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ECONOMIC OPPORTUNITIES OF CLIMATE CHANGE TO RURAL COMMUNITIES IN NIGERIA

Okorie Christiana Uzoaru (Ph.D)[1] and Dokubo Chidinma (Ph.D)[2]

[1]Department of Adult and Non-Formal Education, University of Port Harcourt, Port Harcourt, Rivers State
[2]Department of Educational Foundation, Rivers State University of Science and Technology

ABSTRACT: *Discussions on climate change have focused mainly on the negative impact on the environment and how to mitigate these and adapt to, different mitigation and adaptation measures available today, which are economically potential as proposed by IPCC. This paper looks at potentials that can be harnessed from increase in rice husk generation in Ebonyi State due to provisions of improved rice seedling by the present government of the state as an adaptation strategy to climate change. The paper establishes that to properly harness the economic potential of adaptation strategies of climate change among rural farmers, these farmers need to be educated because majority of them are illiterate and are ignorant of the consequences of their actions, and that the educator should adopt conscientization strategy as mode of facilitating learning.*

KEYWORDS: Climate Change, Adaptation, Economic Potential, Rural Economy, Rice Husk, Environmental Adult Education, Conscentisation.

INTRODUCTION

Climate change is mainly induced by human activities on the environment, though the contributions of natural phenomena cannot be over-emphasized. Human activities greatly contribute to increase in greenhouse gases (GHGs) emissions into the atmosphere leading to unusual increase in global temperature. Climate change according to Onu and Ikechi (2016) is one of the major global problems threatening the survival of humans, animals, crops and the entire ecosystems. Emeka (2008) asserts that climate change is one of the global threats with serious impact on agriculture, natural ecosystem, water supply, health, soil and atmosphere, which are all elements that constitute the support for long term sustainability of most production processes on earth. The issue of climate change has become more threatening, not only to the sustainable development of socio-economic and agricultural activities of any nation, but to the totality of human existence. In response to the increasing effects of climate change, different international conferences such as UN Framework Convention on Climate Change (UNFCCC), Intergovernmental Panel on Climate Change (IPCC), and so on, have been deliberating on how to mitigate and adapt to negative effects of climate change. The Intergovernmental Panel on Climate Change, IPCC's Fourth Assessment Report summary for Africa describes a trend of warming at a rate faster than the global average, and increasing aridity in many countries. Climate change exerts multiple stresses on the biophysical as well as the social and institutional environments that underpin agricultural production (IPCC, 2007).

In Nigeria, the Impact of climate change is visible in all parts of the country, affecting lives and livelihood activities, of mostly the farmers in the rural economy who depend on the weather for their productivity. They are experience low productivity due to shortage of rainfall and

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increase in heat that damages both crops in the farm and those harvested for storage. The nomads (cattle rearers and fisher folks) also have their own share of climate change impact. Hausa-fulani cattle rearers travel far distances in search of grass and water to feed their flocks while the fisher folks paddle their canoes deep into the sea in search of fishes. IPCC (2012) pointed out that economic sectors such as agriculture and fisheries that largely depend on weather conditions either directly or indirectly are increasingly subject to the impacts of climate change. In view of this, Foresight (2011) stresses that the impact of climate change on rural economy necessitates increase in concerns about the rising threats to current income and consumption patterns of households and individuals that earn their livelihoods from these sectors. In order to address the resulting impacts, international conventions, government at international, regional, national, state and local levels have resorted to different mitigation and adaption measures. Notable among the international convention toward addressing the impact of climate change are UN Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC).

Over the years, under the auspices of these international bodies, mitigating and adapting to negative impacts of climate change have been the subject of discussion and different proposals were made in which worst affected regional governments such as those in African countries and Nigeria in particular have directed policies towards mitigating and adapting to the impact of climate change. The issues of mitigating and adapting to climate change have taken a new direction with the recent IPCC report on impact and adaptation of climate change. The report proposed that there is likelihood of positive impacts of climate change on agriculture, depending on the region and the type of agriculture. Agwu, Amadu, Morlai, Wollor & Cegbe, (2011) observe that in West Africa, more frequent and longer dry periods are expected, which threaten crop yield. They equally observed that coastal areas may also be affected by rising sea levels and intrusion of salt water into inland freshwater resources.

