

“Addressing the plastic shopping bag menace in Ghana through education: the role of FM radio stations,”

AUTHORS

Akwasi Arko-Achemfuor
Kofi Poku Quan-Baffour

ARTICLE INFO

Akwasi Arko-Achemfuor and Kofi Poku Quan-Baffour (2015). Addressing the plastic shopping bag menace in Ghana through education: the role of FM radio stations,. *Environmental Economics*, 6(4), 61-67

RELEASED ON

Tuesday, 08 December 2015

JOURNAL

"Environmental Economics"

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

© The author(s) 2024. This publication is an open access article.

Akwasi Arko-Achemfuor (South Africa), Kofi Poku Quan-Baffour (South Africa)

Addressing the plastic shopping bag menace in Ghana through education: the role of FM radio stations

Abstract

The introduction of plastic shopping bags has contributed in diverse ways to the shopping experiences of consumers across the world. Plastic shopping bags have at the same time created serious environmental problems for many countries especially in the developing world where recycling technology is not easily available. In Ghana, the threat to the environment by plastic shopping bags has reached alarming proportions. Meanwhile, FM radio stations have been established in almost every district in the country which could be used as a medium for environmental education. The paper explores how FM radio stations can be used as a medium to educate communities about the scourge of pollution by plastic shopping bags and its long term effect on sustainable development. The article uses the qualitative method through interview, observations and literature review to analyze the problem of plastic shopping bags and makes recommendations on how the problem can be addressed through education using FM radio stations. The possibility of creating small, medium and micro enterprises (SMMEs) through recycling is suggested as one of the solutions to the problem.

Keywords: communities, education, environment, menace, radio.

JEL Classification: Q52.

Introduction

The introduction of plastic shopping bags has contributed in diverse ways to the shopping experiences of consumers across the world. It has become the norm to use plastic packets for packing the purchases of customers so that they can easily carry them. Clapp and Swanston (2009, p. 1) argue that plastic shopping bags are being viewed of late as an environmental hazard threatening human and other living organisms rather than the benign convenience they provide.

Prior to the introduction of plastic shopping bags to most of the developing countries, traders used various carrying and wrapping items for their shopping and packaging. In Ghana and most of the countries in West Africa, one of the most common items used for wrapping prepared food by traders were leaves which posed many health challenges as a consequence of poor hygiene. Nevertheless, one of the advantages of using organic material such as leaves and paper, when compared with plastic material, is its biodegradability. Citing Ellis et al. (2005), Gyapomaah (2013, p. 9) point out that throughout all the stages of a plastic material's life i.e. from manufacture to disposal, there are negative social and environmental effects associated with them. Gyapomaah (2013, p. 9) adds that the environment (water, soil and air) is directly and negatively impacted upon in various ways beginning with the extraction of fossil fuels in the process of manufacturing. Clapp and Swanston (2009, p. 2) intimate that plastics can exist for up to 1000 years without decomposition by sun-

light and/or microorganisms. The use of plastic shopping bags can be traced to the 1970s in the United States of America which gradually spread to the rest of the world. According to Clapp and Swanston (2009, p. 3), the estimated consumption of plastic shopping bags annually in the world stood between 500 billion and 1.5 trillion in 2007. For example, citing Amankwah (2005), Wiennaah (2007, p. 2) intimates that the Accra Metropolitan Area alone generated 9000 tonnes of wastes a day with 315 tonnes being plastic waste. Meanwhile the Worldwatch Institute (2004, p. 25) points out that a very small percentage of the plastic shopping bags get diverted with the US recycling less than 5% of its plastic shopping bags. In effect, a very high and significant percentage of the remaining plastic waste, according to the United States Environmental Protection Agency (USEPA) (2006), ends up in landfills and the rest is unintentionally released into the environment. A number of countries across the world have noted the challenges plastics in general and plastic shopping bags pose to the environment, human being and other living organisms. Bangladesh was the first country to legislate on plastic bags in 1998 which was followed by other countries in South East Asia such as India in the 1990s, Taiwan in the late 1990s and early 2000s. South Africa introduced legislation on plastic bags in 2004. Plastic shopping bags have at the same time continued to create serious environmental problems for many countries especially in the developing world where recycling technology is not in place. In Ghana, the threat to the environment by plastic shopping bags has reached alarming proportions. The need for public and civil education through the mass media has become imperative as the environmental impacts are being felt across the length and breadth of the country. Plastic shopping bags litter the envi-

