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Environmental knowledge and attitudes: does it differ in urban and rural areas?

Master Thesis

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Prague 2016

Assignment

Declaration

*"I hereby declare that this thesis entitled "*Environmental knowledge and attitudes: does it differ in urban and rural areas?" *is my own work and all the sources have been quoted and acknowledged by means of complete references."*

In Prague, 20.4.2016:

……………………………………….

Mathy Sané

Acknowledgement

ABSTRACT

Environmental education plays an important role in the preservation and protection of biodiversity but also on the environment. It is for this purpose that the thesis aimed to assess the environmental knowledge and attitudes in school children in urban areas and those in rural areas in three regions of Senegal. This evaluation is focused on interviews with teachers and questionnaires administered to children. On the basis of 786 questionnaires collected in 19 schools including 7 in rural area (317 responding children) and 12 in urban areas (448 responding children), I found that children in rural area had higher environmental knowledge in comparison to those in urban areas, and it was also higher in boys than in girl with the same pattern in rural and urban areas. The level of environmental knowledge did not depend on the age of responding children. Concerning environmental attitudes, children expressed mostly similar attitudes in rural and urban areas and these were mostly negative towards environment. Regarding such results, it is recommendable to address the environmental issues through environmental education programs in order to get better knowledge and to build pro-environmental attitudes. The informal environmental education programs can provide opportunities for schools to improve their knowledge, interests, motivation and encouraged to adopt new attitudes towards the environment. The environmental education increases with theoretical and practical experience.

Keywords: Environmental Education, Environmental Awareness, Biodiversity conservation

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1. INTRODUCTION

The environment is made of essential elements for the survival of all living organisms (beings) on earth. That's why man had to adapt to this environment in order to improve his living conditions. Thus, he uses nature for food and for protection as well as healing himself. The new techniques thus discovered have helped him modify his environment that leads to a mastery of his living conditions. These changes impacted profoundly on nature and the living organisms leading to the scarcity of biodiversity due to the destruction and degradation their habitats.

During the last 40 years, there have been many important changes in the ecosystems. For example, forests have seen their surface areas considerably reduced to 5.2 million hectares per year between 2000 and 2010

This deforestation is worsened by the bad agricultural practices, soil erosion and salinization. Besides, human activity affects the climate of the planet. A report of the World Bank foresees a warming between 1.5 and 2 °C by 20 à 30 years. This causes droughts and dryness to turn 40 to 80 % farming land inappropriate for growing maize, millet, and sorghum in the horizon 2030-2040(WB, 2012)).

Developing countries are in general the least capable and the least willing to take into account the question environment protection, because their priority is essentially to ensure the satisfaction of fundamental immediate needs of the populations. Equally, the challenge for Africa is in the management of forests is to face problems of bad governance that are plaguing forestry actors and the use of environment protection for other purposes.

In Sub-Saharan Africa, the question of food security is still a crucial challenge owing to drought risks, flooding and the changes in the precipitation regimes (World Bank, 2015).

Senegal, a West African country, located in the tropical climate area of long dry seasons (Pélissier, 2008), presents a rich ecosystem biodiversity that is under important degradation followed with many endangered species (DPN, 2010).

This loss of biodiversity is linked to food, medicine, industry and energy needs that interact with other anthropic factors of degradation that are bush fires, extensive grazing, over-cultivation, fragmentation and the destruction of the habitats.

In addition, there are other environmental factors like rainfall deficit, erosion and salinization. This loss of diversity constitutes a serious obstacle to the struggle against poverty that explains besides, in large extent the overexploitation of natural resources. In such contexts,

environmental education becomes a fundamental weapon, a must for limiting the risks and reducing the threats.

Before the global crisis of natural resources exhaustion and ecological changes, it is mandatory to set up programs of concrete and efficient actions for reducing immediately the destructive environmental and societal impacts and to opt for responsible behavior.

1.1. Environmental education

Education is general used by man as a means for having an informed choice on his responsibilities, and for learning all along his life, without barriers, whether they are geographical, political, cultural, religious, linguistic, or sexual on his future. Environmental education is the key process that will help us reduce the risks of the degradation of nature. It is supposed to answer to the environmental issue. That is the global crisis of the exhaustion of resources and ecological change. This learning is a means given to everyone for building peaceful societies and for protecting the planet (UNESCO, 2014).

Environmental education is according to the report of inter-state conference of UNESCO-PNUE at Tblissia process of development of the world population that is aware and concerned with the global environment and related problems, and who has the **knowledge, competence, attitude, motivation and commitment** to work individually or collectively to the resolution of present problems and prevent future ones (De Lavega, 2004).

The objectives of environmental education are following: Sensitization which helps social groups and individuals acquire awareness and related environmental issues; Knowledge: to help social group and individuals acquire a variety of experiences, a basic background and related issues; Attitudes: to help social group and individuals acquire a set of values and feelings of concern for the environment, and the motivation to participate actively to the improvement and the protection of the environment; Competences: to help social groups and individuals acquire competences in order to identify and solve environmental issues.

In Senegal, the integration of the protection of the environment and natural resources is testified by its adhesion in most of the treatises and the international conventions on the environment and on the other part the adoption as early as 1983 of the first law on the environment. In this text it clearly stated the national will to make of the environment of education a lever, a means for taking over environmental challenges. In fact, article L7 of the said code stipulates that:

"The state guarantees to all the citizens the right to an environmental education. In that purpose, the public and private institutions in charge of education, research or communication

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should participate in the education, the training and the sensitization of populations on issues of environment: 1) by integrating in their activities programs that allow ensuring a better knowledge of the environment; 2) By encouraging the empowerment of actors"

That is the concern to go through the educational system to bring solutions to environmental issues and beyond all to build sustainable development is fully effective. It is in that context that evolved the CEFE (Cell for Environmental Education and Training) as a technical branch of the ministry of environment in 2000.

It's in fact today that it is witnessed initiatives everywhere in the country through sensitization campaigns, reforestation, activities environment clubs in school institutions.

CEFE of the Ministry of Environment and Sustainable Development seeks actions for the perpetuation of "school gardens" in schools. It aims at teachers, local elected officials, local community organizations and associations.

The environmental education is a process that allows permanent training for all social categories at school and beyond the school. It aims at empowering educators namely teachers on environmental education, in order to disseminate values to children mainly within school institutions as part of the creation and the materialization of school gardens.

Its objective is to contribute into the improvement of living and learning conditions of students, then allow teachers to an experimental area in order to participate to the training of citizenship awareness.

It aims at human being, mainly the young for solving the degradation of the ecosystem and environmental issues. It adds to it the Program of Reinforcement and Strengthening of Assets (PRSA)

- The improvement of the follow up of the reinforcement of environmental sensitization and education on the environment.
- The restoration of the ecosystems and the improvement of the instruments of sustainable management and control of natural resources with the Great Green Wall, the national reforestation campaign.
- The reinforcement of technical skills and intervention of actors in the management of natural resources with the reinforcement of the intervention capacity of the local comity for the fight against fire bushes, the design and the implementation of national policies for wetlands and ensuring the promotion of green employment and partnership.

- The sustainable management of degraded land and the participative conservation of soils.
- The rehabilitation of the ecosystems of the mangrove, national parks, fauna in the classified forests (Ministry of Environment of Senegal, 2015)

1.1.1. Knowledge and attitudes

Knowledge and attitudes play an important role on students and its impact will have all along their life inside and outside the classroom. The level of knowledge are important for lower-age children and the levels of attitudes are important throughout the education career (Palmer, 2002).

Knowledge is gained through experience and the understanding of the environment and its issues (De Lavega, 2004). Environmental knowledge is acquired throughout time and can be drawn from the media, school, parents, friends, the background where we live, reading as well as personal experiences. This knowledge is observable throughout the behavior of the individual.

Attitudes help students acquire values, feelings of motivation towards the environment but also to be committed and participate into the maintenance and improvement of their environment (Braus and Wood, 1993) That helps prepare mentally the students and put a dynamic pressure on their environmental behaviors. An attitude is a vitality fuel that identifies desire and passion? It is a state of individual awareness towards values that reflect a strength, quality, a better equipped mindset. It characterizes a person. The child does not come to the world with attitudes. He acquires them through socialization with parents, his peers, school, culture, religion, and the media. An individual can't have attitudes towards an object only if he meets it or receives information on that object. The attitudes are built through life in childhood, teenage (Perloff, 2010).

We can equally note a clear improvement of knowledge and attitudes related to the environment in children having benefitted from an environmental education contrarily to those who didn't get any (Rakotomamonjy et al., 2014).

The teaching of attitudes built through ecological schooling should be interpreted as necessary knowledge for understanding the interconnection and the attitude for caring attendance has insisted on the notion of sensitization as the ultimate strong matrix that stimulates knowledge. The acknowledgement that an environmental issue exists implies to be more aware of the facts regarding the states of the environment. This degree of sensitization on environment

calls for a personal commitment to work for the resolution of environmental problems. He has underlined the power behind the acknowledgement factor by classifying three levels of awareness: fundamental belief in environmental issues, factual and scientific knowledge and a commitment to the resolution of environmental problems.

1.1.2. Factors that could influence environmental education

Some factors like the social position, age, and the degree of education, parents, and even the sex can influence environmental awareness.

Level of education

Studies in America have shown that the degree of schooling or education of people can influence on the level of knowledge in environmental education.

The impact of education and the knowledge as a component of environmental literacy have been recently studied(Tikka et al., 2000).A significant difference in the attitude towards the environment has been observed within all the groups of students representing the different major colleges.the children in urban area are more likely to have a good quality of education and to finish their schooling than those who are in rural area because of possibility to find easier acces to school(Montgomery,2005).

Hausbeck, Milbrath and Enright (1992) have concluded sensitization and concern scores were significantly higher than the degree of knowledge among high school students. They related the results to the fact that the main source of information on the environment is electronic media.