In Nigeria, the impact of climate change is visible in all sectors of the economy especially in the agriculture sector due to drop in rainfall and increases heat that affects some farm products adversely. Agriculture serves as major source of livelihood for the rural populace and some farmers due to poverty from lack of production have left the farm for other opportunities in the urban area to sustain themselves, thus increasing the population of people in the urban area. Nigerian government at all level should adapt to reduce the activities that contribute to global warming and climate change. This is the recommendation of IPPC report on measures which affected governments should adapt. These measures are termed adaption to climate change measures. Adaptation to climate change consists of initiatives to reduce the vulnerability of natural climate change effects (Intergovernmental Panel on Climate Change, 2007). According to Mani Markandya, & ipe, (2008) adaptation is understood to include efforts to adjust to ongoing and potential effects of climate change.

Adaptation within the context of climate change, as stressed by Nzeadibe, Egbule,. Chukwuone, & Agu, (2011) includes the actions people take in response to, or in anticipation of changing climate conditions in order to reduce adverse impacts or take advantage of any opportunities that may arise. Most of the adaptation measures in agricultural sector are directed toward increase in production with alternative environmental friendly methods. The increase in production that arises from alternative environmental friendly farming doubled the farm waste generation which is another source of GHGs emission. The cyclical nature of climate change impact and the adaptation measure created the debate on looking beyond the adaptation measures to climate change to harnessing economic opportunities that are likely to be derived

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from the adaptation measure. It is based on this background that this paper discusses how the rural economy in Ebonyi State of Nigeria that depends on agricultural produce, can harness the potentials of climate change adaptation measures for the betterment of the livelihood of the rural populace.

Rural Economy and Climate Change in Nigeria

Rural areas in Nigeria are characterized by a dependency on agriculture and natural resources, and high prevalence of poverty. Nigeria's rural economy is predominantly in the hands of rural smallholder farmers, who have been generally described as poor and hungry. These distinctive characteristics of rural areas make them uniquely vulnerable to the impacts of climate change because their greater dependency on agriculture and natural resources expose rural farmers to climate variability, extreme climate events, and climate change. The main stay of rural economy in Nigerian is farming. Rural populaces in Nigeria are subsistence farmers that grow crops for food and for retail trade to generate income for sustenance of their families. They catch fishes, and rear domestic animals. Bureau of Public Enterprise (BPE, 2004) report that the mainstay of Nigerian Economy since independence is agriculture and it accounts for 38% of the non-oil foreign exchange earnings and employs about 70% of the active labour force of the population.

In response to this observation, Moghalu (2012) suggests that since agriculture offers Nigeria the most cost-effective path to growth and development, with its ever extending value chains, agriculture provides jobs to over 60% of the working population, and that if well-harnessed could be a sustainable springboard for the much awaited industrialisation. This is because the produce from agriculture when exported to foreign countries earns the country foreign exchange with which acquisition of the necessary items or materials for the industrialisation of the nation is made. But Nigerian agricultural production is characterised by large number of dispersed small scale producers employing traditional manual tools based on rain-fed crops but providing the major food needs of the country as observed by Simonyan and Fasina, (2013). Over the years, the increase in heat, partly from continual release of GHGs due to unfriendly environmental agricultural production pattern have resulted to low yield.

In view of this, Zoellick and Taofeeq (2010) point out that as the planet warms, rainfall patterns shift and extreme events such as droughts, floods, and forest fires become more frequent and poverty sets in. Climate change have also resulted to flooding, excessive temperature, rising sea levels and water scarcity at the urban and rural community level, all these affect agricultural production and cause rises in price of agricultural productions. That uncertainty in the onset of the farming season, due to changes in rainfall pattern can lead to a usual sequence of crop failure which results in food shortages due to poor harvests; early rain may not be sustained, and crops planted at that instance may become smothered by heat waves. That increase in rainfall also is conducive for proliferation of pests and diseases, which in turn are detrimental to crop production.