© Akwasi Arko-Achemfuor, Kofi Poku Quan-Baffour, 2015.
 Akwasi Arko-Achemfuor, Dr., Department of Adult Education and Youth Development, University of South Africa, South Africa.
 Kofi Poku Quan-Baffour, Department of Adult Education and Youth Development, University of South Africa, South Africa.

ronment and block waterways resulting in floods during the rainy season across the country.

Meanwhile, FM radio stations have been established in almost every district in the country which could be used as a medium for environmental education on the environmental menace that plastic shopping bags pose to the environment, human beings and other living organisms. This paper explores how FM radio stations can be used as a medium to educate communities about the scourge and its long term effect on sustainable development. The paper uses document analysis and literature review to analyze the problem and makes recommendations on how the problem can be addressed through education using FM radio stations. The possibility of creating small, medium and micro enterprises (SMMEs) through recycling is suggested as one of the solutions to the problem.

1. Theoretical framework and literature review

This article is underpinned by Orr's (1989, 1992, 1994, 2006) ecological literacy and the cultivation theory of media. Orr acknowledges the importance of the natural environment as part of education and notes the weakening of social and cultural structures as well as the increasing degradation that has come to place emphasis on economics and the physical distancing of humans from the land. The cultivation theory of Gerbner (1994) points to the effect of television watching on the viewers' idea of what the everyday world is. Cultivation theorists argue that television watching has long-term effects on viewers which are small, gradual and indirect, but cumulative and significant. Orr (1992, p. 23) outlines ecological literacy as an approach to dealing with what he termed the "crisis of sustainability" in the United States of America. Orr advances his argument regarding the role of education in moving beyond the modernistic "blind" acceptance of development and "limitless" natural resources to a post-modernist socially and spiritually constructive and holistic views of living as part of the biosphere. This view of Orr (1992, p. 23) on the need for education on the environment and the use of natural resources is relevant as post-modern societies are still living as if nothing has happened and as if the resources at the disposal of man are all renewable. For example, industrialization and urbanization have resulted in the shortage of energy in most parts of the world today. There is also the looming crisis of water which some observers have predicted will be the most likely the cause of the next world war. Orr (1992, p. 23) defines a sustainable society as that one that "does not undermine the resource base and biotic stocks on which its future prosperity depends". He suggests ecological literacy as a pathway

for human beings to follow which he believes could be a recipe for sustainability. The foundations of ecological literacy rest on the following six pillars: all education is environmental education; environmental education requires dialogue with place; environmental issues cannot be understood through a single discipline; process is as important as content; experience in the natural world is essential to understanding it; and education for sustainability requires the understanding of natural systems. Drawing inspiration from Leopold's (1987) concern for the lack of concern among people regarding living in harmony with the land, he asks the question: *How does one learn harmony?* Orr's (1992, p. 142) answer to the question is another question: To teach harmony, should education address intellect only, or should it also include "character, intuition, feeling, practical ability and instincts?". Orr's answer to the question is a recommendation for a paradigm shift for education to include the aspects of humanity, promotion of the idea that humans are an integral part of natural world and re-establish harmony with the land. Orr (1994) blames the environmental crisis the world is facing on the increasing disconnection between man and nature, which is the consequence of man's focus on economic success and consumerism, a disjointed school curriculum and overbooked schedules and technological pastimes outside school.

