



Concept Of Environment, Ecology And Sustainability In Ancient India: Insights From The Vedas With Special Reference To Rig Veda.

Dr. Manikuntala Kanrar

Assistant Professor

Department of Geography

Ramsaday College, Amta, Howrah

&

Dr. Anupriya Chatterjee

Assistant Professor

Department of Geography

Kishore Bharati Bhagini Nivedita College (Co-ed), Behala, Kolkata.

Abstract

The Rig Veda, the world's oldest extant literary text, is not merely a spiritual collection but a profound repository of proto-scientific and ecological knowledge. This study examines the hymns to identify evidence of early understandings of geography, astronomy, environment, and, critically, sustainability. Textual analysis of select riks reveals a sophisticated grasp of celestial mechanics, including a heliocentric-like model with the Earth as a sphere that rotates daily and revolves annually in a near-circular orbit around the Sun. The hymns correctly describe the Moon's reflected light and the mechanism of eclipses. Furthermore, the Vedic seers demonstrated a remarkable understanding of the hydrological cycle, correctly identifying the sea as the source of rain, distinguishing different water types, and meticulously describing major rivers like the Sindhu and the now-extinct Saraswati. Descriptions of arid climatic conditions, specific flora (e.g., Ashvattha, Shalmali), and fauna (e.g., camel, tiger, lion) paint a rich ecological picture of the Vedic habitat, even including an early awareness of microorganisms and the disinfecting power of sunlight. Ecologically, the Rig Veda presents a fully integrated worldview built upon the foundational pillars of Rta (cosmic order/universal law of sustainability), reciprocity (Yajña), and Ahimsā (non-violence). The reverence for the Earth as a mother (Pṛthivī Sūkta) and the sacralization of the Pañchamahābhūtas (five elements) established an intrinsic, ethical framework that prefigures modern principles of environmental sustainability and non-exploitative resource management, offering a holistic, spirituo-ethical counter-narrative to modern anthropocentric approaches.

Keywords: Rig Veda, Sustainability, Hydrology, Proto-Scientific, Vedic Astronomy, Environmental Ethics, Ecocritical Analysis, Sustainable Environmental Philosophy.

Introduction

The Rig Veda is the earliest and most significant collection of Vedic Sanskrit hymns and is among the oldest extant texts in world literature. Recording thoughts took a long time to develop in ancient India because there was no script in the earliest periods. People express their ideas through rhythmic oral forms to make them attractive and easy to remember. The hymns (riks) of the Rigveda are the earliest records. The word Veda means "to know" and "to make known." One who knows completely is called pragna, and one who knows nothing is called agna (Mukherjee, 2003). It is believed that the Vedas were not created by humans; they are apaurusheya, not made by man. The Rishis, whose names appear as composers, were seers who received the hymns through divine revelation. In truth, the Vedic ideas were discoveries and not inventions. The Vedas existed in oral form (shruti) around 3000–4000 B.C.. They were later written down, first as the Rig and Sama Vedas, around 1500 B.C. The Veda appeared around 1000 B.C., and the Atharva Veda came much later, around 500 B.C., combining prose and verse (Basu, 1970 & Mukherjee, 1994). 'The Veda does not mean one single literary work, as for instance the word 'Koran'; nor a complete collection of a certain number of books, compiled at some particular time as the word 'Bible' or the word 'Tripitaka' the Bible of the Buddhists, but a whole great literature which arose in the course of many centuries, and through centuries has been handed down from generation to generation by verbal transmission' (Winternitz 1927).

The Rig Veda contains 10 mandalas (books), 85 anuvakas (sections), 1017 sukta (hymns), 10600 riks (verses) (Basu, 1970 & Mukherjee, 1994). But later on it is mentioned that the Rig Veda includes 10 mandalas, 85 anuvaks, 1028 suktas, and 10552 riks/mantras (Mukherjee, 2003). The other three branches of Veda use the riks of the Rigveda to a large extent; for example, among the 1810 hymns of Samaveda Sam, only 75 are new; the others are taken from the Rigveda. Similarly, 1900 hymns of the Rigveda have been used in the Yajurveda and 1200 hymns in the Atharvaveda. Composed of highly stylized poetic meters, it represents humanity's early attempt to understand and articulate the natural world through symbolic and devotional language. Although framed as invocations to elemental deities such as the Sun, Fire, Wind, and Earth, the Rig Veda also preserves empirical observations of natural and cosmic phenomena. Therefore, the present study examines the Rig Veda not only as a literary and spiritual text but also as a repository of proto-scientific knowledge relating to geography, environment, ecology, and astronomy.

The evolution of such a corpus of thought in ancient India was protracted, largely because of the absence of a script during the earliest stages. Oral formulation and transmission, guided by rhythm and meter, ensured memorability and fidelity across generations. The term Veda itself derives from the root vid ("to know"), connoting both knowledge and its communication. Thus, the Rig Veda may be understood as a poetic record of humankind's quest to comprehend nature, articulated by multiple sages (ṛṣis) through diverse prosodic forms. While many hymns are primarily prayers addressed to deities, ritual practices have developed in association with these invocations. Offerings were symbolically made into fire, which was conceived as both a deity and a divine messenger carrying prayers to the celestial realm. Here, it can also be noted that the natural elements were worshipped as God, and pleasing them will lead to balance in the ecosystem, thereby preventing all sorts of natural calamities. This ritual component was codified in the

Yajur Veda, whose name derives from yajña (sacrifice or oblation). Subsequently, selected hymns from the Rig Veda were adapted into musical form as chants (sāman) and preserved in the Sāma Veda. Collectively, the Ṛik–Yaju–Sāma traditions form an integrated body of sacred and intellectual activity (Mukherjee, 2003).

Vedic knowledge, though sacred, was not conceived as otherworldly; it was grounded in this-worldly (aihika) reality and embodied the discoveries of keen observers of nature. The Rig Veda's seventh Maṇḍala, for example, is attributed to the venerated sage Vasiṣṭha. The structural interrelationship between the Vedas reflects the stages of ritual expression: the ṛik (hymn) functions as an invocation, the yaju (ritual formula, in prose and verse) formalizes the offering, and the sāman (chant) elevates the act into musical praise. This tripartite system illustrates how the later Vedas represent the adaptations and extensions of the Rig Veda's foundation. The language of the Vedas was originally the colloquial speech of the early Indo-Aryans (chandasa) and not the refined Sanskrit of later centuries. The term saṁskṛta ("refined" or "perfected") reflects its evolution through grammatical codification, most notably by Pāṇini in the 2nd century BCE. Nevertheless, the Vedic seers frequently referred to themselves as ārya, indicating cultural rather than linguistic self-identification. Thus, the Rig Veda occupies a unique place as both a spiritual text and an intellectual document, bridging the worlds of oral tradition, natural science, environmental appraisal, and worshipping nature, thereby believing in the concept of sustainability.

Objectives

The major objectives of this study are as follows.

- Identify the geographical and environmental knowledge found in the Rig Veda, focusing on physical geography (earth, sky, climate).
- Analyze how the ancient Vedic hymns describe natural phenomena (e.g., landforms, rivers, weather, celestial bodies) and what these reveal about early scientific thinking.
- Trace the evidences of sustainability from Vedic descriptions of environment

Literature Review

The Rig Veda, the earliest of the four Vedas, embodies a profound synthesis of spiritual reflection and natural observations. Its hymns provide insights that parallel modern scientific ideas concerning the heliocentric model, Earth's shape, gravitational stability, and the presence of an atmosphere. Hymns such as Rig Veda 10/149/1 portray the Earth as "unsupported," suggesting an intuitive awareness of gravitational balance (Griffith 1995). According to Jamison and Brereton (2014), such verses employ layered metaphors to express cosmic truths that intertwine empirical and metaphysical dimensions. The Nasadiya Sukta (Rig Veda 10/129) further reflects philosophical speculation about the origins of the universe, which Brereton (2003) characterizes as "edifying puzzlement." Gonda (1963) and Witzel (1997) emphasize that these hymns reveal both ritual symbolism and keen naturalistic observation, bridging mythic imagination with proto-scientific reasoning.

Beyond cosmology, the Rig Veda displays rich ecological awareness. The text frequently praises the interdependence among the Pancha Mahabhuta (five elements)—Earth, water, air, fire, and ether—emphasizing equilibrium and sustainability (1/22/18; 7/49/2). Flora and fauna appear not merely as metaphors but as integral participants in the cosmic order. Trees such as Ashvattha (*Ficus religiosa*), Shalmali (*Bombax ceiba*), and Nyagrodha (*Ficus benghalensis*) are described as sustaining habitats and symbols of fertility and continuity (Verma, 2022). Animals, including cows (*Aghnya*), horses (*Ashva*), and frogs (*Manduka*), are revered as sacred beings within ecological cycles, illustrating a conservationist ethos (Sharma & Biswas, 2023). Hymns such as 1/164 and 10/75/1 celebrate rivers like the Sarasvati and Sindhu as life-sustaining entities, reflecting early hydrological understanding and respect for water as a renewable, yet vulnerable resource (Singh et al., 2020).

