

ICT for Citizens' Awareness of Environmental Decisions

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Abstract

Development initiatives generate environmental impacts of varying magnitude that can last for short or long periods on one hand and be reversible or not, on the other. According to the Mozambican legislation all major development initiatives must be subjected to public consultation. In such processes, participation is critical but often compromised by poor communication. That can be mitigated by using Information and Communication Technology (ICT), increasingly perceived as a crosscutting and enabling technology, which facilitates access to human and civil rights like information, education and health. Access to ICT, by itself, entails fulfillment of digital rights.

The current study looks into the importance of citizens' awareness of environmental decisions. The core of the study is a focus group interview, involving environmental experts and exploring their experience regarding the current features of environmental awareness processes and the potential role of ICTs.

In general the results of the research indicate that in Mozambique decision makers are conscious of the importance of environmental awareness for sustainable development as shown by the approval, and implementation of legislation and creation of related institutions. However, the Focus Group interview stressed that the country still lacks enforcement capabilities, due to unavailability of infrastructures and equipment and low level of human capital: Illiteracy levels, still high and computer illiteracy even higher. The Group interview revealed that some decision makers lack good understanding of sustainable development and, due to that they underestimate the consequences of negative impacts and overrule technical information. Our findings show that ICT is not yet a critical tool for awareness raising and public consultation but it is seen as a promising one with potential to facilitate and speed such processes. Main challenges

are related to improved access, contents, language. Training will be essential for the general public and environmental as well as ICT officials.

Keywords

Environmental awareness, environmental decision making, environmental impact assessment, digital rights.

1. Introduction

Development is made of small and big human interventions which can be as simple as small house building or as complex as big dam construction or even as an urbanization project. Such interventions involve government authorities, investors and ordinary citizens, each of them playing their roles: government creates an enabling environment through legislation and supportive institutions; investors finance and implement development projects and; citizens potentially participate in project conception, implementation, monitoring and evaluation. Development initiatives generate changes on the environment whose impacts can be beneficial or deleterious and vary from discrete to severe, according to nature and magnitude of the undertaken development and sensitivity/vulnerability of the implementation areas. As such, due awareness is required from those participating in the decision making process in order to guarantee social, economic and environmental sustainability, the three key elements of sustainable development, as defined by United Nations' World Commission on Environment and Development, WCED (1987).

Citizens' awareness of the consequences of environmental decisions can be understood as the level of consciousness achieved by the citizens regarding the impacts of decisions taken on environmental issues. Such awareness is of high importance as environmental decisions may have lifelong consequences to them and even for generations to come. In Mozambique, environmental decisions related to development initiatives are preceded by consultative processes, as required by approved legislation. However, experience has shown that, from times to times, during or after implementation, communities complain about their expectations not being met. One reason can be that developers do not comply with the requirements of the law in terms of adequately informing their stakeholders about all the expected consequences. Another reason can be that, despite explanation, communities do not realize the actual impacts of planned interventions and, due to that, either agree naively with new development proposals or do not participate at all in the consultation inherent to the decision making process. In one way or another relevant human rights may be unfulfilled, namely: right to education which would allow understanding the development process; the right for information; the right to live in a sound environment and the right to participate in the decision making process. That can be mitigated with increased access to ICT, increasingly perceived as a crosscutting and enabling technology, which facilitates access to human and civil rights like information, education and access to health. Access to ICT, by itself, entails fulfillment of digital rights. That perception prevails in Mozambique where the Government has approved the Mozambique Science and Technology Strategy (MOSTIS 2006) which defines ICT as an enabling technology and The ICT Policy and Strategy that promotes the use of ICT as tool for communication within the government and between the government and the society as whole.

Poor involvement of stakeholders can degenerate in lack of trust and compromise the whole development initiative in some cases, or result in severe and long lasting prejudice for the communities in other cases. In this regard, ensuring effective participation in environmental decision making is crucial for sustainable development. On that ground, the study aimed at assessing perceptions on the importance of citizens' awareness of the consequences of environmental decisions and its association with digital rights in order to promote informed participation and wise environmental decision as opposite to blind acceptance or refusal of new developments proposals.

The study looked into historic data searching for evidences of the importance of citizen's awareness in environmental management. To that end a review of existing literature, including scientific papers and official documents was conducted, combined with a focus group interview, targeting at public servants government officials involved in related processes. The findings were analyzed considering the Mozambican context and discussed from the viewpoint of the literature in order to show the importance of raising awareness among stakeholders.

Key Concepts: Key concepts for the current study are as follow:

- Environmental awareness - the level of consciousness achieved in regard to environmental issues, as a result of experience, personal exposure to as well as exploration and discovery of people's surroundings. It is shaped by economic, social, professional, religious, ethnic, cultural and educational factors.
- Environmental decision making – a process by which decisions are taken, approving, cancelling or defining requisites for projects implementation, based on their consequences to the natural and social environment.
- Environmental impacts –the consequences of a given intervention on the environment, being it air and water pollution, health, social capital, and environmental justice.
- Environmental impact assessment- an estimate of the potential effects on the environment resulting from a specific intervention which is undertaken in order to supply guidance to decision makers on the recommended measures to prevent, mitigate and manage negative impacts.
- Information and communication technologies (ICT) – can be defined as 'electronic means of capturing, processing, storing, and communicating information'
- Local communities - those individuals or groups of individuals who live in the vicinity of the implementation area and often have a strong relationship with the natural environment potentially exposed to the development impacts.