Age

Liefländer and Bogner(2014) have noticed that the youngest students had more pro-environment behaviors than oldest students. That can be explained by the fact according to Piaget children between 7 and 11 are at the stage of concrete operations and are oriented by role models (parents, teachers) while their oldest peers are yearning for emotional autonomy and have the tendency to challenge authority.

Gender

The sex factor is a major determinant. It enables to notice that men have better environmental knowledge and behaviors than men.

Environmental education could have a positive effect on the participation of women in scientific profession. Nowadays, there are twice more men in the profession related to sciences. The gender difference in the teaching of sciences and its related professions can reflect on the different performances on environmental questionnaires(Coyle, 2005)

Women express generally a more positive behavior towards the environment than men. Maybe, the higher level of environment protection of women and their lower level of knowledge on environment could be put together in a dynamic way. If this high level of interest is captured and supported, environmental education will reverse the present tendency by encouraging and favoring more female scientists (Coyle, 2005).

Zelezny & al (2000) have shown that there is a difference in the environmental behaviors between sexes. Women present stronger environmental behaviors, higher level of socialization and social accountability.

In 1998, the national newsletter on environmental knowledge, attitudes and behaviors reported that women more susceptible than men to adopt the current rules on the protection of the natural environment and are conscious of their well-being and that of the biosphere Four of the studies that are implemented in the New Environmental Paradigm have shown that women have expressed more concerns than men and two studies haven't shown any significant difference. (De Lavega, 2004).

Socio-economic factors

The socio-economic status influences environmental knowledge and attitudes. Those with a weak socio-economic status perceive less environmental threats than those with a higher socio-economic status (Morrone et al., 2001) This claim is defended by Worsley & Skrzypiec (1998) , who conclude that children from the weak socio-economic background have expressed more attitudes towards the exploitation of the environment than those from the higher socio-economic background.

Villacorta, Koestner and Likes (2003) have noticed that that individuals adopt environmental behaviors if they have received an education from their parents and showed more interest for behaviors being developed on the environment, and decision-making on the environment.

Socio-cultural background

During the last decades, environmental education has considerably developed in both rural and urban areas. This education aims at teaching to individuals' knowledge and attitudes, how

to behave and live in their environment while taking into account the interactions between factors they embody.

De Lavega (2004) has shown that there was a difference between the urban and the rural background. Both in rural and in urban areas men and women don't have differences in terms of environmental education.

1.1.3. Role of target group selection for environmental education in Senegal

Formal education in Senegal is compulsory for children aged 6 years till 17 years and ends with a bachelor's degree. The age of children, however, vary a lot, specifically rural areas, and there are many children attending school level at higher age than expected. This is frequently due to delayed start of primary education or multiple doubling of school classes(Montgomery and Hewett, 2005). Children are sent late to school because in some rural schools are within a few kilometers of the village or by foul means or by lack of specialized schools for children with some disability or illness.

The child's education is very important because the child is the adult of tomorrow. And it's important to think about transferring knowledge-based age.

When we look to the future, there are many uncertainties about what will be the world of our children, our grandchildren and the children of our grandchildren. But we can be sure at least one thing: if we want that the Earth can support the needs olf human beings who inhabit it, human society will then be transformed. Thus the world of the future will be fundamentally different from the one we know today. We must work to build a sustainable future (UNESCO, 1977).

Children have great influence on the expenditure of the family home, their purchasing power is therefore a result and are now a target of importance for experts in marketing and communications. They not only benefit from greater autonomy in their home, a greater decision-making power over previous generations but also a power to annoy their parents. This power is to harass the parents until the children get what they want. It seems to work relatively well since children have, in fact, an important influence capacity with parents. Today's society promotes the guilt of parents who are often forced to limit the time spent with their children. Their absences are often offset by the purchase of products for children. The marketing experts and communications have understood.

At 8 years old, children are able to tell the difference between a TV program and a commercial. Besides, the school becomes a particularly attractive medium for advertisers.

Companies provide the technical equipment at a lower cost and still others offer health kits to promote good eating habits in exchange for advertising space in the school. It must be said that the school offers a great way to target youth.

Children are particularly vulnerable as captives and very impressionable. On the environment, the experts adopt the same strategies to inspire new ways of thinking and living based on the principle of protection of natural resources. Increasing environmental awareness initiatives aimed at young audiences, particularly alerted. The challenge is to ensure that children develop a report favoring the environment (Beuille, 2012).

Madagascar A study showed that a year after training children to the environment, there has been an increase in their environmental knowledge and had pro-environmental attitudes. There was also a positive impact in the behavior of their parents who have had to learn the experience of their children, which resulted in increasing the level of awareness of parents on the pro-environmental education (Rakotomamonjy, 2014).

Education allows children to consider and build a secure future.

It is also the key to a better life for all children but also the foundation of any strong society .

1.2. Environment and biodiversity in Senegal

To evaluate environmental knowledge and attitudes in rural and urban areas, it is important that to make a general overview of the biodiversity and certain policies of protection of Senegalese biodiversity.

1.2.1. Physical framework of Senegal

Senegal is located in the extreme west of the African continent between 12 ° 20' and 16 ° 40' North latitude and 11° 20' et 17° 30' West longitude (Figure 1). It is bordered by the Islamic Republic of Mauritania, in the East by Mali, in South by the Republic of Guinea and Guinea Bissau and in the West by the Atlantic Ocean. In the climatic plan Senegal stretches between the Soudanian areas at the Centre, the Sahelian in the North and the Sub-guinean in the South with a coastline of more than 700 km long.

This determines favorable conditions for diversification of ecosystems and species, but the issue of food security still remains as the ultimate challenge, because of the risk of drought, flooding and changes in precipitation patterns (World Bank , 2015).

Figure 1 : The geographical situation of Senegal in the West Atlantic region (Source : https://www.google.cz/maps/@15.9021467,-22.4951809,2462369m/data=!3m1!1e3)

1.2.2. Socioeconomic framework of Senegal

The resident population in Senegal is estimated at 13,508,715 inhabitants, 49.9% men and 50.1% women with an area de196712km². It's a very young population. The average age of the population is 22.7 years and half of the population is 18 years (median). The rural population is younger with a median age of 16 (against 21 in urban areas). This is probably due to rural exodus which usually concerns young adults from rural areas. The resident population is mostly rural with 54.8% against 45.2% urban. In terms of spatial distribution, there is a disparity in the settlement of administrative districts (regions and municipalities) in the country. The region of Dakar, with 3,137,196 inhabitants, is by far the most populous region, while the Kedougou region is the least populated with 151 715 inhabitants.

With a national average density of 69 inhabitants per km², Dakar is also the region where the population concentration is more intense with 5739 inhabitants per km² against only 9 people per km² in Kedougou. The rate of the population growth is 2.6%, and GDP was 4.5% in 2014 (World Bank, 2015).

Senegal is a developing country with relatively good living conditions as compared to Western countries in Africa. However, the problems of hygiene, sanitation and access to drinking water remain. In Senegal pollution is a serious environmental problem, especially in the capital, Dakar, causing diseases, food hygiene problems, but also the deterioration of the living environment. The dust particles suspended in the atmosphere are the main source of air pollution. This pollution is exacerbated by human activity, dust from the Sahara and greenhouse gases. In terms of emissions of greenhouse gases, the energy sector emits alone 49% followed by the agricultural sector 37% (ANSD, 2016).

Compared to the state of morbidity and the hygiene of individuals, the results show that just over 47 out of 100 of the surveyed people reported having a disease or any health problem during the four weeks preceding the survey. We note, moreover, that the majority of Senegalese (96.6%) is used to hand washing. Regarding sanitation, the survey shows that over 35% of the Senegalese households discharge their septic tanks with an automatic pump. In addition, most of the households, or 60.5%, uses the street, road or nature as the main mode of disposal of their wastewater.

The level of education, the gross enrollment ratio (GER) in primary education is 84%, while the net enrollment rate (NER) is 61.4% and that these rates fall as we go into the graduate level. In addition, the average contribution of a household to the education of its children amounts to 83,190 CFA francs. For vocational training, the results indicate that 87.5% of people have no vocational training. As for the level of literacy of the population, it is estimated at 52.9% with significant differences by gender: 64.4% of men against 43.3% in women.

The unemployment rate for people 10 and older is estimated at 13.0%. Regarding the population of 15 and older, the unemployment rate is estimated to 13.4% in 2015. Unemployment is higher among women (16.7% against 9.5% for men). Depending on the place of residence, the unemployment level is higher in other urban centers (17.2%) than in rural areas (10.8%). In Dakar the capital, the level of unemployment is 13.8%. Regarding the level of study, people who don't have a degree represent 40.1% of the unemployed. (ANSD, 2015)

1.2.3. Biodiversity in Senegal

Senegal is a country that is located in West Africa between 12 ° 20 'and 16 ° 20' North de latitude et 11°30' et 17°30' de longitude ouest. It is in the tropical climate zone with a long dry season, divided into six eco-geographical zones and has four major ecosystem types:

terrestrial, river and lake ecosystems, marine ecosystems and coastal and individuals called ecosystems. In addition to this ecosystem diversity, Senegal has high species richness with over 3,500 plant species and 4,330 animal species. These plants, 33 are endemic species (DPN 2010). However, most ecosystems are experiencing significant deterioration and several species are threatened.

Senegal presents a great ecological diversity including six major geographical eco-zones that are the southern forest area, the eastern Senegal area, the groundnut basin, the Niayes area, the pastoral zone of Ferlo and the Senegal River Valley (Figure) which are subdivided into ecosystems: terrestrial, fluvial and lacustrine ecosystems, marine and coastal ecosystems and special ecosystems.

Ecosystems in Senegal

- Terrestrial ecosystems: savannahs, steppes, and forests

Savannahs: they are savannahs with trees, shrubs and woodlands that cover the central regions. The trees and shrubs of the savannahs in the north consist of woody species.

Figure 2: Savannah trees and shrub
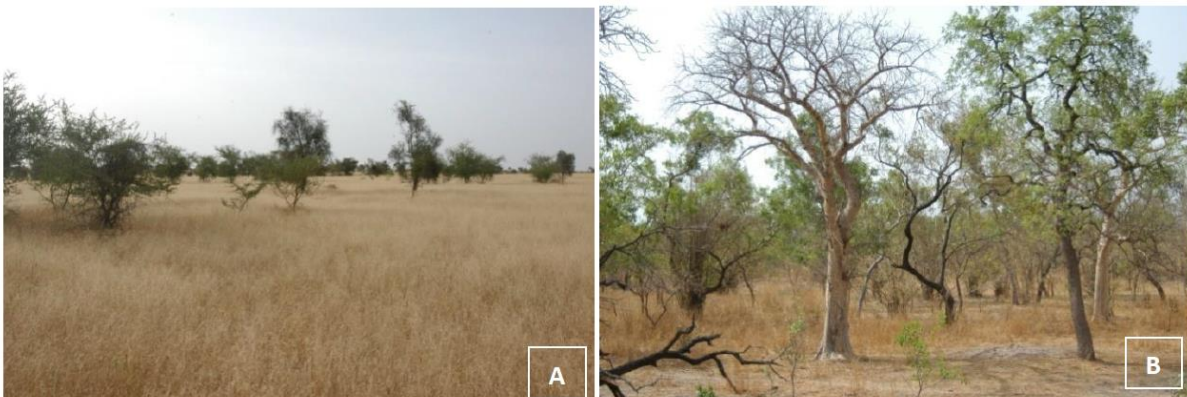
The steppes: they are found the northern third of the country and consist of a grass cover.

Figure 3: steppes in ferlo area

Forests: forests are usually found in the southern part of the country with woodland, dense dry forests and gallery forests. The forest area includes; 213 classified forests of 6,237,648 hectares of total area, of which 20 are forestry and pastoral reserves (1,514,000 ha), 8 zones of hunting interest (1,976,315 ha), 10 national parks and integral and special reserves which cover an area ha to 1,613,790, or approximately 8% of the country(USAID, 2014).

Figure 4: Clear forests

- The river and lake ecosystems: they consist of rivers and lakes.

Senegal is crossed by five rivers and river systems that are: the Senegal, Saloum, Gambia and Casamance. The Senegal River is the most important water resource in the country with an area of 290 000 km2, including 27 500 km2 in Senegal. In addition to these rivers and, lakes, Senegal has the largest system that are: Lake Guiers and Tamna lake located in the north and central west respectively.

Figure 5: The Senegal river

- The marine and coastal ecosystems: deltas and estuaries are the river Saloum and Casamance, they are characterized by mangroves, mosaics of sandy islands and lagoons.

These ecosystems are full of migratory species and sedentary species like mammals, fish, shrimp, crabs, oysters, shellfish (DPN, 2010).

Figure 6: Nothern coastline and mangrove

Specific ecosystems: they are ecosystems of the Niayes and Djoudj. The Niayes lare ocated on the north coast is a coastal wetland that is rich in affinity Guinean flora. They cover an area of about 2759 km, extending over a length of 135 km along coast with vegetation typical of the Guinean area. Djoudj located at the Senegal River delta, this species such as *Acacia nilotica*, *A. tortilis*, with also a variety of birds, reptiles, amphibians and mammals. Built in national park for birds, Djoudj hosts a large population of birds including flamingos and white pelicans (DPN, 2010).

<u>Plant and animal species</u>

Senegal has a high species diversity with over 3,500 plant species and 4,330 animal species. The main families of the flora of Senegal are dominated by herbaceous species that constitute over 50% of the flora. The grasses and sedges totalize 473 herbaceous species, more than 18% of the total number of flowering plant species encountered in Senegal. Senegal's fauna is relatively diverse because of the diversity of ecosystems and habitats. About 4330 species have been identified. Figure 10 below, which provides guidance on the number of species distributed in different taxonomic groups shows a clear predominance of insects followed molluscs and birds (DPN 2010).

Figure 7: Species distribution

Source : https://www.cbd.int/doc/world/sn/sn-nr-04-fr.pdf
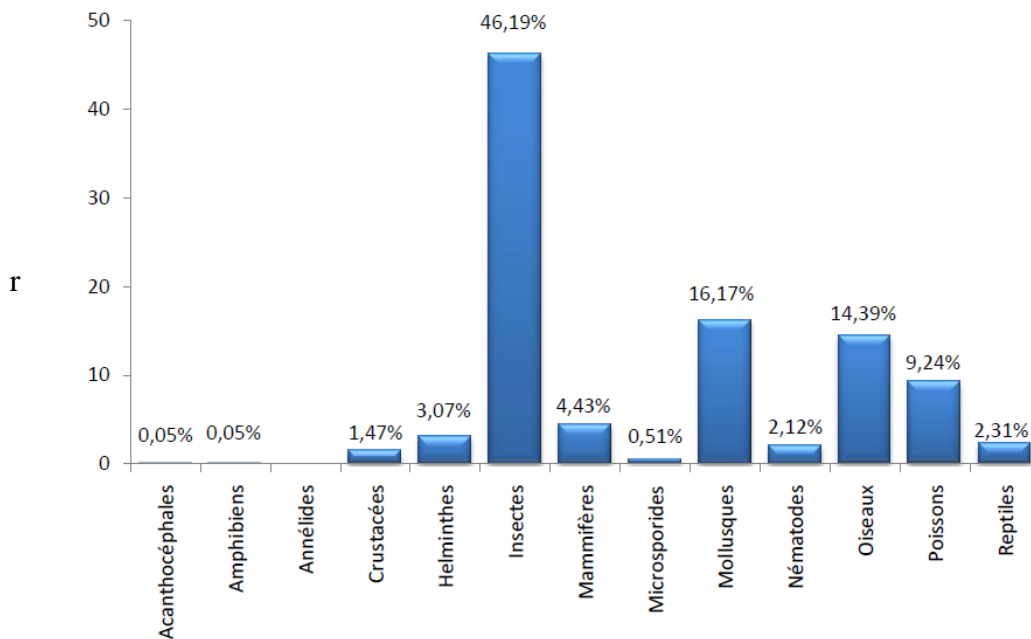
However biodiversity is experiencing a significant decline. In Senegal the degradation of biological resources has led to supply problems in domestic fuels especially in areas that do not have access to alternative sources of energy, reduced revenues from the exploitation of forest resources and increases in same time poverty of the rural population, a drop in long-stay fishing practices and a scarcity of fodder resources of northern regions that spawned seasonal movement of livestock to the South (DPN 2010).

The forests declined from 9,203,153 hectares in 1990 to 8,558,153 hectares in 2005, about a 7% decline.

This decrease is accompanied by a decrease animal species. In the Niokolo Koba National Park, there is a decrease of approximately 25% of plant species. Animal species like the Giraffe and Damalisque of Niger have disappeared from the area since the early twentieth century. The Elephant and Western Derby Eland (Brandlová et al., 2013) are now rare. The areas of woodlands increased from 5,300,876 ha to 5,100,876 ha or approximately a 6% decline as river and lake ecosystems, brackish habitats are declining in favor of saline areas. Coastal, estuarine and marine are also affected by degradation. In the Saloum Delta, mangroves and vegetation of sandy islands experienced a decline estimated at more than 25% between Foundiougne and Kaolack. In the Niayes area, the botanical reserve Noflaye lost 212 species between 1957 and 1992 (DPN 2010).

 Biodiversity loss constitutes a serious obstacle to the fight against poverty , that also explains to a large extent overexploitation of natural resources.

Policies of conservation of biodiversity in Senegal

The degradation trends of biodiversity that are mentioned has led to the adoption of a system of planning and natural resource and biodiversity management through national documents such as the National Action Plan for Environment and Strategy and the National Action Plan for biodiversity conservation.

According to the contexts, the priorities that social groups give different environmental issues in Senegal. In the field of plant protection, the National Agency for Agricultural Rural Council (ANCAR) mission is to grant to farmers a broader range of technical innovations, disseminate rural endogenous proven solutions from farmers' experiences to strengthen organizational and communication skills of farmers and rural development advisory support. The Agency is deployed into six agro-ecological zones of the country and has a rural and agricultural advisor (RAA) in each rural community. The Directorate of Plant Protection (DPV) was created to prevent the introduction of harmful organisms in the country and fight those present on the territory, in order to help increase agricultural production while protecting the environment and health producers and consumers (Ministry of Environment of Senegal, 2010).

In the domain of animal species protection, the creation of protected areas such as parks and reserves whose main objective is to protect the natural ecosystem of over-exploitation by humans. The creation of a protected area is generally part of a dual perspective. In the case of

a national park, the main objective is to protect the natural ecosystem of over-exploitation by humans, while meeting the scientific, economic, recreation and tourism. In the case of a private reserve as Bandia Reserve, the priority is to generate income through tourism activities, involving effective protection of the ecosystem and generating various scientific research themes.

Incidentally, meat production can be considered(Vincke et al., 2005).And so, today, Senegal leads a protection policy of conservation of biodiversity and adopted the environmental education program in schools through the Ministry of Environment and NGOs such as Derbianus Conservation.

2. AIMS OF THE THESIS

Recently NGOs, governments, teachers and even local people have begun to feel the need to integrate environmental education programs both inside and outside of the school. The present work aims at an investigation on knowledge and environmental attitudes of school pupils in urban and rural areas at the same school level and with the same study program. The goal was to compare the environmental knowledge and attitudes of children in rural and urban areas in Senegal by taking into account factors such as: gender, educational level, socioeconomic ones that can influence them.

For that we have set out four hypotheses:

1) Urban children will express more environmental knowledge that children from rural areas: socio-economic status, ease of access to information are reflected on their opinions.

2) Environmental attitudes of rural children are more favorable towards environment than those in urban areas: environment closer to the natural resources they exploited daily.

3) The boys have more environmental knowledge than girls because of the scientific disciplines they embrace.

4) The girls will have more environmental attitudes, because they are more conscious about environmental issues than boys.

3. MATERIAL AND METHODS

3.1. Study areas

The study was conducted in urban and rural areas of the three regions in Senegal: in the Dakar region (Figure 8). The region of Dakar is by excellence the area that holds the capital of Senegal. The region of Thies is located 70 kilometers from the Dakar region. The region of Dakar and Thies are both located in the center of Senegal West. The region of Ziguinchor is 450 Km from that of Dakar, it is located southwest of Senegal.

Figure 8 : Map of region of Senegal being studied.

Source :

https://upload.wikimedia.org/wikipedia/commons/8/80/Senegal%2C_administrative_divisions _-_en_-_monochrome.svg

3.2. Target group

The study was conducted with the children of the college, level 1 to 6th which corresponds to the first level of the middle school. This level follows the basic level (primary school) which has 6 levels. The child starts the Primary school at the age of seven years and complete this cycle at the age of twelve years by award of the CFEE (Final Certificate of Primary School). Secondary School follows after the Primary School. The education at secondary school has two cycles. The first is called Middle school, lasting for four grades by award of BFEM (Final Certificate of Middle Study). The last cycle of secondary school, lasting for three grades with the award of Baccalaureate at the age of nineteen years. Our target group consisted of children attending local public and private schools in the 6th classes (6ème college, in French).

The age of our target group should be 12 years. Some exceptional differences were found in rural areas in our questionnaires and the actual age of the study ranged from 10 to 17 years. This was probably due to delayed start of primary education or multiple doubling of school classes(Montgomery and Hewett, 2005).We also note a child's sending late to school because in some rural schools are within a few kilometers of the village or by foul means or by lack of specialized schools for children with some disability or illness.

3.3. Data collection techniques

Data collection process was based on an interview with teachers and questionnaires for children.

3.3.1. Interview with teachers

Interviews took place from late November to late December 2015. It concerned the SVT (life and earth science) teachers, History-Geography teachers who participate in the activities of environment clubs in schools. These teachers serve both in the urban or rural areas. They were 5 to be interviewed, two from rural and three from urban area. This choice was due to the fact that environment topics can be found in the programs they teach of order or due to the fact they pilot pro-environmental activities. The questions asked in the interview were:

1- In the level 6th are there chapters on the environment such as: environmental issues, environmental protection, and the importance of environment? Cite them. This question was asked to see whether the 6th school level contains subjects that talk about the environment.

2- What are the environmental problems that students cite in the examples? This question will allow us to see if students are aware of the environmental problems that the world faces today.

3- Do you have pro-environmental activities in your school? This question was put to see if the studied concepts are being implemented.

4-What problems do you face when you implement pro-environmental activities? This question is asked to see the shortcomings in the sequences of pro-environmental activities programs.

5- Do you think there's a difference of knowledge and environmental attitudes between students in urban and rural areas? Why? This question helps to measure if there are other aspects that involve for better environmental knowledge.

6- What should the government do to educate students to adopt pro-environmental attitudes? This question is asked to see if the government's proposals were sufficient to meet the challenge.

3.3.2. Questionnaire for children

The questionnaire was submitted to a target group of students. This target group consists of children attending local public and private middle schools in the 6th classes. The age of our target group. Regarding the class size, we are often faced with classes of over 70 students, that is to say twice the number that has been programmed. In Senegal the projected enrollment is 45 students per class. With very large classes, we were faced with a selection problem because we could not take some and leave others. It also adds to the problem of the difficulty of transport, because some institutions are remote and access to them is difficult. The lack of means of the school also makes deficit it that the programmed standards have not been met.

The questionnaire was written in French, the official language of Senegal that is used at school. On the header, it <u>was</u> requested the last name and first name of the student, gender, age, class, school, location and function of the father. The questions focused on the components of the environment, importance of the environment: flora and fauna; he increases of human population; the laws of nature; factors degradations environment; people's behavior towards the environment; the risk of natural disasters; the protection of nature; and natural reserves.

The structure and form of the questionnaire was as follows here below and in the Table 1(French Version) is the original version is given and in the Table 2 (English version).

Table 1: Questionnaire for student (French Version)

Prénom:	Nom :
Date de naissance:	Age:
J´ai déja visité:	Parc zoologique de Hann	Réserve de Bandia	Autre aire protegée:……………………
Mon père est :	agriculteur	employé de l'État	sans travail	Autre……………………

		JE SUIS TOUT A FAIT D´ACCORD	JE SUIS D´ACCORD	JE NE SUIS PAS SÛR (E)	JE NE SUIS PAS D´ACCORD	PAS D´ACCORD DU TOUT
1	L'homme doit bien préserver ce qui lui reste de la nature.					
2	Les plantes et les animaux ont le même droit que l'Homme pour vivre .					
3	Si les choses ne changent pas, nous aurons un grand désastre dans l'environnement bientôt.					
4	Les gens doivent toujours obéir aux lois de la nature.					
5	Il ya trop (ou presque) de personnes sur la terre.					
6	Les gens ont mal traités la nature.					
7	Quand les gens salissent la nature, il y'a un mauvais résultats.					
8	Les gens sont assez intelligents pour ne pas ruiner la terre.					
9	La nature est assez forte pour gérer les mauvais effets de notre mode de vie moderne.					
10	Les gens sauront un jour le rôle que joue la nature pour être en mesure de la protéger.					

11	Je préfère qu'on arrête la protection de l'élan de Derby pour y construire un centre de jeu.	😀	🙂	😐	🙁	😭
12	Je pense que les gens de ma ville/ de mon village devraient être autorisés à chasser dans des réserves naturelles.	😀	🙂	😐	🙁	😭
13	Je considère que la protection des antilopes dans notre pays est très importante.	😀	🙂	😐	🙁	😭

14. Quelle siloulette représente **l'éland de Derby**?

1 2 3 4 5 6
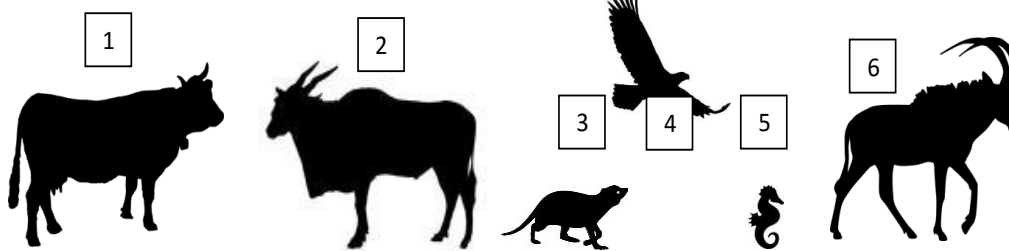
15. Ecris le nom de **10 animaux souvages** qui vivent au **Sénégal**.

_____   _____
_____   _____
_____   _____
_____   _____
_____   _____

16. Pourquoi les animaux sauvages sont menacés au Sénégal?
   a. parce qu'il n'y a pas assez d'eau au Sénégal.
   b. Parce qu'il y a de plus en plus des bâtiments construits dans la forêt.
   c. parce qu'il ya des braconniers qui les chassent.
   d. parce qu'ils sont mangés par d'autres animaux.

First Name: ……………… Last Name……………

Date of Birth……………………. Age…………………

I have already visited:

- o Hann Zoo
- o The reserve of Bandia
- o Other protected areas

My father is:

- o A farmer
- o In civil service

Table 2. The questions in the questionnaire.

N°	Question	I strongly agree	I agree	I am not sure	I don't agree	I strongly disagree
1.	Man should preserve what remains from nature					
2.	Plants and animals have the same rights to live as men.					
3.	If things don't change, we will witness a great disaster in the environment very soon					
4.	People should always obey the laws of nature.					
5.	There are too many (or almost) people on the Earth.					
6.	Men have ill-treated nature.					
7.	When people pollute nature there will be bad consequences.					
8.	People are enough intelligent not to ruin nature.					
9	Nature is enough strong to manage the bad effects					
10.	People will one day know that the role that nature plays to be able to protect it.					
11.	I prefer that we stop the protection of the Derby Eland and build there instead a playground.					
12.	I think that people from my					

	village/city should be allowed to hunt in natural reserves.					
13.	I consider that the protection of antelopes in my country is very important.					

3.3.3. Collected questionnaires

The data collection was conducted in November 16th to December 24 in 2015. The questionnaires were administered in 19 schools including 7 rural schools. In total, 765 questionnaires were collected, 448 in urban areas and 317 in rural areas. Of the 448 students in the urban area, 229 are girls and 219 boys. Of the 317 students in the rural area, 145 are girls and 172 are boys. Distribution was almost balanced between both areas.

3.3.4. Encountered problems while collecting data

Except for some students, we met students who had low levels of the French language but were however more receptive if the questions they were asked in local languages. Sometimes, the translation of the issue in the local language does not give exactly the desired direction, thus we were always forced to rephrase the question to get the meaning.

We were also faced with a real problem. The classes were overcrowded, more than 70 students per class. The questionnaire that was scheduled for 45 minutes, took about 1 hour.

3.4. Techniques of data analyses

To make an investigation on the knowledge and attitudes of the environment of rural and urban areas we assessed four points:

- The level of environmental knowledge
- The environmental attitudes
- The Influence of sex
- Influence of environments: urban versus rural.

To assess the environmental knowledge of children, the questions 17, 18, 19 and 20 (hereafter as Q17-20), then question 15 and 16 were used. Sum of points for Q17-20 were calculated and tested. First, the Kolmogorov-Smirnov test of normality was applied to test the normality of data distribution. As the data (sum of points) showed normal distribution, we used

parametric tests for further testing. First, the effect of age on number of points in Q17-20 was tested by simple liner regression. Then, the two-way ANOVA was used to test the effect of sex (male x female) and environment (rural x urban area) on number of points in Q17-20. Post hoc Tukey tests were applied in case of significant ANOVA results.

Question 15 concerning the recognition of the silhouette od Derby eland with categorical responses (correct x incorrect) was assessed by contingency table with focus on differences between sexes and environment (urban x rural area).

Question 16 concerning listing of wild animals living in Senegal was first assessed descriptively as frequency of responses (in categories), including confounding ones with domestic animals and wild animals not living in Senegal. Then, the number of animals in each category was tested for differences between sexes and environment (urban x rural areas) by Student's t-tests.

To assess the attitudes of children towards the environment, the responses given in the questionnaires were transformed to categorical scale 1-5. For questions Q3, Q6, Q7 and Q9, the New Ecological Paradigm scale for children (NEP scale) according to Manoli, Johnson and Dunlap (2007) was applied where 1 indicates "strongly agree", 2 "agree", 3 "neutral", 4 "disagree" and 5 "strongly disagree". Responses 1 thus indicate the most positive attitudes to nature protection. For questions Q1, Q2, Q4, Q5, Q8 and Q10, the scale 1 – 5 had opposite meaning, i.e. 1 indicates "strongly disagree", 2 "disagree", 3 "neutral", 4 "agree" and 5 "strongly agree". In these questions 5 indicates the biggest support for positive pro-environmental attitudes. To test differences between sexes and areas, separate contingency tables were applied.

4. RESULTS

4.1. Interview with teachers

The interview with 5 teachers has revealed the results as follows (Table 3):

Question 1: 80% of teachers answered there in the 6th program chapters that talk about the environment. These chapters talk about the components of the environment, relationships in the environment, the action of man on the environment and environmental management. Only 20% of students have answered that there is no environmental education on the first form syllabus.

Question 2: 100% of teachers said they practice pro-environmental activities at school. These activities include reforestation, human investment, gardening, sensitization lectures and film screenings.

Question3: 20% of teachers did not answer the question. The 40% answered that students are not aware of the environmental problems that we are facing and say that environmental education is not supported by the state. The other 40% of students are aware of environmental problems and often organize awareness sessions at school. However, the behavior of some pupils do not reflect their environmental concerns.

Question 4: The problems encountered by teachers during the sequences of pro-environmental activities are numerous: 30% of teachers said that they were faced with a lack of interest and commitment of the students. 50% said they had no teaching aid for lessons. 10% said they had no funds to support their activities and 10% say that in rural areas, access to the Internet is difficult

Question 5: 100% of teachers said that there is a difference knowledge of and attitude between students in urban areas and those in rural areas. Of the 100%, 60% said that students in urban areas are more familiar to environment issues than those in rural areas because they are more educated on waste management, they feel more environmental problems such as pollution, floods, garbage that those in rural areas and are more aware. 40% said that students from rural areas are more familiar with the environment. They are in constant contact with the environment unlike those in urban areas and know the value of the natural resources they exploit daily.

Question 6: According to teachers, the government must integrate environmental education in all levels, conducting an environmental policy, motivate and award those who have good environmental management, financially support the work of environmental cells. These results are summarizing in the following table.

Table 3 . Responses of teachers during the interview

Questions	Responses	Justifications
1- Are there chapters first form syllabus that speak of the environment such as: environmental issues, environmental protection, importance of the environment?	1-No 2-Yes 3-Yes 4-Yes 5-Yes	List them 1. In HG there are no 2. components of the environment, relationships in the environment, photosynthesis 3. components of the environment, relationships in the environment, classification and distribution of living things 4. Components of the environment, relationships in the environment, the action of man ds environment 5. components of the environment, relationships in the environment, sustainable management of resources.
Do you practice pro-environmental activities at the school?	1Yes 2Yes 3 Yes 4-Yes 5-Yes	Give examples. 1-reforestation, investment in people, gardening 2-organize meetings on human capital development, conferences 3-reforestation, cleaning, environmental knowledge 4- reforestation, investment in people, gardening 5 Film-projection during activity days and conferences

2- Are students aware of the environmental problems that the world faces now?	1-not all but a few 2-no answer .... 3- yes, but their behavior does not reflect their environmental concern 4-yes! the history-geographic club organizes sensitization sessions for students 5-no, by that sensitization of environmental education is not supported by the state	
3- What problems do you encounter when you implement pro-environmental activities?	1-Lack interest and engagement of students for pro-environmental activities 2-Student management, purchase of teaching materials and tools 3-Lack of student interest in pro-environmental activities, lack of club activities grants to school animation, lack of partners 4. Insufficient teaching materials, difficulties accessing the internet for rural students 5- Funding of educational activities and lack of material for educational outings.	
4. Do you think there's a difference of knowledge and environmental attitudes between students in urban and rural areas	1yes 2-yes 3-yes 4yes 5-yes	Why? 1-urban environment students are more educated about the environment and waste management 2-the rural students are in constant contact with the environment unlike those in urban areas 3-urban environmental problems are felt most in rural areas 4-urban students are more aware of environmental problems. 5-rural areas, the student is in permanent contact with nature and knows the value of

		natural resources
4. What should the government foster a better awareness of students to adopt pro-environmental attitudes?		1. Integrate environmental education at all levels - redynamise the activities environmental cells fiscal - Support school environmental cells at school 2-Award and motivate good environmental managements. 3. It must conduct an educational policy that encourages and supports environmental education and awareness are wide at media 4. Entry into the school curriculum from primary to university a module for environmental education 5. The same answer the questionnaire n°4

4.2. Environmental knowledge

The questionnaires were administered in 19 schools including 7 rural schools. In total, 786 questionnaires were collected. Only 765 of them were completed to be fully assessed. From those 448 in urban areas and 317 in rural areas. Out of the 448 students in the urban area, 229 are girls and 219 boys. Out of the 317 students in the rural area, 145 were girls and 172 were boys.

4.2.1. Knowledge based on questions 17-20

The table 4 shows that the total number of points obtained on questions 17-20 as well as the frequencies of students 786 students answered these questions in the questionnaire. The results reveal that 48 were obtained between 0 and 2 points to 77 were obtained between 8 and 10 points against the majority of the 661 students obtained between 4 and 6 points).

Table 4.Frequency of obtained items from questions 17-20 focused on the environmental knowledge.

Number of points	Frequency table of sum of points for Q 17-20	
	count	Percent of valid
0	3	0.38168
1	3	0.38168
2	42	5.34351
3	86	10.94148
4	163	20.73791
5	184	23.40967
6	129	16.41221
7	99	12.59542
8	53	6.74300
9	19	2.63613
10	5	0.00000

Effect of age

The age factor was tested separately on Q 17- 20. It shows a high added value and a relatively low correlation coefficient. This shows that age has no effect does not influence the number of points thus knowledge does not depend on age (Figure 9).

Figure 5: The on the number of points obtained in the questions 17-20.
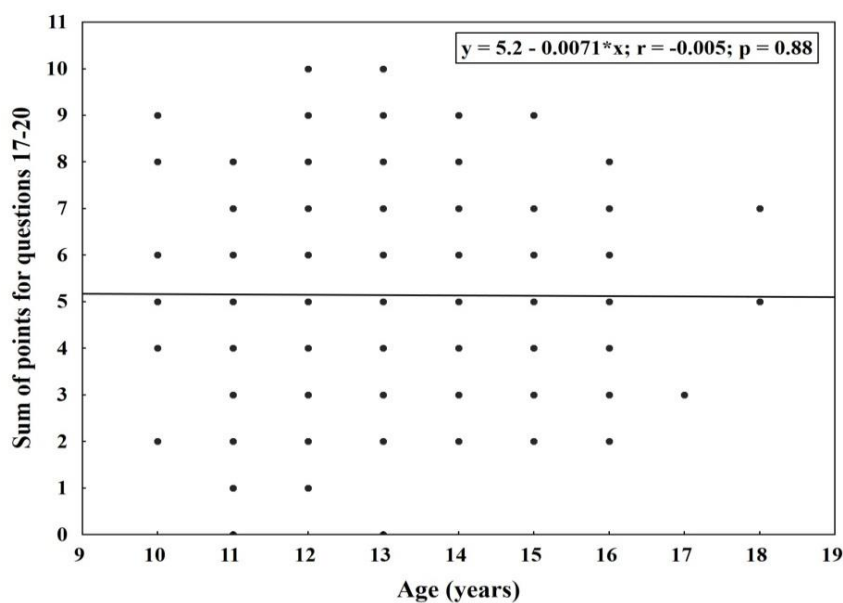
Effect of sex

The following figure shows that there was a significant difference on the number of points obtained between children of the same sex from different backgrounds (Figure10). It was found that whatever the medium, boys scored more points when compared to girls with an average of 5.4 ± 0.09 SE for boys' vs 4.9 ± 0.09 SE for girls. Have rural children got more points than the urban children with an average of $5.5 \pm$ SE 0.09 vs 4.9 ± 0.08 SE.

