

The Impact of Acid Rain and the Changing Condition of Zinc Roofs: Implications for Environmental Education in Nigeria

by

Ojong, Aganyi Asu

Department of Environmental Education

Faculty of Education

University of Calabar, Calabar

Email: aganyiojongasu@gmail.com, +2348063408399

Dr. Usang Nkanu Onnoghen

Department of Environmental Education

Faculty of Education

University of Calabar, Calabar

Email: Usangonnoghen@gmail.com, +2348171953333

Ekpenyong, V. O. Ph.D

Department of Continuing education and development studies

Faculty of Education

University of Calabar, Calabar

Email: violet.oyo2016@gmail.com, +2348138971943

Abstract

Acid rain influences every single segments of environment. Acid rain likewise harms man-made materials and structures. Acid downpour is one of the most genuine natural issues developed because of air pollution, Sulphur dioxide (SO₂) and oxides of nitrogen, and ozone are the essential drivers of acid downpour. These contaminations begin from human exercises, for example, ignition of burnable waste, petroleum products in warm force plants and cars. These constituents interface with reactants present in the climate and result into corrosive testimony because of the collaboration of these acids with different constituents of the air, protons are discharged causing increment in the dirt sharpness, bringing down of soil pH assembles and filters away supplement cations and expands accessibility of lethal overwhelming metals. Such changes in the dirt synthetic qualities lessen the dirt richness, which at last causes the negative effect on development and profitability of woodland trees and yield plants. Acid downpour has additionally been accounted for in other African nations. A precipitation of pH 3.5 was accounted for in Port Harcourt. The air contamination levels are consistently ascending in the metropolitan urban communities like Port Harcourt, Warri, Lagos. Acid rain issue in Bihar, West Bengal, Orissa and southern beach front India has been anticipated to prompt barren soil. Acid rain makes the water bodies acidic. The creatures of land and water are likewise influenced by fermentation of water bodies. At low pH, numerous types of creatures of land and water including frogs, amphibians and lizard are especially touchy. Roundabout impact of acid rain on human wellbeing includes lethal substantial metals in light of the fact that these are freed from soil when soil gets fermented and causes wellbeing difficulties to people. The most widely recognized substantial metals are Al, Cd, Zn, Pb, Hg, Mn and Fe. These prepared contaminants are disintegrated in soil and water advance toward

groundwater that is tanked by people and defile the nourishment (Fish, meat, and vegetables) eaten by these overwhelming metals get gathered in the body and came about into different medical issues like dry hacks, asthma, migraine, eye, nose and throat disturbances. Acid rain issue has been handled somewhat in the created world by lessening the emanation of the gases causing acid rain and the multiplicity effects on zinc roofs.

Key words: Acid rain, Air pollution, Heavy metals, Contaminant, Pollutants and Sulphur dioxide

Introduction

The menace of acid rain to the earth ecosphere has become a very serious environmental issues that have attracted global attention and if much assertions are not paid to ameliorate it challenges, it implications to humans and other organism inhabiting the biosphere would be very deleterious. Acid rain is the term utilized in natural science that speaks to blending of ecological poisons with the downpour water (Wood, and Bormeann, 2004). The blending raises the corrosiveness of downpour water by arrangement of corrosive after compound responses including toxin gases and water. In Nigeria, the hints of acid rain is seen in the industrialized territories and its unfavorable impacts harm our environment (Johnston, Shiner, Waver and Lodge 2019).

Acid rain fundamentally influences the zinc tops of houses. The significant reason for acid rain in these situations is because of gas flaring. As indicated by Nwaugo, Onyeagba and Nwahcukwu (2005) gas flaring is the control consuming of common gases related with oil creation. The comprised flaring has left an overwhelming impact on the general condition, where the exercises of the oil investigation and misuse are most prominent.

Orimoogunje, Ayanlade, Akinkuolic and Odiong, (2010) set that flaring is as yet the most widely recognized practice to arrange the waste gases that are delivered during traditional oil investigation in Nigeria. Oil Company like Exxon Mobil associated with gas flaring in Nigeria. For Exxon Mobil to increase greatest financial benefit, gas flaring is the most productive approach to discard the related gas being flared. The gases, in the wake of flaring can be conveyed many kilometers in the air and spread all through the zone where flaring is completed. These gases are later changed over to corrosive gas and saved as downpour. Wet testimony of acids happens when any type of precipitation expels acids from the climate and conveys it to nature. Jacobson (2016) proposed that, the effect of acid rain on condition is a worldwide worry that should be taken care of by nations that are profoundly industrialized.

Be that as it may, the criticalness of this paper is to address how acid rain influences our zinc rooftops and suggestions for ecological training in Nigeria and furthermore propose quantifies on how it very well may be cured. For example, the modern contaminations brought into the climate by manufacturing plant smokestacks, are spread over wide regions by the common breezes and tumble to earth with precipitation called 'acid rain', bringing down the pH of water on ground and executing life.

Therefore, an endeavor to catch and expel the contaminations as opposed to discharging them into the air appears to be hard to execute and exorbitant. Consequently, the perfect Air Act Revisions of 1990 tended to the issue in the United

State essentially just because. In Nigeria, the impact of corrosive precipitation is genuinely felt in the industrialized regions, for example the NNPC towers in the Calabar high ocean where most organizations arrange their squanders unpredictably into the earth. On this note, the consideration of the Federal Government of Nigeria is being drawn through our suggestions on the most proficient method to handle the danger of air poison right now locales. As per Wolosz (2001), acid rain impactly affects timberland biological systems and their occupants. The harm to the woods trees and plants is far reaching. Acid rain harms leaves as it falls. Acid rain overflow from the trees and timberland floor penetrates the woods' water supplies; spillover that doesn't enter the water supply is consumed by the dirt. The outcome of this is similarly all things considered for any dirt or water source contaminated with acid rain. The plants and animals vanish, and the animals that depend on those plants and littler animals lose their nourishment source and bite the dust also. Charkrabbarty (2002) placed that those looking for extravagant paint work on their vehicle should reconsider in regions straightforwardly influenced by acid rain. The abundance sulfur dioxide and nitrogen oxides in acid rain harms car paint and consumes surfaces. It is accepted that the acid rain causes the harm as it dries on, and vanishes from, the surface. Auto and paint covering producers are attempting to create defensive coatings that forestall acid rain erosion.

Acid rain drains out of the dirt when it is consumed by the arable land. This straightforwardly influences the minerals levels of the dirt and the animals, for example, snails, that depend on that calcium for shell development (Lee, Perrigan and Grothans 2014). Thusly, beyond words and winged animals, which eat them for calcium, lay eggs with shells that are powerless and fragile and consequently tumble to bring forth. Diminished calcium likewise makes abundance aluminum in the dirt, keeping trees and other vegetation from retaining water. Debilitated vegetation can't endure extraordinary temperature or fend off bugs and infection (Wolosz, 2001). Acid rain straightforwardly influences the substance and pH adjusts in surface and household waters. The biological impact of acid rain are most plainly found in the sea-going, or water, situations, for example, streams, lakes and swamps. Acid rain runs off the land and winds up in streams, lakes and swamps.

The downpour additionally falls legitimately on these zones. As the acidity of a lake builds, the water becomes more clear and the quantities of fish and other water creatures decay. A few types of plant and creature are better ready to get by in acidic water than others. Freshwater shrimps, snails, mussels are the most immediately influenced by fermentation followed by fish, for example, minnows, salmon and insect. Lee and Weber (2013) set that the eggs and youthful of the fish are the most noticeably terrible influenced as the corrosiveness of the water can keep eggs from incubating appropriately, can cause deformation in youthful fish which likewise battle to take in oxygen. The acidity of the water doesn't simply influence species straightforwardly; it additionally causes lethal substances, for example, aluminum to be discharged into the water from the dirt, hurting fish and other sea-going creatures.

Lakes, waterways and swamps each have their own delicate biological system with a wide range of types of plants and creatures all relying upon one another to endure. If a type of fish vanishes, the creatures which feed on it will step by step vanish as well. In the event that the wiped out fish used to benefit from a specific types of huge creepy crawly, that bug populace will begin to develop, this thusly will

influence the littler bugs or tiny fish on which the bigger bug takes care of, (Odegunmi, 2017).

Causes of acid rain

Decaying vegetation and ejecting volcanoes discharge a few synthetic concoctions that can cause acid rain, yet most acid rain are result of human exercises. The greatest sources are coal-consuming force plants, industrial facilities, and cars. At the point when people consume non-renewable energy sources, sulfur dioxide (SO₂) and nitrogen oxides (NO_x) are discharged into the air. Those air toxins respond with water, oxygen, and different substances to frame airborne sulfuric and nitric corrosive. Winds may spread these acidic mixes through the air and more than several miles and when acid rain arrives at the Earth, it streams over the surface in spillover water, enters water frameworks, and sinks into the dirt and a portion of this acidic particles stay on the zinc rooftops which perpetually changes the progressions the shade of rooftops after some draw out high temperature deformity and unremitting acid rain drops.

Impacts of acid rain and the changing conditions of zinc roofs

Acid rain can demolish structures and zinc by stripping ceaselessly the material and consuming metal that makes up these structures component called sulfur dioxide. Designers pick limestone, marble, steel and metal as solid materials expected to oppose the components. Be that as it may, shockingly, concoction responses between the acid rain and zinc prompted noticeable weakening after some time. Scientists measure the destructive intensity of acids with the pH scale, in which littler numbers show more grounded acids. The pH of unadulterated water is 7 or unbiased, while the pH of a feeble corrosive, similar to vinegar, runs between 2 to 3. Ordinary downpour isn't impartial like unadulterated water however is somewhat acidic at around 5.6 pH or lower. Modern zones have announced a acid rain underneath a 2.4 pH. Downpour water turns out to be feebly acidic in light of the fact that carbon dioxide gas in the environment responds with water to shape carbonic corrosive. Be that as it may, sulfur oxide and nitrogen oxide particles coming about because of modern contamination and car fumes respond with water to shape solid acids. These particles respond together to cause acid rain.

Acid rain harms zinc and structures since it disintegrates the zinc or erodes the metal that is presented to the climate. Before individuals got mindful of the issues that acid rain caused, they regularly utilized metals, limestone and marble as building materials presented to rain and haze. A portion of these materials contain calcium carbonate or calcium-based mixes, which can be broken up by acid rain. Sandstone holds up better to acid rain, yet can be defaced by dark surface stores after some time. Moreover, sulfur dioxide and nitrogen oxides are not essential ozone depleting substances that add to a dangerous atmospheric deviation, one of the principle impacts of environmental change; truth be told, sulfur dioxide has a cooling impact on the air. However, nitrogen oxides add to the arrangement of ground-level ozone, a significant contamination that can be hurtful to individuals. The two gases causes natural and wellbeing concerns since they can spread effectively by means of air contamination and acid rain.

Acid rain has numerous natural impacts, particularly on lakes, streams, wetlands, and other oceanic situations. Acid rain makes such waters progressively

acidic, which brings about more aluminum retention from soil, which is conveyed into lakes and streams. That mix makes waters dangerous to crawfish, shellfishes, fish, and other oceanic creatures. A few animal groups can endure acidic waters superior to other people. Notwithstanding, in an interconnected environment, what influences a few animal groups inevitably influences a lot more all through the natural pecking order, including non-amphibian species, for example, feathered creatures. Acid rain and mist additionally harm timberlands, particularly those at higher rises. The corrosive stores ransack the dirt of fundamental supplements, for example, calcium and cause aluminum to be discharged in the dirt, which makes it difficult for trees to take up water. Trees' leaves and noodles are likewise hurt by acids. The impacts of acid rain, joined with other natural stressors, leave trees and plants less sound, progressively powerless against cold temperatures, bugs, and ailment. The contaminations may likewise restrain trees' capacity to duplicate. A few soils are preferred ready to kill acids over others. Be that as it may, in zones where the dirt's "buffering limit" is low, for example, portions of Nigeria, the hurtful impacts of acid rain are a lot more prominent. Corrosive stores harm physical structures, for example, limestone structures and vehicles. What's more, when it appears as inhalable mist, corrosive precipitation can mess wellbeing up including eye aggravation and asthma.

Implications for environmental education in nigeria

As an environmental educationist, awareness should be created in respect of the following damages caused by acid rain.

Harmful to aquatic life: The acid rain flows that is because of expanding the acidity character in water bodies that Stops eggs of specific living beings (for example fish) to quit bring forth, Changes populace proportions and influences their environment.

Destructive to vegetation: Vegetables are decimated because of expanded causticity in soil, Leeches supplements from soil, and easing back plant development, harming plants, makes dark colored spots in leaves of trees, blocking photosynthesis, permits creatures to contaminate through broken leaves.

Influences human wellbeing: Causes respiratory issues, asthma, dry hacks, cerebral pains and throat disturbances; Leeching of poisons from the dirt by acid rain can be consumed by plants and creatures. When devoured these poisons influence human's life harshly, which cause mind harm, kidney issues and Alzheimer's infection which have been connected to individuals who eat meat of "poisonous" creatures/plants by these contamination.

Impact on transport: Currently, both the railroad business and the plane business need to go through a great deal of cash to fix the destructive harm done by acid rain. Moreover, spans have crumpled in the past because of acid rain consumption. Acid rain disintegrates the stonework and mortar of structures (particularly those made out of sandstone or limestone). It responds with the minerals in the stone to frame a fine substance that can be washed away by downpour.

Job of natural training in diminishing the impact of acid rain from the earth

There are a few different ways to diminish corrosive affidavit and precipitation. These are:

Tidy up smokestacks and fumes pipes: Almost the entirety of the power that powers

present day life originates from consuming non-renewable energy sources like coal, petroleum gas, and oil. Notwithstanding, exhaust outflow of these powers are the primary driver of corrosive affidavit that are discharged into the environment. Coal fuel represents most SO₂ and a huge segment of NO_x outflows. Sulfur is available in coal as a polluting influence, and it responds with air when the coal is singed to frame SO₂. Conversely, NO_x is shaped when any non-renewable energy source is singed. There are a few choices for lessening SO₂ emanations, including utilizing coal containing less sulfur, washing the coal, and utilizing gadgets called scrubbers to artificially expel the SO₂ from the gases leaving the smokestack and reusing to use as a crude material. Force plants can likewise switch energizes; for instance consuming gaseous petrol makes considerably less SO₂ than consuming coal. Certain methodologies will likewise have extra advantages of diminishing different toxins, for example, mercury and carbon dioxide. Understanding these "co-benefits" has gotten significant in looking for practical air contamination decrease procedures. At long last, power plants can utilize innovations that don't consume non-renewable energy sources. Every one of these alternatives has its own expenses and advantages, be that as it may; there is no single general arrangement. Like scrubbers on power plants, exhaust systems lessen NO_x discharges from vehicles. These gadgets have been required for more than twenty years in Nigeria, and it is essential to keep them working appropriately and tailpipe limitations have been fixed as of late. Natural Protection Agency (EPA) has additionally made, and keeps on making, changes to fuel that permits it to consume cleaner oxides of sulfur (SO₂) and NO_x.

Utilize elective vitality sources: There are different wellsprings of power other than petroleum products, for example, atomic force, hydropower, wind vitality, geothermal vitality, and sun oriented vitality. Of these, atomic and hydropower are utilized most generally; wind, sun based, and geothermal vitality have not yet been bridled for an enormous scope. There are likewise elective energies accessible to control cars, including flammable gas controlled vehicles, battery-controlled autos, energy components, biofuels and biodiesel and mixes of option and gas fueled vehicles. All wellsprings of vitality have ecological expenses just as advantages. A few sorts of vitality are more costly to deliver than others. Atomic force, hydropower, and coal are the least expensive structures today, yet changes in advancements and ecological guidelines may move that later on.

Liming: Powdered limestone added to water and soil to kill corrosive. It is regularly utilized in Norway and Sweden. Be that as it may, it is increasingly costly and momentary cure. Corrosive statement enters profoundly into the texture of an environment, changing the science of the dirt just as the science of the streams and narrowing, at times to nothing, the space where certain plants and creatures can endure. Since there are such a large number of changes, it takes numerous years for biological systems to recuperate from corrosive affidavit, significantly after emanations are diminished and the downpour becomes typical once more. For instance, while the perceivability may improve inside days, and little or long winded synthetic changes in streams improve inside months, constantly fermented lakes, streams, woodlands, and soils can take a very long time to decades or even hundreds of years (on account of soils) to recuperate.

Notwithstanding, there are a few things that individuals do to bring back lakes and streams all the more rapidly. Limestone or lime (a normally happening essential compound) can be added to acidic lakes to "offset" the causticity. This

procedure is called liming. Liming will in general be costly, must be done over and over to shield the water from coming back to its acidic condition, and is being viewed as a momentary cure in just explicit zones as opposed to a push to decrease or forestall contamination. Moreover, it doesn't take care of the more extensive issues of changes in soil science and timberland wellbeing in the watershed, and does nothing to address perceivability decreases, materials harm, and hazard to human wellbeing. Be that as it may, liming does regularly allow fish to stay in a lake, so it permits the local populace to make due set up until discharges decreases lessen the measure of corrosive testimony in the territory.

Conclusion

For the most part, precipitation that has a pH esteem under 5.6 is considered as acid rain. It is framed when sulfur dioxides and nitrogen oxides responded with water during precipitation and as gases. Acids downpour is depicted as far as wet and dry statements. The wet affidavit alludes to acidic downpour, haze and day off dry testimony alludes to acidic gases and particles. This acid rain influences an assortment of plants and creatures (Harmful to amphibian life, Harmful to vegetation, influences human wellbeing and Transport) in our condition. We lessen it by Clean up smokestacks and fumes pipes as wells as utilizing elective vitality hotspots for vehicles and power age for various reason so as to live in a sheltered and appropriate condition unafraid of a dangerous atmospheric deviation. The best way to battle acid rain is by checking the arrival of the contaminations that cause it. This implies consuming less non-renewable energy sources and setting air-quality norms.

Recommendations

As of late acid rains have expanded because of normal and man-made exercises, absence of important support, and so on. In some cases acid rain is designated "the concealed plague". The impacts of acid rain must be decreased for the government assistance of the worldwide environment. Force plants use coal, gas, and oil to deliver power. Thus, these plants produce SO₂ and NO_x that causes acid rain. Low sulfur coal must be utilized in coal-subordinate electric force plants to diminish sulfur contaminations in the environment. Individuals can diminish the measure of utilization of power in different manners and can add to decreasing acid rains. To diminish the utilization of electric force lights, fans, air cooler, and other electrical instruments need to turn off when don't utilize. Additionally, TVs, music frameworks, microwaves, and so forth ought not keep in hold on and must turn them off. The creation of sustainable power source, for example, wind power, sunlight based boards, tidal force, and so forth should increment to lessen acid rain contamination. To diminish NO_x it is expected to maintain a strategic distance from private vehicles and utilize open transports for a long excursion. The administrations take fundamental activities to lessen the utilization of private vehicles. Increment utilization of more trains, carpools, bigger open transports, and so forth can decrease nitrogen, sulfur, and lead emanations in the climate. Governments can make it mandatory to fit exhaust systems to vehicle depletes which evacuate the NO_x. Strolling or bike use will improve wellbeing and lessen the propensity of fermentation for short excursion. Utilization of waxes, uncommon coatings, and paints can diminish disintegration of metals and structures. To cap it all, the knowledge of environmental education in the creation of awareness, acquisition of skills, change of attitudes and active participation is very essential for acid rain to be remedied.

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