The Rig Veda also contains indirect references to microbiological and atmospheric processes in the hymns. The concepts of Yajña and Agni (fire sacrifice) can be viewed through an ecological lens as representing energy transformation and organic recycling. The recurring emphasis on Rita—the universal order—underscores the idea of sustainability through balance and cyclical renewal (Sharma and Biswas, 2023). Modern scholars (Chavan, 2020; Pathak, 2021) interpret these as early acknowledgments of homeostasis. Moreover, the Vedic notion of purity (*shuddhi*) and disease prevention through air and water sanctity parallels proto-germ theories, as certain hymns describe invisible agents affecting health and fertility (Vahia & Soma, 2016).

Comparative studies reveal that while Greek and Mesopotamian cosmologies externalized divine control over nature, the Rig Veda internalizes ecological ethics within cosmic interdependence. It views nature as sacred and self-regulating, promoting principles akin to modern sustainability—restraint, reciprocity, and reverence. Witzel (1995) and Subbarayappa (2001) argue that the Vedic vision of Prithvi (Earth) as a motherly figure nurturing all life aligns with ecological ideals of balance and non-exploitation. Thus, the Rig Veda not only prefigures scientific thought but also embodies one of the earliest articulations of sustainable environmental philosophy, merging observation, spirituality, and ethics into a unified worldview.

Methodology

- **Textual Analysis:** We examined original Rig Veda verses (Riks) in Sanskrit along with respected translations and commentaries (for example Griffith, 1896; Jamison & Brereton, 2014). Passages related to geography, climate, and astronomy were also identified.
- **Contextual Evaluation:** The verses were analysed in their cultural context to distinguish metaphorical language from genuine observational claims. We cross-checked Vedic descriptions with modern scientific understanding (e.g., the water cycle and orbits).
- **Thematic Synthesis:** Common ideas and differences across hymns were noted. We organized the findings thematically (physical geography, climate, and environment) to build a comprehensive picture of Vedic knowledge.

Analysis of Rig Veda in the light of Physical Parameter, Ecological Parameter and Concept of Sustainability

A. Physical Parameter

a) Celestial Elements –

i) **Sun:** The Sun as an entity is considered heavenly (dibyam), precisely moving (suparnang), and ever-moving (bāyasang). It is described as giant-sized (brihantam), the rainmaker (apang garbhang), the producer of plants and herbs (darshatam oshadhinam), and one that fills up water bodies (abheepatah bristibhih) while nourishing the Saraswatis (rivers) (tarpayantam saraswantām) (1/164/52). This being is elevated as the God of all gods and the root of all causes (ayang devānām apasamapastamo) and the maker of this earth (ya jajan rodasi Vishva shambhubā). Crucially, it is said to keep everything in control by a "hook or goad," interpreted here as gravitational pull (skambhanebhih samanriche) (1/160/4). It is further identified as the soul of all movable and immovable beings (Surya ātmā jagatah tasthushah cha) (1/115/1). The text asserts that this entity never sets or sinks and has 12 positions as seen from Earth, which include Barun (mid-night, where darkness covers everything as the sun is on the other side of the Earth), Sabitā, Aswin, Ushā, Bhaga, Surya, Vishnu (mid-day), Mitra, Aditya, Dyou, Pushan, and Rātri. The Sun is the single source of all three types of energy: solar (saurya), electrical (apāng napāt), and fire (agni) (1/164/43). Finally, the bright rays of the morning sun are depicted as driving away the darkness of the night, causing the stars to hide "like thieves" (apa tye tāyabo yathā nakshatrā yanti ahtubhyih) (1/50/2).

ii) **Earth's Origin, Movement, and Gravity:** The Vedic verses present a cosmological view of the Earth (Prithivi), suggesting its origin from the Sun (Yah Jajān rodasi) (1/160/4). In terms of movement, the Earth is described as rotating daily, which is the mechanism that creates day and night (vishvang tvana bibhrito yaddha nāma bibartete ahani chakriyeba) (1/185/1-2). Furthermore, the Earth is depicted as revolving in the sky without any legs (padarahita), yet remaining steady in its orbital track (abichalita). This motion is coupled with a concept akin to gravity, as the Earth is said to be holding with affection (or by gravity) all legged, moving, and flying creatures "to her bosom" (bhuring dve acharanti charantang pādvantang garbhamapadi dadhāte), much like a child securely held in its parent's lap (1/185/1-2).

