अनुसन्धक

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Ancient Verses of Vedas from an Ecological Perspective:
Divinity of Nature and Theory of Natural Balance

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Abstract

One of the most revered ancient Indian texts, the "*Vedas*", are a testament to sacred knowledge and wisdom, pertaining to the origin of the world and its living organisms. Vedas are a source of enlightening physical and spiritual knowledge that encircles "life" as we "live" it and "nature" as we "experience" it. In recent studies, it has been established that this ancient text cites factual and scientific knowledge, which has been duly researched and authenticated. Ecology, nature and the divinity of nature is a prominent and recurring theme in the Vedic texts. With vivid descriptions of "*Paryavaran*" or environment, and the creation and evolution of "*Dyava Prithvi*" or Heaven and Earth together, it also phenomenally illustrates the concept of natural balance, in relation with the five basic elements, the world and its organisms are created out of, which are, Earth (*prithvi),* Water (*jal*), Fire (*tejas*), Air (*vayu*), and Ether (*akasha*). "*Veda*" is a broad term to describe an extensive body of Indian Classical Literature, however this paper focuses on the four "*Vedic Samhitas*" namely the *Rigveda, Samaveda, Yajurveda* and *Atharvaveda*. This paper aims to explore the concept of "divinity of nature" and the theory of "natural balance", and how any imbalance among the elements of nature creates climate change, environmental degradation and exhaustion of natural resources. It also highlights the significance of Vedic wisdom regarding environmental conservation and protection, and how it can be utilised in the modern world for ecological transformation.

Keywords: Indian Classical Literature, Vedas, Divinity of Nature, Natural Balance, Ancient Indian Philosophy

Introduction

The Vedas are attributed as the earliest known Indian Classical Literature. The word "Veda" signifies "wisdom", exploring philosophical narratives and curiosities through a variety of

mythological discourses and allegories. Vedas have been divided into four doctrines, The Rigveda, consisting of hymns, which is also considered as the oldest text of ancient Indian literary and philosophical traditions. The *Yajurveda* consists of sacrificial traditions and formulas, the *Samaveda*, consists of melodies and the *Atharvaveda*, consists of various spells and incantations for the healing and longevity of human life. *Atharvaveda* is also considered the oldest known doctrine in medicine and healing, through nature. These texts have served as the originating source for the Indo-Aryans' religious and philosophical thoughts (Radhakrishnan and Moore 3). The Vedas are considered to be *Apauruseya*, a work which is beyond the creation of a normal human being (Roy 21). The philosophies that the four Vedic texts propose, however, are not beyond the grasp of a human being and are meant to be adopted for a righteous life. Nature and ecology are an essential part of these texts. As Dr. Marta Vannucci mentions in her work, 'Human Ecology in the Vedas', "[...] the ancient Indian sages, the Rishis, had already established the foundations of an ecologically sound way of life some three to four thousand years ago, or earlier. The ancient traditional Indian way of life was objectively correct, rationally sound and ecologically valid" (167).

The term 'ecology' was first used by Ernst Haeckel in 1866, to describe the 'economies' of living forms. Ecology has come to be understood as the study of the interaction of living organisms and systems, with their environment, and with their co-species (Sarkar and Elliot-Graves). In order to have a better understanding of literary texts through an ecological perspective, the term 'Ecocriticism' comes into play. Ecocriticism is the study of the relationship between literature and the physical environment, according to Rueckert. It is an attempt to explore the roles played by literature in the ecology of human species, and the application of ecological concepts to the study of literature (Glotfelty xviii - xx). The Vedic texts, composed of hymns, chants and incantations, and melodies in the Vedic Sanskrit, have a deep-rooted ecological significance and scope for practical application in the contemporary world.

The Vedas

"[...] Countless are the resources of Mother Earth,

from whom flow the rivers of wealth in hundreds of streams,

Worship Motherland as you worship God

From time eternal, the Mother Earth is giving life to her children — you owe debt to Her"

(Atharvaveda 12:1:45)

The word 'Veda' is derived from the root word '*vid*' in Sanskrit, which means 'to know', or according to another etymology, it means 'revelation'; the knowledge which contains the evidence of truth within itself (Wilson 1). According to the '*Puranas*', the Vedas are believed to have originated from the mouth of '*Brahma*', and hence are attributed as the 'word of divine', its creation beyond the capabilities of a normal human being, the work of an '*apaurusheya*' (8). In the Vishnu Purana, it has been mentioned that the Vedas were created as a singular work and later on was divided into four separate treatises of divine knowledge, by the arranger and editor '*Vyasa*', referring to '*Ved Vyasa*'. The division of the Vedas into *Rigveda, Yajurveda, Atharvaveda*, and *Samaveda*, has been credited to Ved Vyasa, the task to have taken place in the '*dwapara yuga*' (9). In the *Shapatha Brahmana*, it has been mentioned "From them so heated the three Vedas were produced, the *Rigveda* from *Agni* (fire), the *Yajurveda* from *Vayu* (air) and the *Samaveda* from *Surya* (the Sun)" (6).

Hence, the Vedic scriptures, mythologically believed to have been in existence since the beginning of time, and to have been created out of divine natural forces; beautifully explain nature and its intimate relationship with human beings. There is, however, some scepticism about the dating of the Vedic texts. Some Indian scholars attribute them to 3000 B.C. and others to 6000 B.C., Vedas being dated back to the 15th century B.C is contested as well (Radhakrishnan and Moore 67). The great Indian mystic and scholar, Aurobindo Ghosh is of the view that Vedas hold within them secret doctrines and mystic philosophies (69). The Vedic texts are inundated with curiosity and philosophical impulse. One marvels at the array of knowledge they provide, dating back to centuries. In their appropriate context, an ecological examination of the Vedic texts offers a wealth of knowledge about the conservation and upkeep of our environment.

Vedic Divinity of Nature and the Theory of Natural Balance

" O Prithivi, auspicious be thy woodlands, auspicious

be thy hills and snow-clad mountains.

Unslain, unwounded, unsubdued, I have set foot upon the Earth,

On earth, brown, black, ruddy and every-coloured, on the firm earth that Indra guards from

danger." (*Atharvaveda* 12:1:11)

"O Prithivi, thy centre and thy navel, all forces that

have issued from thy body —

Set us amid those forces ; breathe upon us. I am the son of Earth, Earth is my Mother. Parjanya is my Sire ; may he promote me." (*Atharvaveda* 12:1:12)

"Dyaus is my Father, my begetter: kinship is here. This great earth is my kin and Mother. Between the wide-spread world-halves is the birth-place: the Father laid the Daughter's germ within it." (*Rigveda* 1:164:33)

In the Vedic texts, specifically the four *Vedic Samhitas*, natural elements and nature are venerated as 'divine entities.' In the above-cited translated hymns from the Atharvaveda, Prithvi or Earth is being referred to as 'Mother', which can also be connoted to 'Mother Goddess', endowing a certain divinity to the Earth itself. Humans are referred to as 'the sons of Earth', with Earth serving as the heavenly mother figure who gives birth to her offspring, raises them, and provides for their needs through her resources. Environmental resources including forests, hills, mountains covered in snow, as well as the soil are praised and referred to as 'auspicious.' In the third hymn cited above, from the Rigveda, Earth is again referred to as the 'Mother', and *Dyaus*, the Vedic deity of the sky or heaven is referred to as the 'Father'. Heaven and the Earth are therefore life givers, Heaven sowing the seeds of life into Earth, and Earth nurturing and carrying life within her, similar to a child in the mother's womb. The enormous corpus of hymns, which are devoted to, or glorifying nature in metaphorical and allegorical narratives, reveals the profoundly ingrained ecological concerns of the sacred Vedic texts.

Divinity of Nature and Nature Worship

The Rigveda begins with a hymn dedicated to *Agni* (fire), and similarly, the *Yajurveda* begins with a hymn for *Vayu* (air). Natural resources, flora and fauna, are a part of 'lower mythology' in the Vedas, entities at a lower position than the Gods, but divine in nature (Hopkins 3). Water, Mountains, Vegetation and Animals etc. are all revered as divinity and the Vedic texts describe using beautiful imagery, the importance and means of preservation for the same. Water is considered to have healing powers and every mountain is a divine entity, as well as a resort for the Gods. A variety of Trees and Groves are revered as holy as they are too, associated with the Gods. "A lamp is offered to the *Karanjaka* tree itself, and to cut down trees on the day of the new moon is a sin equal to that of murdering a priest (13, 123, 8 and 127, 3)" (7). Several Vegetal and Animal divinities are holy as well, their existence praised and needed for an ecological balance.

The Earth and its resources were hence seen as divine entities, to be worshipped and conserved by any means. The exploitation of natural resources and inflicting damage on them was considered 'sinful', having serious implications on human life. The Vedic traditions revel in the creations of God and aspire to make the best use of the resources human beings are bestowed with. They throw light on Nature's eternal history and being. The Rigveda, comprising 1,017 hymns divided over ten books, is more of a poetic outpouring on the immense nature of the Universe than the commandments of priests.

> "Agni is in the earth, in plants ; the waters hold Agni
> in them, in the stones is Agni.
> Agni abideth deep in men : Agni abide in cows and steeds." (*Atharvaveda* 12:1:19)

> "Agni gives shine and heat in heaven : the spacious
> air is his, the God's.
> Lover of fatness, bearer of oblation, men enkindle him." (*Atharvaveda* 12:1:20)

In the Rigveda, Nature deities are being worshipped; *Agni* (fire), *Dyaus* (sky), *Surya* (Sun), *Vayu* (air), *Apas* (water), *Usas* (dawn), *Marut* (storm) and *Prithvi* (Earth). The deities were all related to ecological phenomena, hymns being dedicated to them and each of these phenomena given the utmost importance. It is also interesting to note that when a prayer or worship is offered to any one of them, in the Rigveda, that specific Nature deity becomes the chief God, the supreme creator and the supreme destroyer of the universe and life (Radhakrishnan and Moore 4). Similarly, we see these ecological occurrences being referred to as deities in the other three Vedas as well, for instance, in the two hymns cited above, from the *Atharveveda*, *Agni* is being revered as the 'God'. *Agni* is omnipresent in biotic and abiotic life forms, in the earth, the plants, the waters and the stones. It is present in human beings as well as in animals. It is what gives light and heat, the air belongs to the God of Agni, human beings are called upon to enkindle this divine force for the betterment of their lives. S.R.N. Murthy, a well-known geologist, has stated in his work "Vedic View of the Earth", that "the natural geological aspects have been described as *Indra, Agni, Vayu, Varun, Usas* etc." (Tiwari 159). Personifying nature and ecological phenomena as divinity, and nature worship is therefore an inherent part of the Vedic texts, to bless and protect 'life'.

Elements of Nature and Theory of Natural Balance

Elements of nature, often varying in their exact number, are often mentioned in the Vedic texts. The fundamental concept is that Prakriti, the primordial force that permeates all living forms,

is the source of the five main elements—space, air, fire, water, and earth—that together make up the environment. Although each of these aspects has a distinct expression, they are all interconnected and dependent on one another. The safeguarding of the *Dyaus* (heavens) and *Prithvi* (earth) together as interrelated spheres for overall well-being is addressed in the Vedas (Mukherjee 20-21).

> "Agni and Prithivi, closely connected,
>
> may they bring low for me the Boon I mention.
>
> Vayu and Firmament, closely connected, may they, etc.
>
> Closely connected Dyaus and the Aditya, may they, etc.
>
> Closely connected Varuna and Waters, may they, etc.
>
> Lord of the seven communities and her who forms all beings, eighth.
>
> Make our ways full of pleasantness: may So-and-So and I
>
> Agree." (*Yajurveda* 26:1:1)

According to a hymn from *Yajurveda*, cited above, fire, air, heat/light, Sun, water, cloud and sky/heaven are the seven forces of life, on whose support all living beings depend for the sustenance of their life. Earth is revered as the main upholder of life, a divine entity, on which all these interactions take place and life is sustained. Man is called upon to make a beneficial use of these divine interactions and create a good life for himself. The number of the core elements varies across the Vedic texts. In the two hymns from Atharva Veda, cited below, the numbers 'five' and 'six', are in repetition and hold great meaning when read in their appropriate contexts. They can also connote the number of 'elements of nature' among the variety of meanings like five senses, five seasons, five directions, six senses, etc. Despite these variations and inconsistencies, the case for Vedas bestowing great reverence to the forces of life, the elements of nature, is not undermined.

> "Five milkings answer to the fivefold dawning, five
>
> seasons to the cow who bears five titles.
>
> The five sky-regions made fifteen in number, one head have these to one sole world
>
> directed." (*Atharvaveda* 8:9:15)

> "Six Elements arose, first-born of Order: the six-day
>
> time is carried by six Samans.

Six-yoked the plough is, as each trace is numbered : they call both broad ones six; six. Earth and Heaven." (*Atharvaveda* 8:9:16)

However, the *Upanishads* state that there are five basic elements of nature, of which this universe and life are constituted of, Fire, Air, Water, Land and Space (Aitareya Upanishad 3:1:3). The equilibrium among these components or elements and living things has been preserved by nature. The natural balance is disturbed by an increase in any environmental component's proportion above a certain point, and any change to the natural balance poses serious challenges for the universe's living things. Various environmental components have established connections with one another. Humans and the ecosystem have a very natural relationship because they cannot survive without it (Tiwari 158).

Ecological Significance of Vedic Texts: Reverence, Preservation, Transformation
The very concept of environmental preservation dates back to the Vedic era; it is not a contemporary occurrence. The Vedic 'Man' initially sensed God's existence in the world through nature, during the earliest, most formative stages of their civilization (Desai 638) The basic elements of nature were not perfectly balanced for the universe's creation. It has also been suggested by various mythological tales that the cosmos initially expanded before beginning to contract. As the basic forces' or elements' strengths were adjusted, the cosmos then started to expand again, creating a habitable world, known as the '*Vivasvana*' (Roy 57). This was the world where life could sustain itself, but it was also the duty of the living beings to protect and not over-exploit the resources provided to them, so as to not hinder the natural balance of the world they live in. The Vedic texts have a copious number of hymns dedicated to the preservation of ecological balance, and on how to make the most apt use of the ecological resources, for the betterment of their mind, body and soul.

"Whatever I dig from thee, O Earth, may that have quick growth again
O purifier, may we not injure thy vitals or thy heart." (*Atharvaveda* 12:1:35)

"Be glad and joyful in the Plants, both blossoming and bearing fruit,
Plants that will lead us to success like mares who conquer in the race."(*Rigveda* 10:97:3)

"Let fruitful Plants, and fruitless, those that blossom, and the blossomless,
Urged onward by Brihaspati, release us from our pain and grief." (*Rigveda* 10:97:15)

In the hymns cited above, from the Atharva Veda and Rig Veda, respectively, practices for the preservation and conservation of ecological resources are preached in an allegorical and theological form. The first Hymn can be connoted to an advisory against depleting Earth of its resources, by exploiting it for minerals, vegetation and even groundwater. A cautious prayer, that Earth may be replenished of its resources again and not destroyed by exploitative acts of man. In the two hymns cited above, from the *Rig Veda,* the essentiality of plants, both blossoming and blossomless, fruitful and fruitless, for the nurturing and advancement of human life is stated.

Vedic Texts: from the Ancient to a Modern Era

The Vedic texts highly personify 'Nature' and attribute a divine quality to ecological entities. The Vedic Aryans indicate that they were aware of their reliance on and relationship to something greater than nature by personifying and worshipping natural things. Personification entails knowing a person, and personifying a natural thing as a subject of worship implies having a more or less clear understanding of what we refer to as 'God'. Man yearns for a superior force he can rely on. He could revere someone who is superior to him. The gods of the different stages of the Vedic faith are reflections of man's evolving requirements, pains, desires, and heart-searchings (Radhakrishnan and Moore 98).

> "But the paramount importance of the Rig-Veda is after all not as literature, but as philosophy. Its mythology represents a clearer, even if not always chronologically earlier stage of thought and religious development than is to be found in any parallel literature. On one side at least it is primitive in conception, and constructive under our very eyes: how a personal god develops by personification out of a visible fact in nature (anthropomorphosis) no literary document in the world teaches as well as the Rig-Veda" (Bloomfield 29).

It is necessary to see the Vedas, not just as a theological and mythological text, but as a serious work of literature, brimming with scientific, philosophical, moral and ecological knowledge and discourses. It is not fruitful to reject the doctrines of this marvellously detailed text on the premise of it being primitive and closer to theology than science. As Goldsmith believes, the ancient texts of the world, mythologically presented, are not merely pre-scientific revelations but an insight into the reality of our being, they must be read with serious and earnest considerations as religious practices may have the enormous potential for saving the natural

world. "Dayananda considered the Vedas to be the books of all fields of knowledge, and he has written his commentaries to prove this point. Aurobindo has given a psychological interpretation of the Vedas. *Satwalekara* follows the line of thinking of Dayananda to a certain extent" (Roy 34). Hence, it can be inferred that Vedas belong to the world and not just one religion, a literary reading of the texts reveals a multitude of mysteries and philosophies, of utmost importance too.

Conclusion

The Vedic texts personified 'Nature' as 'Divinity' and hence, the Earth and its resources were revered and protected at all costs as sacred beings. Natural resource exploitation and harm were regarded as "sinful," as they had detrimental effects on human existence. The Vedic customs praise God's creations and maximize humankind's access to its resources. They also discuss the "Elements of Nature," which make up the world, and how nature has maintained the balance between these components or elements and living beings. Any rise in any environmental component's percentage over a certain threshold disturbs the natural balance, and any shift in the natural balance presents significant risks to the universe's living things. Environmental protection is not a modern phenomenon; the idea itself is rooted in the Vedic period. During the oldest, most formative phases of their culture, the Vedic "Man" first discerned the presence of God in the world through nature. However, the Vedas must be read as a serious work of literature, full of scientific, philosophical, moral, and ecological knowledge and discussions, rather than just as a religious and mythological document; the study of which is imperative in understanding its mystical philosophies and thoughts.

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Human-Nature Relationship in Selected Poems of Cowper, Hopkins, and Lawrence and its Contemporary Relevance

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Abstract

"For in the true nature of things, if we rightly consider, every green tree is far more glorious than if it were made of gold and silver."

—Martin Luther King Jr.

We rely on nature for numerous goods and services. Our happiness, health depends upon what we call, 'Natural Capital'. For ages, we have seen a relationship between humans and nature, a relationship of give and take. All we needed to do is to take care of the environment around us and judiciously utilize its fruits, but, instead, we became the reason, directly or indirectly, to harm and disrupt the balance of nature. As the native American proverb goes, 'We don't inherit the earth from our ancestors, we borrow it from our children', we are indebted to the coming generation and it is our responsibility to pass on the resources without harm to them. There are many articles and resources available on the ecological imbalance created and the need for sustainable development. These are based on scientific reasoning and tell us the methods we can employ to protect our environment. An interesting point to highlight is the dynamic amalgamation of science with Literature. Literary works that are focused on Nature sensitize an individual towards the beauty of nature, and prompt and motivate one to protect the environment. There are many literary works written on Nature and Human Relationships throughout the varied Eras of English Literature but, in 1978, William Rueckert in his essay "Literature and Ecology: An Experiment in Ecocriticism" coined the term, 'Ecocriticism'. Ecocriticism takes into consideration literary works in the context of environmental issues and nature. This paper takes into account selected poetry from the Romantic Era to the Modern Era. In this paper, we will deal with the loss and destruction of Nature and its psychological impacts on humans as discussed in 'Poplar Fields' by William Cowper. We will also have a look at the unreasonable harm we inflict on animals as highlighted in 'Snake' by 'D H Lawrence'. We will also consider the scene in which the loss of a particular component of nature impacts its counterparts and natural beauty as we see in 'Binsey Poplars' by Gerard Manley Hopkins. Finally, we will compare and contrast the poems

discussed and discuss the various nature-related themes highlighted in these poems. We will have an ecocritical approach towards the selected Literature and establish a relationship with the contemporary scenario of the degradation of nature.

Keywords: Nature, Environment, Ecocriticism, Ecological Imbalance, Human – Nature Relationship

Introduction

Ecology is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them. Ecology also provides information about the benefits of ecosystems and how we can use Earth's resources in ways that leave the environment healthy for future generations.

Ecocriticism is the study of literature and the environment from an interdisciplinary point of view where all sciences come together to analyse the environment and brainstorm possible solutions for the correction of the contemporary environmental situation. Ecocriticism was officially heralded by the publication of two seminal works, both published in the mid-1990s: The Ecocriticism Reader, edited by Cheryll Glotfelty and Harold Fromm, and The Environmental Imagination, by Lawrence Buell (Mambrol).

One of the major threats that the world is facing today is the loss of biodiversity. There are various methods through which one can spread awareness to conserve our biodiversity. It is well understood that the problem that we are facing today is not something new but rather something that has prevailed over decades even for centuries. Literature is indeed an instrument used by writers and poets to spread awareness among the population of the world to save biodiversity.

The amalgamation of science and literature has definitely made a dynamic impact on readers and even budding writers. The science which follows reasoning and logic when intertwined with literature which exhibits the passion and emotions of humans has definitely left the readers in awe. Over centuries, poets through their poetry have emphasised the importance of nature and how industrialization and urbanization have impacted it. Be it Keats, Shelley, Wordsworth, Cowper, Lawrence, and Hopkins or even the contemporary writers, ecocriticism still is one of the major subjects highlighted. These works not only help us to experience nature in a surreal way but also somehow manages to make us realize that if humans keep on meddling with nature, it is going to revolt against the entire human race.

The Poplars are fell'd, farewell to the shade
And the whispering sound of the cool colonnade,
The winds play no longer and sing in the leaves,
Nor Ouse on his bosom their image receives.

- Poplar Field by William Cowper

The poem 'Poplar Field' was written by 'William Cowper', (born November 26, 1731, Great Berkhamstead, Hertfordshire, England—died April 25, 1800, East Dereham, Norfolk), one of the most widely read English poets of his day, whose most characteristic work, as in The Task or the melodious short lyric "The Poplar Trees," brought a new directness to 18th-century nature poetry. Cowper wrote of the joys and sorrows of everyday life and was content to describe the minutiae of the countryside. In his sympathy with rural life, his concern for the poor and downtrodden, and his comparative simplicity of language, he may be seen as one in revolt against much 18th-century verse.

In this poem, Cowper visits his beloved poplar field after twelve years and he realizes that everything has changed in that place. He reminisces about the time when he was young and full of energy. He tells us that he used to sit and play next to the river Ouse beneath the Poplar trees. Cool breeze used to blow whispering through these trees which once provided shade to the poet. But now everything has changed. The Poplar trees are now being cut and used to make benches to sit on them. Ironically, the trees under which the poet used to sit during his childhood are now the seat he is sitting on. The native birds have flown away to some other places like refugees to find shelter. Further, the poet compares his days of life to the eternity of nature. He realizes that soon he will be long gone from this world and will lay low in the ground and grass will grow on his tombstone, suggesting the transient nature of human life and the eternity of nature. In a way, the poet tells the readers that all the worldly pleasures of man will pass away in a blink of an eye but in contrast to it, nature will continue to flourish forever.

My aspens dear, whose airy cages quelled,

Quelled or quenched in leaves the leaping sun

All felled, felled, are all felled;

- Binsey Poplars by Gerard Manley Hopkins

The poem 'Binsey Poplars' was written by Gerard Manley Hopkins, (born July 28, 1844, Stratford, Essex, Eng.—died June 8, 1889, Dublin), English poet and Jesuit priest, one of the most individual of Victorian writers. His work was not published in collected form until 1918, but it influenced many leading 20th-century poets. His poetry celebrates the beauty of nature and the divine in creation, finding God's presence in every living thing. He also emphasizes the significance of individuality and uniqueness, valuing the distinctiveness of each person and creature. Moreover, his poetry reflects on the transience of life, prompting a deep appreciation for the fleeting moments that define existence. Hopkins' use of innovative

poetic techniques, such as "sprung rhythm," showcases his desire to revitalize language and create a powerful impact on his readers.

In this poem, Hopkins begins with the view that the Aspen trees once stood tall. The cool breeze blew through the trees and the golden light of the sun used to light up the leaves of the Aspens. Immediately the poet mentions that now these trees are cut down. He repeats the word, 'felled' thrice to emphasize the fact that the natural beauty of Aspens is no longer seen anymore. The poet compares the Aspens with soldiers standing in a straight line and he further mentions that not even a single tree is left. He recalls the time when he along with his friends used to play in the meadow right next to the river. In the second stanza, the poet mimics Christ on the cross as he calls to God his father, "Forgive them for they know not what they do'. This again shows the strength of emotion Hopkins feels at the loss of these trees and reflects his strong religious convictions. He compares nature with the feminine being who is tender and slender. Further, he mentions that due to the advancements in science human beings are sacrificing Earth. The poet reiterates the fact that nature takes years to grow into beauty but humans take only a couple of minutes to destroy nature. The repetitive three final lines create a wistful tone, as though the poet's rage has subsided to a quiet sadness. The poet takes on a prayerful tone to tell humankind to treat Earth with respect and care.

And so, I missed my chance with one of the lords
Of life.
And I have something to expiate:
A pettiness.
-     Snake by David Herbert Lawrence

The poem 'Snake' was written by 'David Herbert Lawrence', (born September 11, 1885, Eastwood, Nottinghamshire, England—died March 2, 1930, Vence, France), English author of novels, short stories, poems, plays, essays, travel books, and letters. His literary oeuvre often revolves around the complexities of human relationships, exploring the raw and primal instincts that shape human behavior. Moreover, he frequently explores the dichotomy between civilization and nature, pondering the impact of industrialization and modernization on human connection to the natural world. His works serve as a powerful exploration of the human psyche, challenging conventional norms and advocating for a return to a more instinctual, genuine existence in harmony with the natural world.

In this poem, Lawrence tells the readers about the beauty of fauna by mentioning a snake he saw. He mentions that it was a hot summer day, and the poet in his pyjamas goes to the water trough to drink water but he sees a snake there. In a moment thousands of thoughts passed through his mind. He then describes the snake; it had a long slender body with yellow and brown colour like gemstones. The snake stood there

with his forked tongue out drinking the water dripping from the trough to quench his thirst. He compares the snake with the cattle drinking water. Further, he mentions that the snake looked like a God moving his head around. During this whole time, the poet was struggling with the thought of if he should kill the snake as it was venomous. He felt that if he didn't kill the snake, people might call him a coward. As the snake started to move back into the fissure it lived in, the poet, out of his impulsive thought, throws the pitcher into the water trough, though it doesn't hit the snake, but due to the noise, it rushes into the hole. Immediately, the poet realized his mistake and regretted his act. He considered his act a sin which he could never atone for. He thought that he missed his chance to meet one of the lords of nature due to his petty action.

Human vs Nature

One of the major concerns and themes of the three poems mentioned in the paper is the Human-Nature relationship. In the poem, Poplar Field, by William Cowper, and Binsey Poplars, by Hopkins, we see that due to urbanization and industrialization, the poplar trees are being cut. This tells us the fact that humans, because of their selfish motives, are cutting down trees and destroying nature. Also, in the poem, Snake, by Lawrence, we see an internal struggle in the mind of the poet whether to kill the snake or not. We can understand it in terms of hunting and poaching done by humans again to fulfil their unnecessary needs and desires. Another major point highlighted in the poem is that nature is eternal whereas humans on the other hand are mere travellers on this planet, staying for a little while. All these poems try to make the readers understand that both human and nature are a part of each other. Destroying it would ultimately harm humans. Nature is not only important in terms of aesthetic pleasure but also the livelihood of many people depends upon it. Humans, rather than saving nature. are standing against nature causing a great deal of destruction. These poems try to sensitise the readers to save nature, therefore, save the life of humans on Earth.

Ecological Grief

Ecological grief is a relatively new term for a form of climate-related loss and mourning that researchers are just beginning to study. However, some research has already attempted to map out this term and its related causes and psychological experiences. The perspective article published last year in the *International Journal of Environmental Research and Public Health* defined ecological grief as the "grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change." (Hied et al.)

Eco-Grief can be seen in all three poems mentioned in this paper. We see that the poets are mourning the loss of Polar trees in 'Poplar Field' and 'Binsey Poplars'. The poets clearly mention in their poems that due

to change in natural setting the flora and fauna is affected by it. It is important to understand that nature has an emotional impact on human beings. Due to the loss of nature, the poets are grieving the change in the landscape and reminisce about the time of their childhood. Even in the poem, 'Snake' by Lawrence, he grieves because of the action he committed. The poem creates awareness among the readers by emphasising the psychological impact on humans by the loss of nature.

Eco-Anxiety

Eco-anxiety is not considered a disease, at least not yet, but the heightened concern about the climate emergency we are experiencing can lead to psychological disorders. The American Psychology Association (APA) describes eco-anxiety as "the chronic fear of environmental cataclysm that comes from observing the seemingly irrevocable impact of climate change and the associated concern for one's future and that of next generations". The APA, therefore, considers that the internalisation of the great environmental problems that affect our planet can have psychological consequences of varying seriousness in some people (Iberdrola).

In all the poetries mentioned in the paper, we can clearly see, Eco-Anxiety is the major psychological issue portrayed. The poets are concerned about the future. They see a bleak future ahead of us. They mention that people will come and die but the coming generations will have to face even more problems because of what the contemporary people are doing to nature. The poets like Cowper, Hopkins, and Lawrence write nature poems because they are worried about ecology and the ecosystem. As mentioned in the poems, cutting down the poplar trees affects the entire ecosystem. It is important to understand that if humans intervene with any one component of nature all the other components will be affected.

Eco-Guilt

Eco-guilt represents the emotion when you feel you could have done something to help the environment or reduce the environmental threat, yet unable to. It is a feeling felt when people perceive they have failed to meet their own standard or social standard for pro-environmental behaviour. The eco-guilt felt is associated with perceived difficulty of rectifying one's action to prevent or reduce environmental damage. The relation between eco-guilt and engaging in pro-environmental behaviour follows a curvilinear relationship. When a person feels they should be engaging in pro-environmental behaviour and did so, the level of eco-guilt felt should be the lowest. Conversely, when a person feels they should be engaging in pro-environmental behaviour but failed to do so, eco-guilt is felt at its highest level (2019).