2. Public participation in environmental decision making

Development initiatives, being in the fields of agriculture, industry, civil works or urbanization, to mention a few examples, generate environmental impacts of varying magnitude that can last for short or long periods on one hand and be reversible or not, on the other hand. As such, implementing development initiatives requires informed environmental decisions in order to avoid, minimize or even mitigate negative environmental impacts, defined as the unwanted social, economic and

environmental consequences of the development initiatives. In this regard, it is a globally accepted praxis to undertake environmental impact assessments prior to project implementation to inform the decision making processes. Equally, it is widely accepted that environmental decision processes must involve not only government authorities and investors but also all relevant stakeholders and specially the “local communities”. In developing countries like those of Africa, local communities rely strongly on the natural resources for their subsistence from where they obtain water, food, energy and shelter (World Resources Institute 2003), which makes them the main losers when negative environmental impacts prevail. Despite the obvious relevance of their participation, local communities are often excluded from the decision making process that affect their livelihoods because they lack control over knowledge, technology, economic and institutional opportunities. Knowledge, in particular, is the key for informed decision-making processes around environmental issues and in building consensus and shared vision among stakeholders.

To counteract this, participation must be more than a pure legal formality. It must be closely linked to the process of empowerment in order to be, as proposed by the WHO Health Cities Program, a process that enables active and genuine involvement of interested and affected people in identifying issues of their concern, formulating policies, planning and implementing activities required for improving their lives. This is in agreement with Chopra (1991) who considers that participation goes beyond consultation to include the initiation and continuation of an active process of both formal and informal interactions by which stakeholders influence processes impacting on their personal income growth, self reliance and other values.

Taken this way, public participation is extremely important, because it provides the most reliable means to negotiate the trade-offs inherent to development initiatives in an equitable manner (Kerkhof 2007) and to ensure that the proposed goals serve the needs of all affected and interested parties. This view is echoed by Smith (2003) who states that participation provides a level playing field for individual interests and personal and social development. Similarly, Webler et al. (1995) state that participation is essential for people to see the fairness in decisions made, to feel involved in the process, and to support its implementation. Conversely, they are more likely to try to stop developments if they are not well informed (Clarke 1999).

It is important to note that the responsibility for decisions is shared by both developers and stakeholders: while the first have to take into account the needs of stakeholders, stakeholders are also responsible for pursuing a balanced decision. There are requirements for effective public participation, namely: *i*) existence and efficiency of mechanisms for public participation in environmental decision-making processes; *ii*) existence and enforcement of environmental laws and regulations; *iii*) level of people’s awareness on how environmental degradation impacts their livelihoods; rule of law, meaning environmental accountability of both governments and private sector. This means that public participation can be compromised by a lack of capacity on the part of government agencies and the private sector investors to supply relevant information and lead the process of public consultation, collection and digestion of their inputs. At the same time, the public may not engage actively in the process either because it does not know its rights to environmental access or how to use them, or does not understand the full context of the decisions that affect their lives. This relates to the level of environmental awareness in a given stakeholders’ group. Environmental awareness results from knowledge gained

through one's experience, personal exposure to as well as exploration and discovery of people's surroundings and it is shaped by economic, social, professional, religious, ethnic, cultural and educational factors. Environmental awareness is important because it stimulates stakeholders' participation and encourages others to become involved (Posas et al. N.D.). On the other hand, the lack of awareness can lead to poor participation, thus allowing for avoidable negative impacts overburdening local communities who usually lack resources and expertise to cope with them.

Harvey (2010) refers to barriers to participation and cites lack of education, lack of appropriate skills, lack of confidence, lack of interest and lack of trust as concerning to cultural barriers while segregation, alienation from government, low social capital, lack of time and lack of access as being examples of social barriers. According to Smith (2003), lack of trust, results from the fact that consultation in environmental impact assessment often follows a top down approach, and mostly entails passing on information (Petts, 1999; Hickie and Wade, 1998). Participation must be based on a two way communication process between those making decisions and those affected by them.

The way the discourse is carried out between the developer or planner and stakeholders or public can very much affect the success of the participation exercise. Communication must be felt to be without coercion (Habermas 1987). We understand that when people feel recognized for their contribution, they value the data that they give and share ownership of input data and output information. This results in more reliable and accurate data being supplied during the consultation process.

Currently it is recognized that ICT plays an important role as it facilitates communication, information sharing through internet, email based on PCs and mobile communication devices allowing not only to receive but also to send ideas and data. The main problem is that both availability and access are skewed into privileged groups in a country, defining the digital divide, and geographic regions, defining the global digital divide. The ICT Policy and Strategy adopted by the government of Mozambique (Chemane 2004) addresses the global digital divide by investing in the ICT backbone, which links the Country to the world and supplies ICT access to all provinces. Internally, the government has adopted the e-Governance strategy aiming at: 1) increasing the use of ICT within the government, thus facilitating, speeding internal communication and reducing financial and environmental costs of its functioning; 2) Improving access and quality of government services delivered to the public. In this regard anchor projects are being implemented, covering: identification services; business licensing and support, land management, higher education and research institutions networking, among others.

3. Relevant theories and principles

This paper analyzes the importance of citizens' awareness of the consequences of environmental decisions associated to a new development initiative. According to the Mozambican legislation, an Environmental Impact Assessment, EIA, is a requisite for the approval of such an initiative in a participatory process in which the initiative is communicated, assessed and appraised through a consultative process. On undertaking the proposed research, the following theories and principles are relevant.

Diffusion of innovation theory – This theory explains how an innovation is communicated to and accepted by a given community. Though its roots remote to the

end of WWII, it gained visibility with the book *Diffusion of Innovations* by Rogers (1962). According to Rogers, an innovation is a product or object perceived as new by an individual, group of individuals or organization. In this regard a new development initiative can be seen as an innovation when introduced to a new community. There is a “diffusion process” by which the innovation is communicated through certain channels such as interpersonal communication or mass communication by which people can get informed about and perceive the innovation as useful. The diffusion theory follows the classic communication model introduced by Lasswell (1948) that encompasses five parts: **Sender-Message-Channel-Receiver-Effect**. For Rogers (1995), communication model corresponds closely to the elements of diffusion”. Specifically: *i)* senders can be inventors or opinion leaders, *ii)* the message can be a new idea or product, *iii)* channels can be interpersonal or mass communication, *iv)* receivers can be members of a social system, and finally *v)* the effects can be individual’s adoption or social change. Individuals exposed to an innovation respond differently with some adopting it almost immediately and others remaining reluctant with time. Based on that, five different types of adopters in the diffusion process have been identified: “(1) Innovators, (2) Early Adopters, (3) Early Majority, (4) Late Majority, and (5) Laggards”. These categories follow a standard deviation curve that is bell-shaped.

Futurology – Futurology is the study of postulating possible, probable, and preferable futures and the worldviews and myths that underlie them (Wikipedia 2012). It involves defining objectives and using a set of scientific tools, techniques and methodologies such as extrapolation, brainstorming and forecasting for importing desirable future outcomes or building scenarios and conducting normative research to explore better strategies. To that end, certain enabling assumptions and conditions are adopted, questioned and reassessed. The Environmental Impact Assessment process, EIA, falls in this category as it is defined as series of detailed studies, which predict the effects of a development project on the environment. As such, EIA is a tool used to predict environmental, social and economic impacts of a project prior to decision-making yet at a project planning and design stage, so that, the project can be shaped to suit the local environment, and alternative ways and means adopted to reduce adverse impacts.

Uncertainty theory and the Precautionary principle – Sustainable environmental management implies the commitment to safeguard the environment against potentially adverse future outcomes of some decisions. That is assured through an EIA that predicts impacts based on a given set of objectives and alternative scenarios. Information gained from the EIA studies is only certain within the studies’ epistemological and methodological limits what entails a certain degree of uncertainty about the magnitude and especially about the project’s ultimate impacts. Science is used to anticipate potential problems and find solutions rather than demonstrating impacts that have already occurred. In the environmental sciences the precautionary principle has been devised as an effective approach to dealing with uncertainty in guiding environmental regulators to rather than await certainty, act in anticipation to prevent any potential harm. We assume that, combined with Futurology, it can be used to shape the future when environmental related decisions are taken.

In this paper, the above theories were used as follow:

According to the prevailing legislation, all stakeholders must be aware of

development initiatives being planned, in order to participate in the EIA process, a futurology exercise based on the precautionary principle. A pool of experts was invited to participate in a Focus Group Interview, to help in the identification of relevant episodes as part of the critical incident analysis. Specifically, the theories were used as stated below.

The uncertainty theory and the precautionary principle - Development initiatives encompasses a certain degree of uncertainty, regarding the nature and magnitude of potential impacts. Though willing to promote development, we want to be sure that no unavoidable deleterious impacts will happen. To that end, new initiatives must undergo an EIA process, thus applying the precautionary principle under the Uncertainty theory.

Futurology is a helpful to sketch and agree upon future scenarios. In the current study future scenarios will result from the EIA process and will inform people about the possible futures and empower them not only to choose but also to adopt, and adjust the preferable future. In this regard, futurology will be used to shape the future by working on the driving factors toward the pretended objectives, avoiding unnecessary impacts.

The **diffusion of innovation theory** – it will help in the identification of individuals' different attitudes ahead of new initiatives. According to the diffusion of innovation theory, in a given group of individuals or community there are some 2.5% innovators, 13.5% early adopters, 31% early majority, 31% late majority and 16% laggards. As such, information will be prepared and presented in a professional and friendly manner i.e. adjusted to receptors group and conveyed in order to generate feedback, targeting, primarily, the innovators and early adopter groups. According to Surrey (1997), it is worth putting efforts in convincing this adopters segment that will later push for the others.

4. Research Design

Research context

The current study pretends to show the importance of citizen's awareness of environmental decisions by analyzing the legal and institutional framework for environmental decision making. Additionally, it explores the potential for ICT in fostering communication amongst stakeholders, thus contributing to higher awareness and participation. The core of the study is a focus group interview, involving environmental experts.

The majority of projects in Mozambique involve access to land and other natural as well as environmental management. According to the Constitution (Assembleia da República 2004), in Mozambique land is the property of state and is administered by government authorities at different levels and with different legal powers. Local communities have granted land stewardship along generations. In recognition, the Mozambican law determines that communities are entitled to traditional rights and must be consulted as a precondition for development settlements.

Preventing and managing environmental risks potentially resulting from development initiatives is regulated by the environmental law and its regulations. The Constitution of The Republic of Mozambique and the environmental law, adopted in 1997, define

the right to a sound environment and enforcement of the precautionary principle (EIA) through the implementation of EIA process for all projects with potential to generate significant impacts. By definition, the EIA process must be participatory, involving all relevant stakeholders including local communities. The objective of the consultations is to encapsulate views and concerns of the different stakeholders in order to minimize undesirable impacts and promote social and environmental sustainability of the development initiative. However from time to time there are complaints from some of the stakeholders, usually the local communities and occasionally some NGOs.

Research questions

For the planned research the main questions are:

- a. How can we show the importance of citizens' awareness of the consequences of environmental decisions?
- b. Who are the key players in the decision making process?
- c. Are decision makers aware of the importance of citizens' awareness of the importance of environmental decisions?
- d. Is there room for further promoting citizens' awareness?

Research approach – Methodology

The research was conducted in Maputo, the capital city of Mozambique. Mainly it was based on the focus group interview using the semi-structured approach with a list of questions given below. The interview recordings were analyzed using the critical incident method. Literature review assisted in reviewing progress in environmental related issues and ICT for development in Mozambique and globally. Few past cases were evaluated against focus interview findings.

The critical incident analysis - Critical incident analysis (Flanagan 1954) was developed by J C Flanagan in the 1940s. It consists on describing an episode of excellent performance or extreme failure (the 'critical incident'), collecting the details of the incident by asking respondents to share a story about an experience they have had and using these details for the identification and analysis of the factors that lead to its occurrence. Based on the analysis a decision can be made on how to resolve the issues on various possible solutions and finally determining that the solution will not cause further problems.

The Focus Group Interview was conducted involving officials from the Ministry for Coordination of Environmental Affairs, MICOA, responsible for drafting regulations and enforcing their implementation. Selection criteria was based on the diffusion of innovation theory according to which it is worth to start a new idea with early adopters, who can judge but are open to new ideas. In this regard, the criteria for the selection of the focus group participants were: university degree, more than five years work experience and professional activity at "expert level" as opposite to top management. All items together entitle them to make professional judgment with reduced bias margin. The semi-structured interview was based on a list of questions presented in Annex 1 and it was tested prior to the actual research. Free acceptance by selected participants was a precondition for the interviews. The list consisted of 14 questions addressing the 4 research questions outlined above. It was conducted in a flexible manner, all participants had a chance to interview (moderator controlled

dominance tendency from one or other participant). It was conducted in Portuguese, the official language of Mozambique, and recorded. The transcripts were translated and analyzed. Following the Critical Incident Technique respondents were asked to recall projects they were familiar with, deemed to have attracted attention based on their failure or high performance (critical incidents). Main issues were identified and discussed, looking into how to resolve them". Possible solutions were highlighted as well as their feasibility and efficacy assuming that it is important to *root cause of the situations*.

5. Results

In general the results of the research indicate that in Mozambique there are institutions and legislation supportive to citizens' awareness of environmental decisions. However, the outcomes of the Focus Group interview stressed that the country still lacks enforcement capabilities, due to unavailability of infrastructures and equipment and low level of human capital. Levels of literacy are part of the problem.

According to the list of questions used for the interviews (below in italics), the main findings are categorized by research questions:

Research question 1: How can we show the importance of citizens' awareness of the consequences of environmental decisions?

Is citizens' awareness of environmental decisions important for sustainable development? Why?

The participants to the focus group interview agreed that citizen's awareness is important for sustainable development. The rationale is that if aware, citizens can better contribute to sustainable management of natural resources by anticipating the consequences and influencing the decisions, in order to avoid environmental degradation. That is especially important in developing countries where the livelihoods of the majority of the population is strongly linked to the availability and quality of natural resources.

The group considered that environmental awareness must be promoted at all levels in society, from the ordinary citizen to decision makers because it has been noticed that there are decision makers whose background is from a different field who tend to overrule informing technical opinions, on pursuing economical development. They must be prepared to better realize the consequences of environmental decisions and respect technical opinions informing the decision makers.

Communication was identified as key in the awareness building process. It was equally accepted that it must be a two ways process, clearly formulated and presented, in a language familiar to the beneficiaries. Failure in some of these criteria may lead to miscommunication.

Give examples of environmental decisions that affected the lives of citizens (or will affect in the future). How did they affect and what are the risks in the future?

Focus Group participants identified two cases of projects affecting and one with potential to affect negatively the environment and generate negative social impacts as well, namely:

1. *Fumes by pass in the Mozal Smelter Company* – In late 2010, Mozal, an

Aluminum Smelter Company operating in the vicinity of Matola, the capital of Maputo Province was authorized to implement a bypass process by which, temporarily, fumes generated by the industrial process were released without the usual filter treatment. NGOs contested the measure arguably because it would cause severe damages to the environment and human wellbeing.

2. *Resettlement of citizens living in a new concessional mining area* – one mining company relocated people and supplied “improved housing” to the displaced population. There are complaints about poor compensation with focus on lack of employment, loss of access to “their land” and poor quality of the houses. What went wrong?
3. *Mpnada Nkua dam* – a dam is being planned to supply water and electricity to large areas of Mozambique- Some people are concerned about the fact that it is secure that positive economic impacts will result but they consider that there is high risk of severe social and environmental negative impacts.

How were the citizens aware of the decisions above?

It was consensual that the main source of citizens’ information is through the media. Prior to eventual problems, government authorities and investors do release information on planned investments and invite stakeholders for public consultation. However, when problems occur it is usually the media itself and NGOs who usually raise the issues and call the attention of the ordinary citizens.

Government communication was considered not effective meaning that few have access or pay due attention to information about planned or ongoing projects. As an example, it was mentioned the Ponta do Ouro Harbour Project and Circular de Maputo Project.

Quality of information was identified as a matter of concern as some participants reported that, in some cases important aspects of information that could generate contrary opinions are omitted. On the Circular de Maputo Project, taken as an example, it was referred that everyone welcomes the project but few know that it will encompass a number of toll gates. Being a vital route, are the citizens ready to pay the toll at gates? Are they financially capable? Would they be equally supportive if aware of the financial implications?

Another example was related to the Resettlement Strategy under preparation. It is a much needed instrument that will facilitate and regulate compensation of those reallocated by development projects. However its preparation has not yet been publically discussed.

One participant referred to lack of access to information as one critical aspect hindering the contribution of the media to awareness rising on environmental decisions: if they don’t have access to comprehensive and reliable information their potential to bridge investors and communities is reduced.

Public debates are seen as other way of raising awareness. However it was questioned if participants are not “conveniently selected” in order to keep discussion within predefined lines.

What are risks of lack or poor awareness? Who is affected?

The risks of lack of awareness are related to bearing the costs of negative impacts of the decisions taken. Examples refer to miss location of projects; resettlement of population without observing existing legislation; exposing people to poor living conditions (e.g: no basic infrastructures in the resettlement areas)

Poor negotiation with investors prior to project implementation. Though the projects are welcome, it is important to make sure that there is fair benefit sharing. The main issues are: What are the benefits? Who are the beneficiaries? What compensations for lost propriety (land and houses)? Are there provisions for training of the locals so that, having lost they field, can make their living by working for the project?

Participants stressed that resettlement projects must consider social aspects: In Cateme, communities were given very small houses, inadequate for their needs and WC where constructed too closely to the main house but with no tap water, no flush toilets. This poses health risks and affects the well-being of the beneficiaries.

Maputo has a transportation problem (which is self replicating in other cities) - all business and official services are concentrated down town, thus every one travels daily to down town and back what results in traffic jam, air pollution and high costs of transportation. We need better planning and decentralization of services. Some ministries should be moved out of town what would result in less mobility of the staff. Stretching salary of the family head leads to reduction of the family budget and increased poverty.

The costs of poor environmental decisions, related to lack of awareness are borne by the entire society. The local communities are directly affected and suffer the most because they lack buffer systems. However, the government is also penalized because approved legislation is not observed, infrastructures are damaged, environmental degradation and poor health result in repair and recovery costs. In addition, poor environmental decisions prompt angry from the citizens and can lead to avoidable crises of confidence. and eventually to civil arrest. For the private sector, as investor, usually it results in “poor brand name” and maintenance and repair costs.

Can you identify any conflicts between citizens’ improved awareness of environmental decisions and their effective implementation? Political, economical or social conflicts?

Lack of awareness and poor communication can degenerate in social, political and economic conflicts. Those were the cases with The Mozal bypass project and the Cateme resettlement project and with the removal of informal market barracks in Maputo City.

Research question 2: Who are the key players in the decision making process?

Which are the main institutions involved in its promotion, support and enforcement? What are the practical means? Are they effective?

Participants identified the following key players in promoting environmental awareness: government institutions – ministries (mainly Ministry for Coordination of Environmental Affairs (MICOA); Ministry of Heath (MISAU); Ministry of Science and Technology (MCT); Ministry of Education (MINED) and their provincial branches, district administrations and municipalities; NGOs and other civil society organizations.

The methods used are diverse, including use of mass media, workshops, public consultations. Internet and social networks (facebook) are emerging tools.

Research question 3: Are decision makers aware of the importance of citizens' awareness of the importance of environmental decisions?

Decision makers, taken as a class in society are aware of the importance of citizens' awareness of environmental decisions. In fact the Members of Parliament enacted laws, the Cabinet approved and is implementing strategies and regulations and new development projects are subjected to public consultation as part of the environmental impact assessment process.

Findings reveal that the Mozambican authorities are concerned with due participation of the citizens in environmental decision making. In fact official documents show that in the country a public reform process is on going, with decentralization as one of its main features, decisions are taken at different governance levels (central provincial, district and sub-district levels and public participation is required either through consultative meetings or as decentralized management bodies (Conselhos Consultivos). Environment related laws and regulation have been prepared through consultative processes and include:

Table 1. Environment related laws and regulations. L=Language; F=Format: text, images etc.; T=time for reading, interaction, seeking advice etc.

Legal instrument	How does it promote participation	Monitoring & evaluation How is it done	Use of results	When is consultation Undertaken (phase of the process)	Means for effective consultation
Land Law	Public consultation is a precondition for land allocation	Filled Report, signed by community representatives (local authorities + at least 3 community members	Positive response from the communities needed for land allocation	Prior to land attribution	L= Portuguese F=public gathering = usually not more than 15 days
Environmental Framework Law	Public consultation defined as requisite for major interventions	As for specific regulations		As for specific regulations	Not available
EIA Reg	Public consultation is the key component of the EIA process	Report must be	Public acceptance is a condition for project approval for implementation	Prior to project approval	L= Portuguese F= text T= usually not more than 15 days

However, there is need for further improvement, as recognized by the participants to the Focus Group interview. They claim that some politician adopt a top down approach “just say what they want to say and want to see happening”. They don't

invest in communicating with experts or communities. Enforcement of Public Consultation regulation is seen as poor because, as declared by one of the participants “if a régulo (traditional chief) agrees/sign a proposal, then it is assumed that is approved, independently of the views of other members of the community”.

According to the participants, decision makers should prevent themselves from overruling valid technical opinions.

On the other hand, populations “throw it into the air” knowing that someone will listen, soon or later. In Cateme, Tete Province it happened that communities complained during extended periods before corrective measures were taken, what eventually happened after public manifestations.

To create a common understanding and raise awareness, when the environmental authorities have an opinion recommending cancellation or significant revision of a project, they call the technical advisory commission which advises the investor on the required changes if a project has to be continued. However, some of them instead of accepting the advise, tend to encourage the officials to allow project implementation because “they are helping us in the development of the country”. Here is a strong link with poverty.

Research question 4: Is there room for further promoting citizens’ awareness?

How can we strengthen the institutions in the task above?

By improving their institutional capacity. Training is the key: experts are not sufficiently prepared to sustain their own positions: A decision taken, with objection from NGOs and experts, most likely will not be implemented if arguments are adequately presented.

In addition, experts need training in communication. Are we able to brief communities? To inform them about what will happen to them and their land, before it happen? Not sufficiently. There is need for training in awareness raising and communication skills.

In project design there is need to consider the local context and social aspects, especially when sensitive issues like resettlement are involved. “what worked for Mozal wasn’t satisfactory for Cateme”.

Integrated management – depending on their interest, institutions do reply or not: MCT pretends to build a laboratory and so do the new Agência de Qualidade Ambiental, under MICOA. There is need for harmonization as both are part of the same government.

Describe the access that the citizens in the above examples had to ICT (for example, own or shared mobile phones, access to a Community Multimedia Centre or similar). How were they using ICT for getting aware of the decisions? What were the bottlenecks preventing the use of available ICT?

It was assumed that ICT (understood as all electronic means of communication, including TV, internet and cell phones) were used. One participant said that TV is expensive and all agreed that email, sms through mobile phones are not only cheaper but also provide real time communication.

Compromising factors include lack of awareness on the capabilities of the new technologies, lack of funds to buy use and access to ICTs.

How could better ICT access have promoted the citizens' awareness of the decisions?

Improved Access could be of use. To justify that, it was said that ICTs are being used in the following cases: Pesticides registration; food security; natural disaster management and environmental information sharing. With increased access, more people would use the technologies and information related to environmental decision could be shared and discussed. Even the quality of face to face discussions, during public consultation could benefit.

What is the citizens' own role in demanding (the use of ICT for) a better awareness of environmental decisions?

Increasingly ordinary citizens are demanding access and making use of ICTs. Given examples were: the TV debates on the navigability of River Chire was advertised (and participants mobilized) through mobile phones. Similarly, people to invite each other to mass pro-health gym exercises through mobile cell supported sms.

What kinds of differences can you identify between various groups of the society (young/old, low/middle/upper class, non-educated/professional/academic, city/suburban/rural) in their demanding (a) an improved awareness of environmental decisions and (b) the use of ICT in this task?

Differences related to level of literacy, poverty and education. Accordingly, youngsters tend to use more and better ICTs, because they have better education; medium class tend to be more educated and are economically better off than the lower class the some happening with urban dwellers, if compared to semi-urban and rural fellows. Uses of ICTs tend to be oriented to specific needs of each group. As such, the use for environmental management can be expected from professional and academics and less from richer, older people even if detaining access to tools.

Need to educate environmental officials to realize the potential benefits of ICTs including the CMCs, which are close to the rural citizens. Capacity building must include inputs to program preparation.

How do you understand citizens' awareness of environmental decisions as their human right? How can related ICT solutions or tools promote their digital human rights?

At least ICT are civil rights. They are basic need for improved working conditions because they introduce savings in costs, time, paper, tonner, etc. They facilitate communication access to Human rights and services.

They are closely associated to human rights: by supporting environmental management, the guarantee the right to live in a sound environment as prescribed in the Constitution.

ICT must be part of institutional priorities. Based on e-Government strategy, they should contribute in awareness rising.

6. Discussion

Mozambique is a booming country with a fast growing population and a wealth of natural resources ranging from natural forests, coastal ecosystems and minerals. To meet social and economic development, an ever increasing number of projects is being submitted, approved and implemented. The country is part of most multilateral environmental agreements and cooperates with global and regional organizations in fulfilling the MGDs, Human Rights and sustainable development approach. In this regard the country has approved the Environmental Strategy for Sustainable Development (EADS) (Governo de Moçambique 2007) and the Mozambique Strategy of Science Technology and Innovation (MOSTIS 2006). EADS promotes environmental awareness, and public participation in the decision making process, in order to prevent environmental degradation and concur to sustainable development. MOSTIS fosters the massive use of ICT as a crosscutting and enabling technology.

Sustainable development requires citizens' awareness and their effective participation in consultative processes. It is recognized that communication is essential for awareness raising and improved participation of all stakeholders. To that end the existing governmental institutions, NGOs and other partners are implementing awareness raising and communication activities.

To be effective, communication must be bidirectional, meaning that both parts must have opportunity to listen and voice their views. In this regard ICTs have a strong role to play because they can guarantee ideas' presentation and feedback on real time, thus building confidence and partnership among stakeholders. The sense of ownership is high when people feel that their opinions are important and often help in overcoming social and cultural barriers (Table 2).

Table 2. ICTs for overcoming barriers.

Barriers and their features		Potential technology based solution
<u>Cultural barriers</u>	Lack of education	<i>e-education</i>
	Lack of appropriate skills	<i>Language learning; mobile in service training; Mentoring to learn professional skills</i>
	Lack of confidence	<i>Networking through mobile devices is crucial; technology mediated reward and recognition by the people you advise (e.g: beneficiaries of a tourist e-guide)</i>
	Lack of interest	<i>Feedback can mobilize participation by promoting transparency and showing shared benefits for all</i>
	Lack of trust	<i>Recognition. collaborative technology – you trust some authority</i>
<u>Social barriers</u>	Segregation	<i>ICT are instrumental in connecting people (as opposite to segregation); ICTs are collaborative technology (e.g: robotics create a “working together” opportunity)</i>
	Alienation from government	<i>ICT makes interaction with government possible (In particular, through mobile – interactive e-government); supplies feedback and promotes participation.</i>
	Low social capital	<i>Social media is an equalizing technology : matters what you say; networking – connected to many independent or poor or rich</i>
	Lack of time	<i>Speed of communication by mobile phones</i>
	Lack of access	<i>Distribution of cheap mobile phones</i> <i>Subsidized sms – free access and even reward people with air time-possible role for the environmental fund</i>

However, the use of ICTs for environmental awareness and participation in Mozambique still has to overcome a number of difficulties. Access and affordability of ICTs are still limited and in consequence the coverage is equally limited; general and ICT illiteracy are high what means that message contents must be carefully prepared and eventually tailored according to specific groups. All combined, Mozambique has not yet ICT as an important tool for environmental awareness and public participation in environmental decision making what may be affecting the perception to other civil rights.

7. Conclusion

Based on the results of the study, we conclude that citizens' awareness of the consequences of environmental decisions is a requisite for sustainable development. Being aware allows citizens to effectively participate in public consultation inherent to the environmental impact assessment process that in Mozambique - and globally- is mandatory for all major projects with potential to generate significant deleterious impacts to the environment. The study indicates that communication is key to awareness rising and ICT, due to its crosscutting and enabling nature, has a role to play in supplying timely and effective bidirectional communication, thus improving the quality of participation. Challenges identified recommend for further studies on how to promote increased use of ICT and specialty mobile ICT platforms for awareness raising. In this regard we intend to undertake further research including interviews not only in Maputo but in other provinces in order to capture other perceptions and needs. Affordability and visualization as a way overcome literacy and language skills are among our key priorities.

References

Assembleia da República 2004. Constituição da República de Moçambique. Boletim da República. Maputo: Imprensa de Moçambique.

Chemane, L 2004 Mozambique ICT Policy Implementation and e-Government – Challenges and Opportunities Moçambique <http://unpan1.un.org/intradoc/groups/public/documents/cafrad/unpan006472.pdf> Last accessed May 2012.

Chopra, K., Kadekodi, G.K. 1991. Participatory Institutions: The Context of Common and Private Property Resources. *Environmental and Resources Economics* 1: 353-372.

Clarke, R. 1999. A Primer in Diffusion of Innovations Theory. <http://www.rogerclarke.com/SOS/InnDiff.html> Last accessed May 2012.

Flanagan J.C. 1954. The Critical Incident Technique. *Psychological Bulletin* 51(4): 327-359.

Governo de Moçambique 2007. Estratégia Ambiental para o Desenvolvimento Sustentável. Maputo: Conselho de Ministros.

