Insieme Arti
Journal for Performing Arts
ISSN: 3048-9849 (Online)
Volume 3, Issue 1 (2026)
DOI: 10.63984/IAJPA.v3.i1.2026.50-62

# From Nāda to Melakarta: The Evolution of Rāga in Indian Knowledge Systems and its Relevance to the Sustainable Development Goals

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**Abstract**

The evolution of Indian classical music represents one of the most sophisticated intellectual trajectories within the Indian Knowledge Systems (IKS). Beginning with the metaphysical doctrine of Nāda and the tonal recitation of the Sāmaveda, Indian music developed through systematic refinements in śruti (microtone), svara (note), jāti (proto-rāga), grāma (scale system), mūrchanā (modal shift), and rāga (aesthetic melodic entity). Foundational treatises such as the Nāṭyaśāstra, Dattilam, Bṛhaddēśī, Saṅgīta Ratnākara, and Chaturdandi Prakāśikā progressively codified these developments, culminating in the 72 Melakarta system.

This study employs historical-textual analysis to trace the transformation of melodic thought from Vedic chant to structured raga taxonomy. It further interprets rāga as a multidisciplinary knowledge system integrating acoustics, mathematics, psychology, pedagogy, and metaphysics. By mapping these principles onto selected United Nations Sustainable

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Development Goals (SDGs)—particularly SDG 3, SDG 4, SDG 11.4, SDG 16, and SDG 17—the paper argues that Indian classical music offers a sustainable epistemic model capable of addressing contemporary global challenges. The rāga system thus emerges not merely as a performing art tradition but as a living knowledge paradigm grounded in scientific rigor and cultural continuity.

***Keywords:*** *Nāda, Śruti, Jāti, Grāma, Rāga, Melakarta, Indian Knowledge Systems, Sustainable Development Goals*

## 1. Introduction

Indian classical music stands as one of the most enduring intellectual-artistic traditions in world civilization. Its evolution spans millennia, beginning in the Vedic ritual soundscape and extending into highly systematized melodic frameworks of the classical and post-classical periods. Unlike many musical traditions that evolved primarily as performance arts, Indian music developed simultaneously as metaphysical inquiry, scientific investigation, and pedagogical discipline.

The concept of Nāda, understood as primordial vibration, establishes the philosophical foundation of Indian music. The doctrine of Nāda Brahma posits sound as the ontological basis of creation, situating music within cosmology rather than mere aesthetics. From this metaphysical origin, music gradually assumed structured tonal organization through the recitational traditions of the Sāmaveda, eventually expanding into complex melodic identities known as rāgas.

The transition from unstructured tonal chanting to systematic rāga classification reflects a sophisticated epistemological process. The gradual development from śruti to svara, from jāti to rāga, and ultimately to the Melakarta taxonomy reveals an intellectual continuity that

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characterizes Indian Knowledge Systems (IKS). In the contemporary era, this structured knowledge tradition gains renewed relevance when examined through the framework of the Sustainable Development Goals (SDGs), particularly in domains of education, mental health, cultural preservation, and social harmony.

This study seeks to analyze the historical evolution of rāga while situating it within broader epistemic and sustainability frameworks.

## 2. Materials and Methods

### 2.1 Research Design

This study adopts a qualitative historical and textual methodology grounded in primary Sanskrit musicological treatises and supported by secondary scholarly interpretations. The approach is descriptive-analytical and interpretative in nature.

### 2.2 Primary Textual Sources

The principal treatises examined include:

- Nāṭyaśāstra – foundational articulation of jāti theory and Daśalakṣaṇa principles
- Dattilam – classification of 18 jāti-rāgas
- Bṛhaddēśī – earliest formal definition of rāga
- Saṅgīta Ratnākara – medieval synthesis of musicological theory
- Chaturdandi Prakāśikā – systematic formulation of the 72 Melakarta scheme

### 2.3 Analytical Procedure

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The study proceeds through:

1. Chronological tracing of conceptual developments
2. Comparative analysis of melodic classifications
3. Structural examination of tonal frameworks
4. Interpretive mapping to IKS epistemology
5. Thematic correlation with SDG objectives

## 3. Results

### 3.1 Vedic Foundations: From Nāda to Svara

The earliest musical articulation appears in the tonal recitation of Vedic hymns. The three primary tonal accents—anudātta, svarita, and udātta—formed the nucleus of melodic differentiation. Over time, this triadic tonal system expanded into a seven-note structure (saptasvara), supported by the classification of 22 śrutis.

The codification of 22 śrutis in the Nāṭyaśāstra marks a major milestone in acoustic theory, indicating a refined awareness of microtonal perception. (See Table 1.)

### 3.2 Emergence of Jāti and Daśalakṣaṇa

Before the formalization of rāga, melodic types known as Jātis dominated classical music. Bharata identifies seven śuddha jātis and eleven vikṛta jātis. Each jāti was characterized by ten defining attributes (Daśalakṣaṇa), including graha (initial note), amśa (dominant note), nyāsa (resting note), alpatva (minor use), and bahutva (frequent use).

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This systematic classification indicates early structural thinking comparable to modal theory in other musical cultures.

### 3.3 Formal Definition of Rāga

The term "rāga" receives its first technical definition in the Bṛhaddēśī, where it is described as a melodic configuration capable of "coloring the minds" of listeners. This definition shifts focus from purely structural features to aesthetic-emotional impact (rasa).

### 3.4 Grāma and Rāgagīti Systems

Three primary grāmas—Ṣaḍja, Madhyama, and Gāndhāra—served as scalar bases. From these emerged six principal Grāmarāgas (See Table 2).

Later, five Rāgagītis—Śuddha, Bhinna, Gauḍa, Veśara, and Sādhāraṇī—demonstrated regional assimilation and stylistic diversity (See Table 3).

### 3.5 Scale Expansion and Modal Logic

The Sāma scale evolved gradually from triadic to heptatonic structure. Modal shifts (mūrchanā) enabled flexible reorganization of tonal centers. This represents early permutation logic within music theory.

### 3.6 Classical Consolidation of Rāga Theory

The classical period marks a decisive phase in the systematic consolidation of Indian melodic theory. In the Nāṭyaśāstra (c. 2nd century CE), Bharata identifies two vikṛta svaras—antara Gāndhāra and kākaḷī Niṣāda—indicating a refined awareness of tonal alteration within the seven-note framework. This recognition of microtonal differentiation reflects an advanced acoustic understanding and signals the transition from Vedic chant toward structured melodic organization.

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By this time, key theoretical categories had been formalized: svara (note), sthāna (register), varṇa (melodic movement), kāku (vocal inflection), alaṅkāra (ornamentation), aṅga (component), and mūrchanā (modal arrangement). Gandharva music employed seven śuddha jāti-rāgas, each defined by tonal structure, modal sequence, and aesthetic intention (rasa and bhāva). These jāti frameworks functioned as prototypes of the later rāga system.

Mūrchanā, the sequential arrangement of notes from varying tonal centers, was central to early scalar logic. From the three principal grāmas—Ṣaḍja, Madhyama, and Gāndhāra—emerged multiple modal permutations. Bharata enumerates fourteen mūrchanās, while Nārada identifies twenty-one, demonstrating theoretical diversity. Between the 5th and 7th centuries CE, mūrchanā expanded to include twelve tonal positions. In the Bṛhaddēśī, Mātaṅga distinguishes seven-tone forms (pūrṇa, audava, ṣāḍava, sādhāraṇa) and twelve-tone configurations distributed across mandra, madhya, and tāra registers. This expansion marks the gradual shift from modal systems to a fully aestheticized rāga concept.

Simultaneously, performance grammar acquired structural precision. Varṇa, also termed gānakriyā, denotes the primary modes of melodic movement—ārohi (ascending), avarohi (descending), sthāyi (sustained), and sanchāri (mixed). These patterns provided the structural basis for alaṅkāras, which enriched melodic texture while preserving tonal identity.

Tāna, derived from *tan* (“to stretch”), represents patterned melodic extension. Early references in the Saṅgīta Makaranda and the Bṛhaddēśī suggest ritual antecedents. The Nāradīya tradition lists forty-nine tānas derived from the grāmas, while Bharata expands them to eighty-four, categorized by tonal structure. Tānas were further distinguished as praveśa (gentle) and nigraha (forceful), illustrating expressive differentiation and strengthening improvisational practice.

Gamakas and kāku deepened expressive nuance. Gamakas—oscillatory embellishments such as kampita and āndolita—define rāga identity through microtonal inflection. Kāku, the

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modulation of vocal tone for emotive expression, is treated in the Nāṭyaśāstra as essential to rasa realization, later elaborated by commentators including Abhinavagupta and Śārṅgadeva. Together, they integrate technical precision with aesthetic communication.

Recurring melodic frameworks known as sthāyas gradually emerged from improvisatory practice and were systematized between the 5th and 11th centuries. These provided stability within evolving rāga structures.

The consolidation of rāga theory culminates in the Daśalakṣaṇa—the ten defining characteristics of melodic identity: graha, amśa, tāra, mandra, nyāsa, apanyāsa, alpatva, bahutva, shādava, and audava. Complemented by tonal hierarchies—vādi, samvādi, anuvādi, and vivādi—these principles ensured structural coherence and aesthetic distinctiveness.

Collectively, these developments transformed early modal practices into a sophisticated rāga framework, reflecting an integrated epistemology uniting acoustics, aesthetics, and performance theory.

### 3.7 Evolution of the Scales

Scales—the systematic arrangement of tones—form the structural basis of rāgas in Indian classical music. The earliest organized scalar framework is associated with Sāma-gāna, regarded as the most ancient musical system. Tradition holds that the Sāman scale evolved from the Vedic tonal accent Krushta, corresponding to the laukika Panchama of the lower register, and developed primarily in a descending (avarohi) order.

Initially, Sāma chants employed three tonal accents—Udatta, Anudatta, and Svarita—identified with the laukika tones Rishabha, Nishadha, and Shadja. These constituted an early triadic tonal framework. The addition of Gandhara (a semitone above Rishabha) expanded the system into a tetratonic configuration (Ga, Ri, Ni, Sa). With the inclusion of Dhaivata, it

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evolved into a pentatonic form, and the subsequent addition of Madhyama produced a hexatonic structure (Ma, Ga, Ri, Sa, Ni, Dha).

The final development occurred with the incorporation of Panchama, resulting in the complete heptatonic scale (saptaka). This formed two balanced tetrachords: Ma, Ga, Ri, Sa and Sa, Ni, Dha, Pa. According to Prof. P. Sambamurthy, the structural symmetry of these tetrachords—approximating a 3:4 ratio—led to its identification as a Madhyama-oriented scale.

When the lower tetrachord was rendered an octave higher, the concept of the saptaka became fully articulated. This Sāma-saptaka later evolved into the Shadja Grāma, regarded as the primordial scale of Indian music. The Shadja Grāma functioned across three registers—mandra, madhya, and tāra—establishing the foundational register system for subsequent rāga development.

### 3.8 The 72 Melakarta System

The culmination of scalar organization appears in the 72 Melakarta framework proposed in Chaturdandi Prakāśikā. By systematically permuting swara positions under defined constraints, Venkatamakhi conceptualized a comprehensive parent-scale taxonomy.

Later refinements through the Kaṭapayādi system completed the naming structure of the 72 melas (See Table 4).

## 4. Discussion

### 4.1 Rāga as a Multidisciplinary Knowledge System

The historical evolution of rāga demonstrates:

- Acoustical science (śruti classification)

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- Mathematical combinatorics (Melakarta permutations)
- Psychological theory (rasa aesthetics)
- Pedagogical structure (guru–śiṣya paramparā)
- Philosophical cosmology (Nāda Brahma doctrine)

Thus, Indian music represents a holistic epistemic framework characteristic of IKS.

### 4.2 Relevance to Sustainable Development Goals

**SDG 3: Good Health and Well-being**

Rāga therapy and Nāda Yoga demonstrate measurable effects on stress reduction, emotional balance, and mental clarity.

**SDG 4: Quality Education**

Rāga training strengthens memory, concentration, auditory discrimination, and analytical reasoning.

**SDG 11.4: Safeguarding Cultural Heritage**

The continuity from Jāti to Melakarta reflects successful intergenerational transmission of intangible heritage.

**SDG 16: Peace and Social Harmony**

Rasa-based aesthetics cultivate empathy and emotional refinement, fostering peaceful social interaction.

**SDG 17: Partnerships**

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Collaborations among universities, cultural academies, and global institutions promote preservation and dissemination.

### 5. Conclusion

The journey from Nāda to Melakarta encapsulates a civilizational process in which metaphysical insight evolved into structured musical science. Indian classical music represents not merely artistic heritage but a sustainable knowledge system integrating acoustics, cognition, mathematics, psychology, and spirituality.

When examined through the dual frameworks of IKS and SDGs, the rāga emerges as a living model of holistic education, mental well-being, cultural resilience, and sustainable knowledge transmission. Its continued practice and study thus hold significance not only for cultural preservation but also for global human development.

## Tables

**Table 1. Names of Śrutis, Corresponding Jāti, and Associated Svaras**

| No. | Name of Śruti | Corresponding Jāti | Svara |
|---|---|---|---|
| 1 | Tīvrā | Dīptā | |
| 2 | Kumudvatī | Āyatā | |
| 3 | Mandā | Mