (1973), Formal Education refers to "the hierarchically structured, chronologically graded educational system running from pre-primary, primary, secondary through tertiary and post-university and also including general academic studies, specialized programs and institutions for full-time and professional training".

According to UNESCO (1996) "formal education can be characterized as intentionally organized full-time learning events with regular fixed duration and schedules, structured hierarchically with a chronological succession of levels and grades, admission requirements, and formal registration, catering mainly to a population of 5 – 25 years old, which are held within established educational institutions, and using pre-determined pedagogical organizations, contents, methods and teaching/learning materials"

V.3.1. Integration of Human Values into Academic Subjects

1. **Primary School**

Grade	Subject	Topic	Objectives	Development	Underlying Human Values
1	Science	Water	1. Source of Water 2. Properties of water 3. Use of water	1 God, source of everything 2. Pupils and their sources of water Display of charts Colourless/Shapeless	TRUTH: Enquiry, Quest for knowledge LOVE: Humanism in man's relations with the universe. R/CONDUCT: Equality RIGHT CONDUCT:-
2	Social Studies	Water	1. Identifying sources 2. Appreciating the importance of water	1 Water is life for all living things 2. Water comes from different sources 3. Use of water 4. Abuses of water	Duty, Good behaviour TRUTH: - enquiry, Quest for knowledge N/VIOLENCE: Responsibility TRUTH: - Enquiry,
3	Religious Education	Water and Life	1 Necessity of water for plans and all living thins	1 Plant life 2. Animal life 3. Human life	Curiosity, Quest for knowledge LOVE: - Care, Kindness R/CONDUCT: Conservation of nature
4	Bemba Language (Water Education	Imfula (rain)	1 Safe drinking water 2 Rain cycle	1 Sources of water 2 Traditional myths and belief about rain 3 Rain cycle	PEACE: - Discipline TRUTH: - Enquiry, Quest for knowledge R/CONDUCT: - Resourcefulness
5	Science	Rain Cycle	1 Evaporation 2 Formation of clouds 3 Rain fall	1 Process of evaporation 2 Process of transpiration 3 Process of condensation	TRUTH: Curiosity, Quest for knowledge, Spirit of Enquiry R/CONDUCT: Regularity, Duty, Initiative
6	Science	Water	1 Sources of water supply 2 Water supply systems Prevention of water pollution	1 streams, wells, dams, rivers, lakes, boreholes, etc. 2 Storage of domestic water 3 Purification of	TRUTH: - Curiosity, Quest for knowledge, Spirit of Enquiry, Discrimination LOVE: - Kindness, care, Patriotism, Humanism in relation with universe.

				domestic water	R/CONDUCT: - Respect, Self help NON-VIOLENCE: Responsibility, Sense of oneness
7	Mathematics	Water in: Addition Subtraction Multiplication Division	To introduce Human values Approaches in solving problems relating to the topic. 1 Operation on percentages 2 Solving problems involving percentages	ADDITION House A has 20 litres of water. House B has 30litres, House C has 70 litres. If they put all the water together, how many litres of water would there be? SUBSTRACTION Wo buckets of water at home. Out of these, 5 are given out to neighbours who have no water. How many remained? MULTIPLICATION 20 Households in a village. Each fetches 20 buckets of water and contributes to the village resevior. How many buckets of water are in the reseviour. DIVISION 20 cups of tea to be shared among 5 children. How many cups of tea would each child have?	
Mathematics	Percentages		1 Finding percentages 2 Percentage of water on Earth – 75% Fit for drinking- 3% Our bodies –75% 3 Managing water properly and cautiously	TRUTH Curiosity, spirit of enquiry Quest for knowledge LOVE: Patriotism, Humanism in man's relations with the universe NON-VIOLENCE Awareness of responsibility, Sense of social service, Readiness to co-operate RIGHT CONDUCT Cleanliness,, self help, self sacrifice	

Secondary School

8	Book keeping	Water Bills	1 double entry 2 Profit & Loss A/c 3 Balance Sheet	1 Water, a vital asset 2 Supply of and demand for water 3 Effect of Water Bills (proper use and wastage) on profit and society 4 WHEN PAYING BILLS DR: Water Bills CR: Cash Book 5 WHEN TRANSFERRING TO PROFIT AND LOSS AC/C DR: Water Bills 6 IF WE PAY IN ADVANCE **Current Assets (Balance Sheet** 7 IF WE DO NOT PAY - Current Liabilities (Balance Sheet)	TRUTH: Curiosity, quest for knowledge, Spirti of enquiry RIGHT CONDUCT: Regularity and punctuality Duty, Honesty, Resourcefulness, Integrity, reliability. PEACE: Freedom for worry, Moderation, Discipline. Self control. NON-VIOLENCE Awareness of responsibility Sense of social service and social justice, Good manners, Fellow feeling, Gentlemanliness/Ladyliness LOVE Sincerity
9	Environmental Science	Water	1 Importance of water on plants 2 Effect of osmosis on plants	1 Germination of seeds 2 Growth of seedling and plants 3 Water entering the roots by osmosis 4 Large percentage of living cells implants is water 5 Lack of water causes cells to shrink	TRUTH: Curiosity, Spirit of Enquiry, Quest for Knowledge. LOVE Tolerance, (easy entry and exit), Patriotism, Humanism in man's relations with the universe, Friendship, Accommodating (loves all, serves all), Selfishness, PEACE: Still and silent RIGHT CONDUCT: Resourcefulness, Self-reliance, Duty, conservation of nature and environment. NON-VIOLENCE Awareness of responsibility, Sense of social service, Helpfulness, Turning away from negative or injurious discrimination, Readiness to co-operate

10	Biology Chemistry Commerce	Transpiration and Translocation	-Define Transpiration -Relationship of waster loss to the cell surface, air spaces and stomata	1 Loss of water from stomata -The leaf has air spaces -Water from the roots is used by the leaves for photosynthesis -Excess water is lost through the stomata (transpiration) 2 Types of leaves: small and big -Big leaves have many air spaces and therefore, there will be a lot of water loss due to many, many openings called stomata -Small leaves have few air spaces stomata openings and hence less water loss	TRUTH: Curiosity, Quest for knowledge, Spirit of Enquiry, Discrimination RIGHT CONDUCT: Duty, Team spirit, Self-sacrifice

V.4.   Informal Education (IFE):

Is commonly understood as being the incidental learning that takes place throughout our lives. Since Jomtien (1990) many refer to IFE as the third Channel Education following FE (first) and NFE (second) categories of education. In agreement with UNESCO (1996), we can identify two components of informal education:

V.4.1. Informal learning which is generally intentional but encompasses unorganised and unstructured learning events that occur in the family, the work place, and in the daily life of every person, on a self-directed, family-directed or socially-directed basis and;

V.4.2. Random/incidental learning which refers to unintentional learning occurring at any time and in any place in every person's everyday life.

However, for the purpose of the present discussions, I prefer to borrow from Coombs (1973) once again. According to him, IFE is a "Lifelong process where we acquire attitudes, values, skills and knowledge from daily experience and the educative influences and resources of the environment".

V.4.3. Self Education (SE):

Self-education, according to Znaneicki (1930), is the process by which individuals who have already partly learned under the guidance of others, continue to prepare themselves and further their knowledge on their own initiatives and by their own efforts. This concept becomes particularly relevant as we relate it to the Jomtien EFA indicator of "Learning Achievement"

3 Non-Academic Subjects

Grade	Subject	Activity	Objectives	Development	Underlying Human Values
Whole School	Games and Sports	Football Volleyball Basket ball Baseball Table Tennis Lawn Tennis Badminton Netball Swimming Gardening Farming	1 Physical and mental health 2 Development of skills 3 Fair competition 4 Source of water for players 5 Treatment of water 6 Proper use of water after games and sports 7 Cost of water	1 School House System (5 homes in all) Earth Water Fire Air Sky 2 House Fathers and Mothers 3 Appointments of Games and Sports and Games Equipment 6 Regular practices Fixtures 8 Provision of water facilities for drinking, watering of trees, vegetables, flowers, etc	TRUTH Curiosity, Spirit of Enquiry LOVE: Tolerance in the use of water, Sincerity in the use of water, Kindness to other participants. PEAC Discipline in the use of water, Self control in the use of water, Self satisfaction, RIGHT CONDUCT Cleanliness, Hygiene living, Proper use of water, obedience to rules, Respect for others. NON VIOLENCE Awareness of responsibility, Concern for others and consideration of others. Appreciation of the water supply

V.5.   Strategies for Lake Management Education

Water education of youth clubs in areas where water education is critically needed. Such clubs could operate from community and recreational centers managed by Non-Governmental Organizations or municipal authority. Club activities could include water saving promotional events that would be characterized by drama, story telling, slide shows or videos. Events could be highlighted by recreational events that would attract more youths. Both press and print media could cover the events. Leaflets and magazines written in local languages could be distributed. To reach the wider community, the use of media especially television could be equally effective.

However, it must be acknowledging tat poor families may not have access to this media, either because they cannot afford a television set or it is not of their priorities.

Learning activist must have the right approaches in relation to water. Non-formal education programme should be planned in such a way that it cater for both the literate and illiterate members of the community. The programme should encompass the following,

♦ Education about water source and cycle, i.e. where does the water really come from, how is it processed and delivered to people. Organized learners could be taken out into the field on an excursion to see water source treatment plant and distribution process, areas of possible pollution source.
♦ Secondly communities need more information about water use, by individuals, plants, animals and its importance to people's health.
♦ Thirdly, communities need to be aware of the wrong and right ways in which man interferes with water cycle. This would go a long way in empowering communities to come up with suggestions on how best they could utilize water without jeopardizing the needs of future generations and the ecosystem.

Within the community one can identify individual who cold assist in making people understand water problem. Government and NGOs have information and should be patronized. Within the general public are many people with interest, hobbies and professions related to the environment. School based clubs and associations open membership to out of school youths and involve them in club projects, for instance cleaning a polluted river or stream or water source.

To involve every body in the provision of water and protection of water source means turning water into a precious commodity, rather than something to be taken for granted. It would mean empowering urban dwellers to manage their own affairs, with the state playing a critical supportive role and civil society playing a vital role in encouraging equity and sustainability water use

V.6.   Non-Formal Education (NFE):

Non-Formal education generally refers to intentionally organized full-time learning events catering essentially to persons not currently participating in formal education, which do not fulfil one or more of the underlined conditions above. (UNESCO 1996).

Coombs and Manzoor (1974) described NFE 'as any organized, systematic educational activity carried on outside of the framework of the formal systems to provide selected types of learning for a particular sub-group in the population, adults and children, rural and urban"

According to UNESCO (1996), some countries introduced an additional category: "para-formal education" to designate non-formal education activities that offer equivalence to specific levels, grades and types of formal education. This term applies particularly to non-formal education programmes organized for out-of-school children and youth to enable them to either eventually

rejoin appropriate levels and grades in formal education, or to gain access to suitable employment opportunities requiring pre-determined educational qualifications.

In any case, it is important to keep in mind as you go back to your respective duty stations that for an educational activity to be categorized NfFE, it must meet the following conditions:

> Be consciously and purposively organized and systematically pursued with a view to facilitation particular kinds of learning by a particular group of sub-group; and it is not an integral part of the formal education system. (Coombs 1973)

Non-formal education refers to all the semi-organized and organized educational and training activities that operate outside the regular structure and routines of the formal education system aimed at serving greater variety of learning needs of different sub-groups of the population, both young and old (Bishop 1989 p131).
It includes among other things:

- ♦ School equivalency programmes to provide a second chance to those who have missed school or dropped out early.
- ♦ Some youth activities with educational purposes
- ♦ Cooperatives and so on.

V.6.1. Characteristics of Non-formal education

In non-formal education the teacher may not necessarily be a teacher, but a facilitator or a group leader or anything, but a teacher. There may be no textbooks, no written work, no set syllabus and no examination. The class may be held in someone's house or under a tree. There may be no teaching but rather discussion or interaction. The activities may vary from fairly intellectual to practical skills and tasks. Learning projects can involve anything from learning how to master a new machine at work to participation in a working environment in the community. (Thorpe et al (ed) 1993 p103).

The emphasis could be on freedom of learners to use negotiated learning agreements or giving learners ownership of their learning. The study programmes may be tailored such that they meet the learners' individual requirements (Race P. 1998 p7). They could be community service programmes with no academic credit awarded. These programs are usually designed to reach large numbers of people where they live without having to remove them from their normal environments and responsibilities.

V.6.2. The purpose of non-formal education

Non-formal education has been ignored or neglected in Africa, in spite of its capabilities and advantages, especially given its relative cheapness compared to formal education. For many years, consideration was given to formal education, which was more concerned mainly with certificates and qualifications. In view of the poor record of formal education as promoter and catalyst of development, it is of paramount importance that there should be more investment in a system of education that responds more to the needs of the people. According to Bishop,

1989,p149) non formal education has been the burden of providing basic educational needs, as more than half of today's school age children in poor countries receive no sustained formal schooling. It should not be seen as rival to formal education, but as mutually reinforcing partners, each indispensable of the other.

It is however, important to note that in many of the African countries non-formal education is now being given serious attention as an alternative to their formal system of education. The main purpose is to provide everybody with relevant knowledge, skills attitude and ideas that will enable him or her lead more fulfilling, productive and satisfying lives (Bishop, ibid). It is not only aimed at adults, but also at children arising from the need to compensate for inadequacies or lost opportunities of earlier education.

V.6.3. Challenges in providing Non-Formal education

One of the greatest challenges is to try and create the national will to accept and appreciate that non-formal education is a real alternative to formal education, and not a third-rate formal education.

Many people still view this form of education with disdain, as they have been indoctrinated into believing that skills are valuable only if they are a result of formal schooling. Schooling is viewed as the only channel of social mobility, or the only route upward to the modern sector.

Some children may not be prepared to participate in non-formal education programmes unless the "what's in it for me question" has been answered. That is, they may want to be assured of such immediate benefits as financial gains and employment opportunities. There is also the need to remove the stigma attached to this type of education, as it is associated with adulthood or children of lower academic levels. Furthermore the culture of certificate acquisition, which has become entrenched in many of the African education systems, and the examination results have been used as a measure of success. Any education that may not award certificate is likely to be rendered inferior and, therefore, not worth the effort. Another challenge is to change the perception of politicians and decision makers themselves to appreciate the role of non-formal education in society so that they begin to redeploy the country's resources to provide useful and meaningful learning experiences for a much larger proportion of the population in the environment in which they live.

V.6.4. The Need for Non-Formal Lake

The goal of non-formal education is not the imparting of information; that is only the beginning step. After the information should come a greater awareness and interest in the subject leading to some behaviour changes. When enough changes have been made successfully, an attitudinal change will be the sign that the education has proven effective. So with non-formal environmental education, the information given to women and youths and others about the environment or after conservation only starts the process. People's interests in the environment and their behaviors and attitudes about the environment will be the signs effective education. And perhaps the most complete evidence will be given when a moral or ethical dimension of

attitude is reached: it is right for the environment to be protected, and to be used wisely and sustainably.

VI.   COMMUNITY INVOLVEMENT IN LAKE MANAGEMENT AND CONSERVATION

VI. 1. Philosophical Foundation of Involving the People in Micro-planning for Lake Management

Go to the people;
Live among the people;
Learn from the people;
Plan with the people and work with the people:
Start with what the people know;
Build on what the people have;
Teach by showing;
Learn by doing;
Not a showcase but a pattern.

VI.2.   Micro-Planning as a Strategy for More Effective Community Education and Participation in Managing Lakes and Water Resources

Operational Definition of Micro-planning

Micro-planning is also called local planning. In its widest sense, micro planning is simply the replication of all planning activities at the sub-national levels (Regional, District, Division, Location, Village or Institution). All the problems and issues addressed in macro-planning are relevant to micro-planning. All the discussion on the selection of objectives, strategies and activities can take place at a lower level as well.

Micro-planning in contrast to macro-planning seeks to ensure greater equality in the distribution of services and goods, better adaptation to the needs of local communities and amore efficient use of all available resources. In short, Micro-planning is a planning exercise initiated at the lowest level unit whit effective and active involvement of the beneficiary at all stages of planning/programming/design up to implementation, monitoring and evaluation.

VI.3.   What is a Community?

Cultural, socio-economic, political and spiritual commonalities are key variables in the operational definition of community. From both a developmental and anthropological perspectives, community is operationally defined as a group of individuals sharing common

value system, living in the same socio-economic conditions in the same geographical location and affected by the same problems.

However, for planning purposes, community is often understood to be the lowest level unit as we disaggregate from nation state, to district, division and location. In most cases, it is a village or a group of villagers.

VI.4. Involving the community in Lake Management Activities

How can we involve people in lake management and conservation after years of alienation from legitimate involvement? The concept of community-based lake management and conservation seeks to involve rural communities in taking joint responsibility for sustainable management of the lake and other natural resources, where they live and to share the direct and indirect benefits of its managements. It involves devolvement of power to the communities. "Involvement" means full participation and empowerment is a powerful and frightening concept for conservationists, governments and other stakeholders.

The question of ownership of land in the lake basins remains a very big puzzle in many African countries. Effective participation requires transfer of proprietary rights to participants. How do you encourage and reward all participants? There are ranges of participation from "good neighborliness" through to partnerships; there is a range of beneficial participation.

Participation pays but is difficult. There is need to develop tools and identify best practice on the ground as there is a general agreement on the theme. Developing good participation is going to be extremely important but should be done around concrete examples.

There is a need for co-operation and collaboration on how markets, value added processes and income generation activities can be developed and how income can be equitably shared.

VI.5. Rationale for Local Planning due to:

o The problem of over ambitions plans, unrealistic plans, many objectives, and lack of prioritization and inadequate planning responses to perceived needs;
o Inadequacy of policy formulation goals – good policies are based on knowledge of the environment;
o Local planning is expected to facilitate effective mobilization and genuine participation of the community;
o Locally designed programs and projects are expected to reflect local priorities and aspirations ensuring greater realism and more flexibility in planning.
o Local level planners (LLP) have a more profound knowledge of the characteristics and needs of the population they serve and of the educational institutions in their area.
o LLP are able in their decision-making to give due consideration to the implementation difficulties.

VI.6. Community Participation in Lake and Wetland Management Education

The problems associated with lake management in the world calls for meaningful stakeholder or community participation. Participation to be effective needs an informed stakeholder who is empowered further to take part in the decision making process. Although education systems have tackled water education through carrier subjects such as science, agriculture, social studies and other opportunities, little or no education on lake management has ever been taken to those many that are unfortunate not to go to school or drop out because of various reasons. Provision of adult education on lake management and sanitation has barely started in Africa generally despite its urgent need.

To involve the communities of the poor lake regions, there is need for environmental education geared to their needs. In this environmental education there should be issues tackled regarding water and sanitation. Education is important to empower the communities to understand the dynamics and complexities of the environmental issues facing them. It is indeed true that;

> **'the answers to the perplexing issues associated with the environment lie not so much in an advanced technology s they do in a human population that at long last realizes that solutions exist in human beliefs and values, and in the ability of each and every person to confront the issues in logical and productive ways. At least part of the mechanism for resolution lies with educators who will shape the beliefs, values and skills of young people throughout the world' (Menon, 1994)**

The need for community oriented environmental education can therefore not be overemphasized. This type of education is more capable of responding to local environmental issues, which have more social meaning and usefulness to the community. Although attitudes towards the environment may vary from culture to culture, it is imperative that people foster and develop an environment ethic, which is conducive to a harmonious development with nature, stability, and sustainability.

A non-formal water education programme should be made an important element of stakeholder participation or seen to reinforce participation. Participation is guided by the observation that local stakeholders know better than anyone else what their problems are and what solutions might work. When people commit to a course of action that is their idea, the results are more likely to succeed and continue than when ideas are imposed from outside, or delivered within a top-down approach structure.

Education and communication are important elements of any participatory programme, like water conservation. Such a programme should aim to involve as many local stakeholders as possible in the process of formulating, designing, implementing and evaluating programmes in the hope of making development self directing, fair, and self-sustaining. Participation also aims to erase the feelings of inferiority that stakeholders from poor areas have often experienced. So one of the aims of a non-formal education programme should be to enhance the participation of out of school youths in water development and management. Such education should build on active participation; individual enthusiasm and the hope that the effort spent on education will give concrete results in the form of a better environment.

What is water education or awareness/communication? Why is it needed? Non-formal water education should apply all useful experiences and knowledge in pursuit of sustainable water resources management and raising awareness of its importance. This education is needed and should be provided even at non-formal level because it is critical to make more people aware of the importance of water, threats and what improvements and correction actions required. Water knowledge needs to be generated, tested and shared without restrictions for it to achieve the goal of safe water provision and management.

Non-formal water education is crucial for developing water security. New ways of thinking often opens up for more effective handling of water related problems. It is a matter of getting better knowledge and gaining insight. Education must meet both general needs and needs from different professions. The basic non-formal educational issues are:
♦ What shall we learn?
♦ How shall we teach it?
♦ Why should the subject be taught?

VII. LAKE MANAGEMENT EDUCATION FOR URBAN LOW-INCOME AREAS

The aim of water education should be to develop attitudes of caring, sharing, accepting responsibility and respecting the rights of future generations.

It is noted that…Non-formal EE with its wide and large target audience is a fertile and promising field for fulfilling the purpose of inculcating awareness knowledge skills, commitments and actions on the part of individuals and groups and the general public for the protection and improvement of the environmental and its quality for the present and future generations (UNESCO, 1986 and 1996).

Youths outside the formal education system could be catered through planned and coordinated non-formal channels.

McLeod (1998:171) has observed that 'people have in many cases developed bad habits and are unaware of the importance of water conservation. Massive education and awareness programmes are now necessary to address the issue. Teachers can play a major role in developing water awareness amongst youth.

The need for water conservation in urban areas cannot be overemphasized. To achieve this there is need for a deliberate education plan to raise awareness as a way of empowering communities in taking responsibility for the management of their water supply and sanitation programmes. Non-formal education is crucial in creating awareness among water users, administrators and politicians for the need to conserve water. People are often quick to demand freshwater, but slow to accept responsibility for conserving and protecting it – although it should be emphasized that most people do not waste water on purpose. Unsustainable water use is often due to lack of understanding of the resource, having no skills to manage it and a lack of affordable alternatives. With the right information and knowledge provided, all users should be in a better position to use water in a more sustainable manner.

Successful run water education and conservation programme requires that full cooperation, understanding and willingness of the users to participate in the activities. Participation at all levels will most likely only be achieved through well-coordinated public education and awareness programmes that can help people change their attitudes to use water.

The general aims of a public awareness and education programme are to:
- Promote awareness of water in daily life, this would develop awareness outside of crisis situations such as droughts;
- Promote awareness of conservation issues and the links to issues of environmental quality;
- Promote awareness of the economic benefits produced by water savings;
- Provide an understanding of the possible need for higher prices; and
- Provide an understanding for the non-harmful likely future use of recycling wastewater.

The provision of non-formal water education is urgent in Africa urban, particularly in low-income areas. It is needed to answer the questions of modern integrated water resources management (IWRM), as these cannot be achieved without the full participation of communities who handle water daily. In the movement to educate people on water, it is important to:

- Raise awareness of water issues (involving young people, reaching decision makers and opinion leaders, reaching out to women and industry).
- Invest in people – including promoting professional associations, incorporate practical customer analysis, gender sensitive designs in the curricula- promote research, development and demonstration (including water productivity, freshwater ecosystems, sanitation, and practical demand management research) and
- Improve information generation and sharing.

Some of the issues to be tackled by a non-formal water education programme include among other things:

- Lake/Water conservation
- Water cycle and functions
- Ecological sanitation
- Conflict resolution in water scare environments
- The role of water companies in education of citizens
- Information technology for water networks and access to environmental data.
- Water diseases and prevention
- Water economics (pricing, distribution and prospecting)

An out-of school youth water education programme should be part of a wider public awareness programme which should play on several strings to achieve an impact. It should be target various segments of the society either individually or as group. It should be able to address issues on an acute basis or be looked at as a long-term investment.

VIII. INVOLVING THE PEOPLE THROUGH PARTNERSHIP IN LAKE MANAGEMENT

VIII.1. What kinds of partnership are appropriate?

Partnership should include all levels of government; different departments within government; women; youth; the media; the arts, and especially theatre; and all other major sectors including community, conservation and business groups.

The need for environmental education and training has long been recognised and many agencies are involved both at national and global level. Environmental education must be continuous because each new generation needs to learn for itself the importance of conservation.

Individual campaigns or programmes cannot be regarded as ends in themselves but as a part of a long-term process. The main purpose of environmental education is to provide a conceptual framework so that people can respond in a concerted fashion to the challenge to promote ecological security and sustainable development, and for this programmes for government, public and private sectors are required.

A lot of people at grassroots level feel that the role of government should be one of facilitating and implementing and not of influencing opinion. NGOs should make sure that governments don't exceed the mandate.

VIII.2. Obstacles to partnerships

Seven major obstacles are:

1. Lack of trust in all level of government;
2. Loss of identity by any of the partners;
3. Loss of credibility with the local community
4. Lack of continuity from those in positions of power;
5. Inequality between parties. Partnerships between the poor and unschooled and the rich with certificates are similar to the partnership between the horse and its rider. This problem can only be addressed by changing both economic systems and education systems. Otherwise partnerships without exploitation are impracticable.
6. Institutionalization of an organization or community group erodes is ability to innovate. Yet it is hard for a project to be replicable if there isn't certain element of institutionalization.
7. Compartmentalization obscuring the fact that everyone in the community is a part of an education resource.

VIII.3. Factors in success

Never over-estimate the value of a formal education or under-estimate the value of traditional wisdom.

Avoid stereotypes. There is no correct way of educating. It is a matter of "horses for curses. What works in one situation may not in another.

1. Take the time to listen to, and learn from, the community.
2. Any service being developed should be low-cost, community based, and should reduce the dependency of the community on government or international agencies.
3. Informal education at community level is very important when it comes to attitude change and awareness.
4. Partnership are not about giving or taking but about sharing.
5. Generating appropriate, but not excessive, opposition and conflict is inevitable to bring about fundamental change.
6. Asking the right questions in the right places; for instance, are pressure groups from below succeeding in getting the government to respond?
7. Positive impact of particular programme on the quality of the life of the poorest 10% of the community or country

Recognition of the difference between literacy and education. The literate man is not always best at working at grassroots level; he may look down on the community. People in the community my not be literate but they are educated, they are wise. Communities know how to demystify technology - we must encourage this.

Awareness is created by action. Communication is important but the words of the communicators are themselves of zero value; the only value comes out of the action of those who are receiving the communication.

IX. THE ROLE OF WOMEN IN LAKE MANAGEMENT AND CONSERVATION

The need to ensure democracy, community participation, equality and trust. Partners can work towards the same end, but each have their own private goals, which may not always be honorable.

Women involvement in conservation (particularly in rural Africa) is largely a function of gender. Women are the daily managers of the living environment and the local systems plus the fact that they are the educators to the children. It is high time that Africa and the rest of the developing world refrain from being gender blind but instead become gender sensitive to appreciate the tremendous potential value of women by involving them fully in the processes that will lead us to arrive at our destination, which is community participation.