iii) **Earth as a Sphere, its Orbit, and Motion:** The Rishis (ancient seers) conceived of the Earth (Bhulok) as a sphere, surrounded by a spherical shell of air known as the atmosphere (antariksha). Beyond the atmosphere lies the celestial world (Dyulok), which is also described as a sphere (golak) (1/164/23). Regarding its motion, the texts state that the Earth and other astronomical bodies revolve around the Sun in concentric, nearly circular paths (dvādash pradhayah chakramekang trini navyāni) (1/164/48). These paths are described as almost perfect circles with a nominal eccentricity or ellipticity of 1/60. Each of these paths is considered a 'wheel' with 12 spokes (dvādasha aram barbarti Chakrang), representing the 12 months required to complete one revolution (1/164/11). Specifically for the Earth, this 'wheel' has 360 spokes (ar), indicating that it takes 360 days, or one year, to complete one full revolution (tāsmīn sākam trishatāh na shankabah arpitāh shasthih na chalāchalah) (1/164/48);

iv) **Moon:** The Vedic understanding of the Moon is that it possesses no light of its own. Its illumination is merely a reflection of a fraction of the sun's rays from its surface (athāpyasyaiko rashmih chandramasang pratideepyate, ādityasya deeptirbhabati). Furthermore, the phenomenon of an eclipse is

accurately described as being caused by the alignment of the Earth, Moon, and Sun, leading to the interception of light (Darshah Soorjendu Sangama).

b) Water Element –

i) River: The Rigvedic texts describe the Sindhu (Indus) River in exceptional detail, both rationally and metaphorically. It's praised as the "indomitable Sindhu" that is flowing straightway, is white (foaming) and bright, and possesses greatness (Rrijeetyeni rushatee mahitvī pari jrayāngsi bharate rajāngsi, adabdhā Sindhuh apasāṅg apastamā ashvā n chitribapusheeva darshatī) (10/75/7). Sindhu is metaphorically called a "fleeting mare" and is described as supple as a young lady. It is revered as the Mother Indus with seven daughters (Sindhomātā sapta kanya) (10/75/5), and its western tributaries, including the Kabul and Saraju, are mentioned (10/75/6). The Saraswati River is identified as the seventh tributary of the Indus River (7/36/6, 3/33/1, 7/95/2). The Saraswati is specifically noted for its strong current, which is said to have cut at the base of the Pārabat mountain (Siwalik) (6/61/2). Settlers on its banks frequently pleaded with the river to protect them and not to "trouble with excess water (flood)" or force them to abandon the optimal riverbanks for the undesirable, forested Tarāi region at the Siwalik base (6/61/14). In contrast to the Sindhu and Saraswati, other major rivers, such as the Ganga and Yamuna, are mentioned only by name.

ii) Sources of Water: The Rishis demonstrated a sophisticated understanding of the hydrological cycle and the purity of water sources crucial for their arid region. They categorized water into four types: Divine Water (divya), or rain, which they recognized as the purest and naturally distilled; Oozing Water (s rāb), which is pristine river water flowing from snow-capped mountains; Dug-out Water (khanitrimā), or groundwater obtained from wells (kebat); and Naturally Grown Water (svayamjā), which is saline sea water that cannot be used directly (7/49/2). The sea (Samudra) is correctly identified as the largest source of water (Samudra jyesthā salilasya madhyā 7/49/1) and the ultimate supplier of all other types. The texts explicitly describe the mechanism of the cycle: the Sun sends hot rays to raise a huge quantity of water (vapor, free of salt) from the sea, for which the atmosphere (Indra) makes "enough room and passage" (7/47/4). This vapor forms clouds, leading to rain or snow/ice on the Himalayas, which then melts to feed the rivers, a concept strikingly aligned with modern science and in sharp contrast to the later myths.