Figure 10: Number of obtained points by gender and the environment of origin.
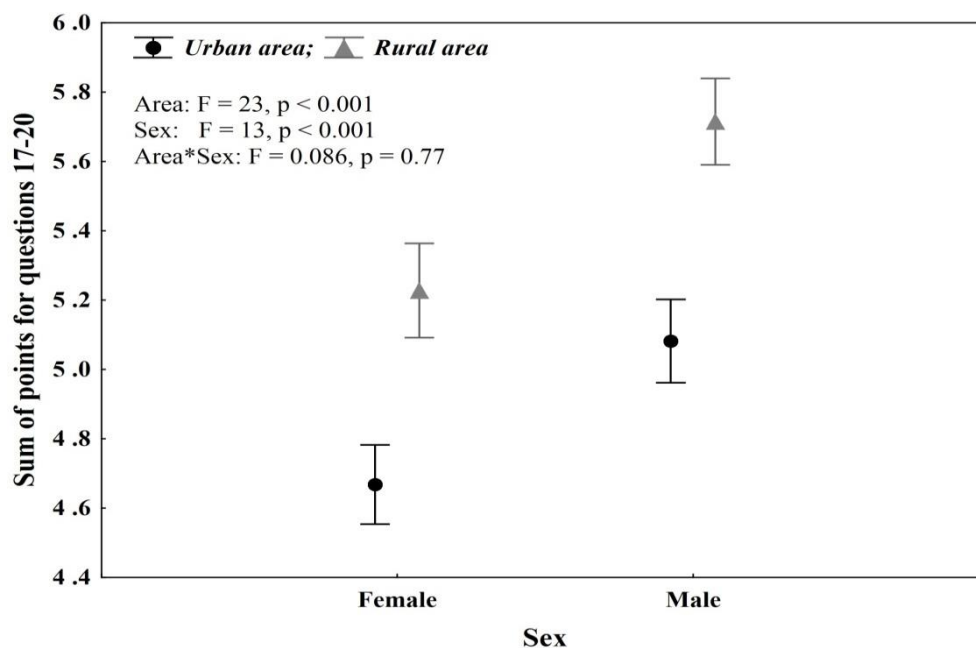
4.2.2. Recognition of the silhouette of the Derby Eland based on Q15

Among the 764 children, 49 (6%) did not answer the question. For these children we cannot say if they know the right answer or not. 610 children or 80% answered the question but did not find the right answer. Only 105 children or 14% correctly answered the answer, namely recognized the silhouette of the Derby Eland.

The results show that the percentage of correct answers that are given by urban students (15%) is almost the same as that of rural students (12%) as there was no significant difference in responses between children from both backgrounds ($\chi2 = 4$, df = 2, p = 0.13) and between their sexes ($\chi2 = 1.8$, df = 2, p = 0.42). The knowledge thus not dependent on the environment from the students but do not depend on gender (Table 5).

Table 5.Responses on question 15, frequency of answers obtained according to gender and background.

		Correct	Non-correct	Unanswered
Area	**Urban**	15%	80%	5%
	Rural	12%	80%	8%
Sex	**Male**	14%	79%	7%
	Female	14%	81%	5%
Total		14%	80%	6%

4.2.3. Listing wild animals based on Q16

The results that are presented below in the Figure 11 and Table 6 show the number of animals mentioned by children, and the percentage that are obtained, depend on the number of animals cited. These results show that, for wild animals in Senegal, 62 (8.1%) were not cited, 133 (17.4%) were cited 2 animals and only 2 (0.3%) were cited, namely 10 animals.

For pets 388 (50.8%) were not cited, 61 (8.0%) were cited only 3 and 1 out of 10 of wild animals not-native of Senegal were cited. For wild animals, 504 (66.4%) did not cite any and there was no children who cited 10 animals.

The analysis shows that the majority of children have cited native wildlife from Senegal. Is that the question has been understood even if the number of animals listed is not important.

There was no significant difference on the list of wild animals between children coming from urban areas and those from rural areas (Students' t = 1.9, df = 762, p = 0.052), with respective averages of 3.6 (± SD 2.3) and 3.3 (± SD 2.0). In addition, there was a difference of sex in relation to the list of wild animals listed (Students' t = 3.2, df = 741, p = 0.001) for mean of 3.8 (± SD 2.2) in boys against 3.2 (± SD 2.2) for girls. This shows that boys experience more wildlife than girls in urban and rural areas.

Figure 11: Distribution of the number of students according to the cited animals.
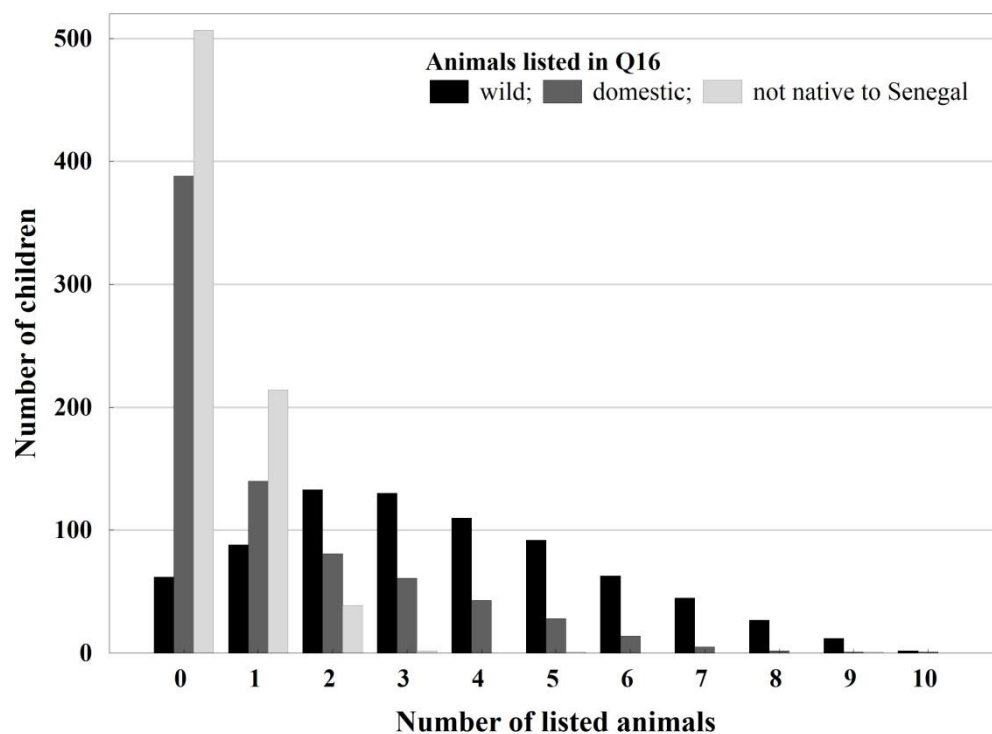
Table 6. Frequency of answers for the question 16 concerning the list of wild animals.

N°of listed animals	Wild animals		Domestic animals		Non-native to Senegal	
	Count	Percentage	Count	Percentage	Count	Percentage
0	62	8.1	388	50.8	507	66.4
1	88	11.5	140	18.3	214	28.0
2	133	17.4	81	10.6	39	5.1
3	130	17.0	61	8.0	2	0.3
4	110	14.4	43	5.6		
5	92	12.0	28	3.7	1	0.1
6	63	8.2	14	1.8		
7	45	5.9	5	0.7		
8	27	3.5	2	0.3		
9	12	1.6	1	0.1	1	0.1
10	2	0.3	1	0.1		

4.3. Attitudes

Questions Q3, Q6, Q7 and Q9 related to environmental attitudes in the questionnaire showed that majority of responses were 5 or 4 (Figure 12, Table 7), it means very negative attitude towards environment. There were no significant differences in responses between children from urban and rural areas, neither between boys and girls (for all $\chi 2$ tests $p > 0.05$), with two exceptions. In Q7 (People are destined to dominate nature), there is slight, but statistically significant shift in percentage of disagreement in girls in comparison to boys ($\chi 2 = 12.5$, df = 4, p = 0.014). Another exception is Q9 (People will one day know how the nature functions to be able to control it) where there was significantly ($\chi 2 = 33.7$, df = 4, p < 0.001) more children with agreeing responses in urban area than in rural areas, where most of responses were shifted towards disagreement (Table Y).

Figure 12. Relative distribution of responses concerning environmental attitudes, including missing ones in questions Q3, Q6, Q7 and Q9. Attitudes are expressed by numbers 1 to 5, response 1 indicating very positive attitude and response 5 very negative attitude.
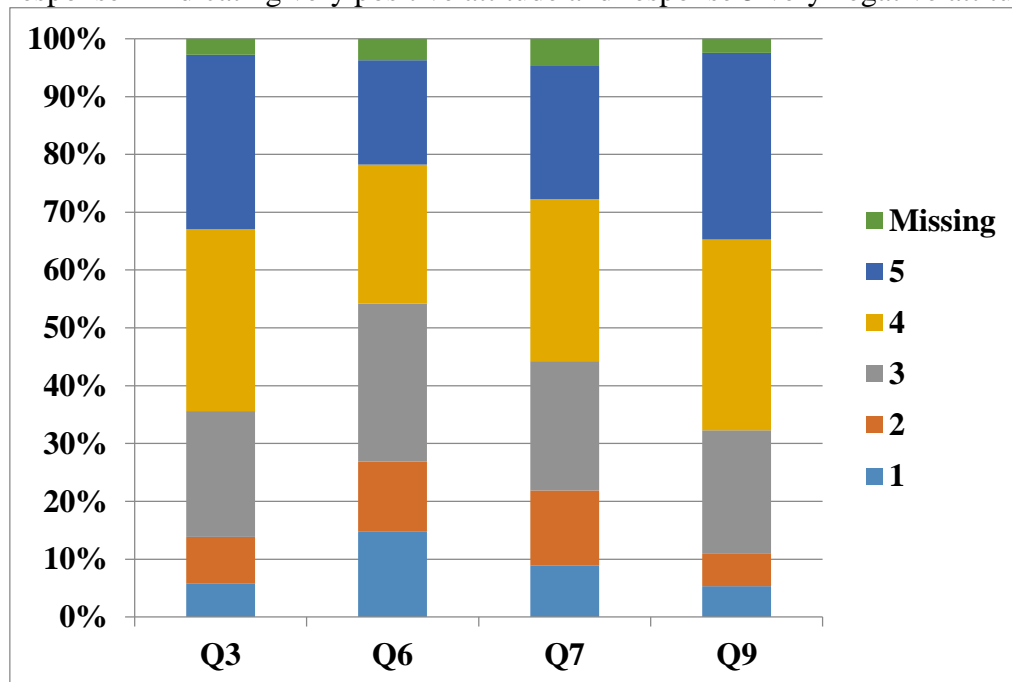
Table 7. Distribution of responses to questions concerning environmental attitudes, including missing, unanswered counts. Attitudes are expressed by numbers 1 to 5, response 1 indicating very positive response (STRONGLY AGREE) and response 5 very negative response (STRONGLY DISAGREE).