Habermas, J. 1984-1987. The Theory of Communicative Action. Cambridge: Polity.

Harvey A. 2010. Public participation: Theory and practices. http://www.heritagecouncil.ie/fileadmin/user_upload/Events/CPD_May-10/Alison_Harvey_Public_Participation.pdf Last accessed May 2012.

Hickie D, Wade M. 1998. Development of guidelines for improving the effectiveness of environmental assessment. *Environmental Impact Assessment Review* 18 (3): 267–87.

Kerkhof, M. van de 2007. Participation in environmental governance and assessment - Institute of Environmental Studies – IVM- University of Amsterdam
http://www.glogov.org/images/doc/2007_Kerkhof.pdf. Last accessed May 2012

Lasswell, H. 1948. The structure and function of communication in society. Ed. Bryson, L. The Communication of Ideas, 37-51. New York: Institute for Religious and Social Studies.

MOSTIS 2006. Mozambique Science Technology and Innovation Strategy. Maputo: Conselho de Ministros.

Petts, J. 1999. Public Participation and Environmental Impact Assessment. Ed. Petts, J. Handbook of Environmental Impact Assessment. Oxford, UK: Blackwells.

Posas P. and Fischer T. N.D. Organisational behaviour and public decision making in the EA context. <http://www.twoeam-eu.net/handbook/03.pdf> Last accessed May 2012.

Rogers, E.M. 1962. Diffusion of innovations. 1st ed. New York: Free Press.

Rogers, E.M. 1995. Diffusion of innovations. 4th ed. New York: Free Press.

Smith J. 2003. An Investigation into the Theory of Public Participation in Environmental Impact Assessment Applied to a Case Study in Coastal Management Planning.

Norwich: School of Environmental Sciences, University of East Anglia.
http://www.uea.ac.uk/env/all/teaching/eiaams/pdf_dissertations/2003/Smith_Jacqueline.pdf Last accessed May 2012.

Surrey W. D. 1997 Diffusion Theory and Instructional Technology. University of Southern Mississippi - <http://www2.gsu.edu/~wwwitr/docs/diffusion/> Last accessed May 2012.

United Nations World Commission on Environment and Development 1987. The Brundtland Report.

Webler T., Kastenholz H. and Renn O. (1995) Public participation in impact assessment: A social learning perspective. *Environmental Impact Assessment Review* 15 (5): 443–463.

Wikipedia – Future studies - http://en.wikipedia.org/wiki/Futures_studies Last accessed May 2012.

World Resources Institute 2003. A Guide to World Resources 1996-97

Annex 1: Guide for the Focus Group Interview

How can we show the importance of citizens' awareness of the consequences of environmental decisions?

- Será que a consciência dos cidadãos sobre as decisões ambientais é importante para o desenvolvimento sustentável? Porquê?
- Dê exemplos de decisões ambientais que afectam/afectaram ou podem afectar a vida dos cidadãos. Como é que afectam/afectaram a vida dos cidadãos? Que riscos existem de impactos futuros?
- Como é que os cidadãos ganharam consciência (ficaram cientes) das decisões acima?
- Quais os riscos da falta ou de uma limitada (fraca) consciência ambiental? Será que a consciência ambiental pode constituir risco? Para quem?
- Pode identificar alguns conflitos decorrentes de uma elevada consciência ambiental (inerentes à sua implementação efectiva)? Ocorrem conflitos de natureza social, política, económica?

Who are the key players in the decision making process?

- Quais as principais instituições envolvidas na promoção, suporte e implementação da consciencialização ambiental? Que meios práticos usam? São eficazes?

Are decision makers aware of the importance of citizens awareness of the importance of environmental decisions? / A consciência dos cidadãos sobre as consequências das decisões ambientais é legalmente promovida em Moçambique. Concorda? Como? Is there room for further promoting citizens' awareness?

- Como podemos reforçar as instituições na realização das tarefas acima? How can we strengthen the institutions in the task above?
- No caso dos exemplos acima mencionados, descreva o acesso do cidadão às Tecnologias de informação e Comunicação, TICs (por exemplo com base na posse ou partilha de telefones celulares, acesso a Centros Multimedia Comunitários ou similares). Como é que eles usaram as TIC para aceder às decisões? Que constrangimentos limitaram o uso das TICs existentes/disponíveis?
- Como é que um melhor acesso às TICs poderia ter contribuído para melhor consciencialização do cidadão sobre as consequências das decisões com impacto ambiental? Poderiam as TICs adicionar valor aos mecanismos correntes? Como?
- Qual o papel do próprio cidadão na demanda (do uso das TICs) para uma melhor consciencialização sobre as decisões com impactos ambientais?
- Que diferenças pode identificar entre os vários grupos da sociedade (jovens/velhos, classe baixa/ média/ alta, não escolarizados/ profissionais/ académicos, urbanos/periurbanos/rural) na sua demanda por uma melhor consciencialização em relação às consequências das decisões ambientais? E no uso das TICs para o efeito?
- Como concebe a consciencialização dos cidadãos sobre o impacto das decisões ambientais, no quadro dos direitos humanos? E no quadro dos MDGs?