Communication theory is used mostly as the basis to explain how information is transmitted from one source to the receiver with the objective of receiving feedback. Communication theory in a way attempts to describe and explain what communication entails. Some of the most widely used communication theories include diffusion theory, agenda setting theory, technology determinism theory, media dependency theory and cultivation theory.

According to Ladzarsfeld (1994), diffusion innovation theory posits that communicators who have strong opinions can influence people through the mass media. McLuhan (1962), on the other hand, points out that the theory of technology determinism states that, "media technology shapes how we as individuals in society think, feel, and act and how society operates as we move from one technological age to the other". Agenda setting theory states that the media (most especially the news media) are not only successful at telling people what to think, but they are quite influential in telling them what to think about (McCombs, 1972; Shaw, 1973). According to Gerbner, Gross, Morgan and Signorielli (1994), cultivation theorists argue that television watching has long-term effects which are small, gradual and indirect, but cumulative and significant on viewers. They add that the media shapes the views,

perceptions, attitudes and behavior of viewers. Media dependency theory equally states that the more an individual depends on the media in fulfilling his or her needs, the more important the media will be to that person (Ball-Rokeach, 1976).

The past two decades have witnessed rapid growth in the mass media most especially in the broadcasting industry in most of the countries in the developing world. This phenomenon according to Naqvi, Baloch, Niaz and Kasi (2011, p. 1) can be attributed to the forces of globalization, mainly liberalization, privatization and the free market economy. The programs of most FM radios focus on local and community problems and issues to a large extent and to some extent national issues as well. Naqvi (2011, p. 2) intimates that in Ghana, radio classes are used to a large extent for educational purposes.

Meanwhile, Myers (2008, p. 7) notes that most recent reliable surveys indicate that radio is still the dominant mass-medium in Africa with the widest coverage and audiences when compared with TV, newspapers and other ICTs. Myers (2008, p. 10) quoting the BBC AMDI project in 2006, noted heavy listening (weekly reach of 90%+) in South Africa, Tanzania, Ghana, Mozambique, Kenya and Uganda; moderate listening (weekly reach of 70-90) in Botswana, Zambia, Zimbabwe and Nigeria; and light listening (weekly reach of under 70%) in Senegal, DRC, Ethiopia and Cameroon. Myers (2008, p. 11) adds that all countries in Africa without exception have a state broadcaster with at least one radio (and TV) channel. Myers (2008, p. 11) provides figures to show how radio rich some countries in Sub-Saharan Africa are in terms of the number of radio stations, the proportion of radio stations as a proportion to the population size, or both. According to Myers (2008, p. 11), it is estimated that Mali has 300 radio stations that broadcast in more than a dozen languages; DRC, 250 independent radio stations; Uganda, with over 150 stations that cater for one or more of 38 different languages; Ghana with 130 stations; South Africa with 125 domestic radio channels; and the Republic of Benin with a population of eight million with 74 radio stations. It should be noted that most of the radio stations indicated above are FM radio stations.

Myers (2011, p. 13) categorizes radio stations according to ownership and control with the four main categories being:

- ◆ state-controlled and public radio;
- ◆ privately owned commercial radio;
- ◆ community-controlled; and
- ◆ international.

2. Radio and development

The role of radio in development has been acknowledged by many observers and commentators as it can be used for both constructive and destructive purposes. Myers (2011, p. 33) charges that the onus lies with all stakeholders in radio – journalists, owners, promoters, funders – to use radio for peace-building, counter propaganda and truth-telling, and cites some good examples from various parts of the world. Namasaka (2012, p. 15) points to the possible use of FM radio in attitudinal disposition and opinion shaping. Using the diffusion innovative theory, for example Mamasaka (2012, p. 16), argues that people can be persuaded and influenced to adopt a new idea or technology where a new idea is first spread, followed by the ever-widening social interaction networks to persuade individuals to change or accept an idea, which, according to Rogers (2003), reaches a critical mass at a certain point.