Response	Q3		Q6		Q7		Q9	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1	46	5.9	116	14.8	70	8.9	42	5.3
2	63	8.0	95	12.1	102	13.0	44	5.6
3	171	21.8	215	27.4	176	22.4	168	21.4
4	247	31.4	189	24.0	220	28.0	259	33.0
5	237	30.2	142	18.1	181	23.0	254	32.3
Missing	22	2.8	29	3.7	37	4.7	19	2.4
Total	786	100	786	100	786	100	786	100

Questions Q1, Q2, Q4, Q5, Q8 and Q10 related to environmental attitudes in the questionnaire showed that majority of responses were 1 or 2 (Figure 13, Table 8), it means very negative attitude towards environment. There were no significant differences in responses between boys and girls (for all $\chi 2$ tests $p > 0.05$). There were, however, the significant differences between responses of children from urban and rural areas in the most of the questions. Specifically, children from urban areas selected more frequently extreme response (strongly disagree) than in rural area where responses where more regularly distributed (for detailed results see Annex – Tables A2-A7).

Table 8. Distribution of responses to questions concerning environmental attitudes, including missing, unanswered counts. Attitudes are expressed by numbers 1 to 5, response 1 indicating very negative attitude (STRONGLY DISAGREE) and response 5 very positive, pro-environmental attitude (STRONGLY AGREE).

Reponse	Q1		Q2		Q4		Q5		Q8		Q10	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
1	278	35.4	449	57.1	405	51.5	309	39.3	243	30.9	409	52.0
2	207	26.3	243	30.9	220	28.0	201	25.6	213	27.1	210	26.7
3	110	14.0	56	7.1	82	10.4	99	12.6	128	16.3	70	8.9
4	100	12.7	19	2.4	46	5.9	84	10.7	117	14.9	50	6.4
5	70	8.9	13	1.7	18	2.3	80	10.2	72	9.2	39	5.0
Missing	21	2.7	6	0.8	15	1.9	13	1.7	13	1.7	8	1.0
Total	786	100	786	100	786	100	786	100	786	100	786	100

Figure 13. Relative distribution of responses concerning environmental attitudes, including missing ones in questions Q1, Q2, Q4, Q5, Q8 and Q10. Attitudes are expressed by numbers 1 to 5, response 1 indicating very negative attitude and response 5 very positive attitude.
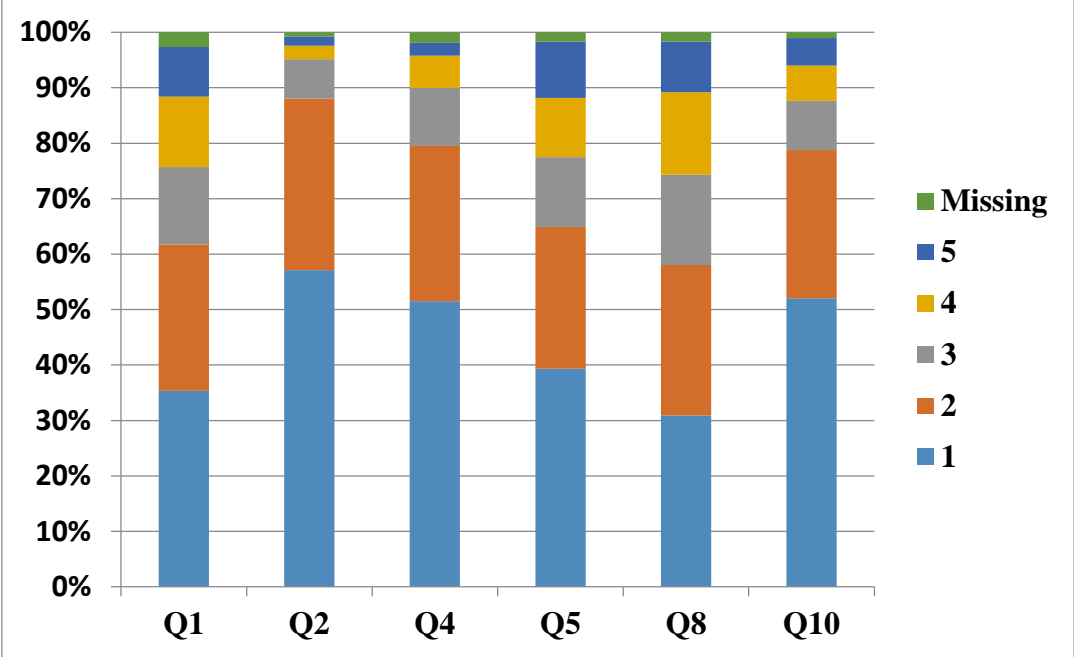
5. DISCUSSION

In this study environmental knowledge and attitudes of school children in Senegal were assessed. These knowledge and attitudes represent integral part of the objectives of environmental education that prove to be the focal points for the reduction and limitation of the environmental problems we face. This study is to assess the knowledge and attitudes of students of the same level who come from different ways of life: urban and rural areas.

5.1. Teachers' interviews/ points of view to environmental education

The interview of teachers showed that children have received the same topics with the same contents on subjects' relative on environmental education program. It's suppose as they attend the same environmental education level. This should be reflected in their responses that there would be no difference between the children on the knowledge and environmental attitudes even if they are from different living environment. First, the teachers said that despite the formal environmental education program made in class, some of the children do not express the pro-environmental behavior in the concerns. This can be explained by the non-student motivation when learning but also the schedules of quantum is not complete especially in rural areas. Rural areas are often affected by weather conditions. For example, when the raining season start girls join the cities in researching job for financing their study. And boys leave to go to the field for agriculture., but also in general, teachers do not receive their early assignments to rally their schools, causing a delay in the start of classes. These skill gaps can be explained by the lack of educational support, lack of access to information (Internet in rural area), lack of funds to support environmental activities and the lack of monitoring of environmental education programs. However, all teachers surveyed said that urban children have more knowledge and environmental attitudes than those in rural areas. This can be explained by the fact that urban children face the most popular environmental problems namely pollution, poor sanitation, floods but also because of their socio-economic status that make them more aware. The rich Parents are found mostly in urban area. They sent their children to good public and private school with qualified teachers.

5.2.   Questionnaires for children

5.2.1.   Environmental knowledge

Assessment of knowledge in questions Q17-20 of this study revealed that there were no significant differences in the knowledge among pupils of different age. The youngest have not obtained more points than older ones, neither vice versa. This finding does not support the hypothesis that older children have more knowledge than the younger because older ones have more experience and therefore more knowledge. In contrast, Berk & al (2004) suggested that younger people (children) have more knowledge than older ones. This is because they are in an operational training and had the ability to learn more than older ones who, in contrast, tend to challenge the parental and institutional authorities. This similarity of knowledge can be explained by the fact that children have the same knowledge assessment due to attending the same level of education and having the same concepts in the scholar curriculum.

However, in those questions Q17-20, there was a significant difference between girls and boys. Boys have more knowledge than girls, probably because the topics dealing with the environments fall in scientific disciplines and these are embraced better by boys than girls (Coyle, 2005).

Regarding the living environment, children in urban areas got more points than rural children, so have manifested more knowledge than those in rural areas. This supports the thesis of Arcury et al (1993) who suggested that urban residents are more concerned with the environment and lead and environmental actions. And that residents of rural areas have lower levels of education as opposed to urban residents who have a level of 'high information. They are exposed to environmental problems such as pollution (Saphores & al, 2006) and they have trained and have easier access to information (TV, radio, internet and other media). Another point could play a role of more positive influence that would be due to the transmission of environmental awareness in families with higher social position.

On the question Q15 which is the recognition of the silhouette of the Derby Eland, there was no difference in the proposal of responses between children in urban areas and those in rural areas. The response rate was almost the same. Similarly, there was no significant difference between girls and boys. This is due that despite the TV and other information sources, both children of the urban and rural ones are not taught the Derby Eland, and knowledge are limited about this animal. For question Q16 through, there were no significant differences in naming wild animals living in Senegal between children from urban and rural areas. One

hypothesis assumed to have a long list of animals from children in urban areas because of the easy access to information sources. Another hypothesis assumed the contrary that rural children would cite more wildlife than urban children because of their proximity to nature. However, the results indicate more likely that children are not motivated and do not care about wildlife and were more interested in pets, because the letters appeared in their answers they appointed more frequently than domestic and wild animals.

5.2.2. Environmental Attitudes

The results obtained in responses concerning environmental attitudes have shown that children from rural areas and those in urban areas all have negative attitudes towards the environment (answers questions Q1 - Q10). This can be explained by the fact that the proposed program of Environmental Education in the scholar curriculum has not achieved its objectives and probably did not take into account the needs of the population or that the children were not interested environmental education programs. But also it may be that teachers who give these environmental education programs are not sufficiently trained. However, two exceptions were noted in Q7 and Q9.