In response to the dearth in agricultural sector due to climate change, Nigerian government through ministry of agriculture at federal and state levels in conjunction with international organisations such as World Bank, Food and Agricultural Organisation (FAO), agricultural research institute, and other governmental and non-governmental organisations mapped out different strategies to mitigate the impact of climate change and also proffer different adaptation strategies to reduce the vulnerability of agricultural sector to impact of climate change. But as farmers in rural Nigeria strive to overcome poverty and advance economic

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growth through adaptation of mapped out strategies to improve their production in the midst of change in weather pattern due to release of GHGs into atmosphere from human activities, they generate more agricultural waste which they ignorantly dispose off indiscriminately. However, the indiscriminate disposal of farm products and its resultant effects distort the basis of adaptation as initiatives to reduce the vulnerability of natural climate change effects. This is not limited to agriculture/ farming, it replicates on other sectors. In view of this development, IPPC suggested that from all negative, there is element of positives derivable from it, and this forms the debate of fourth IPPC conference on climate change.

Economic Opportunities of Climate Change among Rice Farmers in Ebonyi State, Nigeria.

Ebonyi State is one of the food crops producing states in Nigeria. The people are predominantly staple food producers. They major in the production of rice, yam, cassava, cocoyam, maize, groundnut, and different leafy vegetables that are indigenous to people of South East of Nigeria. Farmers in this state are adversely affected by the impact of climate change because they depend on rainfall for cultivation of their crops. In South-Eastern Nigeria, sheet erosion which is the complete removal of arable land is a major threat to agriculture in the region. Nigerian Meteorological Agency (NIMET, 2016) observed that the nature (time of commencement, amount, duration, and intensity) of rainfall has not been encouraging and this is a deviation from the natural pattern of rainfall. In view of this, Oga and Oga (2016) establish that the current unfavourable nature of rainfall widely experienced is due to global warming and subsequently climate change, and that this situation does not augur well for agriculture and agricultural productions, and this, no doubt, has multiplier effects. Furthermore Oga and Oga (2016) observe that in most parts of the country, and even in the local government areas, some farmers allow some un-harvested crops in the farm between the months of October and November to dry up in order to use them as future farm inputs and even for consumption. In this regard, these farmers have suffered losses of such crops as a result of rainfall being experienced around this time of the year, contrary to popular opinion. This implies that farmers may no longer allow this practice and this may affect availability of crops either as inputs or for consumption. This trend of rainfall equally implies that those crops that require much water for example rice may not do well and crops like late maize may not be cultivated as a result of inadequate rainfall.

Ebonyi State major agricultural potential is in the local production of the famous Abakaliki rice which has made the state so popular and a commercial hub. Varieties of rice cultivar being cultivated by farmers in Ebonyi state include Chinyereugo, Mass I and Mass, Onuogwu, Faro15 and Faro14, E4334, Co-operative, E4077, E4197, Awilo (that has mixed colour), and the newly introduced long grain hybrid rice varieties (E4314), that are white in colour. According to Oko Ubi and Efisue (2012), most of these long-grained varieties seem to be better than the so-called foreign rice (e.g. Uncle Ben's rice) in grain length.

Rice production is already under pressure on the demand side due to population growth and current government diversification of Nigeria economy to agriculture but the supply side (farmers) is further exposed to natural pressures through climate change. Rice production is already under pressure on the demand side due to population growth, but the supply side is further exposed to natural pressures through climate change. There is therefore a prevailing demand-supply gap for rice in Nigeria due to population growth and quest for alternative means of national income apart from crude oil export. Idoma, Ikpe, Ejeh, & Mamman (2017) explained that rice is an important food item as it forms the main part of the diet of over one

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third of the world's population. It is among the most valued cereal crops of West African and has become increasingly used as a constituent of animal feed. In same vein Molua (2000) asserts that rice is rich in protein and carbohydrate and that the outside layer of the rice grain which is removed during polishing is known as rice bran which is rich in protein and vitamins and is widely used in the formulation of poultry feed. Besides, it is low in fat and protein, compared with other cereal grains. Rice also provides minerals, vitamins and fiber, although all constituents except carbohydrates are reduced through milling. Idoma et al (2017) also pointed out that Nigeria is one of the largest rice producers in West Africa, producing an average of 3.2 million tons of milled rice for the past seven years. In Nigeria, rice is also one of the key cereal grains taking the place of some of the grains and tuber crops. Before the introduction of World Bank Rice Project and River Basin Development Authorities in Nigeria, domestic rice production depended predominantly on natural rainfall which was very unpredictable in nature.

Consequently, farmers employed traditional practices and inputs ensuing low yields. However, rice production then was mainly rainfall dependent and this contributes to non-attainment of self-sufficiency in rice production despite increasing hectares put into production. Presently due to increase in demand of locally produced rice and government economic diversion policy to non-oil products for export and also for food security and sustainable development government directed policy toward rice cultivation in larger quantities. In other to combat the impact of weather variability and climate change on rice production, improved seedlings were introduced and farmers were encourage with subsides such as loan, grant and even fertilizers to boost the fertility of crops yield due to impact of climate change on the land.

In Ebonyi State, the present administration as a way of adaptation to climate change among rice farmers encouraged the mass production of rice through different policies such as the ban of sale of foreign rice in the state, so that rice farmers will be patronised by consumers in the state, establishment of additional rice mills in Ohaukwu, Ishielu and Ohaozara local government areas, to complement Abakaliki rice mill, which is the oldest rice mill in the state since 1957. Also re- awakening of farmer's interests through provision of soft loans, grant, subsidy, provision of improved rice seedlings and fertilizer, and so on. These have tremendously increase the production of rice in the state. To increase the production capacity of rice farmers in the state, united nations industrial development organization (UNIDO) in partnership with the Federal Government of Nigeria and the Ebonyi State Government established a pilot 3 ton/hr modern milling machine to demonstrate efficiency in milling operation. These projects has modernised the milling process in the state, and replace the old, inefficient and non-motorised diesel engines. The successful implementation of this project as observed by Offiong (2012) has empowered farmers and improved the quality of rice made in Nigeria. This has boosted Ebonyi state rice production capacity to 1.2 million tonnes of rice annually. The state has 72, 000 hectares for rice plantation with a target of six tonnes per hectare production.

However the increase in production of rice in Ebonyi State is presently associated with secondary climate change impact due to use of fertilizer and increase in generation of rice waste such as rice bran and husk. Despite the fact that farmers in the rural area are being guided by extension officers on how to plant the improved seedlings and also the application of fertilizers, majority of the farmers are still ignorant of the proper usage due to illiteracy.

Illiteracy on the part of rural farmers contributes to their excessive usage of fertilizer on the land. Too much of fertilizers in the soil can alter the fertility of the soil by increasing the acid.

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The level of awareness differs by experience and interest in resource use. In most studies, rural farmers' levels of awareness seem to be on increase regarding their experiences in change and length of seasons, incidence of environmental hazards such as flood, droughts, and crop failures, long term shift in wind speed, change in rainfall intensity and uncertainty of rain and so on, (Morghadiya & Smarden, 2011). Also heaps of rice husk and bran are generated on daily basis during processing periods; farmers harvest their rice and carry them to rice mills for processing. Majority of the rice mills are sited in the rural communities. They process the rice and generate tons of rice husk, which are not properly disposed. They are deposited at dungs provided by the community where the mills are sited. The heaps of rice husk and rice bran are set on fire to burn for weeks, thereby emitting carbondioxide (CO2) into the atmosphere. CO2 is one of the GHGs that contribute to climate change. In some cases when it rains the heaps of husk and bran decay and emit methane which is also another GHG. Most of the farmers are not aware of the danger associated with improper disposal of rice husk but they are only interested in increase in productivity associated with environmentally friendly seedlings they are using for improve productivity. This indicator of climate change is not well known to rural rice farmers in the state. They are not really aware that their increases in production of rice contribute to heat they complain of. From the negative effects of climate change, economic opportunities can be derived as proposed in the recent IPCC report. In same vein Ebonyi State rural farmers need to be guided on how to harness the economic potential that can be derived from rice husk and rice bran which are processed based residues and in turn reduce the emission of GHGs and methane that contribute to climate change

Rice Husk and Power Generation

In Nigeria, power generation is below 40%. Urban cities in Nigeria are characterised with epileptic power supply, while majority of the communities do not have electricity at all. Asumadu-Sarkodie and Owusu (2016) observe that there is a growing need for clean energy technologies throughout the world to meet energy demand due to a global decline in fossil fuel reserves within the last decades. That energy development is closely linked with the economic development of a country, thus supplying the energy demand for residential use, industrial use, and commercial use will directly affect the economic growth of a country. However, the inadequate energy supply, power outages, and load shedding have become challenging in developing countries due to increasing population and energy demand.

In Nigeria, urban cities are characterised with epileptic power supply, while most rural areas do not have electricity at all. To improve the availability and supply of electricity in rural areas, federal government through Ministry of Environment, Housing and Urban Development of the Federal Republic of Nigeria in conjunction with United Nation Industrial Development Organization (UNIDO) proposed rural electrification schemes in rural communities in Nigeria. UNIDO is one of the agencies implementing Global Environment Facility (GEF), having comparative advantage in the development and implementation of biomass based mini-grid projects through its experiences in Nigeria. Since 2006, UNIDO has done several preliminary activities in the development of biomass based mini-grid projects and has gained considerable knowledge about Nigerian biomass energy environment, barriers, financial situations, and so on.

In 2006, UNIDO received formal request from the Ministry of Environment, Housing and Urban Development of the Federal Republic of Nigeria to assist in the development and implementation of a Global Environment Facility (GEF) project under climate change strategic programme. The overall objective of the project is to reduce greenhouse gas emissions through

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creation of policy, regulatory and conducive market environment for promoting renewable energy based mini-grids to augment rural electrification and productive uses in Nigeria. The proposed project aims at promoting renewable energy, mainly in the form of biomass based mini-grids as viable options for augmenting the rural electrification programme in Nigeria.

This project was geared toward biomass generation because of locally available biomass energy resources in the rural areas. Electricity generation from biomass will also result in global environmental benefit in the form of CO2 emission reduction by replacing diesel based power generation.

United Nation Industrial Development Organization (UNIDO,2011:7) pointed out that Nigerian Government has put forth many policies, legal and regulatory frameworks for promoting renewable energy based electricity generation in Nigeria. Some of such important policies are:

1. The National Energy Policy drafted by the Energy Commission of Nigeria (ECN 1993)
2. The Electricity Power Sector Reform Act (EPSR 2005);
3. The REA and the Rural Electrification Fund (REF 2006);
4. Nigerian Renewable Electricity Policy (2006)
5. Renewable Energy Master Plan (REMP 2007)

Nigerian Renewable Electricity Policy was passed in 2006 with following objectives, to:

1. promote biomass as an alternative energy resource especially in the rural areas;
2. promote efficient use of agricultural residues, animal and human wastes as energy sources; and
3. reduce health hazards arising from open burning of biomass resources and agricultural residues.

It also supports the construction of independent renewable electricity systems in areas not covered by the electricity grid to provide power service for local economic activities and sustainable living.

Furthermore, UNIDO (2011) observed that though there are several policies and regulatory frameworks formulated for promoting the renewable energy based electricity generation, there is no growth in biomass based power generation in Nigeria. It is mainly due to several barriers that hinder the development of biomass power generation. The major barriers constraining the development of biomass based mini-grids are:

1. Lack of awareness and data
2. Policy and regulatory barriers such as lack of feed-in-tariff
3. Lack of human and institutional capacity
4. Financing/private sector investments in RE

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Presently, most rural areas in Ebonyi State do not have electricity supply, while the urban areas are still experiencing frequent blackouts. This can attributed to lack of power to meet the demand of increase in population. Rice husk are potential energy generating source for Ebonyi state, the

quantity of rice husk produced on daily basis during rice processing stage at different localities in Ebonyi state, can be of use by the government to generate power and cushion the effects of lack of electricity supply to the teaming population. Muhammad, Ab Saman and Farid (2014) established that the economic potential of utilisation of rice husk as fuel in the power plant can be obtained by converting the energy value of rice husk into coal or oil with reference to the calorific value of rice husk. Electricity generation using rice husk known as biomass is a concept that started in India which uses a biomass gasifier that creates fuel from husks after it has been separated from the rice.

Ebonyi state government in a bid to promote the supply of electricity to the rural communities, in collaboration with UNIDO launched its GEF4 Project for Nigeria in 2011, the project is a mini grid based on renewable energy using rice husk (biomass) to augment rural electrification. The proposed project aims at promoting renewable energy, mainly in the form of biomass based mini-grids as viable options for augmenting the rural electrification programme in Ebonyi State. The proposed biomass based mini-grids to be set up under the project are expected to bring about global benefits in reducing 501,936 ton of CO2e of cumulative direct GHG emissions and 2,509,680 tons of CO2e of indirect emissions, which otherwise would have resulted from the use of diesel generators, as is currently the case in Nigeria. This project was expected to bring about considerable socio economic benefits such as:

1. improving the electricity access situation, industrialization and employment generation;
2. to reduce the energy cost of rice milling and save a considerable amount of spending on diesel which can be diverted to other economic activities;
3. by selling rice husk to the power plant, the rice mills also get economic benefit. The project will bring new technology, knowhow and skill level to Nigeria;
4. increased availability of power will spur the growth of other industries nearby the project location; and
5. direct and indirect employment generation.

Husk from rice produced since the early 1960s have been preserved in dump sites, towering above the rusty iron sheets of the Abakaliki Rice Mill market. To generate more biomass material for the plant, the state government, UNIDO and private investor, Ebony Agro Industry created three rice clusters at Osso Edda, Iboko and Ikwo, respectively. The clusters are expected to produce five tons, three tons and 12 tons of rice respectively and a total 30 tons per hour when fully operational. Rice husk can be utilised optimally as fuel for power plant, besides reducing the use of coal and it can cope with environmental impact. When power generation capacity of a nation improves, it will yield a multiplier effects on all other sectors of the economy and development will set in. Apart from power generation, rice husk can be utilised for production of particle board, poultry feeds, husk-lime bricks, as ash replacement for cement, and so on. This is in support of Oyetola and Abdullahi (n.d) who rightly stated that rice husk constitutes an environmental nuisance as they form refuse heaps in the areas where they are disposed. Thus the use of rice husk ash as a partial replacement to cement will provide an

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economic use of the by product and consequently produce cheaper blocks for low cost buildings. Rice bran is recognised as a useful energy source and a viable source of feed ingredient for fish culture, broiler and can also be fed to other livestock.

Rural rice farmers in Ebonyi State are unaware of the potential of rice husk, that what they dispose as waste can be another source of income, and this contributed to their burning of the waste. Therefore to actually harness the potential of rice husk, rural rice farmers need:

1. to be conscientised;

2. to be given awareness of climate change and how to create wealth through waste;

3. to know how to package their rice waste for wealth creation; and

4. to be trained on skills for participation in proper rice waste management

However, the rice farmers need to be empowered for them to be aware of the economic benefits they can harness from their waste, thus education programme required for this group of learners is adult education programme that is environment oriented. Such adult education programme is environmental adult education.

Environmental Adult Education

Environmental adult education is all embracing, inclusive, and active educational approach drawn from multiple disciplines that inform and empower learners to take actions for addressing the root causes of environmental problems. Eheazu (2016) defines environmental adult education as a learning process that increases knowledge of adults and their awareness about the environment and its associated challenges; develops necessary skills and expertise to address the challenges as well as foster the right attitude, motivation and commitment for adults to make informal decisions, accept responsibility for their environmental problems and take responsible action. Supporting this, Okorie (2015) points out that environmental adult education is an educational programme that will increase adult learners' knowledge about the environment, develop in the adult the necessary skills and also change their behaviour towards the environment. Dokubo and Okorie (2017) define environmental adult education as any educational process that is designed for adults, in which the content:

1. provides environmental awareness

2. knowledge of environment and its associated problems

3. will lead to positive attitudinal change towards the environment among the learners

4. will equip the adult learners with skills of handling environmental issues

5. promote the consciousness of participating in activities that help in sustaining the environment.

For effective utilisation of environmental education for educating rural rice farmers, adult educators require to adopt conscientisation strategy. Conscientisation of rural rice farmers to actually understand that increase in heat they experience is partly as a result of their farming process from cultivation level to harvesting and processing stage and that heap of rice husk generate as waste during rice processing stage can be source of income.

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Conscientisation Strategy

Conscientisation according to Freire in Armitage (2013) is the process in which men, not as recipients, but as knowing subjects, achieve a deepening awareness both of the socio-cultural reality which shapes their lives and of their capacity to transform that reality. Freire (1972) describes the process of conscientization as having three stages, which are:

1. **Magical Awareness:** where individuals explain the events that shape their lives in terms of forces and powers beyond their control, and understanding.