Although some of the bad influences of radio have been acknowledged such as the alleged use of radio to incite and encourage the 1993 Rwanda genocide, Namasaka (2012, p. 15) states that FM radio can be credited as a medium of learning and even persuasion. She adds that various studies across the world show the positive effects of programs such as “Sesame Street” on the cognitive and social skills of children and citing Bryant and Thompson (2002), says that “Media consumers are no longer simply an audience”, but have become “users”, ushering in a new era of active consumption and making communication and media now multi-dimensional rather than uni-directional.

For behavioral changes on sustainable development to become embedded in communities, Myers (2008, p. 36) notes that radio needs to be complemented by the influence of agents, radio clubs, teachers, field workers or medical personnel to help the process along, and/or a mix of media, such as complementary visual support for radio messages through posters, newsletters and the like.

Meanwhile Mwajabu (2001, p. 169) points out that community radios are important for community development and categorizes their purposes as information, amusement, sensitising, integration and social interaction and finally community identity. On information, Mwajabu (2001, p. 170) points out that it is the responsibility of the media, most especially community radio stations, to inform their audiences through their programs and provide them with information about events and conditions in their communities and what is happening around the world to enable people to be informed. Some of such information could be about innovations and

adaptations needed in the community. Community radio and the media are also a medium by which community members and their audiences are entertained through music and sports. On sensitisation and advocacy, Mwajabu (2001) maintains that community members can be mobilised and encouraged as well as activating their interest in taking part in community projects. In addition, radio can provide advocacy on important local, national and international issues such as on HIV/AIDS, female genital mutilation, environmental degradation, drug abuse, corruption, and human trafficking, just to name a few. On personal and community identity and integration, Mwajabu (2001, p. 172) intimates that community radios can promote a sense of community and belongingness through the promotion of the local community language, culture and music.

3. Methodology

The qualitative method based on in depth-interview was used to solicit the views of 10 traders and shoppers, one sanitary inspector from the Ministry of Health, one environmental officer from the district municipal office and one manager of an FM radio station in one district in the Brong Ahafo Region of Ghana. The researchers also had field observation at the district capital to see the extent of the problem of plastic shopping bags. The researchers solicited the views of the participants on the problems and challenges that are posed by plastic shopping bags in the district and how the problem can be addressed in a sustainable manner. The research was carried at headquarters of the Kintampo North District Assembly at Kintampo in the Brong Ahafo Region of Ghana. The phenomenological approach was used for this article as it allows the respondents to describe and interpret experiences of the phenomenon as being lived. The phenomenological study attempts to understand people's perceptions, perspectives, and understanding of a particular situation (Leedy and Ormrod, 2005).

4. Data collection

In-depth interviews were held with 10 traders and shoppers on 24 December 2014 which was the last market day before Christmas at the district capital. The purposeful sampling technique was used to solicit the views of the respondents. The researchers solicited the views of the participants on the problems and challenges that are posed by plastic shopping bags in the district and how the problem can be addressed in a sustainable manner. Purposeful sampling is a technique in which particular settings, persons or events are selected deliberately in order to provide information that cannot be obtained from other choices (Wilson, 2010). The interviews took

place at the shops of the sellers and at the market. Appointments were made with the education officer at their radio station and the sanitary inspector and the environmental officer at their respective offices. The researchers kept a journal which was used to record the data collection as well as requesting the respondents to be allowed to record the interview sessions which were agreed to by all the participants. Pictures were also taken at various places to record the enormity of the challenges posed by the plastic shopping bags.

5. Data analysis

The data collected from the participants were analyzed manually through the use of open coding approach. The analysis was done to understand the various constitutive elements in the data through an inspection of relationships between concepts, constructs and variables and to see whether there were any patterns or trends (Mouton, 2004). The researchers categorized the data into smaller units and arranged them under specific themes as a strategy to make the analysis easy, simple and manageable.

6. Discussion of findings

After collecting the data the researchers arranged and analyzed them under the following themes:

Problems of plastic shopping bags

All the participants in the research expressed their dissatisfaction and concern about the challenges and problems the plastic shopping bags pose to the environment and human and animal health. Some of the environmental concerns included the dirt and litter everywhere. They also mentioned how some animals such as sheep, goat and cattle sometimes eat the plastic bags and end up dying. The sanitary inspector for example said:

We are running out of ideas on how to deal with these plastic bags. Just cast your eyes everywhere and all what you see are these dirty things and I cannot mention some of the things they contain.

The environmental officer from the district echoed a similar sentiment that:

No matter the amount of these plastic bags we collect, the next day you will find them even more than they were before. People just throw these things anywhere after using them for whatever purposes. This is disaster!!!

One of the shoppers

When one of the shoppers who was one of the participants threw a plastic bag down near his shop was asked why he had thrown a plastic bag around he simply said:

That is what everybody does? Don't you see them everywhere? The municipal workers have to collect them. That is what they are paid for.

The views expressed by the participants indicate the seriousness of the problems of plastic shopping bags in most of the communities across the country and elsewhere. Webb et al. (2013, p. 1) point out that the problems associated with plastic pollution has become a global environmental threat. They add that particles from plastics pose direct threat to many animals and many other species.

Disposal methods

The dangers posed by the plastic shopping bags calls for users, communities and municipalities to find sustainable ways of addressing the challenges they pose. Because of its light weight, a plastic shopping bag can easily be carried by the wind and water. Meanwhile, unlike organic materials which decompose easily, most of the participants expressed concerns about the difficulties involved in disposing them. The environmental office from the municipality intimated that:

People appear to have the notion that plastic bags rot or decompose easily like leaves, grass or clothes but these plastic bags hardly decompose. Even if you dig the ground and bury it, it remains there.

One of the traders rather asked:

We take all our refuse to the dumping sites including the plastic bags so what should we do and where do we have to dispose of them?

The views of the participants confirm the observation of Webb et al. (2013, p. 3) that widely used plastics do not naturally degrade when released into the environment. Some of the main methods that have been identified for disposing off plastics include using landfills, biodegrading, incineration and recycling but each of these are not without their side effects and the ability to use them sustainably to address the menace.

Public education

The way people go about the use and disposal of plastic shopping bags call for serious public education of which the radio is one of the widely used mass communication media. One of the shoppers did not see anything wrong with the problem as she jokingly asked:

What do you want us to do? To go back to use leaves to wrap out things and carry our shopping in baskets? No we have passed that stage. We pay for them so those who are paid to clean the streets should see to it that they are picked wherever they occur.

When asked about the time that is allocated for public education on the environment and plastic shopping bags, the manager of the radio station said:

We sometimes educate people here and there when there are serious issues but we honestly do not have dedicated slots as we have for other programs.

One of the traders confirmed what the manager from the radio station said that:

They sometimes talk about dirt in general but I have never heard anything specifically about these shopping bags.

Some of the views expressed by some of the participants appear to border on ignorance which both formal and informal education can address. The need to involve all the stakeholders in fighting the scourge cannot be ignored. For example, Gyapomaa (2013, p. 90) calls for environmental education in communities to create awareness over the issues of the environment to change attitudes. The view of Gyapomaa (2013) above is in line with the cultivation theory which posits that that with the passage of time, the usage of media can “cultivate” into users a distinct view of the world which in effect can be a source of changing perceptions, attitudes and behaviors. Since radio and specifically FM radio is the most available source of information in such communities, they should be encouraged to be at the centre of public and civic education on the problem at stake. As the problem of plastic shopping bags has become a global problem, the Agenda Setting Theory in mass media can be used to set and focus the attention of communities on the issue. The trust of agenda setting rests on the fact that media content does not necessarily change the views of people on a particular issue but can rather change their perceptions on what is important.

Plastic waste as a possible source of economic activities

The issue of the economic spin offs from plastic shopping bags came to the fore during the data collection. The environmental officer from the district municipality stressed on the possible economic activities that can be generated through the value chain of plastic shopping bags. Meanwhile it was shocking to hear from some of the participants about their limited knowledge on what could be done in economic terms with the plastic waste from shopping bags. One of the traders asked:

But what can we do with these plastics? We simply burn or take them the bola (dumping sites). If they cannot be used again you simply discard them.

When asked if they were aware that they could generate money and jobs from the plastic waste, one of the traders laughed and asked:

What do you think can be done with these?

Pointing to the plastic bags lying around.

They are of no use so we have to throw them away although not the way people are disposing of them.

The environmental officer however mentioned a number of things that can be done to generate money from plastic waste. He asked the participant who said nothing could be done with the plastic waste.

Do you know that some people in Accra (the capital city of Ghana) have big businesses and employ many people and built houses from plastic waste?

He added:

People can start businesses by engaging others to collect these plastic wastes and process them or simply send them to the big cities where companies buy them which can create jobs for people.

Meanwhile, Practical Action (2009, p. 3) for example identifies the plastic waste value chain as comprising the collection, storage, sorting, bailing, washing, drying, cutting, shredding, agglomeration (for film sheets), pelletizing, selling of pellets, further processing, injection moulding and selling of its related products. The economic activities that can be generated at every state of the chain cannot be underestimated. Citing KATALYST (2005a), Clapp and Swanston (2009, p. 325) intimate that in 2005, 18000 workers were employed by in the sector with another 7000 people engaged in the recycling sector in Bangladesh with an annual growth of 20% per annum and an annual turnover of US\$98.9 million. The New Jersey Wastewise Business Network (2013, p. 2) confirms that the plastic waste recycling segment of the economy of the state employed 27000 people as well as saving money for the generators of plastic waste. In South Africa, the North West Development Corporation (2015) reports that a women's company by the

name Rethaka Pty Ltd is producing school bags through the use of plastic shopping bags. The innovative solar school bags are manufactured from re-cycled shopping bags which have re-chargeable solar panels which provide light in the night solar.

The need for mass public education of the possible economic activities for local economies as well as the environmental benefits can be taken forward through the mass media of which FM radio is the most available in most parts of Ghana.

Conclusions and recommendations

The menace that is created by plastic shopping and the serious environmental problems they create around the world and in one local district municipality in particular were examined in this article. The findings indicate that for many countries especially in the developing world where recycling technology is not easily available, the issue is becoming a major challenge for communities. In Ghana, the threat to the environment by plastic shopping bags has reached unsustainable levels. FM radio stations as a mass communication medium is easily available but it appears it has not been explored as a possible means of educating the population about the dangers of plastic shopping bags to the environment, human beings, animals and other living organisms. The findings indicate that the problems posed by plastic shopping bags are escalating with no proper strategies or ineffective strategies in addressing the menace. The findings also revealed that a lot of people in the communities do not take the issue very seriously with very limited public education by the different stakeholders including the mass media which is dominated by FM Radio. It is recommended that all the stakeholders put the issue of plastic shopping bags on the agenda of communities and be engaged in serious awareness campaigns in addressing the pandemic. Communities should also be made aware of the socio-economic benefits that can be derived through the proper management of waste, most especially plastic waste.