c) Weather Elements –

i) Wind and Cyclone: The ancient texts contain observations on atmospheric phenomena, linking solar insolation and the rotating Earth (uroochi bhavatu 7/35/3) as factors that influence planetary winds (ababartat abaran chakriya abase 2/34/14). The concept of the monsoon is clearly referenced through the mention of the reversal of wind direction (2/34/5). Furthermore, vivid descriptions exist of intense weather events, including whirling and heat-originated cyclones (2/34/9), the general terrifying nature of cyclonic storms (1/37/2-9), and dust storms (1/34/12). The destructive power of natural phenomena is also captured in references to forest fires (10/79/3 and 1/65/4).

ii) Clouds and Seasons: Rig Veda describes a clear understanding of the hydrological cycle, where the Sun is said to suck a great volume of water from the seas (1/46/4) and deposit it into the atmosphere (7/38/2) to form clouds. Various types of clouds are mentioned and can be correlated with modern international classifications: Shab (cirrus), Māyābi (cumulus), Vritti (stratus), Pipru (cumulo-nimbus), Shusna (nimbus), and Shamber (alto-cumulus) (1/51/5-6, 1/52/6, 2/14/5-6). Furthermore, the Sun is recognized as the maker

of all six seasons (1/23/15, 1/164/15, 3/20/4): Him (Fall), Sisir (Winter), Vasant (Spring), Grisma (Summer), Saras (Rainy), and Sharād (Autumn).

iii) Refraction: The Rishis understood that the Earth is surrounded by a gaseous shell (the atmosphere, antariksha). They observed that when the Sun is viewed through this often dusty atmosphere at sunrise and sunset, it appears to have a crimson color similar to a yolk (bhaga) and looks its largest size, a phenomenon attributed to refraction. Conversely, at noon, when the Sun is directly overhead, refraction causes it to appear at its smallest (Vāman), though simultaneously at its brightest and strongest (shushametu). This apparent shortest size at midday is specifically attributed to refraction in the vertical direction. The Sun's daily path is described as covering the day sky in three steps: early day (purbinha), mid-day (madhyinha), and late-day/afternoon (aparānha), a concept encapsulated in the phrase idang vishnuh vichakrame tredhā nidadhe padang (1/22/17).

d) Lithospheric Elements –

i) Mountains: The Vedic texts frequently mention mountains, identifying specific ranges and peaks such as Sindhokosh Himabant (Himalaya), Hindukush, Muzbut or Muzbant (Nanga Parbat), Trikud (Trishul/triple humps), and Pāribat (Siwalik), all located within the Indus region (9/62/4, 9/63/27, 10/34/1). However, the Pāribat (Siwalik) range was regarded as an unfavorable settlement area compared to the dry, open banks of the Saraswati River, primarily because the dense forest at its base (Tarāi) was dark, damp, and infested with pests. Although the people utilized big coniferous timbers from the high mountain zones (ririhvāngsang yet ripa upasthe), they feared devastating forest fires (dāvāgni). These fires were so intense that they would consume the "sky-kissing" giant trees (ākisam āsvadayantam) like boiled food (pakkinna), igniting the trees instantly from the mere "licking" (ririhvāngsang) of the flame, likely due to the natural oils and tar in the pine wood (10/79/3).

B. Ecological parameter

a) Physical base of ecology

The hymns of the Rigveda provide significant indications of an arid or semi-arid climatic setting during the period of composition. Several terms and descriptions suggest the prevalence of desert-like conditions in Vedic habitats. Expressions such as abarṣi (rainless - 5/8/10), maruto (in the desert - 10/63/15), nirudakāyat (waterless - 10/86/6), dhanva (desert - 10/89/6), and ati dhanveva durita (save us from the hard desert - 10/96/6) point directly to a dry landscape with limited water availability.

The physiography of such an environment is further supported by references to camels, a species well-adapted to desert conditions. For example, various mentions can be found about camels, such as pack camels (uṣṭrān caturyujo dabāt) as beasts of burden (8/6/48), gifts or tribute of camels (praja uṣṭra, 8/46/31), etc., which prove that an intensely arid climatic condition existed at that time. The existence of designated watering points along travel routes, where both men and horses could relieve their exhaustion in this dry climate (10/101/7), underscores the importance of managing scarce water resources.

The Rigvedic seers also revered natural phenomena that alleviated this aridity. Hymns describe gratitude toward clouds that transformed rainless areas into cultivable land through rain (5/83/10). Similarly, the Maruts (winds), in conjunction with Indra, were invoked for their role in dispersing clouds and bringing

rain to mitigate drought (1/23/9). The prominence of Agni (the fire deity) in the hymns may also reflect the heightened risk of fire in dry climates, where offering prayers to fire was a ritual necessity.

Water was conceptualized not only as a vital natural resource but also as a benevolent ally requiring ritual offerings (1/23/16). Major rivers, including the Sindhu (Indus), are venerated as life-sustaining entities (1/23/18). Water was celebrated for its curative and nourishing properties and regarded as a source of vitality, fertility, and medicinal benefits (1/23/19). The repeated emphasis on water as sacred, indispensable, and life-giving highlights its ecological significance and relative scarcity in the Vedic environment.

b) Biological Diversity

A wide range of biodiversity can be traced back to the Rig Vedic period. References to deciduous trees and their characteristic of shedding leaves during winter (10/68/10) are found in hymns. Kingshook (Butea/Flame tree), Shalmali (Bombax/Kopak – 10/85/20), Parna or Ashvattha (Ficus religiosa/Pipal – 10/97/5), and akasam asvadayantam (sky-touching tall trees such as pine and cedar on mountains – 10/79/3) are among the terrestrial vegetation of this era. In addition, seelma (marsh-loving grasses – 10/79/8) and various Oshadhi (medicinal plants) such as Ashvavati, Somavati, Urjayanti, and Udojas (10/97/7) are mentioned in abundance.

The fauna of the Rig Vedic period was equally rich. Animals such as Sukar, Baraha, and Krosta (pig, boar, jackal – 7/55/4, 10/28/4) are referred to, along with species like Prishati, Rohit, and Gaur (spotted, red, and gaur deer – 1/39/6, 8/4/3). Although elephants are not significantly mentioned, predators such as tigers (Rishat – 1/105/11, 18/6/54/7), lions (Simha – 5/15/3, 5/74/4, 10/28/10), and wild buffalo (Banani Mahish – 10/28/10, 9/33/1) A wide variety of birds also find reference in the hymns, highlighting the ecological richness of the time.

c) Microorganisms

The Rigvedic hymns reflect an early awareness of disease-causing agents, described in terms suggesting an understanding of microorganisms. Rishi Agastya, in Rigveda (1/191/1–12), refers to harmful, invisible entities that can be categorized into two types: those present in the air and those found in water. He notes that these agents are imperceptible to the human eye, tend to strike at night, and are metaphorically characterized as possessing a body, shoulders, and a sting—imagery consistent with an attempt to conceptualize their harmful effects. Importantly, Agastya and other seers demonstrate knowledge of preventive and remedial measures. They did not attribute illness to sin or supernatural punishment; rather, they sought recovery through prayer, therapeutic practices, and natural interventions (Mukherjee, 2003). For instance, sunlight was recognized for its disinfecting properties, with hymns stating that the rays of the sun destroy harmful, unseen organisms (utpurastāt sūrya eti viśvā dr̥ṣṭo adṛṣṭāḥ sarvāñjambhyant sarvāśca yātudhānyaḥ). The use of boiling water and herbal medicines was also recommended as a practical method to control and treat such ailments.

C. Concept of Sustainability

The ecocritical analysis of the Rigveda shows that it embodies a cosmologically grounded ethics of equilibrium and reciprocity between humans and nature. Its framework integrates Satya (truth), Rta (cosmic order), and Dharma (righteous action), linking human behaviour to ecological and universal wellbeing. By sacralising natural forces and emphasizing human existence as part of a “living cosmos,” the text advances a relational ethic of reciprocity that is not anthropocentric. Practices such as Yajña (ritual exchange) and Ahimsā (non-violence) are normative mechanisms for sustaining systemic harmony. This concept is discussed below in detail:

- a) **The Foundational Pillars of a Rigvedic Worldview:** Environmental ethics are deeply embedded in Rigvedic philosophy. Central is Rta (“universal law of sustainability”), occurring approximately 390 times. It regulates the natural, moral, and ritual order, binding even the gods. Rta is defined by Gati (continuous movement), Saṁghaṭṇa (systemic interdependence), and Niyati (an inherent order). Disturbance of any part, such as through human excess, leads to imbalance and suffering. This parallels modern ecological theory by linking human actions to universal outcomes.
- b) **The Principle of Interconnectedness:** The Rigveda dissolves the humanity–nature divide by identifying Ātman (self) with Brahman (cosmic self), creating intrinsic motivation for environmental care. The Puruṣa Sūkta (10/90) maps cosmic order onto the human body—the sun as eye, moon as mind, wind as breath, and earth as feet—making harm to nature equivalent to self-harm. Nature is portrayed as an “expression of divine forces” and life as part of a “single, unified existence.” This non-dualism equates ecological integrity with human and cosmic vitality, grounding sustainable living in psychological and ethical imperatives that transcend anthropocentric concerns.
- c) **Deification of Nature:** Natural forces are personified as deities, reflecting the reciprocity between humans and the environment. The Pañchamahābhūtas—Earth, Water, Fire, Air, and Space—are revered as conscious, life-sustaining entities. This sacralization acts as a proto-environmental ethic, discouraging exploitation. Agni is invoked as a “divine priest,” while Indra is praised for slaying ‘Vṛtra’ to release waters, elevating natural processes into cosmological events. Thus, worship functions as a mechanism for environmental preservation, embedded in ritual and cultural memory.
- d) **Hymns to the Earth (Pṛthivī) and Rivers:** The Mother–Son Relationship: The hymns describe Earth as a nurturing system sustaining plants, food, and water. The declaration “The Earth is mother; I am the son of Earth” frames human–Earth relations as kinship. Verses emphasize restraint: “Whatever I dig up of you, O Earth, may you have swift replenishment,” with the plea not to reach Earth’s “heart.” This imagery conveys ecological limits and regeneration in the region. The mother–son model constitutes an ethical and legal framework for preventing unsustainable exploitation. The river Sindhu has also been recorded as the mother (main) river with seven daughters where Saraswati is the 7th tributary, Saraswati Saptami, Sindhu mata (7/36/6).

e) **Cycle of Yajña (Sacrifice):** Yajña encodes reciprocity and conservation where, practical ethics sustaining harmony between humans and the environment is emphasized. It represents an “ever-recurring process of giving and receiving” that integrates human activities into cosmic systems. Offerings to fire (6/5/1-7), water (1/23/16, 18, 19), air (10/186/1), and earth (10/31/9, 5/84) serve as acknowledgments of their life-supporting functions. As a restorative practice, Yajña embodies reciprocity, transcending the anthropocentric–ecocentric divide and situating humans as participants in cycles of conservation, renewal, and mutual support.

f) **The Principle of Ahimsā (Non-Violence):** Ahimsā extends beyond human relations to all living beings. Vedic hymns prohibit the destruction of green trees and the killing of animals or birds, thereby recognizing the intrinsic value of nonhuman life. Applied ecologically, Ahimsā prefigures modern notions of animal rights, plant rights, and biodiversity conservation, positioning nonviolence as both a moral duty and an ecological necessity for systemic balance. In Rig Veda, Forest is praised to be an abode of peace where both the biotic and abiotic communities live in proper co-existence and interdependence without harming each other (10/146/1-6)

g) **Rigvedic Thought vs. Modern Sustainability Theory:** Modern crises have led scholars to seek “help from ancient traditions of wisdom about how to live sustainably.” The Rigveda emphasizes “interconnectedness,” the “cyclical nature of life,” and the need for “balance,” aligning with modern concepts such as the circular economy, biodiversity conservation, and environmental justice. Its value lies not in technological solutions but in offering a holistic foundation that is often missing in policy-driven discourse. While modern sustainability is scientific, the Rigveda adds a spiritual-ethical imperative, filling the “lacuna” between technical solutions and deeper human–nature empathy. Its principles of reverence, reciprocity, and non-greed provide a counter-narrative to exploitation and domination in the West.

Conclusion

The analysis firmly establishes the Rig Veda as an invaluable source that bridges the worlds of early spiritual thought and proto-scientific observation. The Vedic seers articulated a remarkably advanced understanding of the physical world, detailing the Earth’s spherical shape, its dual motions (rotation and revolution) around the Sun, the reflected nature of moonlight, and the entire hydrological cycle. These observations, often embedded within metaphorical or devotional language, reflect a genuine, empirical engagement with natural phenomena that parallels modern scientific discoveries. More significantly, the Rig Veda offers one of the world’s earliest and most comprehensive frameworks for environmental sustainability. This framework is not prescriptive in a modern regulatory sense but is cosmologically and ethically grounded. Concepts like Rta (universal order), the sacralization of nature (deification of Pañchamahābhūtas), and the principle of Ahimsā (non-violence) against all life forms provided an intrinsic motivation for conservation and non-exploitation. The Earth-as-Mother model fostered a relationship of restraint and reciprocity, best exemplified by the restorative act of Yajña (ritual exchange). In summary, the Rig Veda is far more than an ancient text of hymns; it is a profound intellectual document that embodies a unified worldview where spirituality, observation, and ethics are seamlessly integrated. Its principles of interconnectedness and balance provide a powerful, holistic template for addressing modern environmental

challenges, demonstrating that the pursuit of sustainability is a timeless endeavour rooted in the ethical appreciation of the cosmic order.

References

1. Aman, (Ed.). (1976). Rigveda Samhita (Vols. 1–2; Text with Bengali translations based on R. C. Dutt). Haraf Prakashani.
2. Aurobindo, S. (1998). The secret of the Veda (Reprint of 1914 ed.). Sri Aurobindo Ashram Press.
3. Basu, J. (2009). History of Vedic literature (Veder Parichay in Bengali). Firma KLM Pvt. Ltd.
4. Brereton, J. P. (2003). Edifying puzzlement: R̥gveda 10.129 and the uses of enigma. *Journal of the American Oriental Society*, 123(3), 499–512.
5. Chavan, S. P. (2020). A study of the concept of gravity during Vedic and modern age. *Vidhyayana e-Journal*, 6(2), 45–52. <https://j.vidhyayanaejournal.org>
6. Dutt, R. C. (Trans.). (1963). Rig Veda Samhita (in Bengali prose only). Jnan Bharati. (Original work published 1887)
7. Gonda, J. (1963). The vision of the Vedic poets. Brill.
8. Griffith, R. T. H. (1995). The Rig Veda Samhita (Reprint of 1896 ed.). Motilal Banarsidass.
9. Jamison, S. W., & Brereton, J. P. (2014). The Rigveda: The earliest religious poetry of India. Oxford University Press.
10. Majumdar, R. C. (Ed.). (1988). The Vedic age (pp. 229–244, 337–403). Bharatiya Vidya Bhavan.
11. Mukherjee, K. N. (1994). Vedic thoughts. In *Chinta-Vichinta-II (Thoughts & After-thoughts in Bengali)* (pp. 103–141). Calcutta.
12. Mukherjee, K. N. (2003). Rigveda: A reassessment in science, history and divinity (pp. 35–63). Ashima Prakashani.
13. Pathak, J. S. (2021). Laws of gravitation and motion in the ancient Indian texts. *International Journal of Applied Science and Scientific Thought*, 4(1), 66–74. <https://e-journal.usd.ac.id>
14. Sharma, S. K., & Biswas, D. (2023). The environment in Hindu consciousness: Revisiting the sacred texts. In *Environment and sustainability in Hindu traditions* (pp. 45–68). Springer. https://doi.org/10.1007/978-981-97-3933-2_3
15. Singh, R. K., Sharma, V., & Nair, S. (2020). Hydrological processes in the Rig Veda: An ancient insight into the water cycle. *Indian Journal of Hydrology and Environment*, 12(3), 21–34.
16. Subbarayappa, B. V. (2001). Science in India: Past and present. National Academy of Sciences.
17. Sutter, J. (2021). Eclipses and observation in early Vedic cosmology. *History of Astronomy Review*, 48(2), 55–70.
18. Tilak, B. G. (1903). The Arctic home in the Vedas. Tilak Brothers.
19. Vahia, M., & Soma, M. (2016). Astronomy and chronology in the Rig Veda: A re-examination. *Indian Journal of History of Science*, 51(2), 141–160.
20. Verma, V. (2022). Environmental awareness in Vedic literature. *Journal of Multidisciplinary Studies and Growth*, 3(1), 12–19. <https://www.jmsjournals.in>

21. Winternitz, M. (1962). A history of Indian literature (Vol. 1, Part 1: Veda; S. Ketkar, Trans.) (pp. 45–104, 253–271). University of Calcutta. (Original work published 1905)
22. Winternitz, M. (1983–1985). A history of Indian literature (Vols. 1–3; S. Ketkar & H. Kohn, Trans.). Motilal Banarsidass. <https://archive.org/details/in.ernet.dli.2015.97551>
23. Witzel, M. (1995). Early Sanskritization: Origins and development of the Kuru state. *Electronic Journal of Vedic Studies*, 1(4), 1–26. <https://ejvs.laurasianacademy.com>
24. Witzel, M. (1997). Vedic cosmology and its ritual connection. In M. Witzel (Ed.), *Inside the texts, beyond the texts: New approaches to the study of the Vedas* (pp. 89–125). Harvard Oriental Series.