Another important perspective we can look at in the poetries taken up in this paper is Eco-Guilt. If we look at the 'Poplar Fields' by Cowper, we see the guilt in the poet's tone. When he mentions that the poplar trees are cut down and the birds have migrated to some other place. This sense of recalling his childhood

and realizing the fact that he cannot undo the changes humans have done gives us a suggestion of the concept of Eco-guilt. Apart from this, in the poem, 'Binsey Poplars' by Hopkins, he also states that the feminine part of nature is being destroyed by the human race and we are moving towards a dark future. Also, in the poem, 'Snake' by Lawrence, the concept of Eco-Guilt, is very clearly observed. After the poet threw the pitcher on the water-trough which scared the snake, he regrets doing it. He is filled with guilt for what he did. Overall, we look at these poetries and find that humans experience Eco-Guilt in one way or the other if they have the sense of protecting our nature.

Nature as a Living Feminine Being

Metaphorically, we might then say that English literature generally associated women with nature and landscape either as passive and nurturing, 'mother Earth,' or as a 'virgin beauty.' But new images of controlling and dominating nature emerged in Europe with explorations of new worlds and beginnings of colonialism during the sixteenth and seventeenth centuries, when white men began to plunder newly "discovered" lands and their resources, in the name of civilization. These "virgin" lands, as they called them, opened another view of nature (and the native woman) as passionate, wild and uncontrollable. Literature written during these times of colonial expansion often sexualized the conquered lands as feminine (Patel).

In the poem, 'Poplar Field' and 'Binsey Poplars', nature is treated as a feminine being. The poets rather than calling nature as some passive inanimate being, have compared them to a living being. They have compared Earth to a female, expressing the beauty it has. One major reason to treat nature as a living being apart from obvious reasons is to sensitize people not to ruthlessly eradicate nature. The poets want the readers to realize that we are alive today because of nature, if we keep on destroying it, one day we will perish from the face of Earth. It is necessary to understand that Nature is the provider to humans and not vice versa.

Nature and Capitalism

Karl Marx analysed capitalism and argued that raw materials and capital were required prior to being used in production, they are a prerequisite if you like. However, it was not Marx himself who exposed the obvious contradiction between nature and capitalism, yet rather ecological Marxists, arguing that in order for production to begin and to expand, inputs into the system must be available (Foster, 2000). A movement known as the 'The red-green movement' links such environmental degradation by transnational corporations to economic oppression. They assert that the increase in capitalism and desire for more goods has externalizing costs that harm not only the environment but also public health (O'Connor, 1998). Commoner (1987) argues for 'ecological socialism', which is as a method of allowing

the society being affected by negative environmental impacts to have a say in the means of production, simultaneously eliminating unsustainable, environmentally destructive production practices and the exploitative mode of production (Klusener).

If we look at the historical context and background of the poems, 'Polar Field' and 'Binsey Poplars', we realize that these poems were written as a revolt against the ill effects on nature due to industrialization and urbanization. The Romantic and Victorian Era of English Literature was of rapid expansion of trade and industrialization. Due to this fact, people compromised the importance of nature. Even in recent times, its effects can be experienced. These poems tell us the reason for the destruction of Nature which is capitalism.

Cultural Ecology

In 1962, anthropologist Charles O. Frake defined cultural ecology as "the study of the role of culture as a dynamic component of any ecosystem" and that's still a fairly accurate definition. Between one-third and one-half of the land surface of the earth has been transformed by human development. Cultural ecology argues that we humans were inextricably embedded in earth surface processes long before the invention of bulldozers and dynamite. Humans are part of the environment, not an outside force making impacts on it. Discussing cultural landscapes—people within their environment—attempts to address the world as a bio-culturally collaborative product (Hirst).

Lastly, Cultural Ecology is an important aspect of the poetries. We realize through these poetries that human beings and nature are a part of each other. It is better to say that humans need nature for their survival. Any action that a human does impacts nature in one way or the other. In the poems, 'Poplar Field' and 'Binsey Poplars', the Poplar trees are cut down and the fauna of that particular area is affected. Birds migrated to other places to find shelter. Secondly, the poem also mentions that the coming generations will not be able to look at the beauty of nature. In the poem, 'Snake', the poet's struggle whether to kill the snake or not fetches us to the fact of hunting and killing animals. As an aftermath, many species of animals have gone extinct and a lot more are endangered.

Conclusion

This paper looked at the Human-Nature Relationship in Selected Poems of Cowper, Hopkins, and Lawrence and its Contemporary Relevance and it can be said that Nature has no replacement. One needs to understand that we are here because nature allows us to be here. It was also seen that Literature is one of the best mediums to convey the harsh realities of environmental degradation even in contemporary times. It helps to create awareness among the readers. If we continue to destroy nature at the current pace, soon we will face even more natural calamities and disasters than we are facing now. Therefore, it is time

that we look out for sustainable development. We should not exploit natural resources just because of our greed but use them judiciously keeping in mind the needs of the coming generations.

If all mankind were to disappear, the world would regenerate back to the rich state of equilibrium that existed ten thousand years ago. If insects were to vanish, the environment would collapse into chaos.

- E. O. Wilson

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DNA Barcoding of Fagopyrum Sp. (Buckwheat) of the Himalayan Regions of Sikkim and Nepal

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Abstract

Buckwheat (*Fagopyrum* spp.) is a pseudo cereal and economically important nutraceutical crop. The two most cultivated species grown in the Himalayas are *Fagopyrum esculentum* (Common Buckwheat) and *Fagopyrum tartaricum* (Tartary Buckwheat). *Fagopyrum tartaricum* is a highly suitable crop that grows in extremely in cold conditions. It contains rutin (antioxidant polyphenol), quercetin, vitexin and D-chiro inositol (soluble carb). In tartary buckwheat seed proteome, a total of 3363 Proteins were found, and their biological significance was explored and annotated. While the growing season significantly affected the flavonoid content of the hulls, location was the primary source of variation for the flavonoid and rutin concentrations of the seed. The rutin rich buckwheat seeds needs to be verified and encouraged to be cultivated. DNA barcoding using two sections of the chloroplast genes like *rbcl* and *matK* along with the combinations of *ITS2* and *psbA-trnH* yields a better identification result. ITS2 is more suited for species recognition because to its short length and excellent PCR amplification efficiency. The cultivar NGRC03777 (*Fagopyrum esculentum)* had 73.75731 mg/100g rutin and NGRC03731 *(Fagopyrum tataricum* (L.) Gaertn) had 433 mg/100g of the Nepal Himalayas, and E 16-KUMREK had 67 mg/100g of rutin of from Sikkim Himalayas were used for DNA barcoding. The alignment using BLASTn with NCBI, showed 100% and some 98% identity with collected specimens. The future for identifying these rutin specific verities could help the public greatly.

Keywords: Fagopyrum spp., *rbcl* and *matK,* rutin, BLASTN,

Introduction

The *Fagopyrum esculentum* (Common Buckwheat) and *Fagopyrum tartaricum* (Tartary Buckwheat) are pseudo cereal and economically important nutraceutical crop that are cultivated species in Himalayas. It contains rutin (antioxidant polyphenol), quercetin, vitexin and D-chiro inositol (soluble carb). In tartary buckwheat seed proteome, a total of 3363 proteins were recognised, and their biological processes were explored and annotated. Thus, identifying their nutrient value will make us to promote the use of those nutraceutical important cultivars. The cultivar NGRC03777 (*Fagopyrum esculentum)* had 73.75731 mg/100g rutin and NGRC03731 *(Fagopyrum tataricum* (L.) Gaertn) had 433 mg/100g in of the Nepal Himalayas, and E 16-KUMREK had 67 mg/100g of rutin of from Sikkim Himalayas.

Rutin (quercetin3-rutinoside) is a glycoside of flavonoids found in nearly all the parts of the plant including, leaves, stems, inflorescence, cotyledons, and seeds. It possesses a variety of pharmacologically advantageous qualities, including actions that are anti-inflammatory, anti-thrombotic, cytoprotective, and vasoprotective in humans (Nidhi Gupta et al., 2011**).** In tartary buckwheat seed proteome, a total of 3363 proteins were noted, and their biological roles were explored and described. The rutin rich cultivars of the Himalayas needs to be identified and promoted as to get the best use of these cultivars.

As the cornerstone of all biology, the identification, naming, and classifying living things at the species level has emerged as one of the essential standards in biodiversity analysis and management, preservation, and breeding (Vu and Le., 2019). Using sequence divergence based on nucleotide alignment, a DNA barcode is a set of one or more short gene sequences (often 200–900 base pairs) selected from a standardised region of the genome to help identify and find new species (Emerson et al., 2011). This genetic tool's primary goal is to efficiently and successfully identify any biological sample's species independent of the sample's visual categorisation by comparing barcode patterns to refer to databases.

Verification of plant items covering medicinal plants to food products has used barcoding technologies (Chen et al.2010) to kitchen spices (De Mattia, et al. 2010), Berries (Jaakola et al. 2010), olive oil (Kumar et al. 2011) and tea (Stoeckle et al. 2011). Numerous real-world scenarios and classification tests had proven the value of the barcoding technology (Vu and Le 2019). The selected loci and algorithms in a barcoding technique based on sequences directly influence the identification outcomes. Phylogenetic trees have been constructed using genetic sequences obtained by DNA barcoding for application in phylogenetic community ecology.

The necessity for precise identification of species to both protect and use plants underpins the significance of plant DNA barcoding (de Vere et al., 2015). Unfortunately, none of their markers have been found to fully satisfy each and every need for DNA barcodes. For instance,

the rbcL fragment is easy to amplify, sequence, and align while having limited discriminatory strength. However, it is challenging to multiply the matK barcode, which might be the closest plant analogue to COI in animals because to the absence of appropriate universality primers (Braukmann et al., 2017; de Vere et al. 2015; Fang et al. 2019; Li et al. 2015).

In this study, we need to use particular plant DNA barcoding markers. Candidates for plant barcoding include the nuclear-encoded ribosomal internal transcribed spacer (ITS) region and the chloroplast intergenic spacer trnH-psbA. These candidates are followed by the coding sequences from the two plant loci that are now most frequently utilised, rbcL and matK, from plastid genes (Kress et.al.,2007, Loera-Sanchez et al., 2020; Yao et al., 2010), and generate specific gene sequences are unique to each cultivar which identifies and differentiates from the rest of cultivars in Nepal and Sikkim Himalayas.

Materials and Methods

Collection of Seeds

The buckwheat seeds with high rutin content of *Fagopyrum esculentam* and Fagopyrum tartaricum were collected from Nepal Agriculture Genetic Resources Centre (NAGRC) Khumaltar*, Lalitpur, Kathmandu, Nepal* and from the farmers of Sikkim Himalayas. The T 5 (NGRC03731) which had rutin of 433 mg/100g, and E 10 (NGRC03777)-74 mg/100g are from NAGRC and E 16-KUMREK-67 mg/100g from Sikkim were chosen for DNA barcoding purpose.

DNA Extraction

The DNA was extracted from buckwheat seeds using modified 2 % CTAB method. (Porebski L. et al., 1997). The seeds of buckwheat, 100 mg was measured and ground using mortar and thistle with adding gradually up to 1 ml of 2% CTAB solution (100 mM Tris-HCl, 1.4 M NaCl, 20 mM EDTA, 1% beta-mercaptoethanol, 2% CTAB). The extract was transferred to 2ml Eppendorf tubes and kept at water bathe for one hour at $60°$ C, with inverting gently every 15 minutes. After cooling it for fifteen minutes, 10 minutes of centrifuging at 10,000 rpm (rotation per minute) 700 µL of the supernatant was added into a new 2 ml Eppendorf tube. To this, equivalent amount of phenol Chloroform: Isoamyl Alcohol was added in a 25:24:1 ratio. centrifuged for 10 minutes at 10,000 rpm after being gently mixed 5 to 6 times by inversion. After being gently mixed five to six times by inversion, the mixture was centrifuged for 10 minutes at 10,000 rpm. To this, freshly prepared 50 µL of 5M Potassium Acetate was added

and an equal volume of ice-cold ethanol was added and allowed the DNA to precipitate for 20 minutes at 4°C. when the pellets appeared, tube was centrifuged at 10,000 rpm for 10 minutes. After discarding the supernatant, the pellet was washed twice with 500 µL of 80% freshly prepared ethanol at 10,000 rpm for 3 minutes and allowed to air dry for 20 minutes. The pellet was dissolved in 50 L of Milli-Q water devoid of nucleases and kept at -20° C for later use.

Agarose gel electrophoresis

The clean gel casting tray with comb was poured with agarose gel (0.8% w/v). The agarose gel was prepared by adding 0.8 gm of agarose (SRL, Mumbai) in 100 mL of 1X TAE (Tris-acetate-EDTA) and boiled. To this, after cooling it to room temperature, 1 µL of ethidium bromide (EtBr) was added (10mg/ml) was added. The gel was allowed to solidify for about 30 minutes. After placing it in the gel tank with freshly prepared 1X TAE (Tris-acetate-EDTA) from 10X stock solution, the genomic DNA was mixed with the gel loading dye and was loaded on to the wells and the DC current at 70 Volts. After 45 minutes, the gel was placed on a Gel Doc and images were captured using the Mediccare System.

Sequencing and PCR amplification of DNA

50 ng of total genomic DNA was utilised as the template for the PCR, which amplified DNA barcode markers using the standard primers. (Table-1 for matK, rbcL, ITS2 and psbA-tmH (Kress et al. 2007, Fazekas et al, 2008). 1X buffer containing 1.5 mM MgCl, 200 mM dNTPs, 5 pmol primers, and 1 unit of Taq DNA polymerase were included in the PCR reaction mixture (30 ml). PCR was done in a thermal cycler (Applied Biosystems, CA, USA) utilising the following protocol: initial denaturation at 95 °C for 5 minutes, 30 cycles of denaturation at 95 °C for 30 seconds, annealing at 55 °C for 30 seconds, and extension at 72 °C for 1 minutes, final extension at 72 °C for 5 minutes, and hold at 16 °C (Nithaniel et al, 2014). Using a Silica Spin Column PCR Purification Kit, the PCR products were purified after being confirmed using agarose gel electrophoresis (Livegen Biotechnologies, Bangalore). Using the same PCR primers, the purified PCR products were sequenced in SeqStudio (Applied Biosystems, CA, USA) from both ends. With the aid of Gene Mapper v. 7.0, the sequences were manually modified (Applied Biosystems, CA, USA) and full-length sequences were put together.

Target	Nam of the Primer	Direction	Sequence (5' → 3')

matK	matK_xf	Forward	TAATTTACGATCAATTCATTC
matK	matK_MALPR1	Reverse	ACAAGAAAGTCGAAGTAT
rbcL	rbcLa_f	Forward	ATGTCACCACAAACAGAGACTAAAGC
rbcL	rbcL_724_rev	Reverse	GTAAAATCAAGTCCAOCRCG
ITS2	ITS-F3	Forward	CCGTGAACCATCGAGTCTTT
ITS2	ITS-R2	Reverse	CTCGCCGTTACTAGGGGAAT
psbA-trnH	psbA3_f	Forward	GTTATGCATGAACGTAATGCT
psbA-trnH	trnHf_05	Reverse	CGCGCATGGTGGATTCACAATCC

Table:1 Showing the details of the common plant DNA Barcoding markers along with their name and the details of the primer sequences

Basic Local Alignment Search Tool (BLASTn)

The Basic Local Alignment Search Tool (BLAST) identifies areas where sequences are locally similar. It may assess the statistical significance of matches between nucleotide or protein sequences and sequence databases. The rbcL, ITS2, psbA-trnH, matK, and fully modified sequences with original trace files were retrieved and BLAST, a basic local alignment search tool, were used to identify species in databases against the NCBI's non-redundant nucleotide database (www.blast.ncbi.nlm.nih.gov/Blast.cgi).

Results and discussion

Banding Paterns of *rbcL,* ITS2, psbA-trnH **and *matK* markers and BLAST analysis of DNA sequence data**

The banding pattern of the PCR products clearly corresponds to their respective base pair sizes (Fig 1). The 100 kbs ladder is used as the reference. The lanes 1 to 3 are of the sample T5 (NGRC03731), E 10 (NGRC03777) and E 16-KUMREK respectively. The marker used is ***rbcL.*** The 4th & 5th lane is of ITS2 marker of E 10 and E16 cultivars. The 5th lane has no band present. The 6th and 7th lanes are of psbA-trnH of E10 and E16 samples. The 8th lane is of ***matK*** marker of E-16 cultivar.
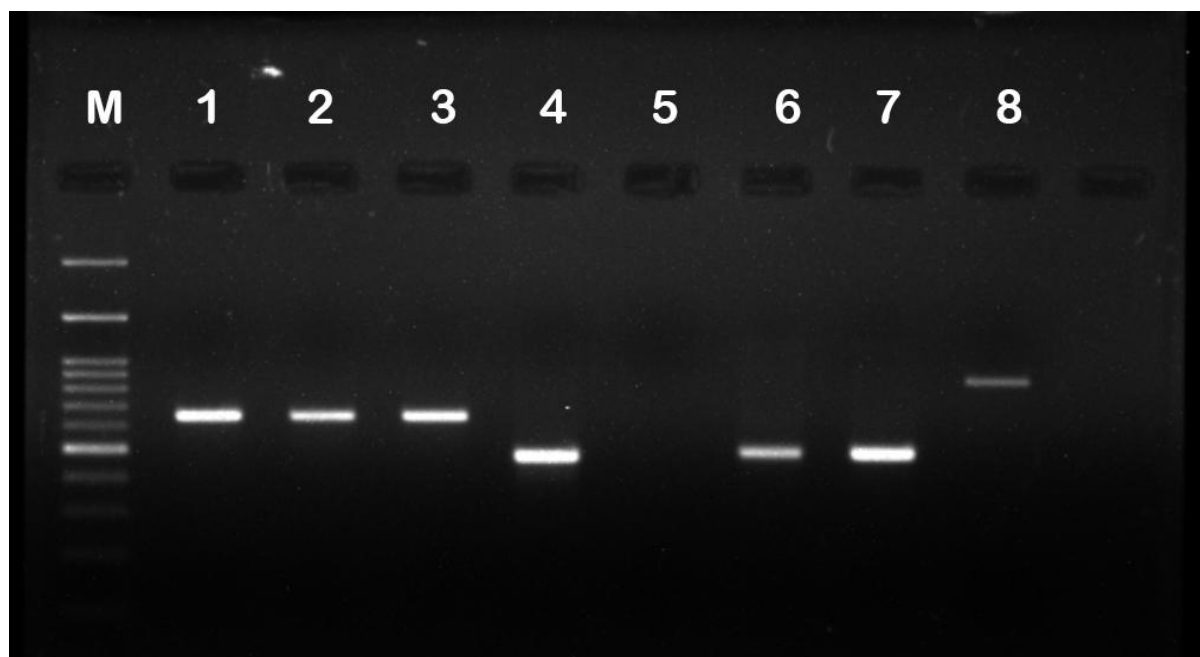
Fig 1: Agarose gel showing the PCR products of different markers: M-100 kbs Ladder. Lanes 1 to 3 **rbcL** Markers, Lane 4&5 are of **ITS2** Marker, Lanes 6 & 7 psbA-trnH marker and 8th Lane is of *matK* **markers**

rbcL Marker

The large subunit of the enzyme ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCo), which is encoded by the rbcL gene, is frequently utilised for molecular identification of different plant species. All the samples' coding regions were amplified, and amplicons of 580 bp were obtained in lanes 1-3. (Fig-1, lane 1,2&3).

These amplicons were further sequenced with both forward(rbcLa_f) and reverse (rbel724_r) primes. The strand of T5 sequenced with the forward primer was 535 bp in length(T5-rbcL-F) while the antisense strand sequenced with reverse primer was of 590 bp (T-5-rbcL-R) (Table :2).

Gene	Primer	Size	Sequence
rbcL	rbcLa_f	568	TGTTAAAGAATACAAATTGACTTATTATACTCCTGACTA TGAACCCCATGACCATGATATCTTGGCAGCATTTC GAGTAACTCCTCAACCTGGAGTTCCACCAGAAGAA GCAGGG

			GCCGCGGTAGCTGCCGAATCTTCTACTGGTACATG GAC AACTGTGTGGACCGATGGACTTACCAGCCTTGATC GTTACAAGGACGATGCTACCACATCGAGCCTGTT CCTGGAG AAGAAAACCAATTTATTGCTTATGTAGCTTACCCAT TAGACCTTTTTGAAGAGGGTTCTGTTACTAACATGT TTACTTCCATTGTGGGGAATGTATTTGGGTTCAAAG CCCTGCGTGCTCTACGTTTGGAGGATTTACGAATCC CTCCTGCTTATACGAAAACTTTCCAAGGCCCGCCTC ATGGTATCCAAGTTGAGAGAGATAAATTGAACAAA TATGGACGTCCCCTATTGGGATGTACTATTAAACCT AAATTGGGGTTGTCTGCTAAGAACTACGGTCGAGC AGTTTATGAATGTCTTCGTGGCGGACTTGATTTTAC CAAAGATGATGAAAC
rbcL	rbcL_724_re v	641	AATGGTTGGCAGTTCACGTTTTCATATCTTTGGTAA AATCAAGTCCGCCACGAAGACATTCATAAACTGCT CGACCGTAGTTCTTAGCAGACAACCCCAATTTAGG TTTAATAGTACATCCCAATAGGGGACGTCCATATTT GTTCAATTTATCTCTCTCAACTTGGATACCATGAGG CGGGCCTTGGAAAGTTTTCGTATAAGCAGGAGGGA TTCGTAAATCCTCCAAACGTAGAGCACGCAGGGCT TTGAACCCAAATACATTCCCCACAATGGAAGTAAA CATGTTAGTAACAGAACCCTCTTCAAAAAGGTCTA ATGGGTAAGCTACATAAGCAATAAATTGGTTTTCT TCTCCAGGAACAGGCTCGATGTGGTAGCATCGTCC TTTGTAACGATCAAGGCTGGTAAGTCCATCGGTCC ACACAGTTGTCCATGTACCAGTAGAAGATTCGGCA GCTACCGCGGCCCCTGCTTCTTCTGGTGGAACTCCA GGTTGAGGAGTTACTCGAAATGCTGCCAAGATATC ATGGTCATGGGGTTCATAGTCAGGAGTATAATAAG TCATTTGTATTCTTTACACAGCTTTGATCAACACTT

			GCTTAGTCCGTTTTGTGTGTGTGTGATAAAATAT AACCG

Table 2: *rbcl* gene sequence of *Fagopyrum esculentum* (E16) as obtained by forward and reverse primer

The strand of E10 sequenced with the forward primer was 575 bp in length(E10-rbcL-F) while the antisense strand sequenced with reverse primer was of 539 bp (E10-rbcL-R. The strand of E-16 sequenced with the forward primer was 561 bp in length (E-16 -rbcL-F) while the antisense strand sequenced with reverse primer was of 549 bp (E-16-rbcL-R.

CULTIVARS	*rbcL*	ITS2	psbA-trnH	*matK*
T5	Yes (535-F) (590-R)	-	-	-
E10	Yes (575-F) (539-R)	Yes (292-F) (263-R)	Yes (426-F) (434-R)	-
E16	Yes (561-F) (549-R)	(313-F) (252-R)	Yes (436-F) (437-R)	Yes (607-F) (631-R)

Table 3: Showing presence of bands of markers of *rbcL,* ITS2, psbA-trnH and *matK* and their number of base pairs in each forward and reverse primers in T5, E10, and E16 Cultivars revealed in Sequencing.

ITS2 Marker

In E10 and E16 samples, the nuclear ribosomal internal transcribed Spacer (ITS2) region was amplified. Using agarose gel separation, a 313 bp amplicon was found (Fig 1 lane 4 &5). The strand of E10 sequenced with the forward primer was 292 bp in length (E10- ITS-F3-F) while the antisense strand sequenced with reverse primer was of 263 bp (E10- ITS-R2-R.)

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The strand of E16 sequenced with the forward primer was 313 bp in length (E16- ITS-F3-F) while the antisense strand sequenced with reverse primer was of 252 bp (E16- ITS-R2-R).

Cultivars/Gene	Description	Common name	Percentage of Identity	Accession Length
T5-rbcL-F	Fagopyrum tataricum cultivar Miqiao 1 chloroplast, complete.	Tartarian bu.	98.86	159272
T5-rbcL-R	Fagopyrum tataricum cultivar Miqiao 1 chloroplast, complete...	Tartarian bu.	99.36	159272
E10-rbcL-F	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	99.01	159576
E10-rbcL-R	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	98.68	159576
E16-rbcL-F	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	100.0	159576
E16-rbcL-R	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	98.09	159576
E10-ITS2-F	Fagopyrum esculentum isolate YJ-19 small subunit ribosomal RNA	Common Buckwheat	93.80	736
E16-ITS2-F	Fagopyrum esculentum isolate YJ-17 small subunit ribosomal RNA	Common Buckwheat	94.10	736
E10-ITS2-R	Fagopyrum esculentum isolate DS-2 small subunit ribosomal RNA	Common Buckwheat	96.98	736

E16-ITS2-R	Fagopyrum esculentum isolate DS-2 small subunit ribosomal RNA.	Common Buckwheat	94.72	736
E10-trnH-F	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	99.56	159576
E16-trnH-F	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	99.78	159576
E10-trnH-R	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	99.12	159576
E16-trnH-R	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	99.12	159576
E16-*matK*-F	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	98.15	159576
E16- *matK* -R	Fagopyrum esculentum chloroplast, complete genome	Common Buckwheat	97.58	159576

Table 4: Sequences producing significant alignments in percentages in Nucleotide BLANTn

psbA-trnH Marker

An intergenic spacer called psbA-trnH exists in the chloroplast genome. The amplicon size in the E10 and E16 samples was 437 bp. The agarose gel separation revealed an amplicon size of 437bp (Fig 1 lane6 &7). The strand of E10 sequenced with the forward primer was 426 bp in length (E10- psbA3_f -F) while the antisense strand sequenced with reverse primer was of 434 bp (E10- trnHf_05-R.) The strand of E16 sequenced with the forward primer was 436 bp in length (E16- psbA3_f -F) while the antisense strand sequenced with reverse primer was of 437 bp (E16- trnHf_05-R.)

matK Markers

Additionally, the nucleotide sequence of the maturase enzyme-coding gene matK, which is encoded by the plastid, was examined. The DNA sequence length for Sample E16 after PCR amplification was 631 bp. The forward primer resulted in 607 bp in length (Fig 1: Lane 8) (E16- matK_xf -F). The reverse primer resulted in 631 bp in length (Fig1: Lane 8) E16-matK_MALPR1-R)

Thus, all the four markers showed high percentage of identity with the NCBI data confirming the identity of the cultivars. The E16 cultivar shows 100% similar identity with the NCBI database (Table:4). T5 cultivar shows 99.36 % identity while the nuclear marker ITS2 showed the lowest similarity which is 94.72%.

Conclusion

Among the buckwheat cultivars found in Sikkim and Nepal, these T5 (NGRC03731), E 10 (NGRC03777) and E 16-KUMREK are found rich in rutin, could be advocated for more cultivation, and use in the future. The 8 samples of Fagopyrum Sp. with prominent amplicons were selected for each barcode. They were subjected to sequencing which revealed a close and unique identity. These could be identified and promoted for wider consumption.

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4

Communion with Nature: An Ecocritical Approach to Mary Oliver's Poetry

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Abstract

Literary studies in the present age are constantly in flux wherein new outlooks toward literature have emerged rapidly to keep up with contemporary pressures. One of the biggest concerns of the last few decades is the global environmental crisis. Humans, nature and literature have had a deep relationship for ages. Nature's influence on Man and Man's influence on nature can be observed closely in literature throughout history. Today, these unprecedented changes in the environment caused by human voracity and egotism are affecting individuals, societies and nations. Under these circumstances, there arose a new theory of literature called ecocriticism that analyses "nature writing" and "nature-oriented literature". Broadly speaking, ecocriticism investigates the relationship between literature, Man and nature. Keeping up with these revisions, another branch of ecocriticism emerged called ecofeminism. An intervention of feminist criticism and ecocriticism, this literary theory explores the inseparable relationship between women and nature and proclaims that the exploitation of women is similar to the exploitation of nature. This paper aims to analyse Mary Oliver's selected poetry like The Journey, Sleeping in the Forest and a few others through the ecocritical and ecofeminist lens. Mary Oliver has been called an "indefatigable guide to the natural world," by Maxine Kumin in the Women's Review of Books, "particularly to its lesser-known aspects." Nature plays a vital role in almost all of Oliver's poetry. Her poems use various elements of nature to explore the inner self. This thesis attempts to prove that her works, unlike the works of romantic writers (mainly Wordsworthian), undo the dichotomous pair of nature/self, but instead, they focus on the communion of nature and self.

Keywords: Ecocriticism, Ecofeminism, Nature Poetry, Nature/Self

**"Instructions for living a life.
Pay attention.
Be astonished.
Tell about it."**

— Mary Oliver, Sometimes

Humans and Nature have always had a harmonious relationship since the dawn of time. The interconnection between Humans and Nature, not merely with the pleasant aspects of nature like plants or animals, but the entirety of the physical realm has created a deep bond between them. The human and the non-human components of the physical environment are interdependent and mutually intertwined. This authentic union with nature has inspired writers across countless generations and has led to the creation of a canon of literature called "nature writing" or "nature-oriented literature".

Ecology is a branch of science that deals with the deep-rooted and interrelated connection between living organisms and the physical environment around them. Suresh Fredrick in *Contemporary Contemplation on Ecoliterature* says that "The modern ecological consciousness has a feeling that the balance between human and the natural world must be maintained. A perfect ecology is one in which plants, animals, birds and human beings live in such harmony that none dominates or destroys the other". What Fredrick is rightfully trying to say is that any disturbance in one relationship will indubitably lead to a disturbance in the other.

The last few decades have already witnessed these unprecedented changes in the environment caused by human voracity and egotism affecting individuals, societies and nations. Therefore, the most ignored, yet the most pressing concern of the 20th century is the global environmental crisis. Literature, always the favourite mode of introspecting various contemporary issues could not have escaped this theme too. These concerns about ecology and human beings' relationship with nature gave rise to a new literary theory: ecocriticism.

ECOCRITICISM

What is Ecocriticism? Simply put, Ecocriticism is the study of Literature and the physical environment i.e., humans and non-human elements. It takes an earth-centred approach to literature. The term ecocriticism was first coined by William Rueckert in his critical writing "*Literature and Ecology: An Experiment in Ecocriticism*" in 1978. According to him, it means a criticism of the environment as represented in literature. According to Rueckert, ecocriticism applies ecology or ecological principles to the study of literature. Lawrence Buell, on the other hand, defines ecocriticism "as a study of the relationship between literature and the environment conducted in a spirit of commitment to environmentalist's praxis. It is distinguished from conventional nature study by its commitment to the natural and non-human

world." Accordingly, eco-critics analyze nature writing or nature-oriented literature and investigate the relationship between man, nature and literature.

ECOFEMINISM

Another branch of ecocriticism has emerged called ecofeminism. An intervention of feminist criticism and ecocriticism, this literary theory explores the inseparable relationship between women and nature. It combines ecology with a feminist concern for the presentation of women and nature in literary texts. Noël Sturgeon in his book *Ecofeminist Nature* defines Ecofeminism as "a movement that makes connections between environmentalism and feminism". The literary theory also investigates the relationship between the exploitation of nature and the exploitation of women. About ecofeminism, Greta Gaard writes that "more than a theory about feminism and environmentalism, or women and nature, [it] approaches the problems of environmental degradation and social injustice from the that how we treat nature and how we treat each other are inseparably linked."

MARY OLIVER

Mary Oliver (1935-2019) was a renowned American poet whose work was celebrated for its deep connection with nature and its ability to capture the essence of the natural world. Born in Maple Heights, Ohio, Oliver's early life was marked by a difficult upbringing and a love for the outdoors. Her passion for nature and writing began at an early age, and she found solace in exploring the woods and fields near her home. Influenced by both Whitman and Thoreau, she is known for her clear and poignant observance of the natural world.

Oliver's poetry is characterized by its simplicity, clarity, and profound observations of the natural world. Her verses often revolve around themes of love, wonder, solitude, and the interconnectedness of all living beings. Throughout her literary career, Oliver published numerous poetry collections, each one receiving critical acclaim. Some of her most notable works include "American Primitive," "Dream Work," "House of Light," and "New and Selected Poems." Many of her poems are grounded in her experiences and interactions with animals, plants, and the landscapes she explored.

In her writing, Mary Oliver invites the readers to slow down, pay attention, and savour the beauty of the natural world. Her language is often evocative and illuminating, making her poems accessible to a wide range of audiences. Her works continue to inspire environmentalists, writers, and those seeking a deeper connection with the natural world. Mary

Oliver's contemplations in her works resonated with readers worldwide, earning her numerous awards and a devoted following. In 2007, The New York Times described her as "far and away, this country's best-selling poet."

MARY OLIVER'S NOTION OF NATURE

Her creativity was stirred by nature, and Oliver, an avid walker, often pursued inspiration on foot. She believes that "everything in nature has a soul and is alive" and claims,

"All things are meltable and replaceable. Not at this moment, but soon enough, we are lambs and we are leaves, and we are stars, and the shining, mysterious pond water itself" (Oliver, 2000)

She binds with Nature through deep contemplation, made possible via the help of imagination, and putting those moments of deep interaction with Nature into words in her eco poetry. For Oliver and the speakers in her poems, this unbreakable relation and connection is her own way to seek salvation, redemption, and a way to God. She says in *Upstream*,

"For me the door to the woods is the door to the temple."

She raises spiritual, philosophical, and religious questions which are answered through nature. She finds the self only strengthened through an immersion with nature. Attuning herself to the rhythm of the natural world, she uses it as her means to understand the world and to cope with it. Oliver's poetry beautifully weaves nature into a tapestry of interconnectedness and dissolves "into the totality of nature" losing her self-boundaries and "all outward form" (Graham, 1994). Mary Oliver's preoccupation is with nature, and judges every single creation of nature with value. In her poetry, she urges us to step into the perspectives of turtles, geese, birds, insects, and other creatures of nature and to merge with forests and oceans through our imagination. The speakers in her poems consistently shed their individual identity, a construct of dominant ideology, immersing themselves in a harmonious, interconnected world of vibrant ecosystems.

Oliver brings forth a new kind of Romanticism. As Janet McNew states, "most male Romantic nature poetry is about achieving an identity that transcends nature" which is not all the case in Oliver's poetry as she brings the focus back to nature in her writings. Though she was inspired by the Romantics like Wordsworth and Keats, her poetry does not come under Romanticism. Oliver's acute observation of Nature leads to the suspension of the motif of egocentrism. Mary Oliver adeptly reconciles apparent opposites, achieving the ecocritical objective of redefining the relationship between nature and self. Oliver's eco-poetry embraces the premise of

Ecocriticism as it broadens the "notion of 'the world' to include all the ecosphere". She does away with the existing rift between man and Nature and the alienating attitude that accompanies the rift.

NATURE AND SELF IN OLIVER'S POETRY

In her eco poetry, Mary Oliver endeavours to restore the lost harmony between nature and humanity. She presents a vision of interconnectedness between Humans and other elements of the ecosystem. Unlike the prominent Romantics, who though sought unity with nature, still focused on the 'human experience' of it all, Mary Oliver's eco-poetry disregards the traditional dichotomous pair of Nature vs Self prominent in most nature writings. Marianna Rosa in *Bridging Opposites: An Ecocritical Approach to Mary Oliver's Poetry* says about Oliver that,

"In her contemplation, Mary Oliver disarms these apparent opposites by viewing them not as mutually exclusive and limiting, but as permeable and interconnected. In her poetry, she wants to attain a certain kind of unity with nature, always accessible by means of the senses, which are doors to communion with the 'natural other'. There is in Oliver no fear at the prospect of dissolving individual consciousness and this is probably so because she conceives of the movement between self and nature as fluid."

In her poem, "*Sleeping in the Forest*" from New and Selected Poems (2023) Oliver celebrates the idea of her unification with nature. She becomes 'a stone on the riverbed' and integrates with nature as she returns back to the earth.

I slept
as never before, a stone
on the riverbed, nothing
between me and the white fire of the stars
but my thoughts, and they floated
light as moths among the branches
of the perfect trees.

She exhibits a willingness to "merge" with nature purely for the delight of the encounter. She dissolves in the natural elements around her and becomes the best version of herself in the lap of nature.

By morning
I had vanished at least a dozen times

into something better.

Embracing her identity as a part of creation, she finds joy in the inherent connection that unites her with all living entities, providing contentment, serenity, and a sense of fulfilment. Oliver unites with nature in her eco-poetry through various sensuous acts. In her poem *The Fish*, she uses the act of "eating" the fish to merge with the sea and become the fish herself. Through these physical acts of catching and eating the Fish, Oliver interacts with nature and therefore becomes one with it.

I opened his body and separated
the flesh from the bones
and ate him. Now the sea
is in me: I am the fish, the fish
glitters in me; we are
risen, tangled together, certain to fall
back to the sea…

In her poem, "*White Night"* from American Primitive, Oliver floats all night in the shallow ponds and expresses her longing to depart from her consciousness and dissolve in nature.

I want to lose myself
on the black
and silky currents,
yawning,
gathering
the tall lilies
of sleep.

In her poem, "When Death Comes", she advocates the use of the metaphor of being both the bride and bridegroom symbolizing her deep connection and engagement with the world, emphasizing her profound communion with the beauty and amazement that surround her.

When it's over, I want to say all my life
I was a bride married to amazement.
I was the bridegroom, taking the world into my arms.

Greg Garrard says that the Romantic poet William Wordsworth is "on the whole, far more interested in the relationship of non-human nature to human mind than he is in nature in and for itself". This is not true for Mary Oliver as she tries to decenter the human experience in nature and just focuses on worshiping nature as something divine with its beauty and its cruelty. Thus, through her eco poetry, it can easily be proclaimed that Mary Oliver undoes this dichotomous pair of Nature/Self.

NATURE AND WOMAN IN OLIVER'S POETRY

Parallel to the dichotomous pair of nature and self, we encounter another contrasting pair, that of women and men. Throughout the annals of history, women have been invariably linked to nature, oftentimes depicted as passive beings, while men, asserting their dominance, have sought to conquer both nature and women. In this context, feminist critics, including Margaret Homans, have ardently argued that a "feminine tradition" within visionary poetry must disengage from the harmful myths perpetuating the association between women and nature.

However, Mary Oliver embraces the multifaceted nature of existence and portrays both the active and the passive aspects of nature. Her association with nature assumes a nuanced and empowering dimension, no longer ensnaring women in the web of submission. Oliver refrains from reducing women to mere symbols of passive nature, recognizing the indomitable spirit that courses through them.

In "Wild Geese," she invites the reader to connect with nature and find solace in the wild landscape. The poem emphasizes the idea of finding one's own voice and path, which can be interpreted as empowering women to embrace their unique identities and break free from societal constraints.

You do not have to be good.
You do not have to walk on your knees
for a hundred miles through the desert repenting.
You only have to let the soft animal of your body
love what it loves

In "Sleeping in the Forest," Oliver explores the concept of unity between women and nature. She feminizes nature as a caring mother while the speaker in the poem finds a sense of belonging and safety while lying down in the forest, suggesting a harmonious relationship between women and the natural world.

I want to flow out
Across the mother
Of all waters

She reclaims the association with nature, reclaiming its power and bestowing upon women the majesty of nature's complexity. Thus, In Janet McNew's words, what Oliver does in her poetry is not so much "To defy patriarchal boundaries as to ignore their defining powers"

CONCLUSION

Mary Oliver's poetry weaves a vision that transcends conventional boundaries and extends beyond rigid dual oppositions. Her verses take apart the restrictive notion of the opposing dichotomies of nature vs self and, nature and woman vs man. Rather than choosing one end of the spectrum within the dichotomy, she sees the movement from one pole to another as permeable. Her reverence for the great outdoors has led her verses to be an ode to unity—a celebration of the interconnectedness between the human experience and the vast expanse of nature's wonders. Fearlessly, she melds herself with the natural world, becoming an inseparable part of it, and in doing so, she unveils her emotions and ideas as seamlessly woven into the fabric of nature. She believes that every element of nature has a soul and uses her diverse poetic voice to merge with those elements of nature, not by forgoing her own consciousness but by embracing the earth and its realm as a part of her. It is through her direct sensual experiences with the non-human world that she attains true Communion with Nature.

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5

Role of Indian Culture in Biodiversity Conservation: A Study on *Dhok Ka Oran* in Barmer District, Rajasthan

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Abstract

Indian culture is the one of the oldest cultures in the world. Our older generations have vast knowledge about every field of life. They connected the conservation of nature with our culture and religion. Thus, people were forced to follow the rules due to the fear of God. Block level field survey in Barmer district, Rajasthan, was carried out. Information was collected through old and interest villagers. Oran land/ sacred grove was found in many villages. 2927.86 km² area of the total geographical area of Barmer district having *oran*/sacred forest area. *Viratara Mata/ Dhok ka oran* is the largest one, having a vast variety of plant species and arthropods as well as reptilian fauna. During recent times, due to illegal practices in the *oran* land, the destruction of biodiversity takes place. There should be modern education to know our traditional knowledge in the scientific way.

Keywords: Indian culture, Oran/Sacred Forest, Faunal and Floral Diversity, Biodiversity Conservation

Introduction

Indian culture is the one of the oldest cultures in the world. Our older generations have vast knowledge about every field of life. They connected the conservation of nature with our culture and religion. Thus, people were forced to follow rules due to the fear of God. These people attributed a spiritual respect and a practical understanding for the natural world (Martinez 1996; Berkes 1999). They culturally expressed conservation ethics and animistic religious beliefs conceptualizing other species as social beings. So, one can see relatively high richness of biodiversity within the sacred forests (Bernbaum 2006).

In these traditional societies, sustainable natural resource management was always carried out

by the beliefs of the communities and local cultures. These were strengthened by their intimate connections to the natural environment that sustains them (Rist *et al* 2003; Sobrevila, 2008). Modern science considers objective and sacred knowledge as separate things, while traditional cultures do not make such distinctions (Negi 2003, 2005). However, traditional knowledge-based systems (TKBS) qualify as being of conservational values (Smith and Wishnie 2000). The inherent conservation role of salient cultural practices in various landscapes, including in sacred forests, and of the TKBS development and practice by mountain communities in the State of Uttarakhand, Central Himalaya, was studied by Negi, 2010.

Objectives

Barmer district is situated in the western part of Rajasthan and forms a part of the hot Thar Desert, which has a special type of ecosystem. According to Bhandari (1990), the vegetation in the arid region is sparse; plants with xerophytic adaptations and drought resistance are able to grow here. In such a fragile ecosystem, our ancient people have a concept of keeping some piece of land in each village for cattle fodder in the form of "Gochar," and for religious purpose as "Oran". The land areas play an important role in improving our cattle health and performing a good habitat for wildlife. During famine period these areas were main income sources for poor people.

- To know the Indian culture.
- Indian culture and nature conservation.
- Concept of sacred forest.
- To know the recent status of sacred forests.

Study Area

The study site *Dhok Ka Oran* (or *Vankal Mata ka Oran* or *Viratara Oran*) is situated 60 km far from district headquarter in West direction. It is located in between 25º47'N to 71º02'E, and has an area of 29 km²; no agricultural activities are carried out in the Oran land. Name of the *oran*/sacred forest is based on the name of Goddess *Vankal Mata*, which is situated in *Dhok* village (Figure-1), where the priest of *Mataji* resides. Many temples of the Goddess are situated in this area, and cutting of green trees is prohibited by the *Oran* committee.
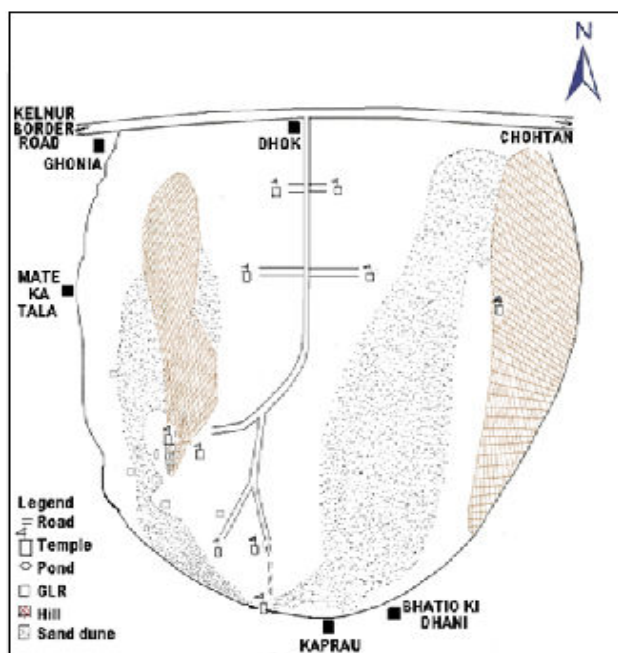
State Remote Sensing Application Centre,
DST, GoR, Jodhpur
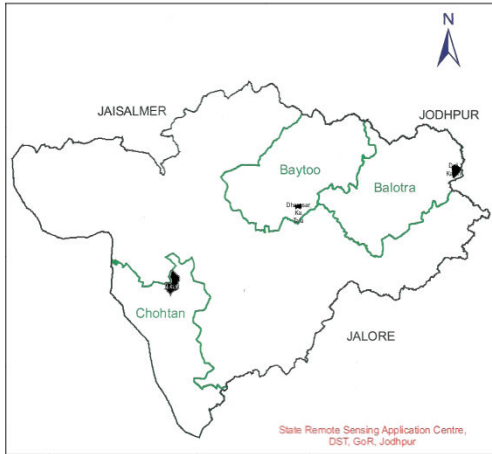
Figure-1: District map showing *Dhok ka oran*, intensive study site. *Dhok ka oran* and nearby villages. [NOT TO BE SCALE]
(Drawn with the help of Manager, Sri Viratara Mata Trust, Viratara)

Methodology

Block level field survey in Barmer district, Rajasthan, was carried out. Along with direct observations, information was collected from old and interested villagers through open ended questionnaire.

Observations and Result

The geographical area of *Dhok ka oran*/sacred forest contains both the hilly region on one side and straight sand dunes of 100-200 ft height in the Oran land (Plate-1); thus, vegetation and fauna of both the regions are found here. The Oran land is richly supported with arthropods, reptiles, birds and mammal fauna, namely *Meriones hurrianae, Tatera indica, Funambulus pennati*, *Hemiechinus auritus collaris*, *Herpestes edwardsi*, *Vulpes vulpes pusilla, Felis s. ornata* and *Gazella bennettii.*

Main vegetation at this site is comprised of *Acacia Senegal, Moringa concanensis, Lycium barbarum, Colligonum polygonoides, Leptodenia pyrotechnica, Acacia nilotica, Salvadora oleoides, Maytenus emerginata, Zizyphus nummularia, Euphorbia caducifolia and Ephedra foliata.*

Twice in a year, a fair is held, in which the priest of the temple sings, "A landlord cut green *ber* tree from the *oran* and made a cot for himself. When he slept on it, legs of the cot turned into snakes and the knitting rope converted into scorpions." Thus he awakes the people for protecting the green trees in the *oran* land by experiencing the fear of the Goddess.

Plate-1. A view of Dhok ka Oran.

Recent Status of Biodiversity in the Oran Land

30 to 40 years ago, there were numerous wolves and porcupines, but now they are either destroyed or have migrated to other places, though there is reptilian and arthropod fauna aplenty. Some medicinal plants are present in the *oran* land (Jain B, 2005). In recent times, increasing greed of physical wealth in people, and reduction in sensitization with others, causes adverse changes in the *oran* land. The illegal mining activities in the hilly region (Plate-2) of the *oran* land can destroy and disturb biodiversity. Illegal poaching is another reason for decrease in wildlife in this *oran* land.

Plate-2. Illegal mining activities in the *oran* land.

Conclusion

Our ancient people had a vast scientific knowledge and foresight. So, they set some goals for nature conservation, and added them with our cultural sense and a source of livelihood (Aman Singh 2006). In *Dhok ka oran*, some rare species of vegetation is present, having medicinal significance (Jain B, 2005). Here, good fauna was also present; albino *Gazella bennetti* was noticed here by Kumar *et al*, 2016. But later, the taboo system was weakened by modern theoretical education and by money makers, who very often have no sense for the local traditions. There is also lack of modern legislation to reinforce traditional rules (Abayie Boateng 1998; Sinha RK, 2009). There is an urgent need to set specific guidelines to protect the sacred forests and promote the traditional knowledge for biodiversity conservation in the scientific way (McWilliam 2001; Swamy *et al* 2003).

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6

Reimagining Public Health and Nutrition in India in the context of COVID-19

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Abstract

Health and well-being are crucial at all stages of life, and therefore it is rightly said 'health is wealth.' The importance of health was greatly realized during COVID-19 and conversely, the pandemic also exposed the fault-lines of India's public health care system and thus deepened and worsened the already broken public health infrastructure! How do we set that right? How do we reimagine a public health system in India from a sustainable perspective? What more needs to be done?

The Sustainable Development Goal 3 is about 'ensuring healthy lives and promoting well-being for all at all ages' with many indicators and targets. A country's real progress might well be defined in terms of the health of its population. In the case of India, however, with a large percentage of poor population, the challenge is so huge that there needs to be more concerted commitment to providing basic healthcare to its vast poor and deprived sections of population. On the methodology front, this paper will rely on both the quantitative and qualitative methods and will draw from the secondary data (WHO database and National Family Health Survey NFHS-5) and the primary data (of a research study that was carried out in 12 states through 5210 household samples between September 2021- January 2022). From the secondary data, the status of India's pathway towards sustainable health would be assessed and analysed through the performance of Indian states. For a better understanding of the status of health and nutrition from a SDG perspective, two developed states (Gujarat and Kerala) would be compared (on select health indicators) with two backward states (Bihar and Uttar Pradesh), assuming better health and nutritional status in the developed states. From the primary data, the status of public health in 12 states of India during the time of COVID-19 would be analysed based on access to public health facilities, functioning of health facilities, including a few case studies depicting the functioning of public health facilities.

From the findings, the paper would also discuss some recommendations to move closer towards the attainment of 'Good health and wellbeing' by 2030, the third goal of the SDG.

Keywords: Health; Nutrition; Sustainable Development Goals; Sustainability.

Introduction

COVID 19 pandemic brought the entire world to a standstill, affecting almost everyone in various proportions. In the case of India, though the first wave was considered to have predominantly affected the cities, the second wave devastatingly affected the lives and livelihood of even the rural population. (CSE, 2022). The impact of COVID-19 was such that it pushed many people to poverty. A study, jointly conducted by the World Health Organization and World Bank, shows that more than half a billion were pushed further into poverty due to healthcare costs (WHO and World Bank, 2021). Being thrown into poverty is akin to being added to the number of hungry population and thus impacting the productivity of people due to their poor and deprived nutritional status. This vicious cycle continues with more and more people rendered poor, hungry, stunted and malnourished.

This paper draws from the findings of a research study titled 'Impact of COVID-19 in rural India', conducted between September 2021- January 2022, from 5210 samples.

Drawing from secondary sources like the National Family Health Survey (NFHS), Sustainable Development Goals India Index (SDG India Index) and Rural Health Statistics Reports, this paper attempts to understand and assess the status of health in India on the one hand and how to make it better and more sustainable.

Methodology

This paper relies on both primary data and secondary data, using both quantitative research method, (through questionnaire for households) and qualitative research method (through FGDs and Case Studies).

The Primary Data was collected from 12 states between September 2021- January 2022, through the use of KoBo Toolbox and it was analysed through the Statistical Package for Social Sciences (SPSS).

A target sample size of 400 responses from different cross-sections of the target population from each state was selected in the intervention areas of Jesuit Conference of India (JCI) through a purposive sampling method. A semi structured interview schedule was used to gather information from the households. Totally 5210 samples were received against the targeted sample size of 4800, which covered 474 villages from 46 districts. The qualitative data was collected through FGDs and Case studies from the sample states and a few select case studies are included in this paper.

Sources of Secondary data

The secondary data relies on the sources from the National Family Health Survey (NFHS) and World Health Organization (WHO) Database. From NFHS- 5 data, two indicators are considered for a better understanding of the case study states. From the WHO health expenditure data, two indicators are considered from 2010 to 2020 to understand the trends in India's health expenditure.

Objectives of the Study

- To analyse how the pandemic impacted the public health systems and the health status in rural India
- To assess India's status on select health indicators and to compare them between two developed states and two backward states
- To explore the status of health and nutrition in India based on a few secondary sources
- To suggest some sustainable ways to improve the status of health and nutrition in India

Research questions

- What do the health indicators suggest? Have they improved or deteriorated over the years?
- What is the progress of India towards the targets of SDG 3 relating to 'Good health and well-being?'
- What is the impact of COVID-19 on health and nutritional status of rural populations?
- What does the government need to do to improve the health and nutritional status of its population?
- How do we move towards attaining the objective of 'health for all'.

Limitations of this study

- This study has limitations like a limited sample from each of the 12 states, as it covered less than 50 per cent of the states in India and it largely focused on the rural population. Though the targeted sample was 400 from each state, there was the limitation of getting enough samples from Andhra Pradesh and Telangana.
- The number of villages, districts and taluks is not uniform across the 12 states. It varies from one district (from Odisha) to 10 districts (from Jharkhand).
- The percentage of SCs (30) and STs (45) in the sample is much higher than their national average, 20 per cent (SCs) and 9 per cent (STs) as per 2011 census. This is due to the fact

we used a purposive sampling in terms of limiting the study to the lower strata of rural population. Lok Manch (People's Forum of different organizations, working to empower people at the grassroots) partners were engaged in data collection.

- The data collection was carried out by the field partners though the use of mobile app, Kobo Collect and the researchers didn't visit the field. Despite the online trainings given to the enumerators, including the pilot study, on the usage of app for data collection, we cannot rule out the errors resulting from the use of app for data collection. The researchers weren't able to visit the field areas due to COVID restrictions.

- Only a few select indicators were considered from the secondary data.

- All states were not considered for secondary data, instead the study is limited to just four states, randomly selected two forward states (Kerala and Gujarat) and two backward states (Bihar and Uttar Pradesh).

COVID-19 and its impact on health

In order to understand the health impact of COVID 19 in rural India, we focused on such variables as a) access to and functioning of public health facilities, b) expenditure on COVID related health treatment, c) access to non-COVID related treatment and d) status of health insurance during COVID 19.

How did the different components of the health system function during the pandemic? Did people frequent the public health facilities more than the private health facilities? Were the people satisfied with the services and facilities available in the public health facilities? The answers to these and related questions are shown in the next few pages.

Figure 1: Accessing public health facilities
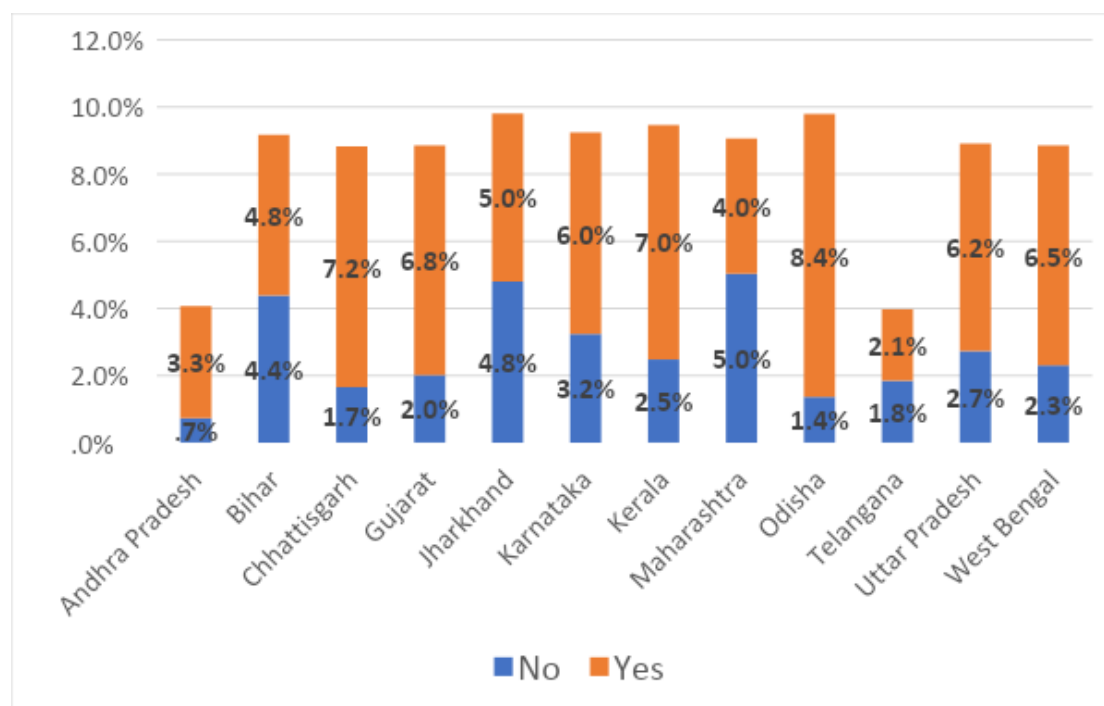
A large majority of people (67 per cent) had accessed the public health facilities in the last one year. Among the 67 per cent of the respondents who visited the public health facilities, many of them were from the states of Odisha, Kerala, West Bengal, Chhattisgarh, Gujarat and Uttar Pradesh. The respondents from these states also expressed general happiness over the functioning of public health facilities in their respective states.

Those with household income less than Rs 3000 frequented the public health facilities more as evident from table 3. The data also reveals that people from all social categories had frequented the public health facilities.

Table 3: Income and social category of the respondents who frequented the public health facilities

Household Income (in thousands/month)	Did you or your family visit any public health facilities in the last one year? (In percentages)		
	No	Yes	Total
Less than Rs 3000	19.0	40.6	59.6
Between Rs 3000-5000	7.6	16.0	23.6
Rs 5000 and above	5.9	10.9	16.9
Total	**32.6**	**67.4**	**100**
Social Category	Did you or your family visit any public health facilities in the last one year? (In percentages)		
	No	Yes	Total
General	1.6	4.9	6.5
Other Backward Classes (OBC)	4.6	13.9	18.4
Scheduled Caste (SC)	11.0	19.0	30.0
Scheduled Tribe (ST)	15.4	29.7	45.1
Total	**32.6**	**67.4**	**100**

When the respondents were asked if any inadequacies in the public health facilities compelled them to visit private health facilities only about 34 per cent said yes. Of these 34 per cent a significant number is from the states of Bihar, Uttar Pradesh and Karnataka, pointing to the poor status of their public health facilities in comparison to other states. From the qualitative data, we gather that many respondents had pointed out to the poor public healthcare system that caused heavy financial burden on them due to high health expenditure.