References

1. Amankwah, A. (2005). *Plastic waste wahala* [online]. Available from: http://www.ghanaweb.com/public_agenda/article [Accessed 15 May 2015].
2. Clapp, J., Swanston, L. (2009). Doing away with plastic shopping bags: International pattern of norm emergence and policy implementation, *Environmental Politics*, 18 (3), pp. 315-322.
3. Gerbner, G., Gross, L., Morgan, M., Signorielli, N. (1994). Living with television: The cultivation perspective. In J. Bryant and D. Zillmann (eds.), *Media effects: Advance Theory and Research*, Hillsdale: Laurence Erlbaum, pp. 17-41.
4. Gyapomaah, A. (2013). Deconstructing the use and disposal of plastic bags in Tema Community One Township in the Tema Metropolis. Master's thesis, University of Ghana, Accra.
5. KATALYST (2005a). Sector Brief-Plastics. Available from: <http://www.kalalystbd.com/admin/downloads/20060503114847.pdf> [Accessed: 24 May 2015].
6. Leedy, P.D., Ormrod, J.E. (2005). *Practical research. Planning and design*. 8th edition. International edition. New Jersey: Pearson Merrill Prentice Hall.

7. Leopold, A. (1987). *A sand county almanac*. New York: Oxford University Press.
8. McLuhan, M. (1962). *The Gutenberg Galaxy: The making of typographic man*, Toronto: University of Toronto Press.
9. Mouton, J. (2004). *How to succeed in your master's and doctoral studies. A South African guide and resource book*. Pretoria: Van Schaik Publishers.
10. Mwajabu, R. (2001). Opportunities and constraints for community media broadcasting environment. In Nassanga, L.G. (Ed.). *The East African Media and Globalisation: Defining Public Interest*, Kampala: Makerere University.
11. Myers, M. (2008). Radio and development in Africa. *A paper prepared for the International Development Research Centre (IDRC) of Canada*. Final Draft.
12. Namasaka, M. (2012). The role of vernacular FM stations in national cohesion and integration in Kenya. Master's thesis, University of Nairobi, Kenya.
13. Naqvi, S., Baloch, M.F., Niaz, B., Mirwais, M. (2011). FM radio and social change, *Bi-Annual Research Journal "Balochistan Review"*, 24 (1), pp. 1-12.
14. North West Development Corporation. (2015). Innovative solar school bags from up-cycled plastic. Available from: <http://nwdc.co.za/why-the-north-west-province/proudly-north-west-products/solarbags>. [Accessed: 20 May 2015].
15. Orr, D.W. (1989). Ecological literacy, *Conservation Biology*, 3 (4), pp. 334-335.
16. Orr, D.W. (1992). *Ecological literacy: Education and transition to postmodern world*. Albany: State University of New York Press.
17. Orr, D.W. (1994). *Earth in mind*. Washington, D.C.: Island Press.
18. Orr, D.W. (2006). Place and pedagogy. In Stone, M.K. and Barlow Z. (Eds.). *Ecological literacy: Educating our children for a sustainable world*. San Francisco: Sierra Club Books.
19. New Jersey Wastewise Business Network (2013). The economic benefits of recycling and waste reduction. Wastewise case studies from private and public sectors. Available from: <http://www.nj.gov/dep/dshw/recycling/wastewise/brbno3.htm>. [Accessed: 18 August 2015].
20. Practical Action. (2009). Recycling plastics: Starting a business. Technical brief. Available from: <http://www.practicalaction.org/practicalanswers>. [Accessed: 15 July 2015].
21. United States Environmental Protection Agency (USEPA). (2006). *Municipal solid waste in the United States: Facts and figures* [online]. Available from: <http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/mswchar05.pdf>. [Accessed: 28 June 2014].
22. Webb, H.K., Arott, J., Crawford, R.J., Ivanova, E.P. (2013). Plastic degradation and its environmental implications with special reference to poly (ethylene terephthalate), *Polymers*, 5, pp. 1-18.
23. Wienaah, M.M. (2007). Sustainable plastic waste management – A case of Accra, Ghana. TRITA-LWR. Master's thesis. Stockholm University, Stockholm.
24. Wilson, J. (2010). *A guide to doing your research projects*. London: Sage Publications Ltd.