To Q7 (people are destined to dominate Nature) which shows a higher disagreement in girls than in boys. We were waiting of the opposite thesis of Coyle (2005), that women had more attitudes towards the environment than men and the Zelezny & al (2000) thesis who shown that girls have more sociability, more concerns toward the environment. This contrast can be explained by the fact that in Senegal, men are privileged than women concerning education (Montgomery, 2005), therefore more informed and have more experience.

For Q9 (people will one day know how the nature functions to be able to control it), the rural children showed more disagreement than those in urban areas. This probably, by the fact that rural children are directly dependent on the environment in which they exploit the resources for the food, needs of medicine. But also taking the environment as an economic factor that influences their quality of life and allow them to flourish.

6. CONCLUSION

The problematics of environmental degradation are from land conversion for agriculture and urbanization, excessive cutting of trees, from timber and firewood, bush fire, poaching and advanced technology. These problems caused an ecological transformation marked by the progressive extinction of many animals like giraffe, topi but also with endangered animals like the lion, the sitatunga and the Derby Eland. This phenomen conducted to the loss of biodiversity and had attracted populations at a better management of the issue related to the environment.

It is for this purpose that environmental education has been called to address this issue to encourage urban and rural populations into getting a better knowledge but also building pro-environmental attitudes. This study was focused on the comparison between knowledge and environmental attitudes in urban and rural areas. The study showed that children in urban areas and those in rural areas differ in the level of environmental knowledge, but they have very similar attitudes towards environment. These attitudes were not mostly positively pro-environmental.

It seems that environmental education is one recommended way to assign environmental responsibilities to students. It also provides opportunities for schools to improve their knowledge, interests, motivation and encouraged to adopt new attitudes towards the environment. The environmental education increases with theoretical and practical experience.

In addition, it seems important to consider the best ways to reduce differences in knowledge and attitudes that exist between urban and rural populations by adopting appropriate programs that match their interests because rural areas have different concerns from urban ones.

7. REFERENCES

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ANNEX

1) **Statistical results of contingency tables concerning attitudes of children towards environment**

Table A1. Relative distribution of responses 1 – 5 to question 9 in urban and rural areas where is statistically significant difference ($\chi 2 = 33.7$, df = 4, p < 0.001).

Response	Urban area	Rural area	Total count
1	33	9	42
Column %	7.32%	2.85%	
Row %	78.57%	21.43%	
2	31	13	44
Column %	6.87%	4.11%	
Row %	70.45%	29.55%	
3	122	46	168
Column %	27.05%	14.56%	
Row %	72.62%	27.38%	
4	130	129	259
Column %	28.82%	40.82%	
Row %	50.19%	49.81%	
5	135	119	254
Column %	29.93%	37.66%	
Row %	53.15%	46.85%	
Total count	451	316	767
Total %	58.80%	41.20%	100.00%

Table A2. Relative distribution of responses 1 – 5 to question 1 in urban and rural areas where is statistically significant difference (for statistical result see table below).

1	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10		
	Urbain/Rural U	Urbain/Rural R	Row Totals
1	182	96	278
Column %	40.44%	30.48%	
Row %	65.47%	34.53%	
Total %	23.79%	12.55%	36.34%
2	89	118	207
Column %	19.78%	37.46%	
Row %	43.00%	57.00%	
Total %	11.63%	15.42%	27.06%
3	69	41	110
Column %	15.33%	13.02%	
Row %	62.73%	37.27%	
Total %	9.02%	5.36%	14.38%
4	66	34	100
Column %	14.67%	10.79%	
Row %	66.00%	34.00%	
Total %	8.63%	4.44%	13.07%
5	44	26	70
Column %	9.78%	8.25%	
Row %	62.86%	37.14%	
Total %	5.75%	3.40%	9.15%
Totals	450	315	765
Total %	58.82%	41.18%	100.00%

Statistic	Statistics: 1(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	29.76641	df=4	p=.00001
M-L Chi-square	29.48286	df=4	p=.00001

Table A3. Relative distribution of responses 1 – 5 to question 2 in urban and rural areas where is statistically significant difference (for statistical result see table below).

2	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10			
	Urbain/Rural U	Urbain/Rural R	Row Totals	
1	289	160	449	
Column %	62.83%	50.00%		
Row %	64.37%	35.63%		
Total %	37.05%	20.51%	57.56%	
2	127	116	243	
Column %	27.61%	36.25%		
Row %	52.26%	47.74%		
Total %	16.28%	14.87%	31.15%	
3	26	30	56	
Column %	5.65%	9.38%		
Row %	46.43%	53.57%		
Total %	3.33%	3.85%	7.18%	
4	10	9	19	
Column %	2.17%	2.81%		
Row %	52.63%	47.37%		
Total %	1.28%	1.15%	2.44%	
5	8	5	13	
Column %	1.74%	1.56%		
Row %	61.54%	38.46%		
Total %	1.03%	0.64%	1.67%	
Totals	460	320	780	
Total %	58.97%	41.03%	100.00%	

Statistic	Statistics: 2(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	13.91090	df=4	p=.00758
M-L Chi-square	13.86028	df=4	p=.00775

Table A4. Relative distribution of responses 1 – 5 to question 4 in urban and rural areas where is not statistically significant difference (for statistical result see table below).

4	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10			
	Urbain/Rural U	Urbain/Rural R	Row Totals	
1	238	167	405	
Column %	52.42%	52.68%		
Row %	58.77%	41.23%		
Total %	30.87%	21.66%	52.53%	
2	124	96	220	
Column %	27.31%	30.28%		
Row %	56.36%	43.64%		
Total %	16.08%	12.45%	28.53%	
3	48	34	82	
Column %	10.57%	10.73%		
Row %	58.54%	41.46%		
Total %	6.23%	4.41%	10.64%	
4	32	14	46	
Column %	7.05%	4.42%		
Row %	69.57%	30.43%		
Total %	4.15%	1.82%	5.97%	
5	12	6	18	
Column %	2.64%	1.89%		
Row %	66.67%	33.33%		
Total %	1.56%	0.78%	2.33%	
Totals	454	317	771	
Total %	58.88%	41.12%	100.00%	

Statistic	Statistics: 4(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	3.201652	df=4	p=.52466
M-L Chi-square	3.287343	df=4	p=.51094

Table A5. Relative distribution of responses 1 – 5 to question 5 in urban and rural areas where is statistically significant difference (for statistical result see table below).

5	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10		
	Urbain/Rural U	Urbain/Rural R	Row Totals
1	213	96	309
Column %	46.92%	30.09%	
Row %	68.93%	31.07%	
Total %	27.55%	12.42%	39.97%
2	119	82	201
Column %	26.21%	25.71%	
Row %	59.20%	40.80%	
Total %	15.39%	10.61%	26.00%
3	44	55	99
Column %	9.69%	17.24%	
Row %	44.44%	55.56%	
Total %	5.69%	7.12%	12.81%
4	36	48	84
Column %	7.93%	15.05%	
Row %	42.86%	57.14%	
Total %	4.66%	6.21%	10.87%
5	42	38	80
Column %	9.25%	11.91%	
Row %	52.50%	47.50%	
Total %	5.43%	4.92%	10.35%
Totals	454	319	773
Total %	58.73%	41.27%	100.00%

Statistic	Statistics: 5(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	31.63638	df=4	p=.00000
M-L Chi-square	31.72199	df=4	p=.00000

Table A6. Relative distribution of responses 1 – 5 to question 8 in urban and rural areas where is statistically significant difference (for statistical result see table below).

8	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10		
	Urbain/Rural U	Urbain/Rural R	Row Totals
1	148	95	243
Column %	32.39%	30.06%	
Row %	60.91%	39.09%	
Total %	19.15%	12.29%	31.44%
2	143	70	213
Column %	31.29%	22.15%	
Row %	67.14%	32.86%	
Total %	18.50%	9.06%	27.55%
3	78	50	128
Column %	17.07%	15.82%	
Row %	60.94%	39.06%	
Total %	10.09%	6.47%	16.56%
4	51	66	117
Column %	11.16%	20.89%	
Row %	43.59%	56.41%	
Total %	6.60%	8.54%	15.14%
5	37	35	72
Column %	8.10%	11.08%	
Row %	51.39%	48.61%	
Total %	4.79%	4.53%	9.31%
Totals	457	316	773
Total %	59.12%	40.88%	100.00%

Statistic	Statistics: 8(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	19.61545	df=4	p=.00059
M-L Chi-square	19.48116	df=4	p=.00063

Table A7. Relative distribution of responses 1 – 5 to question 10 in urban and rural areas where is statistically significant difference (for statistical result see table below).

10	2-Way Summary Table: Observed Frequencies (Attitudes_Q1-10.sta) Marked cells have counts > 10			
	Urbain/Rural U	Urbain/Rural R	Row Totals	
1	257	152	409	
Column %	56.36%	47.20%		
Row %	62.84%	37.16%		
Total %	33.03%	19.54%	52.57%	
2	110	100	210	
Column %	24.12%	31.06%		
Row %	52.38%	47.62%		
Total %	14.14%	12.85%	26.99%	
3	35	35	70	
Column %	7.68%	10.87%		
Row %	50.00%	50.00%		
Total %	4.50%	4.50%	9.00%	
4	28	22	50	
Column %	6.14%	6.83%		
Row %	56.00%	44.00%		
Total %	3.60%	2.83%	6.43%	
5	26	13	39	
Column %	5.70%	4.04%		
Row %	66.67%	33.33%		
Total %	3.34%	1.67%	5.01%	
Totals	456	322	778	
Total %	58.61%	41.39%	100.00%	

Statistic	Statistics: 10(5) x Urbain/Rural(2) (Attitudes_Q1-10.sta)		
	Chi-square	df	p
Pearson Chi-square	9.693380	df=4	p=.04592
M-L Chi-square	9.680487	df=4	p=.04617