Figure 2: Percentage of people who accessed private health facilities due to poor public health facilities
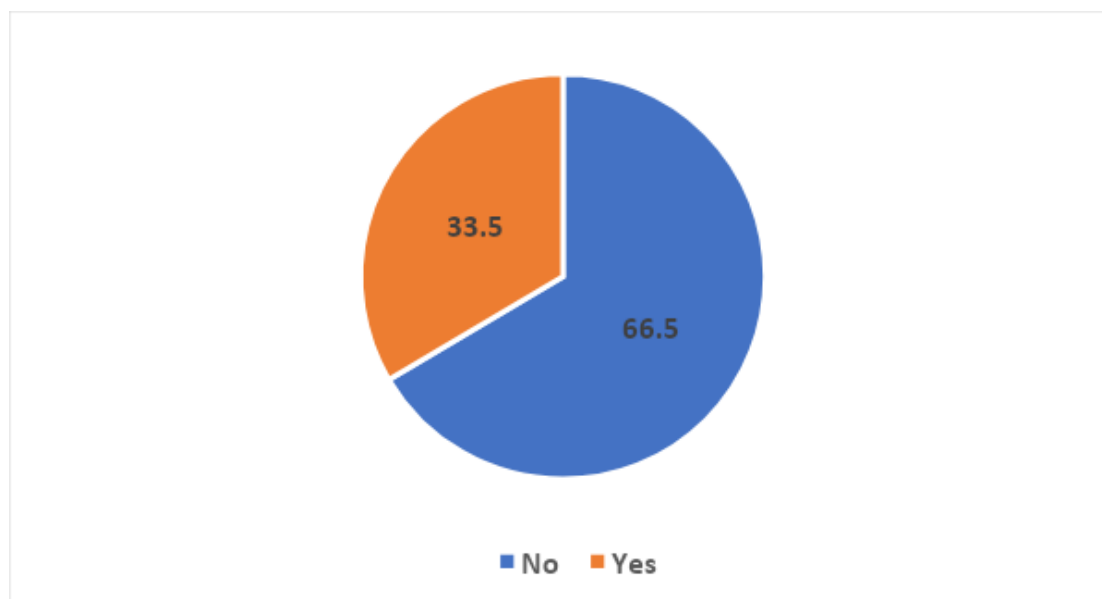
It is evident through the FGDs and case studies that among the 34 percent of people who had to access private health facilities due to the poor public health facilities reported heavy expenditure on health leading to a huge debt burden. As some respondents said the 'focus was on saving lives of our dear ones and we didn't care about the money.'

Box 1: Poor public healthcare System

In 2020, when COVID hit Bihar, Rashmi's father who was working in the Railways got infected with COVID. A diabetic patient, his condition became very severe and he was rushed to the hospital. Rashmi recalls the night her father was rushed to the hospital as one of the scariest moments in her life as when they reached the government hospital, they were referred to another hospital due to lack of beds and facilities. She informed us about the lack of facilities during such hard times at the government hospitals. She feels that if the government hospital had better facilities her father would have survived.

Figure 3: State-wise distribution of people who accessed private health facilities due to poor public health facilities
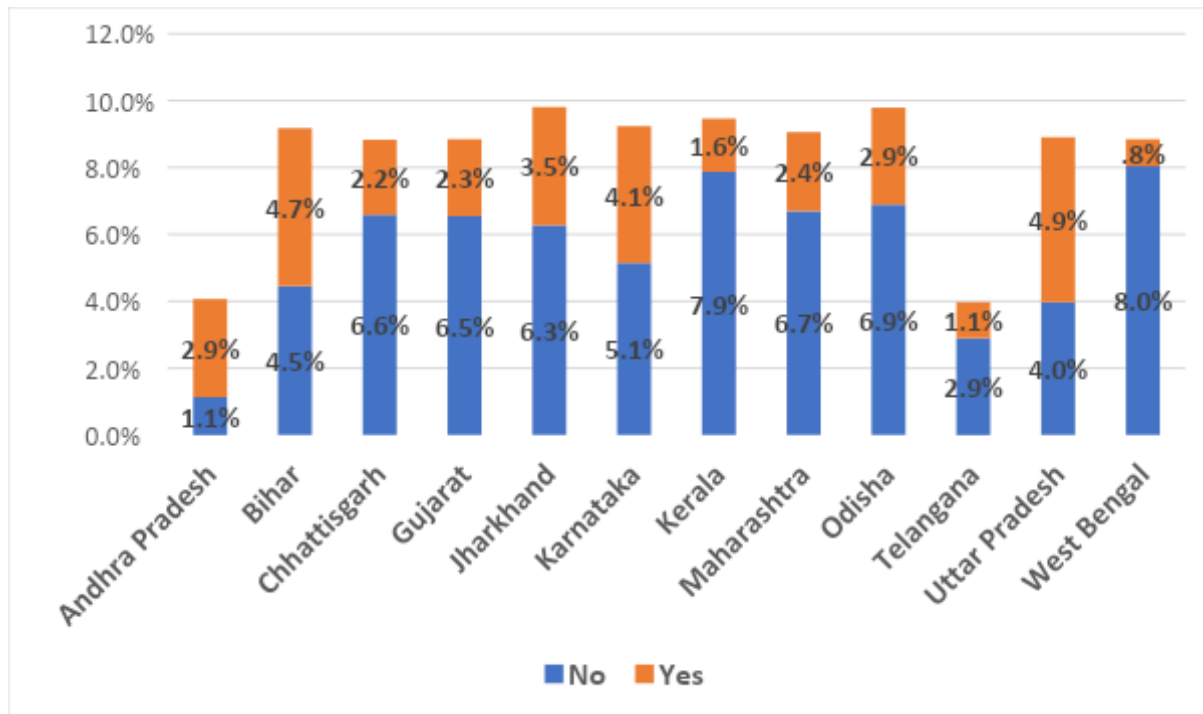
As evident from figure 3, the percentage of people who were forced to visit private health facilities was more in the states of Uttar Pradesh, Karnataka and Bihar.

Box 2: Delayed treatment and high costs of medical treatment

During COVID, Mr. V experienced breathing difficulties and visited six hospitals in Ongole, Andhra Pradesh in search of a bed, including the district hospital, Ongole. He was later admitted and given a bed in one of the RIMS GOVT Hospitals in Ongole and was given oxygen for 30 days.

His total expenses were over Rs. 2 lakhs mainly due to oxygen, and medicines. His son and daughter-in-law were skeptical of the public health system. They firmly believed that in order to save a person's life, people should go to private hospitals. They also mentioned that they have not been visited by an ASHA worker or anyone from the health department in the last two years.

About the expenditure on COVID related treatment, most of the states, led by Kerala, spent less than Rs 3000. But this needs to be seen against the income status of the respondents, where 60 per cent of the respondents earned less than Rs 3000 per month. Even this amount, seemingly low, would have meant a lot of burden for the rural population, adding further burden into their meagre incomes.

Figure 4: State-wise status of people spending on COVID related Treatment
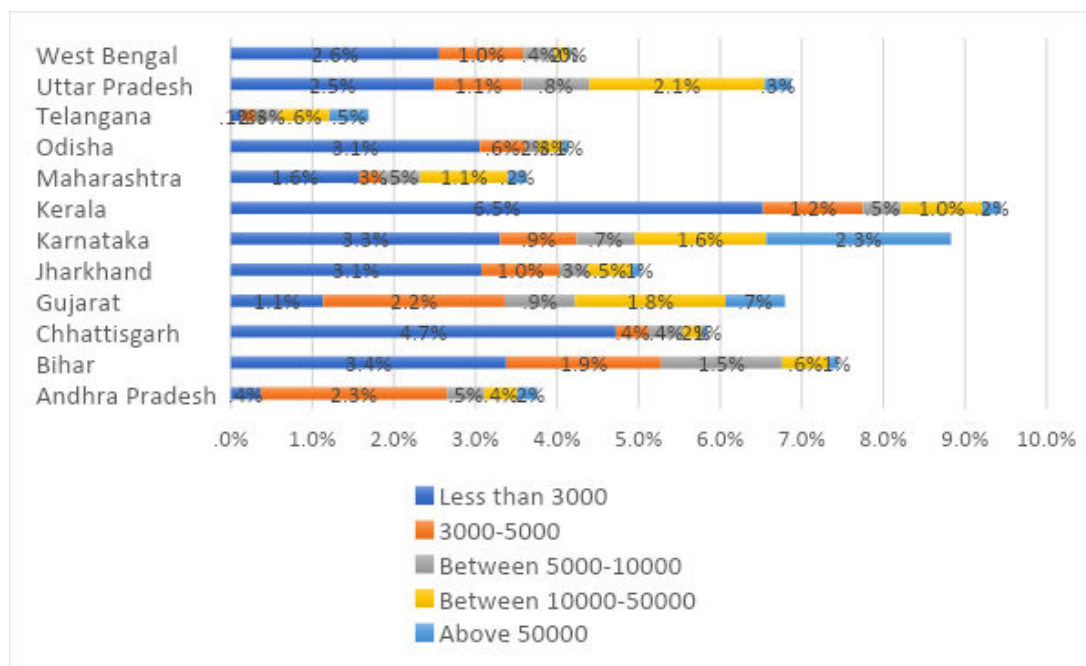
Though predominantly the spending on COVID related treatment was less than Rs 3000, it is a big amount for the rural population and more so for the marginalized groups like SCs and

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Box 3: Poor facilities and inadequate care in public health centers

Mrs Rani (name changed) was eight months pregnant. She suffered from a cold and a cough for a few days and was having difficulty in breathing. So, her husband, Mr Chandu (name changed) took her to Balliguda, CHC first, accompanied by his in-laws. They referred her to Berhampur Medical College and Hospital, Odisha on October 6, 2020, where she was tested COVID positive. Her condition required intensive care at the time, so she was admitted to the ICU ward early in the morning. She died that night at 02:11 a.m. During the pandemic, Mr Chandu lost both his wife and his unborn child. He had to spend Rs.30,000/- towards medical treatment and Rs.20,000/- for vehicle rental during his wife's funeral. He blamed the poor facilities and inadequate care in the public health facilities as the main reasons for the death of his pregnant wife.

STs. It is observed that the expenditure has gone beyond Rs 50,000 in some cases. Among those who spent between Rs 5000-10,000 and between Rs 10,000- 50,000 the SC respondents outnumber the others.

It is observed that when the government invests more on the public health facilities, it ensures easy access for the poor and vulnerable sections of people. When better healthcare facilities are provided, it also paves the way for bringing down the expenditure on healthcare by the

individuals and thus minimizing the financial burden of people, especially those belonging to the marginalized and the vulnerable communities.

There were many complaints about the poor conditions and facilities at the quarantine centers. Moreover, the people from the ST and SC categories also reported to having had to spend huge amounts of money on COVID related treatment.

Studies show that Arunachal Pradesh, Goa, Kerala, Himachal Pradesh, Jammu and Kashmir, Mizoram, Sikkim, and the union territory of Puducherry are among the states that spent more than twice the national average, ranging from \$3,500 to \$10,000. As a result, these states have robust primary healthcare facilities, and their health outcomes are among the best in the country. (Duggal, 2020). It was evident from our findings as well that among the 12 states, Kerala presented a better picture in terms of people spending least on COVID related treatment and more percentage of people, over 90 per cent of those who visited them, were satisfied with the functioning of public health facilities.

Figure 5: State-wise borrowing for COVID-19 related Treatment expenses (In percentage)
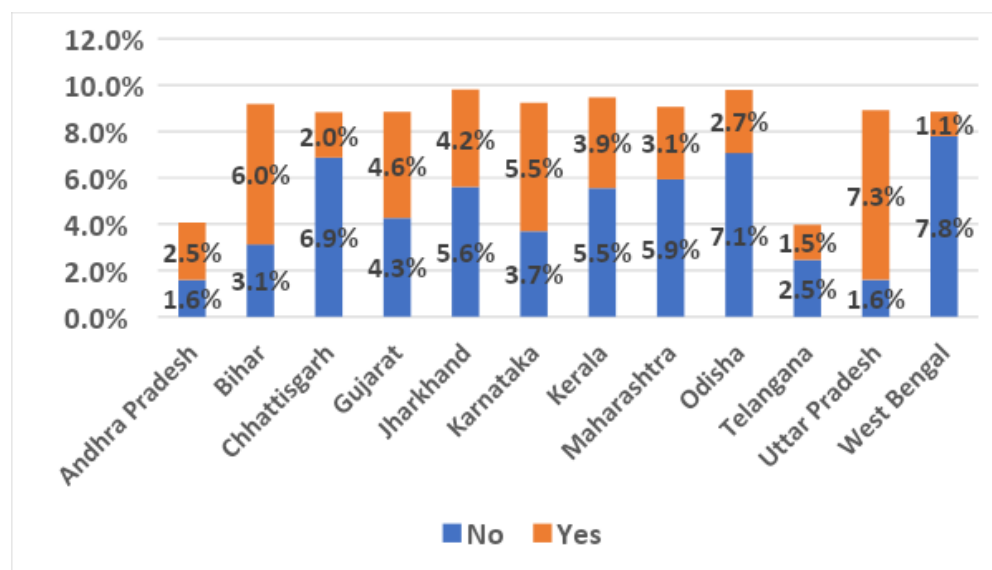
As noted from figure 5, a lot of people were forced to borrow money to cover their COVID related treatment expenses. These were predominantly from the states of Uttar Pradesh, Bihar, Karnataka, Gujarat and Andhra Pradesh and it can be observed that the percentage of respondents who said yes outnumbered those who said no in these states.

Figure 6: State-wise access to Treatment for Non- COVID related health issues
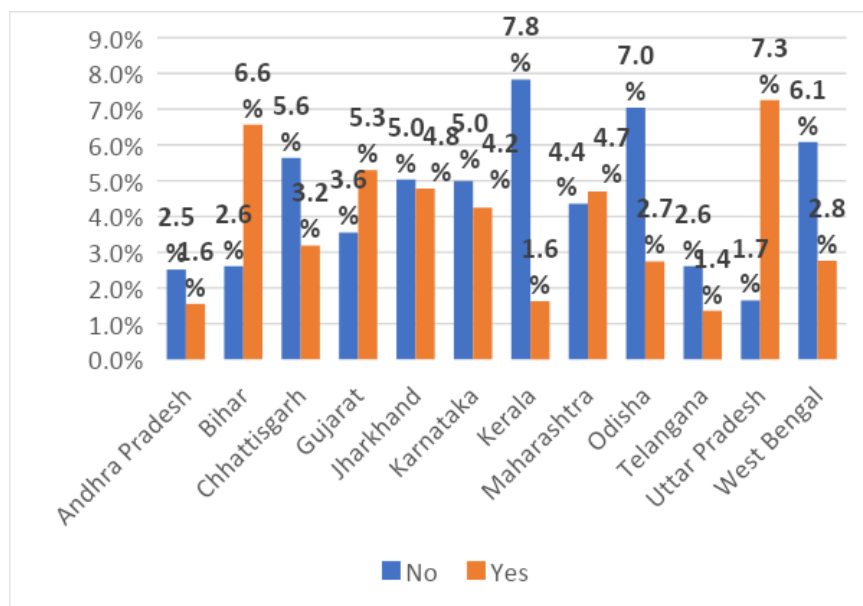
When the respondents were asked if they faced any difficulties in getting treatment for non-COVID related treatment, 46 per cent said yes and among the 46 per cent, the respondents were primarily from the states of Bihar, Uttar Pradesh, Gujarat and Maharashtra (Figure 6). There have been reports of people with non-COVID related health issues turned away from hospitals. There have also been reports of an increase in the cases of some of the other diseases like TB, Measles (WHO, 2022) and others due to the exclusive focus on the COVID and neglect of other health issues. According to Dr Tedros Adhanom Ghebreyesus, the WHO Director-General, "The paradox of the pandemic is that while vaccines against COVID-19 were developed in record time and deployed in the largest vaccination campaign in history, routine immunization programs were badly disrupted, and millions of kids missed out on life-saving vaccinations against deadly diseases like measles. (WHO, 2022).

In other words, a disproportionate focus on COVID-19 led to neglect in the diagnosis and treatment of other diseases such as cancer, TB, kidney failure and other rare diseases. (The Telegraph Online, 2021).

Non-COVID illnesses served by health services halted, resulting in unprecedented hardships and sufferings for chronic patients and those in need of pregnant women, for example, require immediate medical attention. Access to non-Covid medical services were worse for patients in rural and hard-to-reach areas than in urban areas due to the lack of nearby health care facilities and a lack of transportation options (Oxfam, 2021).

Figure 7: State-wise status of Health Insurance Scheme availed during COVID-19
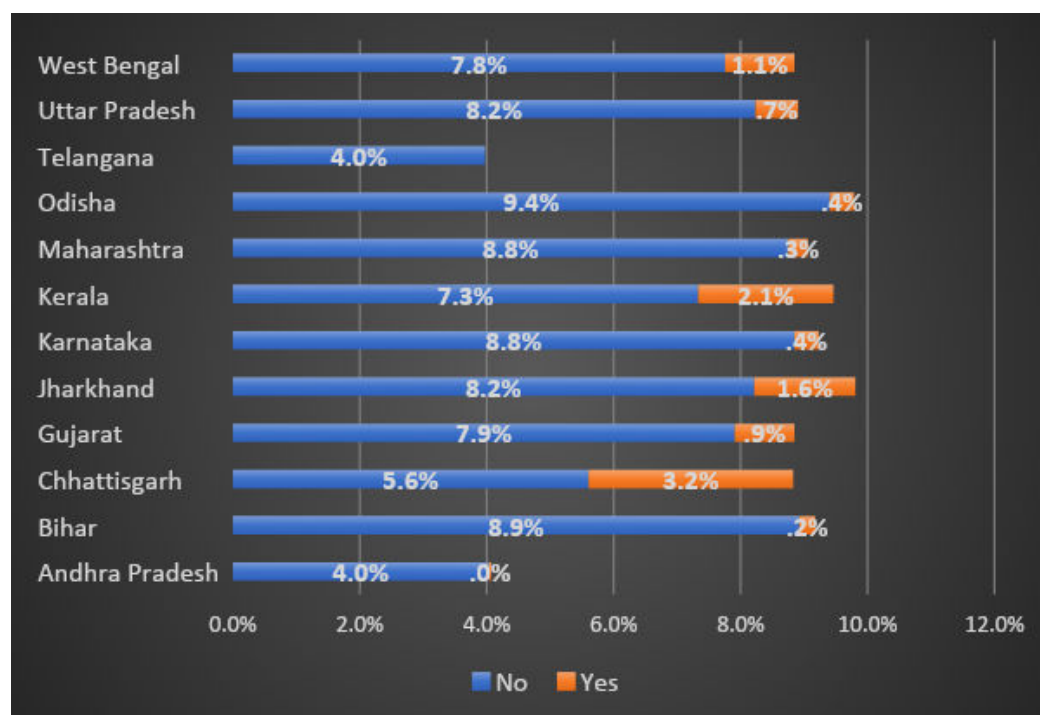
As observed from figure 7, many respondents did not avail any health insurance. If only the health insurance was available and easily accessible to these rural people, their burden on health would have been much lower. Only in the states of Chhattisgarh and Kerala the coverage was marginally better.

What is evident is that COVID-19 has impacted and negatively altered the health status of rural population. The Right to Food Campaign, through the Hunger watch surveys, has documented a lot of instances of women's health being severely impacted due to lack of access to nutrition. (Right to Food Campaign, 2021). It remains to be seen how the poor nutritional intake during

the testing times of COVID would further deteriorate the health conditions of many women, especially the rural women.

Analysis of secondary data

To understand and assess the status of health and nutrition in India a few important secondary sources like National Family Health Survey (NFHS), and World Health Organization (WHO) Database are considered.

National Family Health Survey (NFHS-5)

From the NFHS-5 the following indicators are considered.

- Infant Mortality Rate (IMR)
- Children under five years who are underweight (Underweight is defined as low weight for age)

These indicators are taken to understand the health and nutrition status of India in consideration with the selected states (two developed states, Kerala and Gujarat and two backward states, Bihar and Uttar Pradesh).

Figure 8: Comparison of Infant Mortality Rates (IMR) in developed and backward states from NFHS 5
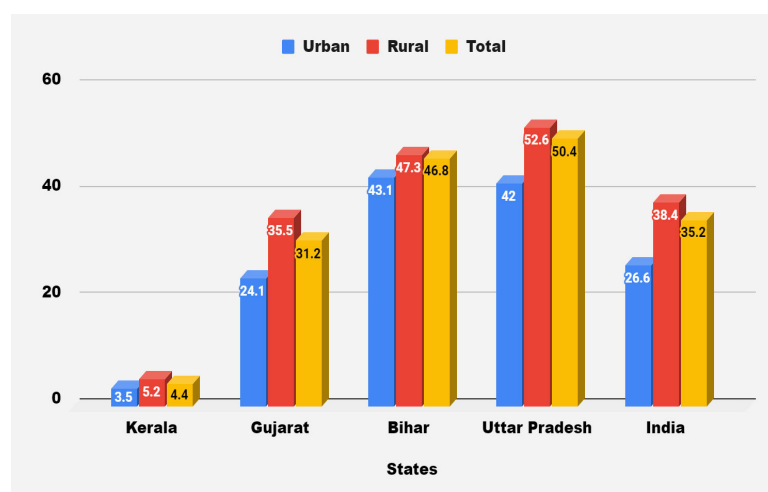
The figure 8 illustrates infant mortality rates in urban and rural areas of selected four states. Except Kerala, all other three states have significantly high infant mortality rates, in which Uttar Pradesh has the highest. Even though Gujarat is considered a developed state, it also has

a higher infant mortality rate when compared with Kerala. But a huge disparity between developed and backward states cannot be noted because of the higher infant mortality rate of Gujarat. When we compare the state wise IMR with the national average of the country, it can be seen that Bihar and Uttar Pradesh have higher percentages of infant mortality than the national average, which is alarming. Only Kerala shows a better record, much lower than the national average.

When we make a comparison between NFHS 5 and NFHS 4, a reduction in the infant mortality rate can be noted. From NFHS 4 to NFHS 5, IMR of India has reduced from 40.7 percent to 35.2 percent.

Figure 9: NFHS 5 data comparison of Children under 5 years who are underweight in the case study states

When we compare the percentage of children under- five who are underweight in developed and backward states it is understood that there is no major difference in percentages between these states. Except Kerala, all other three states have more than 30 percent. Bi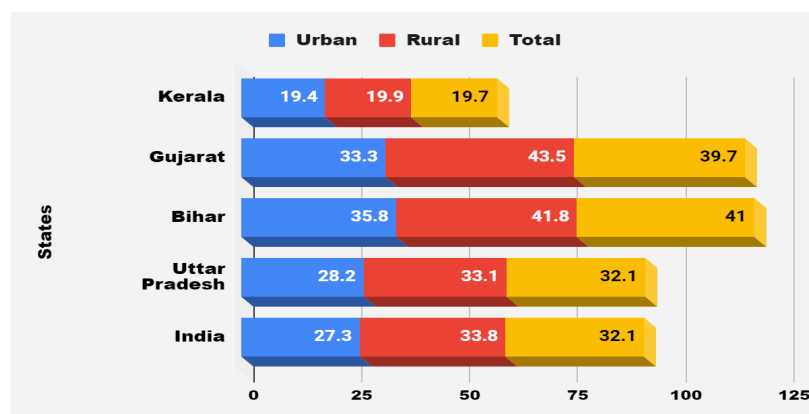har has the highest (41 percent) which is followed by Gujarat (39.7 percent). Both Gujarat and Bihar have shown higher percentages than the national average (32.1 percent). Even when we compare NFHS 5 (32.1 percent) and NFHS 4 (35.8 percent), a notable change is not seen in the percentage of underweight children.

World Health Organization Health Expenditure Data

Comparable information on health spending for more than 190 WHO Member States has been made available since 2000 through the Global Health Expenditure Database (GHED), which is open to the general public. WHO works collaboratively with the member states to update the available information. This report is made based on a few health spending indicators to monitor

the existing health policies and resources available for the public. But will be focusing only on three indicators:

1. Current Health Expenditure (CHE) as percentage of Gross Domestic Product (GDP) (%)
2. Domestic General Government Health Expenditure (GGHE- D) as percentage of Gross Domestic Product (GDP) (%)

Figure 10: Comparison of Current Health Expenditure (CHE) as percentage of Gross Domestic Product (GDP) of India from 2010 to 2020
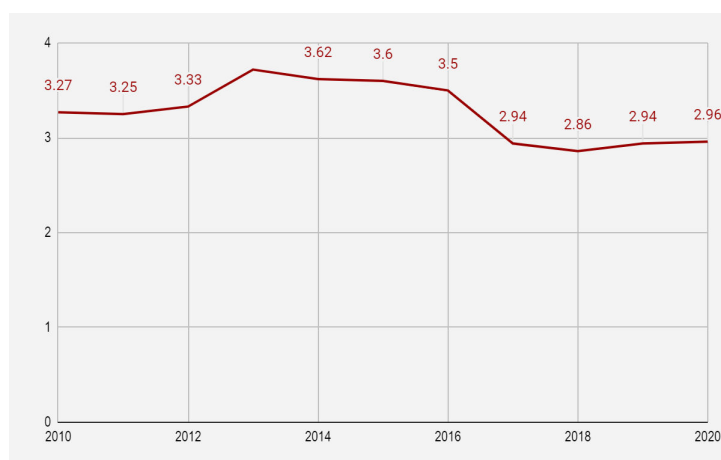
Figure 10 traces the path of health expenditure in the country from 2010 to 2020. It is disturbing to see that no significant change has happened during this period. Even with a span of ten years the country could not make a difference of at least 1 percent.

There is also the problem of huge out-of-pocket expenditure (more than 50 percent of the total health expenditure) which is alarming.

Figure 11: Comparison of Domestic General Government Health Expenditure (GGHE- D) as percentage of Gross Domestic Product (GDP) of India from 2010 to 2020
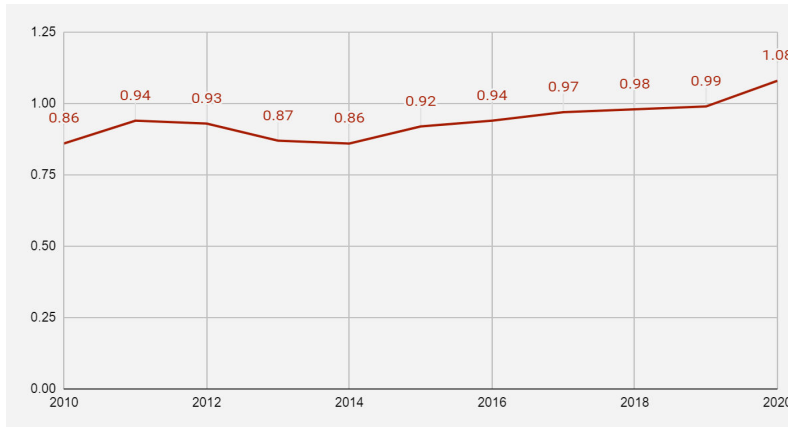
From figure 11 it is very alarming to see that India has not even shown an improvement of 1 percent between 2010 and 2020. In contrast, the GGHED as percentage of GDP for developed countries is over 8 per cent.!

Major Findings

- During the pandemic a large majority, 67 percent, had accessed the public health facilities. A majority of the respondents who visited public health facilities were from the states of Odisha, Kerala, West Bengal, Chhattisgarh, Gujarat and Uttar Pradesh.

- When the respondents were asked whether the inadequacies in the public health facilities had compelled them to visit private health facilities 34 per cent of them said yes. Most of them were from the states of Bihar, Uttar Pradesh and Karnataka.

- Regarding the health expenditure, data showed that 32 per cent of the respondents spent above Rs 5,000 on COVID-19 related treatment and 25 percent of them spent above Rs 10,000 on COVID related treatment. To meet the health expenditure, 45 per cent said that they had borrowed money for COVID-19 related treatment, most of them from the states of Uttar Pradesh, Bihar, Gujarat, Karnataka and Andhra Pradesh.

- There were people who faced difficulties in getting treatment for non-COVID health issues. Most of the 46 per cent of the respondents who said that they faced difficulties in getting treatment for non-COVID related health issues were from the states of Uttar Pradesh, Bihar, Gujarat and Maharashtra. In these four states those who faced difficulties to access treatment for non-COVID related health issues outnumbered those who didn't face difficulties to access treatment for non-COVID related health issues.

- Data also shows that only 11 per cent had availed health insurance. Many of them were from the states of Kerala and Chhattisgarh.

- The states of Bihar (46.8 percent) and Uttar Pradesh (50.4 percent) have high Infant Mortality Rates, more than the NFHS 5 national average (35.2 percent).

- The percentage of children under 5 who are underweight in the states of Gujarat, Bihar and Uttar Pradesh is more than 30 percent, with only Kerala (19.7 percent) performing better than the national average (32.1 percent).

- The Current Health Expenditure (CHE) as percentage of gross domestic product (GDP) of India from 2010 (3.27 percent) to 2020 (2.96 percent) shows no increase over the years.

- Government health expenditure as a percentage of GDP has not shown any significant increase over the years, it is still around 1 per cent of GDP, much lower than the share of developed countries (8 per cent).

Way Forward: Some Suggestions

- The NFHS 5 data suggests that a large population in India is suffering from a high percentage of infant mortality rate, children under five years who are stunted, wasted and underweight, indicating huge nutrient and health deficits within the country. This necessitates more investments in programs that improve maternal and child health, such as prenatal care, immunizations and access to nutritious food.

- Data shows huge regional disparities in health indicators like IMR, Under-five Mortality rates, and MMR. Systematic and regular monitoring of PHCs and CHCs is required to prevent irregularities in healthcare services and to ensure better healthcare access to all. The Rural Health Statistics report 2021 also shows a huge shortfall of manpower in government health facilities like CHCs and PHCs. India can have better health indicators and health standards only with improved health infrastructure both physical and human.

- The secondary data showed that the domestic general government health expenditure in the country is 1.08 percent which is extremely low compared to developed countries. The government should allocate more funds for the healthcare sector, particularly for primary health care services and rural health facilities, to improve access to care for all citizens.

- Government can implement universal health coverage programs that provide access to a comprehensive package of essential health services for all citizens. This will not only reduce the out-of-pocket expenditure by providing financial protection for people who

need health services but also can help ensure that everyone has access to quality health care.