2. **Naive Awareness**: where individuals, although not passively accepting their situation, nevertheless still accept the values, rules, and social order they find themselves in, but still have an incomplete understanding of their lived situation.

3. **Critical Awareness or Consciousness**: whereby individuals look more critically at their lived reality, and start to question the values, rules and expectations of passed down by those who oppress, have power and control over them.

Aruma (2015) rightly stated that conscientisation strategy is an important adult education strategy which is employed to stimulate consciousness in people to understand the realities of their environment with the ultimate purpose of promoting sustainable societal change in the society. That awareness creation is very vital in helping people to really understand the realities of the contemporary global environment, thus raising of people's consciousness in the society. This certainly helps them to know certain relevant issues and challenges and how to handle them. It worthy of note that conscientisation does not stop at an awakening of perception but proceeds to action, which in turn provides the basis for new perception, new reflection. In same vein, Nzeneri (2012) noted that the concept of conscientisation is just a process that helps people to develop themselves, their consciousness so as to be critically aware of their problems and their environment. Furthermore, Gajardo in Armitage (2013) contends that conscientisation introduces notions of reflexivity into the learning process, and that a conscientisied person is:

1. the subject of the processes of change;

2. actor in the management and development of the educational process, critical and reflexive; and

3. capable of understanding his or her reality in order to transform it.

Consequently, it becomes an urgent need to raise the consciousness of rural rice farmers toward climate change in order to understand that their farming processes from cultivation stage to processing stage contributes to climate change . It is certain that adult and non-formal education will stimulate provision of relevant knowledge, skills and attitudes through conscientisation strategy which will enable people to respond positively to societal change in the contemporary global environment.

CONCLUSION

Economic potentials of climate change in Nigeria can be harnessed through government direction of policies toward encouragement and education of rural farmers. Majority of the

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rural farmers are illiterate and are unaware of the effects of their action on the environment. When farmers acquire education, they will be more informed on how to go about their farming processes in a more environmental friendly way and also to harness economic opportunities available at any stage of their farming cycle. For educators to actually get the best out of the farmers, they need to utilize conscientisation strategy for dissemination of information. Harnessing the economic potential of climate change will create more jobs for those in the communities that do not have farmland for cultivation; improve the standard of living of the farmers by alleviating poverty among them; and promote development in the communities.

REFERENCES

Agwu, A. E. Amadu, F. O. Morlai, T. A. Wollor, E. T. and Cegbe, L. W. (2011) Agricultural innovations for climate change adaptation and food security in West Africa: The case of Nigeria, Sierra Leone and Liberia. Available online: www.atpsnet.org/files/wps61.pdf

Anselm A. Enete and Taofeeq A. Amusa (2010). Challenges of agricultural adaptation to climate change in Nigeria: A synthesis from the literature. Field Actions Science Reports. Assessed online on 13 December 2017 from http://journals.openedition.org/factsreports/678.

Armitage, A. (2013). Conscientization, dialogue and collaborative problem based learning. *Journal of problem based learning, 1 (1), 1.18.*

Aruma, E.O. (2015). Adult education strategies for promoting sustainable societal change in Nigeria. Journal of economics and sustainable development. 228-232.

Asumadu-Sarkodie, S and Owusu, P. A (2016). Carbon dioxide emissions, GDP, energy use and population growth: A multivariate and causality analysis for Ghana,1971–2013. *Environmental Science and Pollution Research International*.

Bamgboye, I.A. (2012). The potential of producing fuel from biomass in Nigeria. In Jekayinfa S.O (Ed). Building a non-oil export based economy for Nigeria: the potential of value - added products from agricultural residues. Cuvillier Verlag Gottingen, 35-41.

Bureau of Public Enterprises; Nigeria (BPE, 2004).Retrieved online on 13th of December 2017 from www.Bpeng.org.

Dokubo, C. and Okorie, C.U. (2017). Widening community participation in sustainability of community resources in Ebonyi State through environmental adult education. *Adult Education in Nigeria, 22(2), 95-109.*

Eheazu B.A (2016). Situational challenges of environmental degradation in nigeria: "adult education as a response" Innuagural Lecture Series, University of Portharcourt: University of Portharcourt Press.

