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SCIENCE AND THE ENVIRONMENT: THE KUHNIAN PARADIGM AND THE CHALLENGE OF THE ORDINARY PEOPLE

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Abstract

Across the nations of the world, serious attention is now being paid to the environment because of the increase in environmental disasters. Most of these disasters are not natural but as a consequence of the activities of human beings and their science including their technological apparatuses and deployments. Issues such as global warming, climate change, flooding, desertification, air, water and land pollutions, deforestation, wild fires among so many debilitating issues that affect the environment today have become a source of concern to world leaders, environmentalists, philosophers and other concerned individuals. But the question is; what is the cause of the increase in environmental disasters? Is anything being done to change the narrative? Are the 'ordinary people' aware of the impact of their use and enjoyment of science and technology on the environment? Who takes the lead in shifting the paradigm? Thomas Kuhn had opined in his magnus-opus – *The Structure of Scientific Revolutions*, that every paradigm has relevance in the age to which it is accepted and practiced by the scientific community. But a time will come when anomalies would begin to be noticed in accepted paradigms. These anomalies will lead to crisis that will finally lead to a shift in paradigm thus heralding a scientific revolution. A shift in paradigm means a deliberate departure from the old way of doing things in other to face new challenges that may have been caused by the former way things were done. Using the analytic and critical methods, this paper attempts to situate the impact of science and technology and the activities of the ordinary people on the environment. The Kuhnian notion of 'paradigm shift' shall be adopted as a framework to establish a workable panacea to change the narrative.

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The idea is to canvas for a paradigm shift in the management of the environment by co-opting 'ordinary people' to participate in shifting the environmental paradigm of this age.

Key words: Environment; Science; Technology; Paradigm shift; Ordinary people.

Introduction

The term 'environment' is widely used and has a broad range of definitions, meanings and interpretations. In popular usage, 'environment' means, 'nature': that is, the natural landscape together with all of its non-human features, characteristics and processes such as rivers, plants, animals, volcanos, tornados, and human beings amongst others. Environment according to Puja Mondal (online) is derived from a French word – *Environia* - which means to surround. It refers to both abiotic (physical or non-living) and biotic (living) environment. Thus, the word environment means surroundings, in which organisms live and non-organisms are also found. It is the environment that regulates the life of organisms including human beings. Ordinarily, environment refers to the materials and forces that surrounds the living organism (Puja, online). Thus, environment is the sum total of conditions that surrounds us at a given point in time and space. It is comprised of the interacting systems of physical, biological and cultural elements which are interlinked both individually and collectively. Environment is the sum total of conditions in which an organism has to survive or maintain its life process. It influences the growth and development of living forms. Therefore, anything that affects the environment automatically affects the organisms that live and survive in and by it. It consists of atmosphere, hydrosphere, lithosphere and biosphere. Its chief components are soil, water, air, organisms and solar energy.

There is the underlying assumption that the 'environment' exists in some kind of isolation to humans. However, in reality, human beings, objects, elements and systems rarely exist in isolation; instead, they tend to interact to varying degrees with their surrounding entities. Thus the 'environment' may be regarded as a 'space' in which networks of relationships, interconnections and interactions between entities occur. In fact, the word, 'environment' is often used interchangeably with an ecological term 'ecosystem', which may be

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defined as a community of interacting organisms together with their physical surroundings (Puja, online). For Inyang-Abia (2001), that which surrounds is the environment. Every system has an environment; it is from the environment that life inputs are derived and into it, life outputs are sent. Therefore, the environment determines to a great extent the nature, life style, human culture and activities among other things in life. But human actions, reactions and inactions also have a wide variety of impact on the environment (106). Along this line of thinking, Anametti (1998) asserts that an environment is the milieu of the culture in which anything exists or grows. It includes everything external and internal to the organism that grows and those things, conditions, materials, culture etc. that the organism requires for growth and maintenance, and those that the organism itself produces in the course of its existence (1).

Human beings have however proven to be the most active organism of the environment. The ability of human beings to produce or make things out of other organism in the environment has placed them somewhat above other organisms. Their scientific and technological inventions apart from its numerous advantages seem now to be a source of concern to discerning minds. Human activities on the environment are impacting negatively on the environment with disastrous consequences not only for human beings but also for other organisms that play no role or benefits from the activities of humans on the environment. The technological activities of humans impact the physical environment in many ways such as overpopulation, pollution, and deforestation amongst others. Conditions like these have triggered climate change, soil erosion, poor air quality, and undrinkable waters.

Technology according to Umoren (2001) is the application of science and other forms of organized body of knowledge towards the solution of practical problems. Technology for her is a problem-solving process developed by a people to control the environment, harness resources, and produce goods and services, and has as its goal the improvement of the quality of human life (10). On his part, Dyrenfurth (1984) encapsulates the fear of many as to the usefulness and otherwise of technology to humanity. According to him:

Not only does technology play a pivotal role in our economic world, it also determines the extent to which we can defend ourselves and in a large part, the

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level of our quality of life. It is a significant focus of the recreational activity of millions and the cornerstone of a healthy future. Because of its acknowledged importance, technology carries with it, considerable responsibility and even threat. Misuse of technology are well known to even lay persons and more than a few knowledgeable experts have forecasted doom precipitated by mankind's use / abuse of technology. Therefore, it would seem that the hope, for a future in which people are in control of their environment lies in the universal technological literacy or the ability to do and to use technology – not just to be aware of it (8).

The fear expressed by Dyrenfurth was captured differently by Udo Etuk (2001) when he averred that "nearly everyone is familiar with the dual face worn by technology: some think it is the greatest blessing to happen to mankind; while others think that it is the worst curse to befall mankind" (26). Fears such as these are raised because of the serious negative impact that technology has had and is having on mankind and the environment. More worrisome is the fact that majority of human population, that is, the ordinary people, know next to nothing about the negative impact of their use and enjoyment of technological products. For these group of people, the biggest worry is how to acquire the latest technological product to show that they are in synch with current trends. They do not care about the after-consequence of their 'latest' high-tech equipment on the environment or on them as humans. Arresting the situation has become imperative if the environment must be saved from the destructive tendencies of science and technology and this may only happen if both the experts and the ordinary people begin to consider a shift in paradigm. There are however, philosophical schools of thought that tend to argue for and against the notion that the environment is made for the use and enjoyment of man, and therefore, the ordinary people should not be compelled to abandon their traditional means of subsistence just because the environment needs to be preserved. These philosophies include: Anthropocentrism, biocentrism and ecocentrism.

Anthropocentrism:

The anthropocentric school of thought is founded on the notion that mankind is by nature separate and distinct from the rest of nature and that natural resources are made for mankind; for this reason, the resources are to be exploited for the benefit of human beings. Going by

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this philosophy according to Victor Offiong (2002), the welfare of mankind is paramount and therefore should be accorded primary importance over and above every other consideration whenever there is a quest for environmental protection. This means that the conservation of the environment and its natural resources can only be justified on the basis of the scientific, aesthetic or economic benefits accruing to mankind (94). For Kopnina, Washington, et al (2018), anthropocentrism in its original connotation is the belief that value is human-centered and that all other beings are means to an end. However, according to them, environmentally concerned authors have argued that anthropocentrism is ethically wrong and at the root of ecological crises. This paper will agree with this position to the extent that the deliberate exclusion of the concerns of the 'other' living and non-living beings and things makes anthropocentrism responsible for the environmental crisis bedeviling the earth. Anthropocentrism's affirmation that 'the earth and the fullness thereof' is essentially for the exploration, exploitation, use and enjoyment of human beings is not helpful in the preservation of the ecosystem. The problem however is how to make every human being aware of the serious negative effect of their anthropocentric presupposition of the environment especially the ordinary people.

By ordinary people, it is meant the group of people in societies who are not schooled (and sometimes deliberately refused to be schooled) about the negative effect of human activities on the environment and thus do not care a hoot about what happens to it. It equally includes those whose source of livelihood and existence depends on what they get from the environment in whatever form that is suitable and satisfies their existential needs even when such activities hurt the environment. For the ordinary people 'existence precedes essence'. The ordinary people are the greatest challenge of the environment. They are the ones that deplete the forest to provide energy and shelter; they pollute the environment with non-degradable waste amongst other unfriendly environmental activities they engage in without even knowing or caring to know the consequences of their actions. For them, the value of the environment is measured by its capacity to serve their existential needs.

Biocentric theory:

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This school of thought holds that in any regime for the protection of the environment, premium should not be given to man alone. For them, animals should be given equal rights to those accorded human beings. They are of the opinion that animals are not at the service of man, rather they co-exist with man in nature and deserve to be protected for their own sake, not for the sake of man. According to Offiong (2002), the argument from the biocentric view is that whether an animal is good for food or not, it must be preserved. For example, those who do not eat dog meat should protect dogs not because they provide security but because of the intrinsic value they have in themselves (95).

Ecocentric theory

The advocates of this theory are of the view that whether man, or animals or plants exists in the environment is irrelevant; what is important is the ecosystem. For them humans, animals and plants have value only as part of the ecosystem. They believe that living organisms depend on the non-living elements for their survival and they must exist in a constant ratio. Unfortunately, human activities have tended to introduce undesirable elements into the ecosystem that is negatively affecting everything – whether living or non-living - in the environment. Following from this, the Ecocentrists believes that the ecosystem has an intrinsic value outside the existence of man and animals. For them the protection that is or should be accorded animals or plants does not depend on the use to which they are put to by either man or animals. According to Offiong (2002:97) "the usual materialistic values attached to ecology are here regarded as of little importance. What is more important is the responsibility of all human members of the ecosystem in safeguarding its well-being". The point here is that ontologically, ecocentrism holds that there is no division between human and non-human nature that is sufficient to claim that humans are either the sole bearers of intrinsic value or possess greater intrinsic value than non-human nature. In other words, both human and non-humans (animals, plants, rocks and so on) have equal intrinsic stake on the environment and should pursue, in their different sphere, environmental egalitarianism.

Impact of Science and Technology on the Environment

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Science and technology are the foundation of most social change; it has helped greatly in liberating man from the bondage of superstition and the slavery of other false beliefs and practices. Scientific theories have changed the worldviews of man from anthropomorphism to mechanistic worldview. Technological development and discoveries have been applied to different facets of human endeavors for the maintenance and advancement of the quality of human life on the earth. Technology has been very useful in communication, agriculture, transportation, and industrial revolutions. According to Umoren (2001:18) "if properly applied, technology can wipe out illiteracy, eliminate diseases, fight crime and generally improve the quality of (human) life". But that is as far as it can go; despite its seeming importance and usefulness to man, science and technology has become a threat to man and the environment. According to Abate (1991), it could be regarded as a 'time bomb'. This is because 'the history of man's technological progress is littered with instances of unplanned, unwanted and unmanageable repercussions – Aerosols and other consumer products containing chlorofluorocarbons are developed for a variety of commercial and industrial uses. For Abate (1991), "though the quality of man's life is improved, the earth's sunshield – the Ozone layer is gradually being eroded to such extent that higher earth's temperature and ultraviolet exposures are predicted to contribute to increased incidence of cancer and death". Other areas of concern include the rightful or wrongful use of chemicals. According to Umoren (2001):

> Chemicals are very vital for life but chemical by-products have been stored, dumped and released into the atmosphere either deliberately or carelessly or in error, to such an extent that they constitute environmental hazards (pollution) of great magnitude. Most bodies of water are highly polluted since most industries are located near them and release toxic waste materials into them.

These concerns as expressed by Abati and Umoren indicates that although science and technology has greatly brought about unprecedented development to man and the environment, it has in the same vein brought about colossal damage to the ecosystem and has become a threat to man's existence on the earth with a possibility of a

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man-made environmental catastrophe that may wipe out all forms of living organism from the surface of the earth and make the earth's environment as useless as that of the moon or the images coming from Mars. But the question right now is what is being done to change the narrative and save humanity and his environment?

What is being done?

A lot is being done across the nations of the world to change the narrative. The United Nations (UN), The European Union (EU), The African Union (AU) amongst other regional and international bodies are all collaborating in one way or another to find solutions to environmental problems bedeviling the world today especially man-made devils in science and technology. Recently, from October 31 to November 13, 2021, the United Nations Conference on Climate Change was held in Glasgow, Scotland. The conference tagged COP26 brought together leaders of leading economies in the world to reach agreements on the best way to save the earth's climate from deteriorating further. In COP26, among some far-reaching agreements was the agreement by participating countries to reduce the use of coal in power generation (see Wikipedia). Agreements such as agreed in Scotland is a step in the right direction but the greatest challenge in achieving desired objectives, protocols and agreements of concerned bodies and agencies in saving the environment is the challenge of the ordinary people. How does a few concerned individuals – those at the head of governments and a few non-governmental organisations (NGO's) save the environment where the majority of the populations of the earth do not seem to care about the negative changes and their role in the changes that are taking place in the environment. This paper is of the view that the challenge of the ordinary people is the biggest challenge in tackling environmental problems on the earth.

The Challenge of the Ordinary People

The phrase "ordinary people" may connote different things to different persons. The connotation may be contextual, psychological, social or even philosophical depending on one's inclination. But for the purpose of this paper, the connotations shall be intertwined. This is because according to Thomas Tompion "ordinary people carries social overtones

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because the adjective 'ordinary' suggests they are not distinguished or gifted, or particularly of anything other than the most debased social class". For Panzer Faust0 "you say ordinary people when you are comparing them to people who are distinguished/high-achieving" (forumwordreference.com). The deductions from the two quotes above is the fact that ordinary people are not distinguished members of a class. They may belong to a class but they are not distinguished or refuse to achieve things that distinguish. The descriptions above captures to a large extent the perceptions of a lot of persons about the ordinary people. Ordinary people thus, are people that lack social class; people that have not achieved or may not achieve any significant thing in terms of material wealth, education, politics or military prowess to distinguish them from the other members of the class. Ordinary people is defined in this paper as the group of people in a society that are not schooled (and sometimes deliberately refused to be schooled) about the negative effect of human activities on the environment and thus, do not care a hoot about what happens to it. It equally includes those whose source of livelihood and existence depends on what they get from the environment in whatever form that is suitable and satisfies their existential needs even when such activities hurt the environment. Ordinary people may be categorized into two distinct but related categories namely; the animate ordinary people and the comatose ordinary people.

Categories of Ordinary People

Animate Ordinary people: These class of ordinary people are active members of a society; they are full of live and expectations but add little or no value to their environment. They do not really care about what happens in the environment so long as their existence is not threatened. Some are very educated and can be found in the academia, politics, corporate world, business and even in the military. Some occupy chieftaincy stools of their kingdoms and wields traditional authority over their subjects. The animate ordinary people look like they should know the present predicament of the environment but they seem not to care. Their nonchalant postures towards environmental issues poses some of the greatest challenges to efforts to protect the environment from

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the activities of man. The animate ordinary people know that air and water pollutions for example are destroying the environment but they would not do anything about it in their circle of space and authority. Those occupying traditional stools most times refuse to speak against the activities of their subjects on the environment because those activities are rooted in the traditions and cultures of the people. A good example here is the open defecation and general degradation of the environment on rivers along the coastal regions of South-South Nigeria and in open lands in some parts of India (Carrygo, 2008:1 / www.downtooeaarth.org.in). These class of ordinary people sometimes occupy strategic positions of authority in societies but their ordinary nature makes them of no consequence in efforts to protect the environment.

Comatose Ordinary People: This category of ordinary people is mostly the poor of society who incidentally constitute majority of societal populations. They merely exist. They have no say in problematic existential matters. They only worry about their existential conditions and may not care or try to change their situation. The comatose ordinary people only worry when they cannot get food to feed, they worry when they cannot get rustic shelters over their heads, they worry when they cannot get wood or charcoal for fire and so many other little things that seem to bother them. But the point is that they do not and may not do anything about their worries. They live for the next meal. They do not care about improved food quality, they do not care about decent shelter, they do not bother about getting education. They do not care about government business or politics. They do not care about the environment. They do not care about climate change. The comatose ordinary people include the peasant farmer, the traditional fisherman, the road side market woman/man, the labourers at construction sites, the highway hawkers and roadside mechanics amongst others. These group of people are the silent majority who does nothing and may not do anything about anything that directly or indirectly affects the environment.

The comatose ordinary people do not listen to news, they do not watch television for information; they watch for entertainment. They do not read newspapers and do not discuss serious politics except when it is brought to them with immediate pecuniary gains to be derived therefrom. This class of

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ordinary people are averse to change; they revere tradition and insists that there primitive and environment-destroying culture is their heritage and must be preserved. The example is given by Udo Etuk (2001:30) of a community which would not welcome a generator-driven pump to supply them water because the noise made by the generator was found to be very offensive to the local gods. So, they preferred water from disease-infested ponds than clean treated water. These people have anthropocentric view of the environment. They think that the environment and 'the fullness thereof' is meant for their good and should only be preserved to the extent that it serves their interest. They pollute the environment with open defecation; they cause deforestation by cutting down trees for fire without replanting some and they dispose of their garbage without a care about the effect of toxic wastes on the environment. The comatose ordinary people do not care about what happens to the environment. They are among the greatest challenge to any efforts being made by different World governments and World agencies to find solutions to the problems that science and technology has brought on the natural environment. But the question then is; what do we do with the ordinary people to change the narrative for the good of the environment? A shift in paradigm should be the answer.

The Notion of Paradigm shift

Paradigm shift means an important change that happens when the usual way of thinking or doing something is replaced by a new and different way; it is a fundamental change in an individual's or a society's view of how things work. Thomas Kuhn, in his book, *The Structure of Scientific Revolutions* popularized this concept where he challenged the view that the history of science is characterized by the study of cumulative discovery. His idea of how science develops differs from the standard account. Where the standard account saw steady cumulative progress, Kuhn saw discontinuities. Kuhn's central claim is that development in any scientific field happens via a series of phases. The first phase is pre-paradigm science, then normal science. Followed by the season of anomalies, and then succeeded by a period of crises. The crises are then resolved by a revolutionary change in world view resulting in paradigm shift. According to him "paradigm shifts arise when the dominant

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paradigm under which normal science operate is rendered incompatible with new phenomena, facilitating the adoption of a new paradigm" (Kuhn cited in Michelson, www…).

Phases of Kuhnian Paradigm and Shifting the Perspectives of the Ordinary People

1. Pre-paradigm phase – here, there are many schools of thought competing for general acceptance. In this period; facts are gathered almost randomly without reference to a theoretical structure. But as one theoretical system gradually receives general acceptance, a paradigm is established. In other words, we take it that this is the phase where customs and traditions are established in societies.
2. Normal science - Normal science means research firmly based upon one or more past scientific achievements; achievements that some particular scientific community acknowledges for a time as supplying the foundation for its practice. During normal science, rather than attempt to falsify theories, scientists, engage in puzzle-solving activities. Their faith in the underlying theory is such that anomalies are not treated as falsifying instances of the theory but as puzzles to be solved. The failure to solve a puzzle is not attributed to the inadequacy of the experiment or the incapability of the scientist; it is simply a puzzle to be solved someday. Here, we take it that customs and traditions are established and the people accept it as their way of life. When issues arise, they do not try to fault the tradition or custom, rather they resort to looking for solutions from other sources instead of looking inward.
3. Anomalies - These are results from experiments and theories of normal science that no longer fit the paradigm of normal science. The anomalies phase is the time that the number of inconsistencies with a given paradigm increases that adhoc hypothesis can no longer contain them. Therefore, most members of the scientific community will begin to lose faith in the paradigm. This loss of faith leads to crisis period within the scientific community. In the period of anomalies, the ordinary

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people accept anomalies as their lot in live and thus move on without making any efforts to address the anomaly.

4. Crises phase - This is a period in the life of a paradigm when there is a loss of confidence by most members of a scientific community in that paradigm. This happens mostly when there is the articulation of several other alternative theoretical structures to overcome perceived anomalies. In the crisis period, the ordinary people rather than loss confidence in their old ways of doing things attack and vilify anyone that comes up with an alternative theory. They would rather protect and preserve their cultural heritage than acquiesce to current realities.
5. Paradigm shift - When one of the alternative theoretical structures achieves general acceptance, by the scientific community, then, there occurs what Kuhn calls paradigm shift. A shift from the old to the new (See Kuhn, Structure, 1970). Ordinary people abhor shifts in paradigm. Not that they are not conversant with present realities as it affects them or their environment, the point is that they will rather hang on to their old ways of life until an external force is applied to change or redirect their perspectives.

Scientific revolution

The shift from the old to the new is what Kuhn describes as a scientific revolution which is the violent overthrow of the old paradigm by a scientific community. As a physicist and philosopher, Kuhn applied the term to science, but his definition now applies to any established system, whether scientific, government, socio-cultural, environment, and so on, that their way of thinking or doing things demand a violent re-evaluation of its values. To this extent, it follows therefore that changing the paradigm of how the ordinary people treat or interact with the environment demand a drastic approach. This is because the destruction of the environment will affect everyone and everything on the earth whether ordinary or distinguished.

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Shifting the Paradigm

Paradigm shift as defined earlier is a fundamental change in an individual's or a society's view of how things are done or work. To shift a people's way of doing things most of the time, would require a conscious, deliberate and firm disposition of the change agent. In this instance where what needs to be changed involves the general good of the people, the change agent which this time should be the government must be firm and specific on what it wants changed, how the change should happen and the penalty for not adhering to the terms of the needed change. The ordinary people – both the animate and comatose classes may not shift grounds unless they are forced to change and this 'force' can only be effective if their leadership is persuaded, cajoled and sometimes threatened. The example of 'The Toilet man of India' readily comes to mind. The Indian government had to employ the services of the 'Toilet man' (Dr. Bindeshwar Pathak) to persuade and educate the people on the need to stop open defecation in the country. The leadership of the various communities were coopted into the campaign; the people listened to their leaders and some successes were recorded. Although, Aljazeera reports that while the Indian government is building modern toilets, many villagers have refused to change their old habits and the toilets are lying empty" (www.aljareera.com). The point here is that to achieve any meaningful result in the quest to preserve the environment, the ordinary people must be made to shift their paradigms one way or another.

Conclusion

That the earth's environment is undergoing severe stress due to the activities of man is no longer in doubt. The challenge is how to halt the continuous degradation of the environment and reverse, as much as practicable, the negative impact of science and technology on the environment and the nonchalant attitude of the ordinary people. The argument of this paper is that the ordinary people as defined in the paper is among the greatest challenges that truncates or frustrates efforts being made by heads of governments and international agencies in combating the gradual but steady destruction of the earth's ecosystem. It is the submission of the paper that a time for a paradigm shift is now. A paradigm shift cannot be achieved without a violent revolution in the mindset of the ordinary people. This revolution must be deliberate, conscious and firm. Sanctions must be meted out to those that insists that 'sins against the environment' is their cultural heritage.

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