Conclusion

What is evident, from both the primary data and secondary data, is that India, despite making much progress yet lags behind on many health indicators, in comparison to many countries including our neighbouring countries. Reimagining better health and nutrition status demands greater commitment from the government to address the health inequalities across the states. The government of India must acknowledge the seriousness of this matter and work towards increasing health expenditure and thus improving the health and nutritional status of its population.

India has a thriving private health system with a lot of multi-speciality hospitals, pharmacy shops etc but why don't we have a thriving public health system? Increased budgetary allocations will address this puzzle! Only with a better funded and better monitored public health system India's health and nutrition indicators can be improved.

While India seems to be doing much better on economic indicators like Gross Domestic Product, its social indicators especially in the health and education sectors are a cause of concern. In the absence of an approach that aims to balance both economic and social indicators, without sacrificing the latter for the former, India would not become the 'vishwa guru' that it aspires to be.! India's dream to be a 'vishwa guru' cannot coexist amidst such glaring disparities like the rural-urban divide, gender divide, inequality, poverty, hunger and malnutrition. The 'vishwa guru' cannot be merely focused on growth while neglecting equity. Better health and nutritional standards will lend more credibility to India's claims of a 'super power' or 'trillion dollar economy' or 'vishwa guru'.!

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7

Exploration of a Matriarchal Society and its Echoes in Philip Pullman's 'His Dark Materials'

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Abstract

The visualization of 'matriarchy' in fiction usually takes the form of a simple gender-swapped version of patriarchy itself: the roles presently occupied by males are shifted to females. Unable to imagine a world with women occupying the positions of power while males exist, some hypothesize a world containing only the females. In a society where patriarchy has completely invaded the psyche of human beings, as numerous critics and academicians believe, the creation of an entirely matriarchal society, even hypothetical, becomes virtually impossible. *His Dark Materials* (1995-2000), a trilogy of fantasy novels by Philip Pullman, brings to the fore a novel idea into what a matriarchal society might look like. This paper attempts to understand the fundamentals of patriarchy and matriarchy, and to analyse Pullman's depiction, thereby drawing conclusions whether or not such a construct is possible. The methodology used is examination of prior research done on the topic, analysis of the text and conjecture coupled with observation.

Keywords: Patriarchy; Society; Matriarchy; Construct; Literature.

Introduction

In a sufficiently advanced civilization, the society becomes a semi-independent sentient entity. It does not simply remain a construct to move the workings of the civilization forward, but instead begins to dictate the actions and psychology of the units comprising the civilization, i.e. the individuals. The present society, with its foundations laid on a patriarchal setup, has controlled the minds and actions of the average individuals from time immemorial. In sheer scale, patriarchy engulfs virtually the entire world, affecting both males and females. As bell hooks wrote in her essay, "Patriarchy is the single most life-threatening social disease assaulting the male body and spirit in our nation" (hooks 1).

In his book 'The Inevitability of Patriarchy' (1973), Steven Goldberg states that "women follow their own physiological imperatives and [...] they would not choose to compete for the goals that men devote their lives to attaining" (233). He further explains that male dominance is not due to an imbalance in egalitarian power, but because biologically, physiologically and psychologically, males are drawn towards aggressive and domineering tendencies, while females possess gentler and more nurturing traits. "Men are aware of this and that is why in this and every other society they look to women for gentleness, kindness, and love, for refuge from a world of pain and force, for safety from their own excesses" (Goldberg 234). With society consisting of such binaries, the existence of a pure matriarchy is negated.

On the other hand, an egalitarian non-patriarchal system was not considered as matriarchal formerly. However, with new researches arising, undertaken primarily by female researchers, this notion has begun to be refuted; according to them, the term 'matriarchy' needs to be more strictly redefined. Considerable work has been done on this perspective by the German scholar Heide Göttner-Abendroth.

This paper aims to observe the existing definitions, and the changes that have arisen in the past from these definitions, and by doing so, conjecture to hypothesize the reconstruction of a social setup that, while seemingly opposite to patriarchy, is actually a separate and different form of structuring civilization – similar to how democracy is different from monarchy, where none can be absolutely called greater than the other, with each having its own merits and demerits.

Defining Matriarchy

Matriarchy is generally considered to be a social system in which females hold the primary power positions in roles of political leadership, moral authority, social privilege and control of property. Regarding these factors individually in the present context, it is known that women at present do not hold primary power positions, and while there are women in positions of power – politically and proprietarily – these are not 'primary'. Secondly, observing the moral authority and social privilege, it is seen that the world's leading philosophies and sciences are based on male dominated views; indeed, as mentioned in his "Politics", Aristotle claims that "As regards the sexes, the male is by nature superior and the female inferior, the male ruler and the female subject." (Smith 467).

The masculine motive is considered to be glory and power, while the feminine motive is beauty and creation. It is this difference in nature that Aristotle mistook for superiority and inferiority,

and it is this difference in nature that is crucial to the construction of a civilization from the gender perspective.

Cynthia Eller, in her book "The Myth of Matriarchal Prehistory: Why an Invented Past will not give Women a Future" (2000), defines matriarchy as: "[...] any society in which women's power is equal or superior to men's and in which the culture centres around values and life events described as 'feminine'" (13).

In a civilization where women, or the feminine side, are in power, the cultural context would entirely differ from the present. The civilization itself would be centred on nature, as the feminine side favours creation, protection and adaptation, in contrast to the masculine side, that favours domination, expansion and conquest. Additionally, the architectural and technological aspects of the society would also change, with *yonic* symbolism replacing the current phallic symbolism in the underlying unconscious of the psyche. It must be understood, however, that a matriarchal society cannot be constructed without unlearning the values that are imposed, mostly to one's oblivion, by the patriarchy, both on males and females.

Matriarchal Prehistory

Matriarchal Prehistory declares that before patriarchal dominance of the world, there existed a matriarchal society that lived in complete harmony with nature and flourished peacefully. Following this, patriarchy took over and led to the state of the world at present with female suppression, oppression and social degradation. According to this hypothesis (with no unambiguous or definitive evidence of its existence), patriarchy is a fairly recent and new development, and that matriarchy is what universally governed the workings of the civilization. While this theory has been used by several fields of feminism, there are numerous scholars who refute its claims, based on archaeological and textual evidences. Cynthia Eller discards this theory in "The Myth of Matriarchal Prehistory" (2000), arguing that the existence of such a theory leads to the argument, mainly from the male critics of matriarchal systems, of patriarchy being a more evolved form of civilization as a consequence of its substitution of matriarchy, and to the females it offers a view that patriarchy serves as a recent development that can be, and must be, ended in order for the state of the world to improve. These support the radical feminist views, which Eller aims to dethrone. This myth of matriarchal prehistory ignores the fact that both the masculine and the feminine counterparts need to co-exist in order to achieve a truly harmonious civilization.

Non-Matriarchal Female-Centric Societies

While the existence of an unambiguously matriarchal society is doubtful, there are societies that are female-centric but not matriarchal (based on feminine values), either practicing a gender-inverted version of patriarchy or simply focusing on the female lineage rather than the male. Matrilineality refers to the tracing of ancestry and inheritance through the female line. In this system, every individual is identified through their mother's line, or matriline, contrary to the prevalent system of patriline, where the male's family name and ancestry is given more importance.

The belief that early human familial structure was universally matrilineal was favoured by numerous anthropologists and prehistorians, until the end of the nineteenth century (Murdock 185). After considerable debates and reassessments of this theory throughout the twentieth century, it was concluded that it must be true. This was in part due to the research in ancient childcare practices, which made possible the evolution of the unusually large human brain and characteristic human psychology, as evidenced by the cooperative breeding hypothesis (Burkart 183). Additionally, the 'grandmothering hypothesis' seems to support this view, as it explains the evolutionary development of menopause by way of social support and preservation of genes through care of offspring – "the selective advantage of distinctively human postmenopausal life-spans is that it enabled older women to assist their adult children in caring for and provisioning grandchildren" (Knight 80). Employing the genetic perspective, the certainty of a son bearing an offspring is much lower as compared to a daughter bearing one. "For grandmothers to invest preferentially in their descendants through sons, therefore, would not be an evolutionarily stable strategy. [...] the grand mothering hypothesis tips the scales decisively in favour of matrilocal residence and matrilineal descent" (80). Examples of matrilineal governance include the Minangkabau people of West Sumatra, Indonesia, and Negeri Sembilan, Malaysia; the Nairs of Kerala and the Billavas and Bunts of Karnataka; the Khasi, Jaintia and Garo of Meghalaya.

The matrilineal system cannot be called matriarchal because only the power rests with the females, with no other differences in functioning of the society; the feminine values are not truly embedded in the functioning and structuring of the social systems.

Masculinity versus Femininity

It is only through the understanding of the essential differences between the duality of human consciousness that one can estimate the creation of a society based on that particular aspect. Masculinity is the fundamental root of the patriarchal society, and conversely, femininity must be kept in view for the construction of a matriarchal structure of civilization.

Masculinity refers to, generally, the attributes associated with boys and men, although these attributes can also be displayed by females. Certain traditionally masculine traits are strength, courage, independence, leadership and assertiveness. Similarly, traits that are generally attributed to females, though can be exhibited by males as well, are gentleness, empathy, humility and sensitivity. Although there is some biological evidence as to the emergence of these traits, masculinity and femininity remain a largely social concept.

Additionally, the terms masculine and feminine do not directly mean male and female. They describe specific attributes, which are dominant in either of the sexes. A female can have masculine traits and vice versa. Moreover, both these facets constitute an individual's consciousness, and the absence of any one would be considered an abnormality or imbalance. Observing the basic essential drives, where masculinity aims to acquire glory, recognition and power, femininity aims to create, give and preserve beauty. This is not to say that a female cannot desire power or glory or a male cannot wish for beauty; on the contrary, as a social construct, both femininity and masculinity are present in an individual, but varyingly; social factors play a great role in the emergence and exhibition of the behaviour influenced by either side of self.

Patriarchy – A Societal View

An individual's purpose in life, socially, is to achieve success in the form of fame, wealth, recognition, and perhaps, at the end, leave behind a legacy that would remember them. From childhood, one is taught to compete and win, in order to achieve one's goals in life, i.e. success and recognition. Courage, independence and assertiveness, traits primarily masculine, are ingrained deeply. From an economical view of the society, the entire concept of capitalism is based on the principle of acquisition and ownership – basically a masculine craftwork. Thus, it becomes evident that the current framework and structure of civilization is based on masculine values and traits.

In order to create a true matriarchal society, these traits and values need to be drastically changed and redefined. If a true matriarchy is to be made possible, then a massive restructuring

of the world would have to be in order, and while such changes aren't possible in a short time-span, gradual and definite alterations, stemming from the psyche of the individuals, would possibly turn the civilization towards matriarchy; but such gradual alterations would take more than a few decades and because the values of patriarchy are so deep-seated in the social consciousness, numerous generations would pass before the rise of a descendance that is not influenced by patriarchal prejudices and thought-patterns.

While the rise of matriarchy (if there is a probability of such a time in the distant future) cannot be witnessed in-person, it is possible to acquire an idea of how that society would appear and how it would work.

Societal Restructuring

In a matriarchal society, the power would rest in the hands of the female; thus, the definitions of governance and administration would also be entirely different from the present. The concept of an egalitarian system becomes obsolete considering the fact that one side of the coin holds more power than the other here – femininity is dominant over masculinity, contrary to the present where the reverse is true.

One can indeed argue that the subjection of women to the extent seen in the present civilization would not equal the subjection of men in a matriarchal society, but some gender-based disparities are to be expected in a matriarchal system. The major inequality can be the male's input in the shifting or handling of power. With males being seen as impulsive and aggressive, and the decision-making power therefore being retracted from them, the society would work on a more tolerant, sensitive and emotion-based power structure.

The shift in the power-roles would have a great effect on the literature and media of the time as well. Additionally, the standards of society would tilt in the favour of women. While patriarchy assigns the role of sex-object to women, it assigns to men the role of violence-object, with male expendability being corollary to the sexual objectification of girls (Milojević 57). It can thus be conjectured that in a matriarchal society, such objectification would be reversed in some form.

From the prehistoric times, the role of male as hunter and the female as gatherer was noted. By natural selection, these roles are supported – natural selection is more likely to favour male reproductive strategies that stress mating effort, and female strategies that emphasize parental

investment (Bird 65-75). The patriarchal society glorifies the role of the hunter, and the matriarchal society would, similarly, emphasize the role of the gatherer. The feminine side is characterized by values such as tenderness and empathy, along with beauty and creation: therefore, a matriarchal society can confidently be thought to be driven by creativity and beauty.

Matriarchy in *His Dark Materials* – The Witches

His Dark Materials, a trilogy of fantasy novels by Philip Pullman, tells of a society where femininity is the centre of power and the masculine side is largely ignored. The witches portrayed in the trilogy are exclusively female and live in the far north, away from the patriarchal society of the rest of the world and much closer to nature. Their culture includes their own Gods and Goddesses, the primary one of which is Yambe-Akka, their goddess of death, who "was merry and light-hearted and her visits were gifts of joy" (Pullman, "The Subtle Knife" 41). This marks a crucial departure from the masculine perception of death as something to be feared and avoided. A feminine society – closer to the cycles of birth and death ubiquitous in nature -- would understandably embrace death as a freeing concept.

One of the interesting facts about the witches in the novels is that their closeness to nature is both in a metaphorical and literal sense. As Pullman describes, "They live in forests and on the tundra, not in a seaport among men and women. Their business is with the wild," ("Northern Lights" 165). This reiterates the recurring theme in a lot of literature that women are much closer to nature than males – as exemplified by the portrayal of Earth itself as mother. From a societal point of view, the communities of witches have created a separate habitat and way of life for themselves in a world dominated by the patriarchy and ruled by technological progress. Pursuit of progress that brings with itself destruction is a feature of the patriarchal and expansionist ideology; if women were to create a society, as has been stated previously, they would be much closer to nature, with a sustainable and creationist worldview. Additionally, this closeness to nature also gives to the witches an almost supernatural ability to observe and feel: "every strand of moss, every icy puddle, every midge in her homeland thrilled against her nerves and called her back," ("The Subtle Knife" 49). When seen from a realistic perspective, it can be argued that women are both more empathetic and observant than males; the novels have simply exaggerated this feature.

Furthermore, regarding the nature of economic exchange and gain, the novel describes: "Witches own nothing, so are not interested in preserving value or making profits [...]. [They] have no means of exchange apart from mutual aid. If a witch needs something, another witch will give it to her," ("Northern Lights" 308-09). This goes directly against the capitalistic notions of the current economic and financial foundations of the society. The society of witches – or a society created exclusively by women – does not rely on any currency or profit-loss exchange, but mutual help and sharing. While this may remind one of socialist ideologies, it must be remembered that the notion of ownership or possession does not exist among the witches. Because they are closer to nature, their understanding is of a shared and mutually beneficial coexistence. Land, assets, goods, individuals do not belong to them; rather these are simply objects that exist and may be shared for the benefit of all in the community. The witches are described as "democratic, up to a point; every witch, even the youngest, had the right to speak, but only their queen had the power to decide" ("The Subtle Knife" 55). This describes a society where the power is decentralized and all have the right to opine freely.

Regarding the role of men in their society, the witches only take them as helpers – for dealing with the so-called civilized societies of the world – or as lovers and husbands. If, from a lover, a female offspring is born, then it is taken by the witches and raised to be a witch; if a male offspring is born, then it is taken by the man and raised on his own ("Northern Lights" 315). The union between a witch and a man does not last for long – the reason for this is fantastical, in that witches are said to live for hundreds of years, but from a societal point of view, it makes more sense: in a strongly patriarchal society, the women are reduced to baby-producing machines that work to comfort the males; in a matriarchal society, formed only of women, males must then be reduced to tools of expanding the witch population. This is also reminiscent of the Amazons of Greek myths, but a crucial difference is that while the Amazons killed the men after getting pregnant (and killed or made servants the male offspring), in Pullman's world, such brutality does not exist. Keeping in mind the features of femininity, it is more probable that Pullman's version of society would be closer to reality, in that the creationistic women would not kill.

Another interesting power attributed to witches is that of invisibility: "It was a kind of magic she could work to make herself unseen. [...] this was mental magic, a kind of fiercely-held modesty that could make the spell-worker not invisible but simply unnoticed" (The Subtle Knife" 34). This is another instance of an exaggerated symbolism from something realistic –

in our world, for centuries women were invisible, in that no sense of importance or relevance were attributed and no notice was given to them. If this is converted to a power wielded by the females – as was done by several female spies and informants – from a deconstructionist point of view, it opens up several avenues of possibilities in fiction.

Finally, the medical practices in the witches' society are inextricably linked to nature, so much so that their medicines and treatments are ritualistic and incorporate herbs as well as animals (266-69). This is again indicative of the dependence on nature, and the pagan nature of the practices further acts to distance their society from any influence of the Christian patriarchal civilization present in the rest of the world.

Heide Goettner-Abendroth expounds upon the elements of a matriarchal society. According to her, firstly a matriarchy is economically balanced – where there is "no right of ownership, but only the right of distribution." Secondly, a matriarchy is "a non-hierarchical society of matrilineal kinship," and politically, it is a "society of consensus." Goettner-Abendroth also states that "at the cultural level, [matriarchy] is based on a sacred culture in which there are no aloof male gods, but where the worldview is defined by the feminine divine." (4). All of these elements are clearly justified in the society portrayed in Pullman's trilogy.

The witches' culture focuses on nature and their magic is majorly influenced by the natural forces. Their science and education are also based on natural phenomena, and meditation is emphasized. This affinity towards nature is attributable to the essentiality of femininity, which values creation. Additionally, the economic structure and democratic social stratum further indicates how such a society – with foundational values of femininity – might function. Hence, the witches' society is effectively matriarchal, and, if examined, can be an informative instance of a successful civilization governed by females.

Conclusion

A matriarchal society remains largely a hypothetical possibility. This is aided by ideas from generations of literature, which not only provide varying and wider perspectives, but also give new outlooks both psychologically and socially. That *His Dark Materials* provides valuable insights into the creation of a true matriarchy has been evidenced by analysing the fundamentals of a matriarchy and then comparing those with the portrayals in the trilogy by Philip Pullman.

As has been stated earlier, the ideal civilization would be one in which the values of both masculinity and femininity are incorporated in a positive manner, and in order to achieve that, the patriarchy prevalent now needs to be broken and matriarchal essential values need to be introduced. Although it would take a significant amount of time to get established and function, yet awareness and knowledge coupled with acceptance and mindfulness, would lead to the development of a society more empathetic, harmonious and inclusive – something that is increasingly needed in this patriarchal society: emergence of matriarchy.

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8

An Eco-Critical Study of Selected Poems from *Green Book* by Indian Poet Gulzar

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Abstract

The term 'Eco Poetry" was popularised by J. Scott Bryson in his books 'Eco Poetry: A Critical Introduction' (2002) and 'The West Side of Any Mountain: Place, Space, and Eco Poetry' (2005). With an eco-centric perspective, eco-poetry portrays the interconnectedness of human beings and nature, and in the process, it often delineates dwelling in a particular geographical region, presenting it as a utopia. Similarly, Greg Garrard, a renowned scholar of environmental humanities, states that "'Dwelling' is not a transient state; rather, it implies the long-term imbrication of humans in a landscape of memory, ancestry, and death, of ritual, life, and work." 'Green Poems' (2014), by eminent contemporary Hindi poet, director and lyricist Sampooran Singh Kalra, better known as Gulzar, and translated into English by Pavan K. Varma, is a peerless ecopoetic voice. This collection unveils the poet's apprehensions about the future of this planet, and his thesis that nature is neither silent nor dead. The poet hears the whispers of the river in "The River," "The Aged River-1", "The Aged River-2", and "The Story of a River". He follows the trees' memorialisation and speculation in "The Forest." The proposed paper attempts to study selected poems from the aforementioned collection within an eco-critical framework, along with examining the relationship between the environment and the chosen poems. There are few voices in modern Indian English poetry or translations of Indian regional poems that convey the fear of environmental apocalypse as effectively as Gulzar.

Keywords: Environment, eco-poetry, nature, technology.

Introduction

Acknowledging Gulzar's contribution to the realm of modern poetry, this research paper delves into his poignant poems. By exploring their themes, analysing the linguistic choices, and interpreting their deeper meanings, we aim to unravel the poetic techniques employed by the poet to evoke a sense of mystique and introspection. By examining the interplay between nature, human experience, and metaphysical realms, we aim to unravel the complexities of these poems and delve into their profound philosophical implications.

The present research paper examines five selected poems from Gulzar's 'Green Poems', a collection of fifty-nine poems on nature, that were originally written in Hindustani and later translated into English by Pavan K. Varma. The collection was published in 2014 as a dedication to Her Majesty the Queen Mother of Bhutan, Ashi Sangay Choden Wangchuk. Gulzar presents nature in these lyrical poems as a self-speaking topic, paying attentive homage

to the numerous facets of nature in all its multifaceted manifestations. According to Pavan K. Varma, when Gulzar writes about nature, he gives it a unique personality. True to Varma's assertion, Gulzar writes through it rather than about it, letting nature speak for itself. The poet participates in this process as an observer in its joys and travails. Additionally, according to Pavan K. Varma, for Gulzar, a river, cloud, mountain, tree, leaf, the sky, and the universe beyond, are not merely objects of observation, to be idealised or glorified; rather, these are living, animate beings with a soul, a purpose, and a will that is distinct from that of the observer. He is therefore in a conversation with them, combining humour, pathos and the transcendent spirit of nature. He also combines irony and beauty, thus fulfilling the basic definition of ecocriticism.

Since the beginning of a new century, often heralded as "the century of the environment," a coherent and broad movement embracing literary-environmental interconnections, commonly termed "ecocriticism," has been emerging. Environmental and population pressures inevitably and increasingly support the position that any literary criticism which purports to deal with social and physical reality will encompass ecological considerations.

Arne Naess and Vandana Shiva are well-known environmentalists from Western and Eastern cultures who advocate for the inherent value of all species and natural resources in the developing area of ecocriticism. The green poetry of Gulzar provides a poetic counterpart to the eco-critical tenets of Shiva's "earth democracy" and Naess' "deep ecology."

Many poets have written poetry about nature, but most of them seek to idealise and exalt it, unlike Gulzar, who uses metaphor to let nature speak for itself rather than only speaking about it. The following poems by Gulzar are taken from the collection: *The River*, *The Aged River-1*, *The Aged River-2*, *The Story of a River*, and *The Forest* – these will be examined through the prism of eco-critical ideas.

These poems portray "nature" as the self-articulating subject, which distinguishes them from other nature poetry in which nature is reduced to merely an object of observation. By presenting "Nature" as such, Gulzar encourages readers to reconsider how nature and humans interact, by instilling in them an ethical and ecological conscience through his poetry.

An Eco-Critical Survey of Gulzar's poetry

There are few voices in modern Indian English poetry or translations of Indian regional poems that convey the fear of environmental apocalypse as effectively as Gulzar. His Eco Poetry tries to challenge human ascendancy on nature by developing environmental ethics and denouncing the existing discourse of anthropocentrism, by establishing this type of counter-narrative which presents the voice of nature.

In several of his writings, the setting is a jungle, and animals are the people, giving Gulzar's writing a touch of the natural world. The focus of his poetry switches from Man to Nature, with Nature acting as an observer of humankind and commenting on it. He differs from most poets in the way he allows nature to participate as the subject matter as well as an object of observation by a man. In the very initial phrases of "Green Poems," where he writes, "Some dry leaves dropped from the tree. The season was changing. But the rustle of the leaves had something more to say. I heard them. What they said was profound, to save the globe from rotting," his concern for the environment and his attempt on being an eco-critic can be seen.

"When I pass through tree the forest it seems my ancestors are around me
I feel I am a newborn baby
And these tribes of trees
Are rocking me in their arms" (Gulzar. *Green Poems*. Penguin UK, 2014.)

The setting in the poem "The Forest" is a woodland that Gulzar has revisited. The poet proclaims that he was once the forest's child who, when yet unable to walk, crawled and slithered through the trees while keeping his metaphorical roots firmly planted. The poet is sobbing while sitting under a banyan or a *bargad* tree, reflecting on how much he misses the time they spent together and illustrating how far humanity has come from our ancestors, who once held nature in such high regard.

Here, the banyan tree is alluded to be the poet's ancient ancestor, who is happy to once more have a grown man in his lap. The man notices the flower shaking and diffusing scent as well. The personified forest yells out that since you began walking, the significance of the location you most enjoyed has diminished. The man is compared by the woodlands to a solid rock mountain that has no feelings or emotions. We will eventually return to the earth from which we came, which is a universal fact that the poem finishes with.

These humanised inanimate items highlight how crucial peaceful cohabitation and life are, showing the precariousness of nature-human interaction, the resulting ecological inequality, and the disappearance of important cultural practices. The irony that people are alone even in a crowd while every element in nature remains in harmony is articulated by Gulzar in the mountain. The loneliness in the crowd shows that, although being a component of the larger ecosystem, humans don't engage with nature and have cut themselves off from it.

"In winter, when the fog settles all over his face
And the wind flutters by wiping his countenance clean
He wants, just once, to soar along with the breeze
And simply vanish from the forest." (*The River* 2014)

The aesthetic appeal further enhances "The River". The poem opens with a personification of the murmuring river. By giving the river a heart, Gulzar gives it life, and the line "Some small desires still alive in his heart" (3) supports this claim. These words from Gulzar have an elevated artistic strain. Words such as 'fog,' 'flutters,' 'breeze' and 'forest' of the second stanza spur the aesthetic resonance.

The poet keeps using his limitless imagination to conjure up amazing landscapes that have both a naturalistic and artistic appeal. He recreates the breath-taking scenery of a train crossing a body of water.

"Sometimes, when a train passes over the bridge
The flowing river stops momentarily
With one wish
May be to see once again that girl's face
Who had offered flowers and tulsi to him
For the good husband to find." (Gulzar. *Green Poems*. Penguin UK, 2014.)

This stanza supports Gulzar's status as a romantic poet. His imagery illustrates the influence of nature. He claims that occasionally, the train that crosses the bridge stops briefly to get a glimpse of the girl who is giving him flowers and *tulsi*. Through the river, the train passenger delivers a message to her boyfriend. Rivers are shown by Gulzar as intimidating the girl and her boyfriend. This demonstrates the poet's capacity for creativity. His imaginary notion elicits an aesthetic response and enhances the poem's setting. When he says that the river takes a picture of the girl and sends it to her partner who is gone, it is clear how imaginative he is.

In his narrative poem The Story of a River, Gulzar introduces the protagonist as a river telling its own tale and asking a poet about a dilemma. The aim of its investigation, as is clear in the second line, is to have a period of calm or repose, which is ironically juxtaposed with a poem laying idle after being read, because the river becomes exhausted due to the constant human activity:

"Can it not be
That someday nothing happens
Nothing at all
And I put my back to my bed
And remain motionless for one evening
Just still
Like a poem lies inert after being read
Unmoving, at rest?" (Gulzar. *Green Poems*. Penguin UK, 2014.)

The poem describes the river as an infant beginning to walk while allowing the bank to support its "arms." Gulzar purposefully utilises the image of a baby to highlight the anthropocentric perspective of mankind, an attitude that views humans as primary and nature as secondary. To convey the river's impression of floating, Gulzar shows the river as a "self". He shows graphic examples of how people treat rivers with the utmost disrespect:

"Every day my two banks hold me by my arms
And make me walk a given path;
And, every day, on my back, I carry
Boats full of people to the other side." (Gulzar. *Green Poems*. Penguin UK, 2014.)

Gulzar suggests respecting not only other living things but also natural environments, like rivers and wetlands. He paints a picture of teenagers who keep and update a journal, chronicling daily events:

"Every day, like adolescent children,
The waves write something on my chest."

The title of Gulzar's collection is "Green Poems." According to Jacob Olesen, "green" often denotes "both a riveting and relaxing effect" in literature, and signifies feelings of rejuvenation. On the other hand, it is also connected to fatigue and guilt. According to him, "green is used to

represent nature, harmony, freshness, fertility, as well as ambition, greed, and jealousy" in poetry. The conflicting connotations of the colour "green" are incorporated in Gulzar's green poems. On the one hand, he uses the word "green" to convey how rich nature is, and on the other, he uses it to represent how men's ambition and greed cause nature to be destroyed and lose its value. These green-related metaphorical meanings are deeply ingrained in Gulzar's poetry, which is why they are referred to as "Green Poems."

Conclusion

Environmentalists are conventionally seen as the defenders of nature. However, nature protection and conservation are not just the responsibility of environmentalists. Everyone has a responsibility to work towards redefining nature's value.

Many artists emphasise the value of nature and the interaction between man and nature in their artistic creations. The creation of artistic works can undoubtedly aid in the development of an ethical, eco-centric consciousness, even though they cannot inherently assist environmental conservation and protection. People may be intrigued to realise the effects of human activity on nature by reading a literary work like a poem. For romantic poets like Wordsworth, Keats, and Shelley, nature poetry has served as a celebration or source of joy as an antidote to the busy pace of city life. Gulzar has continued this tradition in the present day.

Human society depends on nature to such an extent that if it is destroyed, in the name of technological advancements or other profit pursuits, human beings will suffer and perish. Today, protecting nature and conserving natural resources has inevitably grown into a worldwide issue that needs to be addressed with a more positive perspective on the natural world. Gulzar's poetry on the environment helps readers to understand the value of using more proactive and effective methods to preserve and conserve natural resources.

To Gulzar, nature is a self-speaking animate subject and a poetic persona who, instead of being observed, is an observer of the human world and their countless careless mistakes. Gulzar's extensive use of personification in his green poems displays his eco-poetic consciousness, and provides an extraordinary, unusual perspective on nature to aid in the conservation and preservation of the current deteriorating condition of our planet.

Gulzar's poetry addresses many ways to treat nature and illustrates environmental problems around eco-criticism. These poems are considered environmental literature as nature is their primary inspiration, where environmental issues are addressed through literary elements such as metaphor, personification, imagery, etc. That several of the poems discuss nature as an observer of man demonstrates how Ecocriticism's primary goal, to shift focus from man to environment, is achieved. Poets like Gulzar are needed today, who view global warming as a major environmental issue and want their readers' aids in saving our lovely planet.

In his "Green Poems" (2014), Gulzar depicts nature as a self-articulating subject to promote ecological awareness for sustainability, at a time when people carelessly destroy nature in the name of modernisation, due to avarice. By fostering a sense of interdependence between people and the natural world, and putting a focus on bio-centric ethics, the poet produces eco-poetic consciousness. Applying the pertinent eco-critical principles of Arne Naess' "Deep Ecology" and Vandana Shiva's "Earth Democracy," this research paper aimed to support Gulzar's representation of nature in the chosen poems to subtly underscore the effects of anthropocentrism and to show his deep ecological thoughts.

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9

Effect of Literacy on Fertility

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Abstract

The main aim of this study is to estimate the relationship between fertility and literacy of women in the world. Using time series data on the total fertility rate (births per woman), and the literacy rate of adult females (% of females ages 15 and above) over 20 years has been taken from the World bank. "Studies have recently shown a strong correlation between an increase in literacy levels and a decrease in fertility rates" (Robey). "According to researchers, the increased literacy rate supports population stabilization" (Google chrome, n.d.). This report highlights the potential impact of these variables in shaping population dynamics, and the need for continued investment in literacy programs to achieve a more sustainable future.

Keywords: Literacy, Fertility

Introduction

Education and literacy play a critical role in gender equality, women empowerment, promoting reproductive health, and family planning around the world. According to the given data, we can see a slow and gradual decrease in the fertility rate, whereas the literacy rate has consistently increased from the year 2000 to 2020. "Women with higher literacy levels are more likely to have more children who survive due to their increased knowledge of proper health practices and their generally improved living conditions" (Robey). Literate people desire to have fewer kids as they can understand the expensive childcare and increased financial burden of having a larger family size. Even educated people are concerned about the rapidly increasing population so they usually plan for fewer kids. However, I have used a simple linear regression model, "it is important to understand that there could be other factors as well that may affect the fertility rate such as environment, lifestyle, fecundity, genetic factors, etc." (Aitken, (2022))

Data

The World Bank data given in the below table represents the total fertility rate (births per woman) and the literacy rate of adult females (% of females ages 15 and above) of the World over the past 20 years.

Variables

1. Fertility rate, total (births per woman)

"The total fertility rate indicates the average number of children a woman would have if she lived through her entire childbearing years and had children based on the fertility rates of a particular year, by age" (google chrome, n.d.).

2. Literacy rate, adult females (% of females ages 15 and above)

"The adult literacy rate is the proportion of individuals aged 15 and above who possess the ability to read and write and comprehend a straightforward statement regarding daily life" (google chrome, n.d.).

Data is given in the below table:

Year	Literacy Rate	Fertility Rate
2000	75.60108185	1.000063812
2001	76.03243256	0.986059038
2002	76.43810272	0.975953471
2003	77.0109787	0.966981413
2004	77.48210144	0.963695525
2005	77.3783493	0.956718225
2006	77.95818329	0.953666463
2007	78.28804779	0.953288442
2008	78.78829956	0.953027727
2009	79.20346069	0.947682205
2010	79.93067169	0.93787984
2011	80.29656982	0.929820164
2012	80.74411774	0.935948271
2013	80.97041321	0.921960972
2014	81.51850128	0.918915938
2015	81.78827667	0.907403636

2016	82.33257294	0.908703074
2017	82.66536713	0.899819223
2018	82.80374146	0.874343161
2019	83.24687958	0.858897326
2020	83.45913696	0.832487272

The chart below represents a consistent global literacy rate increase over time.
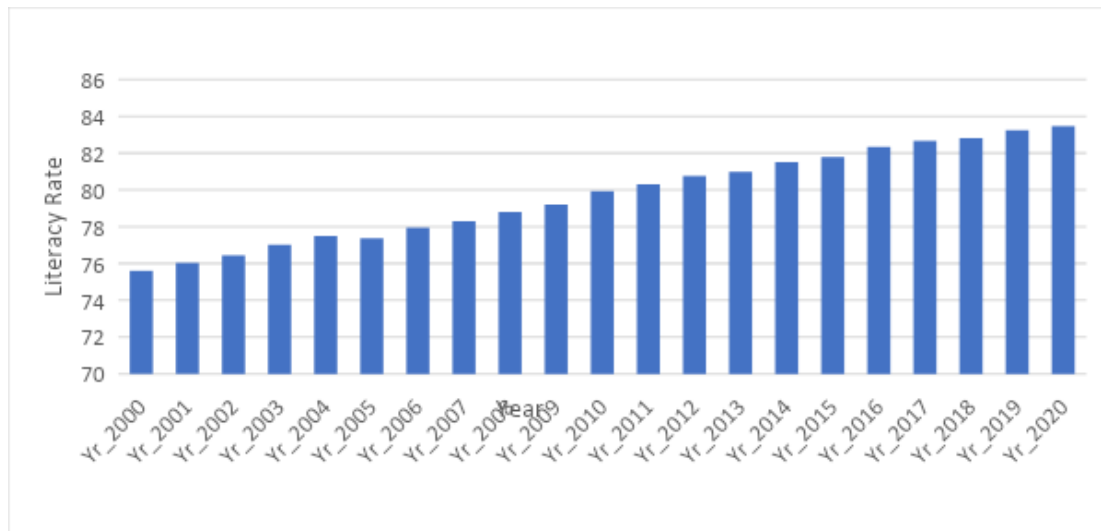
The below chart represents a decline in the world's fertility rate over time.
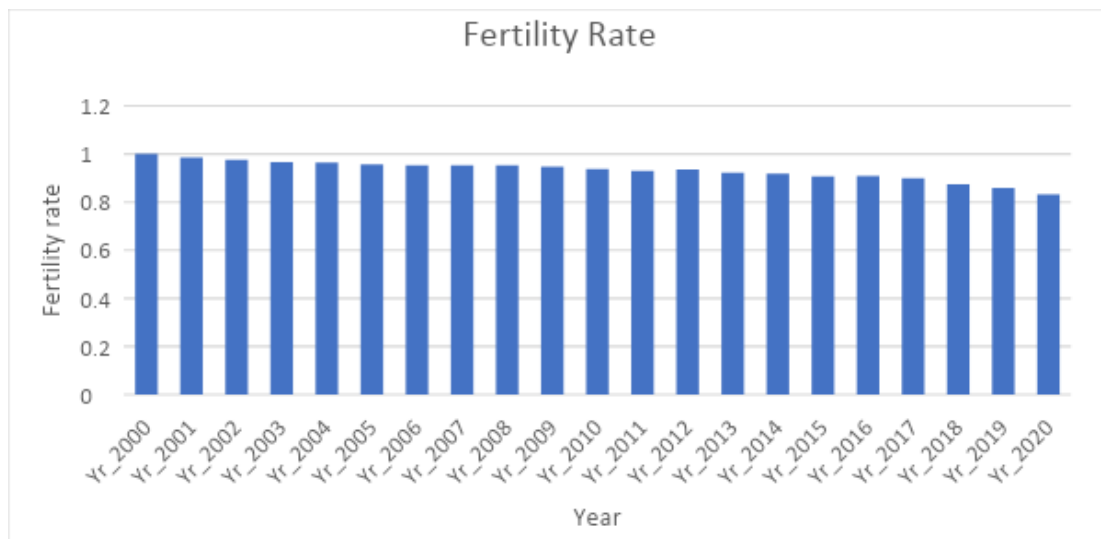
Methodology

"The research carried out is descriptive in nature, aimed at improving the understanding of the conducted analysis of a simple linear regression model with a regressor and a regressand" (Reddy, (2012)).

According to the information in the given tables, I have used a bivariate regression test to forecast the relationship between literacy and fertility in the world. After using econometric testing in a regression analysis, the hypothesis is considered to check the significance of the regression coefficient.

Null hypothesis (H0) = both have no relation

Alternative hypothesis (H1) = both have either a positive or negative relation

Results

Slope coefficient	t Stat	P-value	R Square
-0.015622564	-12.27216458	0.000000000177	0.887975677

As the p-value is less than 0.05 we can say that the coefficient is statistically significant so we will reject the null and accept the alternative hypothesis.

The negative sign of the slope coefficient describes that there is a negative relationship between the variables.

The R- square of this model is 88% which explains the variation in fertility rate i.e., explained by literacy rate.

Interpretation of the model:

When the world's literacy rate increases by 1%, the fertility rate decreases by 0.0156%.

Conclusion

The results of this econometric regression analysis clearly demonstrate that the literacy rate strongly affects fertility. These findings clearly support the well-established notion that "higher levels of literacy are associated with lower fertility rates" (Google chrome, n.d.). However, it is important to note that while literacy is a strong predictor of fertility, it is not the only factor that determines fertility patterns. Several other reasons may affect the fertility rate, such as family planning policies, lifestyle, economic, social, genetic, and environmental factors, etc. The high R-square value highlights the importance of the literacy rate in determining the fertility rate and emphasis the need for continued efforts to improve the education level, particularly in regions with high fertility rates for overall economic development.

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10

Economic-Legal Evaluation of Cryptocurrency in India

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Abstract

A cryptocurrency is a digital asset treated as a medium of exchange and classified as digital currency. The present research aims to evaluate the economic and legal implications of cryptocurrency in India. The research used the theoretical analysis in order to find the economic and legal implication of cryptocurrency by reviewing the literature. The study also briefly discusses the cryptocurrency bill 2021. The research found that cryptocurrency has various legal issues, such as contractual law issues, jurisdictional issues, fraud and privacy concerns, etc. The findings of the study reveal that cryptocurrencies are not legal in India, but exchange of cryptocurrency is legal. The government of India encouraged blockchain technology because once the unit of account of these transactions changes from rupees to any cryptocurrency, it would enable tax collection. The Indian Government knows the relevance of cryptocurrencies which forced them to regulate it.

Keywords: Cryptocurrency, RBI, Supreme Court, Blockchain, Digital currency.

Cryptocurrencies: A Brief Introduction

"Cryptocurrency" is the technique of an encryption to secure the network digitally. This is the form of currency which exists digitally and has no central issuing authority. Additionally, it records transaction in a decentralized manner and control the issuance of new units with cryptography which secure fraudulent transactions. Cryptocurrency is termed as a technology created and protected money by hiding the identities of its users (Houben, 2018). Crypto is derived from "cryptography" which is computer-based technology for hiding information, enriching security and many more. On the other hand, Currency denotes "money currently in use". Cryptocurrency is cash designed digitally with easy accessibility, and more reliable than Government Issue money. In general, cryptocurrency is a digital asset that is based distributed network across a large number of computers (Niranjanamurthy, 2019). Cryptocurrency made it possible to make the transactions without involvement of government to produce it and banks to store it. Cryptocurrency transactions can be recorded and verified simultaneously in a ledger and available to everyone in general. The availability of ledger makes transactions transparent

and efficient. The availability of ledger also in abled the role of banks as the recorded transactions can be seen public ally.

This causes a problem double payment and can be copied easily which is double-spending problem (Bohme et al., 2020). The problem can be managed by third party for maintaining a ledger of cryptocurrency for fees. Mostly the third party is an issuer of cryptocurrency for instance PayPal. The cryptocurrency such as Bitcoin is a step ahead and removes the involvement of third-party by relying on decentralized network of validators that maintain and update copies of the ledger with correct ownership of balances (Chiu and Koeppl, 2017). The cryptocurrency like bitcoin is based on a blockchain which follows the distributed verification and recording transactions.

In the light of this the present paper is divided into five sections as first section deals with the introduction and statement of problem, the second discusses the review of literature. The controversy of cryptocurrency in India is revealed in section three, the fourth section briefly explain the cryptocurrency bill 2021 and Fifth section concludes the research.

Review of Literature
Raymaekers (2015) revealed the first digital cryptocurrency was launched in the year 2009 which made the digital transactions easier. Shin and Rice (2016) analyzed that the blockchain based bitcoin has attracted large number of investors worldwide. Swan (2015) analyzed that the distributed data base of bitcoin made investments in cryptocurrency viable for investors all over the world. The economists viz. Cretarola and Figà-Talamanca (2017) developed the model of Bitcoin pricing through customer confidence. The literature also raised an issue of bitcoin that whether it should be considered as currency or stock and believed that bitcoin brings forth high market vitality. On the other hand, Low and Teo (2017) revealed that cryptocurrencies including bitcoin was considered as financial instrument but not adjustable in the existing financial market. Manta and Pop (2017) concluded that cryptocurrencies were based on decentralized system backed by legal enforcement. The high volatility of cryptocurrencies with divergent opinions on regulations posed the working of virtual currency difficult. Additionally, Ahluwalia et al. (2020) analyzed that the crowd funding made a shift in lending program of banking industry to crypto markets from traditional banking.

Controversies related to Cryptocurrency in India
RBI with issue of notification in 2018 restricted entities regulated by RBI in the context of virtual currencies or the services in virtual currencies. Later in March 2020 RBI struck relieved cryptocurrency trade in India with Supreme Court verdict.
The verdict is important for many reasons. Apart from lifting RBI's restrictions on crypto exchanges, and consequent enabling of operations of crypto exchanges, there is a fair number of other signals that may be read into or interpreted from this verdict.

The verdict includes the following:

The order recognizes the equality for all in the as prescribed in the constitution of India.

The verdict raised the question on RBI regulations on super ceding the and powers of citizens granted by the constitution of India. The verdict revealed "the case void in understanding was stifling fintech innovations and the SC verdict lifts that veil, albeit only by interpretation".

The verdict "removes the arbitrariness of regulatory actions even though it does not disgrace it at all. After lifting the ban over cryptocurrency in April 2020 Bit Buddy, a Bitcoin marketplace, recently announced its launch in India. Bit buddy will allow sellers and shoppers to sell and buy directly on its platform. Ashish Agarwal, CEO, Bit Buddy, in a statement said, "India has more than five million crypto users".

Cryptocurrency and various Legal issues

Legal issues related to contractual law: Cryptocurrencies and blockchain technology uses 'smart contracts,' and these contracts are self-generated contracts. According to the provisions of Indian Contract Act 1872, all the contracts must be offline contract. The essentials of contract need to be followed as per Section 10 of ICA 1872 (Patra, 1962). While Information Technology Act 2000 also consisted some of the provisions dealing with the E-Contract under Section 10A which is useful to understand as Cryptocurrency use the cyber world to functions. All the requirements of Indian Contract Act are mandatory regardless of Online or offline contracts. The issue of traditional laws is dealing with smart contract.

Jurisdictional Issues: To regulate the Cryptocurrency, Blockchain technology is used which provided the great security to currency. As this technology is hard to challenge because transaction when made then it passes from blocks to blocks and it is difficult to pinpoint that from which place the transaction is made and which path was being used to complete the whole task. So, the jurisdictional issues arise. Earlier an adequate law to deal with borderless crime was not available. Now, this currency poses great issue regarding the complex jurisdictional issues.

Fraud: Cryptocurrency is referred to as Digital Currency, and it is not issued by Appropriate Government or Central Bank. So, legal implications are still there. People want to invest a huge amount and expect a return but there are some bad actors who used the advanced technology and get the access of authorised person to commit a fraud. It has become the hot topic of discussion for various agencies, conferences, government enforcement attorneys that how it can be utilised to commit fraud and misappropriate the technology to earn money without much hassle. Initial Coin offering is for initial investment in cryptocurrency and mostly these are fabricated and intention was to fled away with ICO. Market manipulation, Ponzi Scam, Pump and Dump scheme are some of the examples of frauds.

Privacy Concerns: Privacy is the biggest concern with Cryptocurrencies. Although the technology used in currency is one of the safest technologies yet there are in number of cases where privacy was compromised.

Cryptocurrency and Regulation of Official Digital Currency Bill, 2021

The Indian Parliament introduced Cryptocurrency and Regulation of Official Digital Currency Bill, 2021 ("Crypto Bill"). The bill initiated a ban on all private cryptocurrencies and created a

legal digital currency framework for India with certain exceptions related to digital currency (Shukla et al., 2023).

Conclusion and Policy Recommendations

The status of cryptocurrencies is not codified as a Law in the Republic of India. The Supreme Court had relieved a ban from cryptocurrency. Cryptocurrencies are not legal in India but exchange of cryptocurrency is legal. On the next hand regulation of the government has made it difficult for them to operate. There has been prevailing shadow of concerns with respect to money laundering and a cloud of terror financing which has always dominated the discussions surrounding the unchecked flow of decentralized cryptocurrency transactions. The literature estimated 1.7 million users of cryptocurrency in India. With the increasing trend of online centralized transactions and easy availability of cryptocurrency, the Government of India has been sceptical of cryptocurrency and struggling to vacillate between wanting to regulate cryptocurrencies or to continue with imposition of ban. The government of India encouraged blockchain technology because once the unit of account of one of these transactions changes from rupees to any cryptocurrencies would enable tax collection.. The blockchain transactions would definitely reap revenue to the government in the form of cryptocurrency. Former Reserve Bank of India (RBI) Governor and eminent economist Raghuram Rajan says the cryptocurrency is nothing but a classic case of bubble. Moreover, literature revealed that cryptocurrencies also emerged as a cushion against the uncertainty raised by COVID-19.

The study provided comprehensive view on Digital currencies in India. This research helped to draw some relevant conclusions regarding why we need to use digital money and what are the problem faced by financial systems if they allow crypto-circulations due to its decentralized nature. The Indian Government knows the relevance of Cryptocurrencies which is the only reason they want to regulate it. It would be interesting to look upon other countries how they deal with it and what are the regulations and secure network they are opting while doing cryptocurrency transactions.

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11

An Enhanced Spatial Temporal Adaptation Model for Precise AQI Estimation

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Abstract

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The application and consistency of wireless sensor networks (WSNs) in acquiring the data for AQI (Air Quality Index) fundamentally depend on data redundancy. An inherited value of sensory data is spatial and temporal similarity. Reducing this spatio-temporal data redundancy can save significant node power and bandwidth. To reduce data redundancy, essentially every one of data collection method employs either temporal or spatial correlation. Through analogously based sub clustering, manipulation of spatial and temporal correlations among sensor data was performed on Spatial and temporal correlations using the Advance Multiple Data Prediction Interface (*SAMI*) and in our planned model there is a reduction in the spatial redundancy of sensor data. A single instance node can represent nodes that are carefully related by similarity-based sub-clustering. Using model-based prediction techniques can help reduce temporal redundancy and propagate only a subset of sensor data while predicting termination. This method provides a user-defined error threshold for data while significantly reducing power-consuming traffic. Being a distributed methodology, the planned work is in ascending order. This work resulted in a data reduction of up to 75% for the occasional collected system data kept within 0.6°C error.

Keywords: WSN, AQI, similarity-based clustering, data reduction, prediction

Introduction

With forays into chip integration, MEMS, and RF expertise, WSNs are being used in diverse applications, which include environmental monitoring. They rely on growing an extensive terminology data collection on the WSN to maintain the required level of accuracy. Each sensor node within the WSN acts like an identity-wrapped structure that facilitates sensing, computing, and communication. A restricted energy supply is the main limitation of sensor nodes. Wireless communication, which plays an important role in different aspects depending on the type of acquisition performed, is the most important energy-consuming function. Looking at it another way, computing was considered the least energy-consuming activity. Achieving long life while maintaining minimal power consumption is a key goal of excess data collection when using WSNs, and high resolution and high quality are required to enable meaningful analysis. The quantity of live sensor nodes and the amount of data sent by the sensor nodes determines the cost of distributed monitoring.

One method of collecting periodic data[1] is that the node first collects the environment to get the finest granularity of data. The data is then continuously transmitted for a period of no interest. This transmitted data helps enable highly complex data analysis. If the data is continuously collected and the WSN lifetime is also shortened, this process becomes expensive and sophisticated. If bandwidth is limited, introducing multiple nodes will result in uneven communication, excessive data collisions, traffic congestion, and reduced throughput. Redundant data accounts for a large portion of the total amount of data transferred.[2] Although not informative, redundancy consumes a certain amount of network resources. Advantageously, data transmission can be aggressively reduced to save power without sacrificing a significant reduction in observation reliability. This leads to the presence of spatio-temporal correlations in the sampled data. When sensor nodes are in close proximity to each other, their observations might have similarity, so the values of adjacent nodes can be easily predicted. There will be high spatial correlation among the sensors that are physically nearby. To classify similar nodes with the peak energy of CH formation, *Turan's* theorem was employed which is founded on extremal graph theory. By observing the resemblance in size

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[1] M. Li and Y. Liu, "*Underground Coal Mine Monitoring with Wireless Sensor Networks*," ACM Trans. Sensor Networks, vol. 5, no. 2, pp. 1-29, 2009

[2] D. Culler, D. Estrin, and M. Srivastava, "*Overview of sensor networks*," Computer, vol. 37, pp. 41–49, 2004.

and trend of the produced data, it is easy to predict that they are adjacent nodes, as they are also highly spatially correlated. Future results are simply predicted from previous data collected at the same node if consecutive data are more similar than the sampling frequency, at sensor nodes. Approximating signal trends from time correlations can help predict future data.

Planned work uses both inter and intra-sensor temporal and spatial correlations to reduce communication effort without compromising precision. Sensors within a cluster with analogous adherences are clustered into different subclusters. One of the subcluster's sample nodes is chosen to represent the entire subcluster. The Sample node uses LMS filters to accumulate a time correlation model based on previous data collection. The created model corresponds with other subcluster members and CHs. The sample node updates trend changes by updating the appropriate filter coefficients. When a user-defined tolerance value surpasses observed and predicted data, subcluster members begin transferring data. This system of ensuring the accuracy of custom nodes effectively reduces the communication cost of the regular reporting framework.

A prediction system value was performed on a synthetic data set with many correlations. In terms of energy, this system is more efficient. Highest accuracy is achieved with collected data. Improved balancing of node energies within subclusters without negotiating data accuracy. A temporal prediction approach for identifying subcluster heads implemented the idea of large subsets given by *Turan*.

Survey of Related Works

Energy efficient functionality is a crucial matter in any WSN strategy. Most WSN applications are dominated by limited energy as the bottleneck and are based on energy conservation, and much work has been done on energy conservation in WSNs. An important direction for energy conservation in WSNs was published in Anastasi *et al.*[3] discusses where turn-on intervals depend on mobility and data control and describes those methods. Redundant data can be reduced in a data-driven way. Reduce traffic volume, conserve bandwidth, and avoid data collisions to maintain node power.

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[3] Anastasi, G., Conti, M., Di Francesco, M., and Passarella, A. 2009. *Energy conservation in wireless sensor networks: A survey*. Ad Hoc Networks 7, 3 (May), 537–568.

By exploiting temporal correlations between consecutive data, temporally redundant data can be reduced in several ways.[4] From recent data history, reduce communication overhead by predicting future data. Applying linear regression methods,[5] some of the data prediction methods could take advantage of temporal correlations among sensory data, but the absence of adaptableness to dynamic fluctuations in the input signal also reduces accuracy. Predict future sensor data from previous data history using ARIMA-based methods.[6] ARIMA needs rich baseline data. This requires intensive computations and deprives the set of predictions when there are many turning points. Prediction was performed using PCA, which elaborated on the previous model characterization. In the planned model, we will employ the LMS algorithm for model-free prediction filters to take advantage of temporal correlation.[7] The predicted methodology's data dynamics are amply adaptable and easy to compute.

PRESTO[8] builds a model of higher-layer proxies that help you correlate the data observed by each lower-layer sensor. When remote sensors start comparing collected data to this predictive model and push data to detect unusual trends, the model's observations deviate from the predicted values. PRESTO only considers temporal correlation and ignores spatial correlation of nearby sensors. To sample data from different sources, various data acquisition methods have been predicted for modulation of the spatial properties of active sensors, and linear models are predicted by capturing spatial correlations. This model enables maximum sensor nodes to switch to sleep mode. A linear combination of datasets from functioning sensor nodes can be used to derive sensor node readings to a certain degree of accuracy. Conversely, in practice,

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[4] S. Chatterjea and P. Havinga, "*An Adaptive and Autonomous Sensor Sampling Frequency Control Scheme for Energy-Efficient Data Acquisition in Wireless Sensor Networks*," Proc. IEEE Fourth Int'l Conf. Distributed Computing in Sensor Systems (DCOSS '08), 2008

[5] Carlos.Carvalho, Danielo. G.Gomes, Nazim Agoulmine and José Neuman de Souza, "*Improving Prediction Accuracy for WSN Data Reduction by Applying Multivariate Spatio Temporal Correlation*," Sensors , vol. 11, pp. 10010–10037, Oct.2011.

[6] Li and Wang, "*Automatic ARIMA modeling-based data aggregation scheme in wireless sensor networks,*" EURASIP Journal on Wireless Communications and Networking,2013,2013:85.

[7] Santini S and Römer K, "*An adaptive strategy for quality-based data reduction in wireless sensor networks*," in Conf. networked sensing systems, 2006, pp. 29-36.

[8] Ming Li; Ganesan, D.; Shenoy, P. "*PRESTO: Feedback-Driven Data Management in Sensor Networks*", IEEE/ACM Transactions on Networking (Volume:17, Issue: 4), Aug. 2009, pp.1256 - 1269

many systems would not be linear. Additionally, the method by which ASAP[9] chooses the appropriate work node has not been explained.

Sub-clusters are created by selecting correlated sensor nodes, which then choose a subset of samplers to continuously collect data from within the sub-cluster. For predicting non-sampler datasets spatial correlation can be useful. Because ASAP uses a probabilistic model used only by ASAP to validate forced sampling periods, error bounds on forecast data are not guaranteed. Unusual trends among forced samples can go unnoticed if error prediction is not performed correctly. Sub-clusters for planned work can be built based on closely correlated sensor nodes. Spatial correlation is checked at each round of data collection. All the above methods mainly focus on temporal or spatial correlation.

Combined Dual Forecasting

System Architecture & General Overview

The SAMI architecture's basic functional representations and specifications are outlined, along with a brief explanation of the underlying mechanisms. To minimize data communication within the network, spatial and temporal correlations between sensor data in planned work are utilized. The process begins with the formation of subclusters, where the inference of spatial correlations between sensor data is performed, by grouping strongly correlated sensor data. A sub-cluster is represented by a single sampler node, which eliminates redundant data from neighbouring nodes. LMS filters estimate the temporal correlation of sensor data to predict future data. Because of the predictive data, a specific subset of the data is sent that differs from the desired data. This technique helps filter all spatially and temporally redundant data. The use of ensemble forecasting techniques enables the detection of abnormal trends in sampler nodes, and the propagation of these anomalies to sinks.

This projected system pursues a three-layer structure. The bottom layer has N nodes, randomly distributed across the array. Each node operates as a system that calculates the source of finite energy powering its communication modules. High-energy cluster heads associated with groups of spatially close nodes form node clusters, serving as a secondary layer. The nodes' data is aggregated by the CH and transmitted to the base station. The closely correlated nodes in these clusters are then further divided into subclusters, forming a third layer. Each subcluster

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[9] Gedik, B., Ling Liu, Yu, P.S., "*ASAP: An Adaptive Sampling Approach to Data Collection in Sensor Networks,*" IEEE Transactions on Parallel and Distributed Systems, (Volume:18, Issue: 12) Dec. 2007, pp- 1766 – 1783.

has a subcluster header (SCH) that represents it. SCH extrapolates the SCH-generated data to represent the entire subcluster. Figure 1 illustrates a three-tier design.
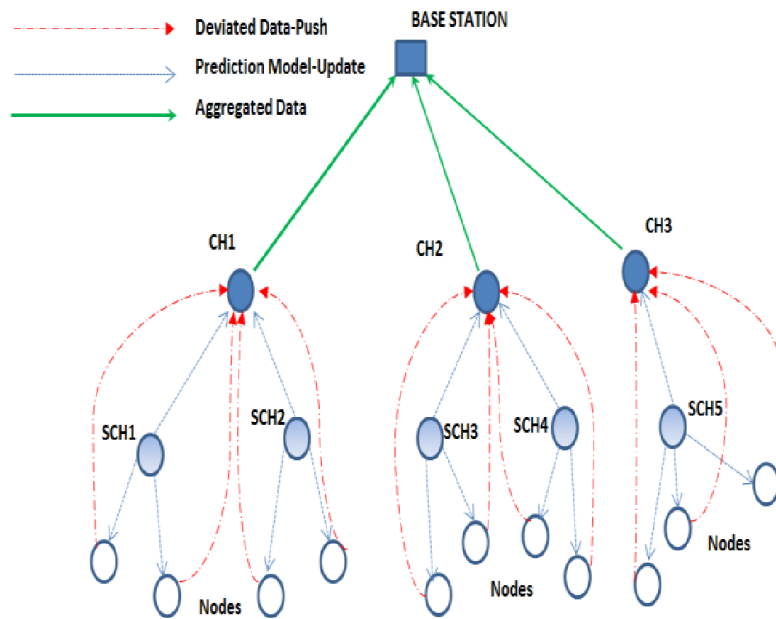
Figure 1 Three-Tier Design of SAMI

A work flow is presented in four segments. The weight-based passive clustering technique is utilized to designate energy nodes as CHs and create groups around them. The cluster head gathers information from its affiliates and sub-divides the cluster further depending on data resemblance. The node with the highest energy represents a sub-cluster head (SCH) and a temporal-correlation prototype is created by the sub-cluster head using LMS-based filters and past observations. This model facilitates future data prediction with custom error tolerance, and is shared by the members of the subclusters and the CH. When the deviance between the forecasted and observed data surpasses time error tolerance, a comparison of these two data sets is made in the fourth phase to update the model, triggered by each random sample. During each sample time, as the deviation of the error threshold grows, the subcluster members compare their forecasted data to their observations and combine the information. The CH predicts data based on the scheme, examines for updates from the Secondary Cluster Head (SCH), and adjusts by verifying inputs from its subcluster members. The maximum size and

spatial correlation configuration are governed by extreme value graph theory based on *Turan's* theorem, as proposed by Tolhuizen *et al.,* using the following properties:

$$ex(v, R) = \{t(E)|R \not\subset E, |S(E)| = v\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(a)$$

If updates are not received from the SCH, then the model is deemed accurate for that moment. The fit takes into account all the data from the subcluster. The subclusters censor transmission from the other members. If communication is detected, the corresponding data set for the equivalent subcluster is replaced.