Emeka, D. O. (2008). Impact of climate change on livelihood sustainability in the Lake Chad region of Nigeria in Popoola (ed). Proceedings of the 32nd Annual Conferences of Forestry Association of Nigeria, 152-153.

Foresight (2011). The future of food and farming. Final Project Report. London, The Government Office for Science Group II Reports. Assessed online on 9th of December 2017 from http://www.ipcc.ch/ipccreports/ar4-wg2.htm.

Idoma, K., Ikpe, E., Ejeh, L., & Mamman, M (2017). Farmers adaptation strategies to the effect of climate variation on rice production: Insight climate variation on rice production: Insight from Benue State, Nigeria environment and ecology research 5(4): 289-301.

Print ISSN: ISSN 2054-6297, Online ISSN: ISSN 2054-6300

Intergovernmental Panel on Climate Change (IPCC, 2012).. Managing the risks of extreme events and disasters to advance climate change adaptation (SREX). Special Report of the Intergovernmental Panel on Climate Change (IPCC). Geneva, IPCC Secretariat.

Intergovernmental Panel on Climate Change. (IPCC, 2007). Climate Change: impacts, adaptation and vulnerability: contribution of Working Group II to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge, UK. : Cambridge University Press.

Mani, M; Markandya, A. and Ipe, V. (2008). Climate change: Adaptation and mitigation in development programmes: A practical guide. Washington, DC: World Bank.

Moghalu, K. C. (2012). A keynote address presented at the International Agricultural Conference, May 7, 2012, at faculty of Agriculture, Anambra State University, Igbariam Campus.

Moghariya, R., & Smardon, R. S. (2011). Farmers' Perception of Risk, Impacts and Adaptation to Climate Change. Perspectives from Western India Dinesh: College of Environmental Science and Forestry.

Molua, E.L. (2002). Climate variability, vulnerability and effectiveness of farm-level adaptation options: the challenges and implications for food security in South-western Cameroon: *Environment and development economics, 7, 529–545.*

Muhammad, A. Ab Saman, K. and Farid, N. (2014). The utilization potential of rice husk as an alternative energy source for power plants in Indonesia . Advanced materials research 845, 494-498. assessed online on 15th December 2017 from www.scientific.net/AMR, A.

Nzeadibe, T.C, Egbule, C.L. Chukwuone, N.A., & Agu, V.C. (2011). Climate change awareness and adaptation in the Niger Delta region of Nigeria. Nairobi Kenya: African technology policy studies network, working paper series 5.

Nzeneri, I.S. (2012).*Adult Education Handbook: Principles and Practices.* Onitsha: J.C. Brother's Bookshop.

Oga, I. O. and Oga, M. O. (2016). Impact of global warming and climate change on the pattern and distribution of rainfall in Afikpo north local government area of Ebonyi State, Nigeria. *International journal of innovative research in technology, basic and applied sciences, 3(1), 39-48.*

Oko A. O, Ubi B. E. , Efisue, A.A. (2012). A comparative study on local and newly introduced rice varieties in Ebonyi State of Nigeria based on selected agronomic characteristics. *International journal of agriculture and forestry, 2(1), 11-17.*

Okorie, C. U. (2015).Revitalizing adult literacy education in Nigeria through appropriate infusion of environmental education into national basic literacy programme. In Ossat S.E. *Nigeria centenary (1914-2014): Issues and challenges in educati*on. Portharcourt: C'Fine Publishers.

Onu, F.M and Ikechi, M.E. (2016). Mitigation and adaptation strategies to the effects of climate change on the environment and agriculture in Nigeria. *IOSR Journal of agriculture and veterinary science (iosr-javs), 9(4), 42319-2380.*

Oyetola, E. B. and Abdullahi, M (n.d). The Use of Rice Husk Ash in Low - Cost Sandcrete Block Production. Assessed online on 12th December 2017 from http://lejpt.academicdirect.org.htm.

Simonyan, K.J and Fasina, O. (2013). Biomass resources and bioenergy potentials in Nigeria. *African journal of agricultural research. 8(40), 4975-4989.*

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