There is a particular need to ensure that the role of women is considered at the project design stage. It has been found that in some cases development efforts have not just by-passed women, but have actually made their position worse. It has also been noted that failing to consider the role women play in rural society, or excluding them from project planning, has at times resulted in the failure of projects [Edgren, M., "Women's Role in Community Forestry." Chapter in SIDA/FAWCDA (1982) "Report from International Seminar on community Forestry." Swedish

International Development Authority and Ethiopian Forestry and Wildlife Conservation and Development Authority.]

In most developing countries, it is the women who are primarily responsible for collecting fuelwood. Men are, therefore, frequently isolated from the problems which arise if supplies become scarce. This has been suggested as an important reason why men care are often unconcerned about fuel scarcity problems and indifferent to suggestions that they should plant more trees.

Another very practical reason for taking women's views fully into account is that to an increasing extent they are becoming the effective family decision makers in many parts of the world. An increasing number of men are migrating away from smallholdings with the consequence that there is a growing number of women-headed rural households. It has been estimated that a third of the world's total households have women as their heads, but this figure would be higher if it took account of the number of households in which men are present but provide little effective economic input [Hoskins, M.W., (1983}."Rural Women, Forest Outputs, and Forestry Projects". Draft Paper for FAO Forestry Department, FAO, Rome].

If programs are to help women, it is absolutely essential that accurate information on their actual work and role in the community is available. In the case of fuel wood, the statistical approach of recording the distances traveled to collect firewood, the time taken, and the loads carried, provides useful information on the actual physical tasks carried out by women. But it does not provide any information on how women themselves regard their problems, and that what they see as realistic possibilities for taking action to ease them.

Particular care must be taken not to impose external values on what is happening at a local level. The collection of fuel wood is normally assumed to be a task which should be reduced or eliminated. But this is not necessarily always the case. In one part of Tanzania, for example, it was found that many of the women prefer wood collection to the work they would otherwise have to be doing. It is apparently seen as a relatively enjoyable task, which they carry out in groups [Skutsch, M. (1983), "Why People Don't Plant Trees: Village Case Studies." Resources for the Future, Washington, DC].

Similar instances in which women regarded firewood collection as a pleasant social activity has been noted in other countries [Brokensha, D. and Riley, B. W. (1983) Chapter in FAO "Wood Fuel Surveys." FAO/SIDA Forestry for local community Development Program, FAO, Rome]. Measures for reducing the amount of time spent collecting wood in these cases would not necessarily be viewed by the women as an important improvement in their daily lives. The point is that there is no general rule about attitudes to firewood collection; women's own views must be established in each case. In many cases, men cannot obtain such information; women survey staff will often be needed.

If women's needs are to be reflected in community programs, it is highly desirable that they are given official representation within the village organization involved. Ensuring that women are elected or nominated to whatever village or community committees are engaged in the negotiation and local planning of projects can do this.

This, however, may not provide an adequate protection of their interests in all cases, since women representatives may be subjected to strong domestic and communal pressures to conform to the conventional norms of their societies. In many cases, women will not speak if men are present, and will allow men to answer on their behalf even when they know that what men are saying is incorrect.

In order to provide a safeguard against such possible distortion or suppression of local women's views, it will often be necessary to ensure that women are adequately represented on the professional planning and executive side of projects. Identifying the specific concerns of women, and translating these into specific provisions in community programs is a complex process. It requires a commitment and understanding, which are frequently lacking in men. Preferably, it will be achieved by ensuring that women professional staff is appointed with explicit responsibilities for dealing with the impact of the project on women.

Gender equality is essential for empowering women - and for eradicating poverty. Already women are on the front line of household and community efforts to escape poverty and cope with its impact. But too often they do not have a voice in the community or in national and international arenas. Gender equality needs to be part of each country's strategy for eradicating poverty, both as an end and as a means to eradicating other forms of human poverty.

A creative commitment to gender equality will strengthen every area of action to reduce poverty - because women can bring new energy, new insights and a new basis for organization.

If development is not engendered, it is endangered. And if poverty reduction strategies fail to empower women, they will fail to empower society.