Passive Clustering for Energy Efficiency

In most Wireless Sensor Networks (WSNs), scalability is accomplished by grouping nodes that are in close proximity and monitoring both route stability and bandwidth maintenance. The computational load is distributed among clusters of CH by making various complex inferences. To perform numerous computations on different data series, the network is divided into clusters of spatially close nodes, led by energy nodes. The CH election algorithm follows a deterministic approach that ensures a consistent distribution of CH. To maximize energy conservation, high-energy nodes are selected as Cluster Heads (CHs). A passive clustering method was developed to reduce power consumption during the clustering process, where the announcement delay is determined by the node's remaining power. As CH has multiple tasks, it experiences high energy depletion, so the selected CH must have ample residual energy. The proposed work uses residual energy as a weighting parameter for CH selection, as residual energy recovery is an internal task that does not require communication.

The process of selecting a CH in passive clustering is based on the principle that the first declaration wins, meaning that the first node to declare itself as CH will become CH. In previous work, the declaration could be delayed, which may result in a low-power node being chosen as CH, decreasing the energy efficiency of the system. When selecting the best node, the declaration lag is inversely related to the node's residual energy. At the end of the declaration lag, the node declares itself as the cluster head. However, if a node receives another declaration before its own declaration delay is over, it will not become the Cluster Head (CH). The latency, T_w, of node n can be calculated as follows:

$$T_w(n) = k/E_{res} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(b)$$

Here, the residual energy of node "n" is represented by E_{res}, and "k", a constant. When a node entertains several CH declaration requests from numerous nodes, it selects the node with the highest residual energy as the CH and forms a cluster with it.

Leveraging Spatial Correlation

By taking advantage of the spatial proximity of nodes, the WSN aims to reduce the amount of redundant and spatially similar data transmitted, thus conserving network power. When the WSN is organized into clusters, the Cluster Head (CH) gathers data from all nodes in the cluster, which is then aggregated and transmitted to the sinks. In this clustered approach, the CH filters out any data that is redundant based on spatial proximity, thereby reducing the amount of unnecessary data flow. Still, it may be more efficient to eliminate redundant data at the individual node level, rather than relying on the cluster head to filter it. In planned work, based on the sensor time series, different subclusters are assigned by the cluster leader according to data similarity. SCH nodes report data for each corresponding subcluster to CH each time. As a result, spatial data is inherently sifted if they are redundant.

The formation of subclusters takes place in three steps. First, nodes with high energy levels are identified as the subcluster head (SCH). Then, the nearest neighbouring nodes are determined. Finally, the SCH data row is compared with other neighbouring data rows. Size and trend similarity are compared. The subcluster leading the SCH will add nodes if the neighbours are similar in size and trend. Secondary energy nodes are identified considering other cluster members. During this process, replication runs until all cluster nodes have been added to the subcluster.

In three steps, the formation of subclusters is completed. The nodes with the most residual energy are identified as SCH and their nearest neighbours are then located. The SCH data row is then compared with other adjacent rows. Through SCH, the CH receives data from within each subcluster. Thus, the residual energy of other nodes should be lower than that of SCH. The cluster head estimates the residual energy of all cluster members and chooses the high-energy node as CH. To find nodes at a maximum threshold distance of D_{th}, CH is used to enumerate the nodes in the cluster. Nodes are considered spatially analogous if the distance between them $(D) < D_{th}$. The similarity between nearby nodes and SCH data is established by recording similarities in two stages. The first stage involves determining the similarity in magnitude and trend. Let x represent a time series for node x $(x_1, x_2,..., x_n)$; let y represent a time series for node y $(y_1, y_2,..., y_n)$. Using the Euclidean method the distance between the two

time series, expressed as *d(x,y)*, is used to indicate the size similarity between the two time series:

$$d(x,y) = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2} \quad \dots\dots\dots\dots\dots(3)$$

The Pearson's correlation coefficient can be employed to determine the existing linear correlation between the given time series, which is calculated using the following formula.:

$$r = \frac{\Sigma(x-\underline{x})(y-\underline{y})}{\sqrt{\Sigma(x-\underline{x})^2 \Sigma(y-\underline{y})^2}} \dots\dots\dots\dots\dots(4)$$

Here an α-like data series is shown for *T(x,y)* > 0.9 and *d(x,y)* < α. When both criteria are satisfied, node y will be included in the subcluster headed by node x, which is identified by CH. Subclusters are formed such that members within subcluster α are members of subcluster α. They are similar, with one representative per subcluster. All representative data have the same α, but since CH only communicates with representative data, the error bound for the remaining data can be approximated by α, reducing overall sensor power consumption.

Leveraging Temporal Correlation

Continuous similarity of nodes depends on their temporal correlation at a point in time. Over time, this temporal correlation is burdened by a significant amount of redundant data. Temporal correlations between data are evaluated within a defined precision to identify subsets of sensor readings and reduce energy consumption. Base stations avoid predicting data that has already been delivered to reduce communication. The analysis of sensor data would be performed in the temporal domain of digital filter, making it simpler to anticipate future values. LMS filters can be used to draw conclusions about the short-term linearity of a signal. Based on previous inferences, recent data history can be used to predict linear combinations of future data.

Prediction-based reporting can be used to reduce data within clustered data attack structures. Identical prediction filters are defined in sensor nodes and CH. If the deviation between the actual value detected by the sensor node and the predicted filtered value at a specific time *t* is below a certain threshold, no data will be transmitted. However, if the difference exceeds the threshold, the data will be sent to the CH. Thus, only a fraction of the data is broadcasted.

Forecast-based reportage is performed in three modes. At every sample time t, the sensor node sends data to the cluster head. The prediction engine promptly revises its coefficients to convergence depending on the deviations. This is referred to as the commencement mode. When the error limit for β exceeds the error limit for deviation, the predictions of M-continuous predictions converge, and the filter transitions to the detached mode, where the filter model connects to the cluster head. The Temporal Correlation based on *Turan's* theorem to overcome large subset problems:

$$C_b \leq \alpha \geq C_p$$

Span equivalence can be computed using *Turan's* graphs, as described by *Reibiger*[10]:

$$\frac{k-1}{2k}(2 \propto -1)p^2$$

At each sample time t, the actual found value in standalone mode is compared to the filter's predicted value. The filter model is deemed precise at time t if the deviation from the actual threshold is small. No data transfer takes place in this case. On the other hand, the CH model is widely accepted, and predictors can be computed and viewed as a time approximation of the actual observations. No communication between sensor nodes and CH is required if the observations of the model are predicted accurately. Standard mode is switched to once the error surpasses β. And transfers data to CH in normal mode. The prediction filter weights are adjusted to converge the predictions to the desired value. The filter model receives CH updates and returns to standalone mode when the predictions converge.

Leveraging Spatio-Temporal Correlation

In a traditional prediction-based reporting method, the CH receives data from all CH members using independent prediction filters. A closely spaced and highly correlated data source is characterized by a subcluster of this proposed work and a single SCH node. Thus, the prediction filter's predicted sub-cluster nodes are deemed adequate for the whole sub-cluster. Here sub-cluster head and cluster head comparisons are analysed by prediction-based reports using common models. Due to the close correlation between neighbouring representative nodes, the

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data produced by the representative nodes are similar in size and trend to the entire subcluster. A collection of representatives characterizes the data fit across subclusters, whose error bounds fall within α. Non-sampler nodes have no error assurance. We predicted an innovative population double-prediction methodology that aids to detect spatial anomalies during data acquisition and corrects them using a model-driven push scheme. For subclusters, predictive models are built by each node based on observed data. Past observations use correlations to predict expected values seen at subsequent times t. The model and its parameters are received by the CH and other subcluster members.

At each sample time t, the values projected by the model are assessed against the actual measured values. If the threshold is exceeded by the difference between the actual collected data and the model projected value, then the model is said to be α-like for that current period. In this case, none of the subcluster members send data. Since CH knows the model, it can predict the value and use it as an alpha approximation of the actual observed value for a given sensor node. If model predictions and observations are similar, no communication between subcluster members and CH is required. Conversely, when the variance between the model projected data and the collected data exceeds the set limit, then the collected value is transmitted to the cluster head. In this way, by detecting trend deviations, sub-cluster members only send data when there is a deviation in the values of the common model's predicted values. The proposed system lowers communication operating cost by having only one sub-cluster head per sub-cluster and eliminates the possibility of missing deviant patterns in the other nodes' data. The system uses VSS-nLMS-based prediction filters to build the forecasting model; it offers high accuracy and it's computationally efficient. The model's parameters are continuously updated to reflect the current trend, even when trends change. The integration of feedback among CHs, representatives, and other sub-cluster members enhances data reliability and conserves energy.

Conclusion

In summary, WSNs can be utilized in AQI monitoring by providing real-time data transmission, energy efficiency, scalability, and cost-effectiveness. The use of WSNs can improve the accuracy and reliability of AQI data and provide valuable insights into air quality patterns in a given area.

The SAMI system is designed to reduce data variations and improve the accuracy of the collected data through two stages of reduction. It was evaluated based on data reduction and the mean absolute deviation of the data. This leads to a reduction in both spatially and

temporally redundant data, with a data reduction that is many times better than previous systems. SAMI ensures user-specified error thresholds in both spatial and temporal dimensions and provides better system performance and fault tolerance. The system is scalable, and the impact of various parameters was analysed. A mean absolute deviation of 0.07°C resulted in a 75% reduction in data transfer. Future work will concentrate on tuning the spatial and temporal error thresholds in response to changes in data and spatial variability.

12

A New Era of D2c Marketing: Influencer Marketing

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Abstract

Gone are those days when traditional marketing used to fascinate people of all age groups. Now with transformation of technology and mobile dependency, people are well equipped with great internet through mobile phones, tabs, and laptops. Even businesses whether small/ medium/large have realized the key to survive in this digital friendly world environment is through social media. It is crucial for all types of businesses to accept the online market and work for their brands' growth accordingly by creating awareness about their product and services through more interactive channel of media i.e. Influencer Marketing. Purpose: To examine the literature related to influencer marketing and different ways associated with Social Media Marketing on businesses. Further primary study has been conducted to study the detailed information about influencer marketing. The research is exploratory and descriptive in nature where a number of research papers, articles, magazines, newspaper editorials; books etc. have been reviewed in order to understand how influencer marketing works. The research paper has also studied different case studies of brands that got successful though influencer marketing on different social media platforms. Research Methodology: the data has been collected through structured questionnaires from respondents of Jaipur city. SPSS tools and techniques have been used to analyze the data.

Keywords: Influencer Marketing, Digital Marketing, Word of Mouth Marketing, Facebook Influencers

Introduction

Influencer Marketing is the preferred type of marketing accepted widely by the online users through all age groups. It is a type of marketing that uses influencers from social media to foster a brand to a larger market and help brands reach to its target audiences by getting recognition. Influencers are basically users on social media platforms who create a self concept for endorsing a particular product or service or an idea. Influencers are most popular on Instagram followed by YouTube and Facebook. They work on storytelling approach to make connections rather than the age old scripted Ad approach. They connect with people though various modes on social media like IGTV'S, reviews, live sessions, reels, pictures, and posts. This Word of Mouth marketing strategy of connecting with more than 200 million general users of India is the most creative and eye catching form of digital marketing. By being the most loved influencer on internet, they gain popularity by gaining the followers. The more people love the content created by influencer, the more they follow them. There are various agencies that help businesses connect with its best matched required influencer according to the need of the brand. Some agencies to name are Ainfluencer, Plixxo, OPA, Influencer.in, Pulpkey, Winkl.

There are five types of influencers on Instagram (Information Marketing Hub):

1. Nano influencers: They are genuine and have good engagement rates with their followers. They have 1000-10,000 followers and are budget friendly to small and medium scale businesses to promote their products.

2. Micro Influencers: These types of influencers have great number of followers and are specialized in their particular field of marketing and with their follower engagement too. They have 10k-100k followers.

3.　　Macro Influencers: These types of influencers are more professional and drive 5% to 20% engagement per post, they can help a brand reach a greater audience and boost brand recognition. They are termed as Social Media Stars who have gained popularity through their hard work and became popular by being the best bloggers in their specialized area. They have 100k-1M followers.

4.　　Mega Influencers: these are basically celebrity influencers, politicians, Sportsmen, famous artists. The brands having big budget can surely connect with them. They have more than 1million followers. They are already successful brand names in their own self and have highest reach among followers due to their fan following.

"Blessed is the influence of one true, loving human soul on another." ~ George Eliot

This phrase rightly describes how a true influencer can impact millions of people worldwide. According to Influencing Socially article (TOI March 2022) ,a research has proven that women are little more active and alert on social media platforms than men. Social media has opened many doors with not just connecting with family or friends but also gathering knowledge, reaching to a greater audience and influencing people through different parts of the world. In the beginning of digitalization, YouTube was the only platform where one could watch or listen to music, movies, trailers, documentaries, biographies etc., but now it is a way of creating content through videos. Micro influencers are leading out of all the other influencers by making relevance with the user's thoughts (Chopra A et al. 2020). People all around the world have also left their full-time jobs and became full time You Tubers/Instagram/Facebook content creators by sharing their particular real life experiences and knowledge.

Leading social media platforms for influencer marketing across India in 2021
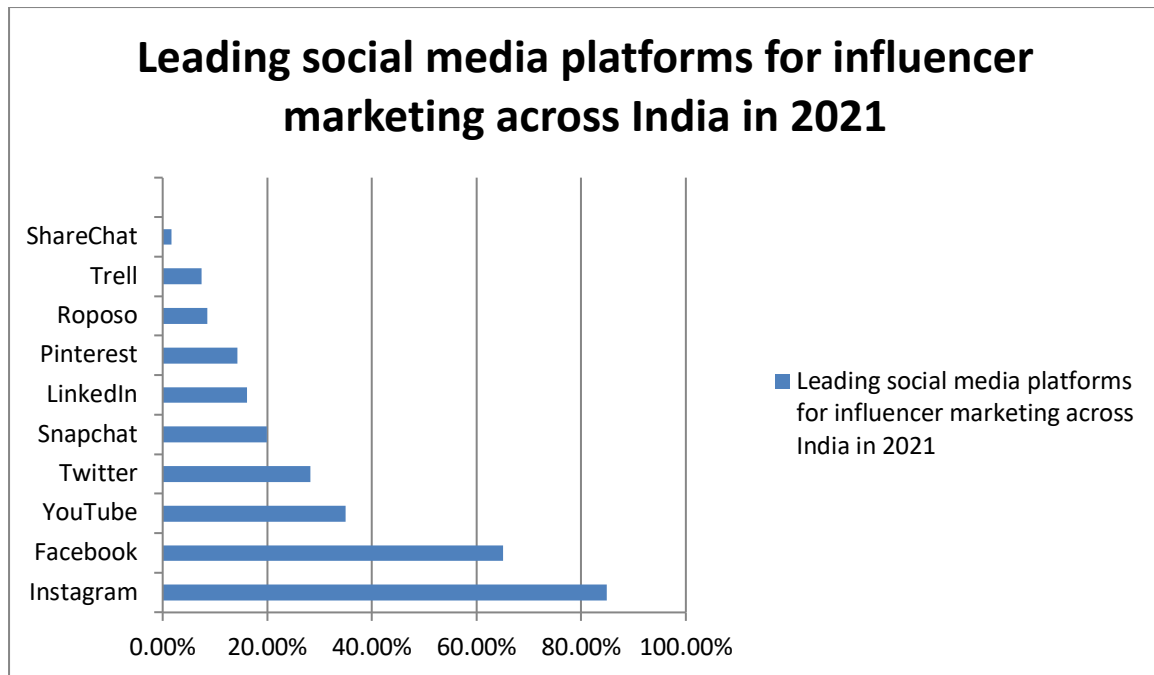
(Source: Statista.com)

This statistic clearly shows how Instagram is ruling the platform among for marketing product and services followed by Facebook and YouTube. It can be noted that with the growth in digitalization, businesses have an easy way of understanding and engaging with the online customer group. Instagram provides more opportunities for male as well as female influencers which help to increase the businesses ROI(return on investment), sales, brand recall, brand recognition and many more. Facebook has the second highest vote for influencer marketing, it allows businesses to sell products in bulk, sell and resell options are available too. Shopping and payments made easy through these social media platforms. YouTube gave rise to n number of small entrepreneurs who wanted to be bloggers and worked for themselves. Recipes, unboxing products, travel tips, learning /education, car reviews, beauty /fashion tips etc. were some of the leading areas where bloggers worked. Long lost recipes could even be found on YouTube, people made videos on everything and anything by sharing their knowledge.

D2C Marketing: D2C Marketing is the new hub where there are no middlemen in the process of making and selling of products. It's a business to consumer marketing wherein a seller collaborated with an influencer' in order to sell its products to the users; it directly connects users with the company website where a person can purchase products through them. Consumer Engagement plays an important parameter towards getting maximum views on the posts on social media platform (Leung F et al2022). It's a boost for small or medium scale enterprises to sell through D2C marketing by deducting the hustle of selling through middlemen. Influencer marketing helps D2C marketing by building its brand. Businesses should study various factors before indulging in D2c marketing:

1. Choosing the right social media platforms

2. Deciding the budget

3. Analysing various influencers and reaching out to the best suitable

4. Choosing the right influencer campaigns

"A trusted referral is the holy grail of advertising "~ Mark Zuckerberg

Literature Review:

Qutteina Y et al(2021) explained social media has positive association of online food exposure with eating behaviours, attitude and perception, food health choices among adolescents in Flanders, Belgium. Food marketing on various social media platforms like Facebook, YouTube, and Instagram induces and persuades unhealthy eating habits among adolescents due to their perceived notions. This study also revealed that adolescent consumption behavior pattern is clearly affected by the credence of what others eat through social media. Social media has the power to persuade others by showcasing the glamorous lifestyle of other users/celebrities.

Bend D et al (2022) research was done to collect expertise reviews on adolescent dietary habits of food products through social media. There is a positive relationship between SMFM (social media food marketing) and adolescents eating habits. Due to this there is more healthy food marketing rather than junk food marketing. Adolescents at that age are connected emotionally and elicit high positive emotions and wants towards particular brands/products and thus increase in consumption. This age group is highly active on social media and with lack of knowledge; they get highly motivated by other influential factors through online users. This even leads to obesity and non-communicable diseases which affects in the overall psychological and physiological problems in a child's life. The adolescents of this age might think that they are tech savvy but they lack the cognitive skills required to differentiate between a true influencer and a money making influencer. Thus, they lack the experience required to judge a particular life situation and, in the end, taking wrong paths by getting persuaded by others.

F Acikgoz, S Burnaz (2021) research was conducted in order to get a clear understanding of attitude of influencer marketing through various influencers on YouTube. Sponsored content of influencers was the most influential way of you tubers after getting successful in their particular field. The three most important factors associated with sponsored content were entertainment, in formativeness and advertising celebrities. The research laid emphasis on investing a business's money in sponsored content on you tube as it brings a positive attitude among You Tubers for making collaborations. Businesses can use video on their marketing strategy to gain popularity and attention. AVM (advertising value model) is studied in this paper for understanding the actual worth of advertising on users on online platforms.

 Khan M et al(2021) explains how various Influencer marketing strategies affects the purchase behaviour of consumers through pilot study of 20 respondents questionnaire. It even discussed the positive as well as negative effect of influencers on buying behaviour.

Thakker S,Pabalkar V (2021) have stated in their research that influencer marketing gives maximum returns on investment getting 11 times more returns than investment. The buying behaviour of baby boomers and millennial through influencer marketing is collected through questionnaire survey. The influencers have strong bond with their followers who follow them on social media platforms which in return increase the chances of buying more through social media.

According to this research DK Thilina 2021 has used two theories namely theory of reasoned action and Information of Adoption Model Consumer Behaviour. The study observed a correlation between social media influencer's credibility and purchase behaviour. The research was subjected to Columbia district which can vary if the area of the population changes.

"The best marketers are always creating relationships with Customers, brands, and other marketers" ~ Kurt Uhlir

A success story of SUGAR Cosmetics has greatly emphasized on influencers of Instagram and YouTube in its beginning days of launch. It created Social media as its first priority marketing campaigns has a net worth of $8 million at present. During the years when big cosmetic brands like Lakme', L'Oreal and Mac were the king in the Indian luxury cosmetic brand market, SUGAR came up with the idea proving cosmetic at affordable and budget friendly prices. The company also aims at working on making products which will be suitable most on Indian skin. Social media marketing strategies and e commerce were beneficial in increasing sales of SUGAR. Though Covid took an ugly turn in the survival of Sugar but it soon came up with more ideas of engaging itself on the social media platforms. The CEO of SUGAR cosmetics (Vineeta Singh) and is also among the top 100 influential women in the world. The company even has 75% of the staff as women.

A case study on Zomato (Prismetric) showcased the encouraging posts on Social media memes created by them which got successful over the years. Food bloggers and micro influencers are gaining popularity in this field as people love the kind of geniuses they show while making a video for a particular food/restaurant. They share live experiences which builds trust among followers for trying or not that food. Food is something which loves word of mouth marketing because people get influenced the most when they particular believe and trust an influencer for their reviews.

Tata power's marketing strategy (SocialSamosa) is a well-known example of how you got to engage with users on social media. It used platforms like TikTok, Facebook, and Instagram for creating a marketing buzz for its various power products which were not only smart but also green and sustainable solutions for the global economy." I have the power "was the powerful campaign used in contests, hash tags, quizzes, reels by influencers to choose sustainable products by Tata and save the economy globally.

Objectives of the Study:

- To understand the role of influencer marketing as a new way of D2C marketing.
- To identify the perception of customers towards influencers of Facebook.
- To identify the purchase intentions affected by influencers of Facebook.

Hypothesis of the study:

Ho_1: There is no significant difference in perception of customers towards Facebook Influencers on the basis of gender.

Ha_1: There is a significant difference in perception of customers towards Facebook Influencers on the basis of gender.

Ho_2: There is no significant difference in purchase intention through Facebook Influencers.

Ha_2: There is a significant difference in purchase intention through Facebook Influencers.

Research Methodology:

The research conducted is descriptive and exploratory in nature. Primary data has been collected through a structured questionnaire from a sample of 104 respondents belonging to the age group 18years-29years residing in Jaipur city. Data is collected from various secondary sources like research papers, articles, magazines, newspaper's editorial, case studies and books. Sampling technique used in this study is convenience sampling method. The sample collection was done on Facebook users as Facebook came into existence in 2004 and is still the second most popular preferred social media application. SPSS tools and techniques have been used to analyze the data for evaluating our findings of primary data. There are 35% males and 69% female respondents out of 104 respondents.

Result and Analysis:

Cronbach's alpha has been used to measure the internal consistency of the variables. The analysis of the reliability of data proved satisfactory and Cronbach alpha values achieved between 0.62-0.81 across all variables. The first objective is to identify the perception of customers towards Facebook Influencers and to attain this objective the respondents were asked to answer on three parameters i.e Physically Attractive (Farraj O et al 2021), Informative and Trending (Kadam N et al 2021). Independent Sample T test has been conducted to analyse the data as shown in Table 1. Out of the three parameters we can conclude that perception in association with physically attractiveness of Facebook Influencer, the null hypothesis is rejected. The Levene's test for equal variances, tests the homogeneity assumption shows the significance value < 0.05 and the p is $.043 < 0.05$, so null hypothesis is rejected and we can conclude that there is a significant difference in male and female perception with context to

Facebook influencers found physically attractive. The level of significance for the rest two

parameters is greater than .05 hence, we fail to reject the null hypotheses.

Table 1: Independent samples T-Test output for perception towards Influencers of Facebook

among male and female respondents

Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Physically Attractive	Equal variances assumed	4.180	.043	2.069	102	.041	.55238	.26702	.02275	1.08201
	Equal variances not assumed			2.153	76.28	.034	.55238	.25654	.04147	1.06329
Informative	Equal variances assumed	.879	.351	.170	102	.865	.04389	.25796	-.46777	.55555

		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
	Equal variances not assumed			.165	63.27	.869	.04389	.26567	-.48695	.57474
Trending	Equal variances assumed	3.101	.081	.774	102	.441	.21077	.27220	-.32915	.75068
	Equal variances not assumed			.732	58.97	.467	.21077	.28808	-.36569	.78723

(Source: Primary data analysis through Spss)

Table 2: Independent samples T-Test output for Facebook Influencers affecting intention to purchase products

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Affects intention to purchase	Equal variances assumed	.112	.738	1.385	102	.169	.40414	.29185	-.17477	.98302
	Equal variances not assumed			1.404	71.047	.165	.40414	.28784	-.16979	.97807

(Source: Primary data analysis through SPSS)

The second objective which is Facebook Influencers affecting the purchase intentions is tested by checking statistically with independent sample t test. The Levene's test for equal variance, tests the homogeneity assumption shows the significance value >0.05. Hence, we failed to reject the null hypothesis, and we can conclude that there is no significant difference in the purchase intention through Facebook Influencers on the basis of male and female.

Conclusion: Influencer marketing in a digital world has become an effective way of direct to consumer marketing in which online users get an access to variety of options like customer participation, expressing interest, giving feedback. Though our research proves no significant association of male and female respondents towards purchases made through influencers of Facebook but the growing market of influencers allows more research on how businesses can benefit from them and get higher return on investments. As influencer marketing targets all age groups, but future research can be conducted on middle age group as this age group spends most of their time on social media platforms and have the power to persuade each other through it. This research also allows future research to be conducted on the challenges faced by influencers on social media platforms because no matter how beautiful content influencers

create, even they share thorns in the making. In this global world, influencers put their private lives in public which puts a threat to their living in long run. Overall this research paper proves that influencer marketing can be a new and effective tool for every business by having a positive impact on affecting the intention to make purchases through them.

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13

Exploring Technology Perception and Readiness for a Blockchain-Based Climate Change Solution: A Survey Study

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Abstract

Blockchain and cryptocurrencies are providing promising solutions in the information sector, and new projects that synchronize numerous activities with cryptocurrencies are becoming more and more popular. Numerous sustainable programmes and digital currencies are developing promising solutions to the current climate change challenge. The authors of this research are looking into one such programme where users engage in carbon footprint reduction activities and are rewarded with cryptocurrency following a thorough verification and calculation of reward points. Thus, a survey was undertaken, and responses were gathered from people of various nationalities who took part and provided their insightful thoughts on the current situation, stressing expectations and expertise. A prepared questionnaire with about 39 items on it was filled out by about 176 anonymous respondents from various countries. The replies were gathered and evaluated to uncover insightful information about reducing carbon footprints. In Part 2 of the survey i.e. this paper, the other questions were looked at and new viewpoints are presented.

Keywords: Cryptocurrency, Blockchain, Survey, Climate Change, Carbon footprint reduction.

Introduction

The use of blockchain technology has the potential to significantly contribute to the fight against climate change. The decentralised structure of blockchain makes it perfect for recording and validating carbon credits and other climate mitigation activities since it allows for safe, transparent, and tamper-proof record keeping of data. Blockchain, for instance, may be used to construct a carbon credit ledger that would offer an immutable record of emissions reductions and allow trade of those credits. By creating a market for emissions reductions, this would encourage businesses and people to lessen their carbon impact. Blockchain can potentially be used to improve the

effectiveness of systems for producing and distributing renewable energy. For instance, families and companies may purchase and sell excess renewable energy using blockchain-based energy trading platforms, making it simpler for anyone to take part in the switch to a low- carbon energy system. Additionally, as excess energy might be sold to third parties, less energy would be lost to waste, leading to a more effective use of renewable energy sources [1][2].

Blockchain technology may also be useful in the supply chain management of goods with large carbon footprints. An immutable record of a product's whole lifespan, including its creation, transit, and disposal at the end of its useful life, may be made using blockchain technology. As a result, it would be simpler to detect and lessen the carbon footprint of products and there would be more openness and responsibility. Blockchain may also be used to create and operate carbon offset programmes, allowing people and businesses to balance their carbon footprints by supporting initiatives that lower or eliminate greenhouse gas emissions in other parts of the world [3].

Despite the fact that blockchain technology is still in its infancy, there are a lot of potential advantages for combating climate change. Its potential to boost the effectiveness of renewable energy generating and distribution networks, together with its capacity to provide safe, open, and tamper-proof record keeping of data, make it a crucial instrument for reducing climate change. It is crucial to remember that the widespread acceptance and successful application of blockchain will determine its effectiveness in combating climate change.

Blockchain & climate change

Blockchain technology can help reduce carbon footprint in several ways: Supply chain transparency: By providing a secure and transparent record of a product's journey from source to consumer, blockchain can help reduce carbon emissions by identifying inefficiencies and reducing waste in supply chains [4].
Carbon credits tracking: Blockchain can be used to track and verify carbon credits, making it easier for organizations to offset their carbon emissions and participate in carbon markets [5].
Renewable energy generation and trading: Blockchain-based platforms can facilitate peer- to-peer energy trading, allowing individuals and organizations to trade renewable energy generated from solar, wind, and other sources [6].
Decentralized carbon footprint tracking: Blockchain can help individuals and organizations track and reduce their carbon footprint by providing a decentralized and secure record of their energy consumption and emissions [7].
Climate finance: Blockchain-based platforms can provide new and innovative ways to finance and invest in renewable energy and low-carbon projects, enabling the transition to a more sustainable energy system [8].
Green certifications: Blockchain can be used to securely verify and track green certifications, such as eco-friendly products, helping organizations and consumers make more informed choices [9].

Also, blockchain is the underlying technology that enables the creation and operation of cryptocurrencies, and cryptocurrencies are one of the many applications of blockchain technology. Cryptocurrencies can also play a role in reducing carbon footprint:

Energy-efficient consensus algorithms: Some cryptocurrencies, like Proof-of-Stake, use far less energy than Proof-of-Work algorithms, reducing the energy consumption of the cryptocurrency network [10].

Decentralized finance (DeFi) solutions: DeFi solutions built on blockchain platforms can allow individuals and organizations to finance and invest in renewable energy projects, helping to scale and accelerate the transition to clean energy. [11]

Additionally, there are several initiatives that incentivize users for reducing their carbon footprint using cryptocurrencies:

Carbon offset protocols: Carbon offset protocols allow individuals to offset their carbon emissions by funding renewable energy projects. These protocols reward users with cryptocurrency for their efforts to reduce their carbon footprint [12].

Energy-efficient blockchain networks: Some blockchain networks, such as Solana and Algorand, reward users who contribute to the network's energy efficiency by reducing the energy consumption required for consensus and other network functions [13].

DeFi carbon credit platforms: DeFi platforms like Ocean Protocol allow individuals to trade carbon credits, incentivizing carbon reduction through market forces [14].

Carbon-neutral cryptocurrencies: Cryptocurrencies, such as Chiliz and Carbon, are specifically designed to incentivize users to reduce their carbon footprint. These cryptocurrencies reward users for reducing their carbon emissions, and use the revenue generated to finance renewable energy projects. [15]

These are just a few examples of the various cryptocurrencies that deal with climate change and incentivize users to reduce their carbon footprint.

Carbon (CUSD): Carbon is a stablecoin that incentivizes carbon reduction by rewarding users for reducing their carbon emissions and funding renewable energy projects [16].

Ocean Protocol (OCEAN): Ocean Protocol is a decentralized platform that enables individuals and organizations to trade and monetize data, including carbon credits and other environmental data. [17]

Energy Web Token (EWT): Energy Web Token is a cryptocurrency that powers the Energy Web Chain, a blockchain-based platform designed for the energy sector. It incentivizes the transition to clean energy by enabling energy producers and consumers to trade renewable energy and carbon credits [18].

SolarCoin (SLR): A cryptocurrency that rewards individuals and organizations for generating solar energy, encouraging the adoption of renewable energy sources [19].

Crypto Trees: A cryptocurrency that aims to reduce carbon emissions by planting trees and promoting reforestation projects [20].

Restart Energy MWAT (MWAT): A cryptocurrency that aims to promote energy efficiency and the use of renewable energy sources, reducing carbon emissions [21].

These are just a few examples of cryptocurrencies that deal with climate change and incentivize users to reduce their carbon footprint.

Resulting Survey

The original survey study comprised of 39 questions and individual's anonymous responses to each one of them were collected. In Part 2 of the survey i.e. this paper, the questions that were looked at are presented and new viewpoints are discussed. The authors aimed to gain insight into the attitudes and behaviours of individuals towards blockchain, cryptocurrencies and climate change. This paper specifically deals with survey questions related to demographics, perception & readiness for technology adaptation, and individual & mass attitude towards climate change.

Q1. How concerned are you about climate change on a scale of 10. (1 Means - Not concerned, 10 Means - Highly concerned)

In this question we asked the respondents to choose from a rating scale (starting from '1' – 'Not Concerned' to '10' – 'Highly Concerned') to rate their concern about the issue of Climate Change, this question was placed to enquire into the concern levels of the respondents regarding the ongoing buzz about climate change.

Obtained inputs:

Notably out of total 176 responses 31.3% i.e. 55 respondents chose rating '10' – 'Highly Concerned' and a total of 2.8% i.e. 5 respondents chose option '1' – 'Not Concerned'. 22.7% i.e. 40 nos. of respondents chose a rating '8'.
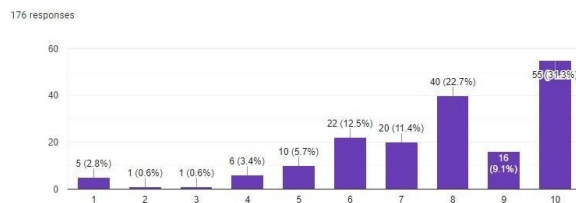
Discussion:

It is evident from the graph of results of this question that a majority of respondents showed greater concern towards the subject of Climate Change and majority of the individuals chose options from '6' to '10', comprising a total of 87% of responses i.e. 153 nos. laid in this range. This clearly shows that a majority of respondents are concerned about climate change. Only a minor 2.8% i.e.

5 respondents showed no concern about climate change, and the low concern range from '2' – '5' contained only 10.3%

i.e. 18 nos. of respondents. So, it is evident that huge majority of respondents which were from different part of globe highlighted that there is a mass awakening going on regarding the matter of climate change and people are getting more aware about it as a matter of fact.

Inference:

The issue of climate change is nowadays the most frequently discussed topic across all segments of society. As it is evident from the results of this question that the awareness about climate change is increasing and people are actually concerned to a greater degree about it. Climate change is real and happening, and now life is has remained untouched by it. At almost all segments of age groups and intellectual levels climate change has impressed its mark. There is however now a need for an efficient technological framework that could take to the masses the individual responsibility to counter it and creates a change from the grassroots. An individual centric mechanism that could counter the effects of climate change, obviously from an individual level, is the need of the time and the basic theme of this research.
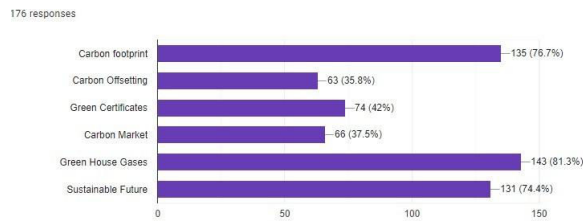
Q2. Which of the following terms are you aware about?

In this question we asked the respondents to mark more than one choice of the topics they were aware and informed about from available options that were, (1) Carbon Footprint (2) Carbon Offsetting (3) Green Certificates (4) Carbon Market (5) Green House Gases (6) Sustainable Future.

Obtained inputs:

Interestingly out of total 176 responses 81.3% i.e. 143 respondents were aware about 'Green House Gases', also a total of 76.7% i.e. 135 respondents were also aware about 'Carbon Footprint', 131 respondents were aware about 'Sustainable Future' that makes it 74.4%. However, 'Carbon Market' was known to only 37.5% of respondents

i.e. 66 nos. 'Green Certificate' was known to 42% of the respondents i.e. 74 respondents and at last the least number of participants were aware of 'Carbon Offsetting' amounting to 35.8% i.e. 63 nos.

176 responses

Carbon footprint	135 (76.7%)
Carbon Offsetting	63 (35.8%)
Green Certificates	74 (42%)
Carbon Market	66 (37.5%)
Green House Gases	143 (81.3%)
Sustainable Future	131 (74.4%)

Discussion:

From the results of this survey question it is visible that large majority of individuals are aware about the 'Green House Gases' (81.3%) and 'Carbon Footprint' (76.7%), this indicates that people do have working knowledge about these thematic areas. Also, the term 'Sustainable Future' is the third highly aware term after these two and a total of 74.4% of the respondents were aware about it. However, the terms 'Carbon Offsetting', 'Green Certificates', 'Carbon Market' were not as widely known. It is due to the fact that these represent technicality in terms of carbon credit exchange and a global framework for carbon offsetting, and it is evident that not many must be aware about them unless they have actively participated in one or other way with them. But still of all the participants around

35 – 42 % of all respondents were aware of these technicality in the present Carbon Offsetting market which is also a fairly large number. The survey question was designed to understand the level of awareness and knowledge of the respondents about various climate-related topics. This information can be used to create targeted educational and awareness programs for the public on topics related to climate change and its mitigation. The results also suggest that more efforts are needed to educate people on carbon markets, green certificates, and carbon offsetting. The reason for the choices made by the respondents in this survey question could be influenced by various factors, such as their level of education, personal or professional interests, media exposure, and awareness campaigns, amongst others. For the topic of "Green House Gases" being chosen by 81.3% of the respondents, it could be due to its widely recognized impact on the environment and climate change, and the increasing efforts to reduce its emission. For "Carbon Footprint," being selected by 76.7% of the respondents, it could be because of the growing awareness about personal carbon footprint and the role individuals play in reducing their carbon footprint to help mitigate the effects of climate change.

"Sustainable Future" being chosen by 74.4% of the respondents could be because of the increasing focus on sustainability and the need for future-proofing the planet for the generations to come. The lesser awareness of "Carbon Market," "Green Certificates," and "Carbon Offsetting" (being selected by 37.5%, 42%, and 35.8% of the respondents respectively) could be due to the specialized and technical nature of these topics, which might not have reached the general public yet.

Inference:

From the results of this survey question it may be inferred that most respondents i.e. a majority of them are well aware of the effect of 'Green House Gases' on climate change and are aware about 'Carbon Footprint'. This reduces to the fact that when individuals individually are aware of their 'Carbon Footprint' they may take up actions to reduce it and eventually they all need is a technological framework, which is also our research theme. 'Sustainable Future' signifies hope here, and envisions a future where progress takes up a climate aware path. A large majority of individuals are hopeful for such a future pathway and must be willing to work towards achieving it. The results of this survey question can indicate that the majority of respondents are knowledgeable and aware of the concept of climate change, particularly in relation to the topics of "Green House Gases" and "Carbon Footprint." This could mean that these topics have been widely discussed in the media, academic circles, and public discourse, leading to widespread awareness among the general population. Additionally, a significant number of respondents were aware of "Sustainable Future," indicating that there is a growing concern among people about the long-term impact of climate change. On the other hand, fewer respondents were aware of "Carbon Market," "Green Certificates," and "Carbon Offsetting," suggesting that there may be a need for more education and awareness about these specific topics. Overall, the results suggest that the respondents have a general understanding of climate change and its related issues.

Q3. How successful according to you will be an mobile app that helps you reduce the amount of Carbon Di Oxide that you produce in everyday life by suggesting you activities that you can undertake and rewards you for every activity undertaken.

In this question we asked the respondents to choose from three available options about what they believe will be the future outcome of a mobile app that helps to reduce the amount of Carbon Di Oxide that individuals produce in everyday life by suggesting them activities that they can undertake and rewards them for every activity undertaken; The options were - (1) Very Successful (2) Mildly Successful (3) Not successful at all

Obtained inputs:

Out of total 176 responses 32.4% i.e. 57 respondents selected the option 'Very Successful', while 60.2% of the

respondents i.e. 106 nos. went with selecting the option 'Mildly Successful', remaining 7.4% i.e. 13 nos. of respondents could not envision any future of this proposed initiative and hence selected 'Not successful at all'. The initiative still stands a fair chance given if the respondents who selected 'Not successful at all' are omitted to get a clear picture, given that it can be said that 92.6% i.e. 163 of the total 176 respondents demonstrated faith in this initiative presented as an mobile application by selecting 'Very Successful' & 'Mildly Successful' options. Hence it can be stated that the numbers stand in favor.
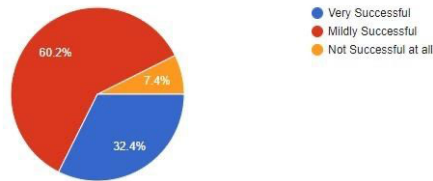
Discussion:

From the results of this survey question it is apparent that majority of the respondents have liked this innovative idea of an mobile application that can suggest carbon footprint reduction activities on day to day basis and rewards the users for undertaking them everyday. An astounding 32.4% of respondents have suggested that his initiative will be a 'Very Successful' one and 60.2% believe that the initiative will be mildly successful. We can henceforth with confidence infer from the results of this question that such an initiative may be well welcomed by the masses if properly executed and delivered and as it suits. 32.4% of the respondents seem to have faith in the success of this proposed mobile app based on this survey data alone. However, some factors that could have influenced the respondents' choices may include:

Awareness and concern about climate change: If the respondents are aware of the negative impact of their actions on the environment, they may be more likely to support initiatives aimed at reducing carbon emissions.

Perceived effectiveness: The respondents may believe that the proposed mobile app will be effective in reducing carbon emissions and helping to mitigate the effects of climate change.

User experience: If the respondents think that the app will be user-friendly, easy to use, and have a positive impact on their daily lives, they may be more likely to support it.

Personal reward: If the respondents believe that they will be rewarded for participating in the activities suggested by the app, they may be more likely to support it.

The reasoning behind why 60.2% of the respondents selected the option "Mildly Successful" could be due to a variety of reasons such as personal beliefs, previous experiences, or perceived challenges with the implementation of the app. However, education and awareness campaigns can certainly help to increase understanding and support for initiatives like this, so it is possible that these respondents could become more optimistic about the app's potential for success if they are given more information about it.

It is possible that remaining i.e. 13 nos. of respondents who selected 'Not successful at all' may have had doubts about the feasibility or effectiveness of the proposed mobile app. They may have lacked information about the initiative, or may have held negative beliefs about similar initiatives in the past. They may have also considered factors such as cost, ease of use, or availability of resources that would affect the success of the initiative and there could be several other reasons.

Inference:

The main idea behind strategically placing this question was to enquire what the respondents think about the future of such an initiative. An enquiry into acceptability and usability of such an application by the masses was the main theme to obtain insights for. The masses seem to have supported this initiative and believe it will be quite successful. Given the responses now the main focus establishes itself in the research work that can be undertaken appropriately. The results of this question are moreover rather motivating to us than evidently surprising. The respondents seem to have fairly understood the question and gauged it personally and individually given their own expertise in communication technologies and their desire to do something in the arising dire need for reversing climate change. Also, it seems that the respondents have welcomed the idea whole heartedly. The choices made by the respondents reflect their beliefs, attitudes and prior experiences towards the issue of climate change and technology's role in addressing it.

## Q4. Will you download this mobile app and use it?

In this question we asked the respondents to choose from three available options that if they are willing to download the mobile application as presented and discussed in Q12. The options placed were – 1 – 'Yes', 2 - 'Maybe', 3 – 'No'

Obtained inputs:

Favorably out of all 176 responses 48.3% i.e. 85 respondents selected the option 'Yes' and showed their

willingness to download and use this mobile application, also positively 36.9% of the respondents i.e. 65 nos. went with selecting the option 'Maybe' and demonstrated partial willingness, remaining 14.8% i.e. 26 nos. of respondents could not be found willing to download and use this application.

176 responses
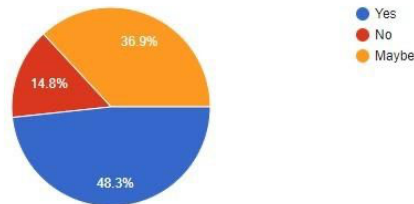
Discussion:

The results of this survey question are favorable given that evidently a large number of respondents i.e. 48.3% were found to be supportive of the initiative and were wiling to not only download but use the mobile application. Also, a large number of respondents i.e. 36.9% demonstrated partial willingness by selecting the option 'Maybe'. Interestingly, if we view these responses in light of the responses collected for Q3, we may discover that the respondents who chose 'Not successful at all' were 7.4%, and the respondents which chose 'No' in Q3 were 14.8%, we may hereby infer that an increase of 7.4% can be amounted to a segment from respondents who chose 'Mildly Successful' in Q3 and an increase in respondents which chose 'Yes' in Q4 can be amounted to respondents who showed confidence in the initiative by selecting 'Very Successful' in Q3, which turn out to be 15.9%. Hence it can be inferred that out of all respondents who chose 'Mildly Successful' in Q3, 7.4% shifted to 'No' in Q4 and 15.9% shifted to 'Yes' in Q13, and remaining 36.9% were still unsure and chose 'Maybe' in Q4.

Inference:

This question was placed to enquire about the likelihood of this mobile application's acceptability and usage, as unless people are interested in the backend initiative and will they won't download or use an mobile application. The acceptability of this mobile application will be reflected in the number of users willing to download and use it. Results from this question were in our favor with 48.3% of respondents reported their willingness to utilize this mobile application proactively. Only a small segment of respondents that is 14.8% demonstrated their non- willingness by selecting the option 'No', rest chose 'Maybe'. Hence the inference is that if such mobile application is launched it will be drawing considerable attention and may also be quite successful in its attempts to manage climate change at individual level. This indicates that a large number of respondents are open to using technology to reduce their carbon footprint and support a sustainable future. The remaining who chose "No" may have different priorities or concerns.

Q5. How old are you, select your age group.

In this question we asked the respondents to choose from available options that were, 1 – '12-18', 2 – '18-25', 3 –
'25-35', 4 – '35-45', 5 – '45-55', 6 – '55 & beyond'.

Obtained inputs:

Out of all 176 responses 68.2% i.e. 120 respondents selected the option '18-25', also 22.7% of the respondents
i.e. 40 nos. selected the option '25-35', 4.5% i.e. 8 nos. of respondents selected the option '35-45' making it 4.5% of total respondents, 6 respondents i.e. 3.4% chose the option '12-18', 1 respondent chose option 45-55, and 1 respondent chose option '55 & beyond'.
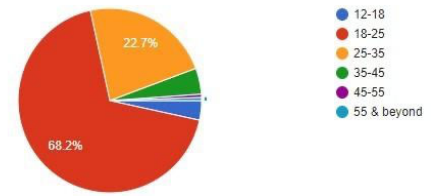
Discussion:

The results of this survey question highlight that most of the respondents are from age group 18-35, comprising of a total of 90.9% of all responses. Although, the survey covered all age groups, the response from youths is outstanding.

Inference:

This survey question provides us with input into the psyche of today's youth, at this moment the youths globally constitute a majority as working population and this survey captured the sentiments of these. The success or failure of any initiative today depends on the acceptability of it by the youth.

Q6. Where are you from? Select Country.

In this question a list of all countries was provided to select one from the drop down box.

Obtained inputs:

Out of all 176 responses majorly 40.3% i.e. 71 respondents were from 'India', also 11.4% of the respondents i.e. 20 nos. were from 'Netherlands', 10.2% of all respondents i.e. 18 nos. were from 'United States'. The rest of the responses are tabulated as below.

Country Name	No. of Responses	Percentage
India	71	40.3
Netherlands	20	11.4
United States	18	10.2
Germany	7	4
United Kingdom	7	4
France	4	2.3
China	5	2.8
Belgium	3	1.7
Switzerland	3	1.7
Philippines	3	1.7
Portugal	3	1.7
Spain	3	1.7
Australia	2	1.1
New Zealand	2	1.1
Hungary	2	1.1
Poland	2	1.1
Singapore	2	1.1
Andorra	1	0.6
Japan	1	0.6
Burma	1	0.6
Afghanistan	1	0.6
Greece	1	0.6
Romania	1	0.6
Slovenia	1	0.6
Denmark	1	0.6
Italy	1	0.6
Taiwan	1	0.6
Malaysia	1	0.6
Bulgaria	1	0.6
South Africa	1	0.6
Turkey	1	0.6

Ukraine	1	0.6
Indonesia	1	0.6
American Samoa	1	0.6
Bosnia & Herzegovina	1	0.6
Antarctica	1	0.6
Total	176	100

Table 1.1

This survey covered respondents from 36 Countries thus making it fairly international. Highest participation was from India, then Netherlands and United States.
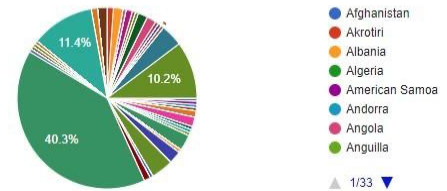
Discussion:

The results of this survey question in light with results of Q14 highlight that the survey has covered its major responses from youths of various countries internationally. This becomes significant as on today major markets depend on youth involvement and participation.

Inference:

The results are presented as available in the response sheets, and discussed as above. It is now possible to infer that as the responses were not limited to particularly one geographical entity like India and participations from other countries have made this survey robust and dependable.

Q7. Which province / state are you from, please mention.

In this question we asked the respondents to type in the name of their province in which they were currently located.

Obtained inputs:

Various name of provinces were typed, this question was placed to ensure that random selection of options is ruled out and to make sure the participants were focusing with seriousness. The results are represented as a word cloud as below.

Discussion:

This question was placed to ensure genuine participation in the survey study as all other options were mouse selected; this question involved typing using keyboard or touchpad.

Inference:

The results are presented as a word cloud, as the responses to the question could not be left blank it can be inferred that all participation was genuine and seriously conducted.

Q8. Select your gender.

In this question we asked the respondents to choose their gender from three available options 1 – 'Male', 2 – 'Female', 3 – 'Others'.

Obtained inputs:

Out of all 176 responses 53.4% i.e. 94 respondents selected the option 'Male' and 44.3% of the respondents i.e. 78 nos. selected the option 'Female' remaining 2.3% i.e. 4 nos. of respondents selected the option 'Other'.

Discussion:

The gender participation in this study was fairly matchable with near equal participation from both male and female genders. 94 male participants and 78 female participants got involved in this study, with 4 others.

Inference:

It can be inferred that the survey was successful in collecting responses from both dominant genders and hence it can be concluded that the gender bias is absent in this survey. This makes the survey more acceptable considering that responses were collected ideally from both genders with only a marginal difference of 9.1%.

Q9. Select your educational qualification.

In this question we asked the respondents to choose from six available options that were 1 – 'School Student', 2 – 'University Student / Under Graduate', 3 – 'University Student / Post Graduate', 4 – 'University Student / Doctorate', 5 – 'Doctorate (Ph.D.)', 6 – 'University Student - Under Graduate'.

Obtained inputs:

58.0% i.e. 102 respondents selected the option 'University Student / Under Graduate', 26.7% of the respondents i.e. 47 nos. selected the option 'University Student / Post Graduate', 13 nos. i.e. 7.4% selected the option 'School Student', 6.3% i.e. 11 nos. selected the option 'University Student / Doctorate', remaining 1.1% i.e. 2 nos. of respondents selected the option 'Doctorate (Ph.D.)'.
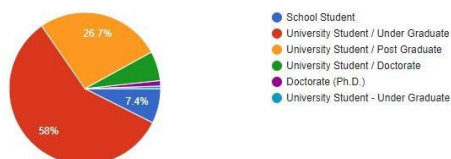
Discussion:

The results of this survey question are favorable given that evidently a large number of respondents i.e. 91% were found to be enrolled in a university pursuing some degree at graduate, post-graduate or doctorate level. Hence we can say that the survey results were from educated to highly educated respondents and this in turn makes the survey more dependable and consistent.

Inference:

Education plays a vital role in ability to access, process and condense information as knowledge. Information presented in this survey came from learned individuals that were found to be majorly enrolled as university students and were knowledgeable. The climate change information is right

now accessible by any learned individual and universities are participating in the quest to device newer ways to counter it. Participation in this survey highlights how learned individuals from various universities across the world have came up with their responses towards the questionnaire posted by us. Hence it can be said with confidence that the participants were informed individuals who had access to climate change information and fairly assisted us in fulfillment of this survey's goals. Additionally, these findings suggest that the target audience for the proposed mobile app is likely to be young university students or under graduates aged 18-25, and predominantly male.

Q10. How often do you talk about climate change with your peers / friends / family / colleagues?

In this question we asked the respondents to choose from three available options about how often they discuss climate change. The options placed were – 1 – 'Very Often', 2 – 'Occasionally', 3 – 'Never'

Obtained inputs: Out of all 177 responses 70.6% i.e. 125 respondents selected the option 'Occasionally' and represented that they do discuss climate change amongst their peers, also positively 18.1% of the respondents i.e. 32 nos. selected the option 'Very Often' highlighting that they are very concerned about climate change and bring up the topic very often, remaining 11.3% i.e. 20 nos. of respondents chose the option 'Never', showing that the climate change is not discussed by them at all.
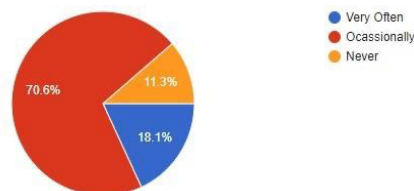
Discussion:

The results obtained from this survey questions demonstrate a growing concern about climate change. Majority (70.6%) of respondents selected the option 'Occasionally' which reflects how individuals have brought climate change in everyday discussions amongst their peers. Also a significant amount of individuals i.e. 18.1% (32 nos.) have selected 'Very often', this shows that many individuals are highly concerned about climate change and found themselves discussing it very frequently. Another option i.e. 'Never', was selected by 11.3% i.e. 20 nos. of individuals that means that still not all are concerned about climate change and do not discuss it at all.

Inference:

The intent to place this question on survey was to evaluate the importance of climate change on individuals. Because, if climate change is important people may discuss it more. The results were in favor of climate change, as majority of people i.e. 88.7% of respondents were found to be discussing it and only a minority i.e. 11.3% are not found to be concerned about it. This also resonates with the results of Q1. where individuals who selected range from 6 to 10 were 87% of all respondents and who were concerned about climate change. It becomes clearer now that the participants of this international survey which were from different locations globally are in majority concerned about climate change. It clearly means that there is a growing concern about climate change and its effect everywhere across the globe.

Q11. Would you like to own any new cryptocurrency in near future that helps reduce the impact of climate change?

In this question we asked the respondents to choose from three available options about if they would like to own a Cryptocurrency that helps reduce the impact of climate change. The options placed were – 1 – 'Yes', 2 – 'No', 3 – 'Maybe'

Obtained inputs:

Out of all 177 responses 43.5% i.e. 77 respondents selected the option 'Yes' submitted their willingness to own a part of such an initiative, also 37.3% of the respondents i.e. 66 nos. selected the option 'Maybe' highlighting that they might be available to own a part in an initiative that helps reduce the impact of climate change, remaining 19.2% i.e.
34 nos. of respondents chose the option 'No', demonstrating their unwillingness to participate in initiative.

Discussion:

An initiative for climate change that is technology based is the theme of our research. This survey question helped us to find out if the participants will be able to own a part of this initiative in form of cryptocurrencies. 43.5% of respondents chose "Yes" could be due to a variety of factors such as:
Environmental Awareness: Respondents who selected "Yes" may be more environmentally conscious and see owning a cryptocurrency that helps reduce the impact of climate change as a way to align their values and actions with their beliefs.
Financial Benefits: Respondents may also see this as a potential financial opportunity and view it as a way to invest in something that not only has financial potential but also helps to mitigate the effects of climate change.

Trust in Technology: Respondents who chose "Yes" may have confidence in the use of technology, including blockchain and cryptocurrencies, to tackle climate change and believe that such initiatives can have a positive impact.

Peer Influence: Respondents may have been influenced by the opinions and actions of their peers or community, leading them to choose "Yes".

It's important to note that these reasons may not be mutually exclusive and respondents may have multiple reasons for their choice.

The reasons why 37.3% of respondents chose "Maybe" could be due to a variety of factors such as:

Lack of Knowledge: Respondents may be unfamiliar with cryptocurrencies and blockchain technology and are unsure about their potential for reducing the impact of climate change.

Risk Aversion: Respondents may be hesitant to invest in a new or unfamiliar technology, or they may be concerned about the potential risks associated with cryptocurrency investment.

Undecided: Respondents may not have made up their minds about the issue and need more information or education to make a decision.

Financial Constraints: Respondents may not have the financial resources to invest in a cryptocurrency or may not want to allocate a portion of their assets towards a single investment.

Waiting for more information: Respondents may be waiting for more information, research or further developments in the field to make a decision.

It's important to note that these reasons may not be mutually exclusive and respondents may have multiple reasons for their choice.

The reasons why 19.2% of respondents chose "No" could be due to a variety of factors such as:

Skepticism: Respondents may be skeptical about the potential for cryptocurrencies to effectively reduce the impact of climate change or may view such initiatives as being unlikely to achieve their intended goals.

Financial Concerns: Respondents may be concerned about the stability and security of cryptocurrencies and may not want to risk their assets.

Disinterest: Respondents may not have an interest in cryptocurrencies or the broader topic of climate change and therefore do not see the value in participating in such initiatives.

Lack of Trust: Respondents may not trust the technology, or they may not trust the organizations behind such initiatives.

No Financial Need: Respondents may already have sufficient financial resources and may not see the need to invest in a cryptocurrency.

It's important to note that these reasons may not be mutually exclusive and respondents may have multiple reasons for their choice.

Furthermore, without more information or data, these reasons are only speculative.
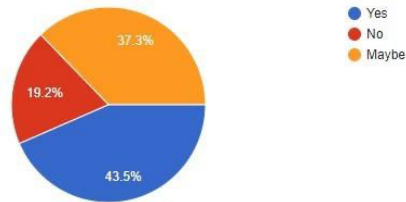
Inference:

This data suggests that there is a significant level of interest in cryptocurrencies that help reduce the impact of climate change, however, there is also some hesitation or uncertainty among a portion of the respondents. The survey data could be used to further explore the motivations and concerns of different groups of respondents and to develop strategies to address any barriers to adoption.

CONCLUSION

Through this survey we were able to identify how concerned the global audience is about climate change. Also, the responses were able to shed some light on the climate specific knowledge of the participating individuals. We were also able to identify how a certain mobile application that helps individual to reduce their carbon footprint will perform in market and also which segment of users to target was made apparent by this survey. The survey's inputs were from all possible segments of internet users, as it was an internet based survey. Also, this paper highlighted the possible success of an blockchain and cryptocurrency based initiative to reduce carbon footprint. The need to advance technological development, put it to use, and give the majority of young people a tool to get involved individually and effect change as soon as possible is growing on a global scale. We conducted this survey to learn more about the current situation and to determine whether there is a need for a technological initiative that can connect people globally and encourage them to reduce their carbon footprint on a daily basis. Given the advancements in Blockchain technology and the alluring cryptocurrencies, a unified framework that connects with nature and revolutionises the ongoing undercurrent where people are ready to contribute to the conservation of this planet's environment is achievable. It is imperative that we recognise that we cannot have a productive conversation or, even better, design a scenario that promotes the sustainability of our world as a vast living organism. We must transfer responsibility for environmental issues to individuals and provide them with a tool for engagement.

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अनुसन्धक

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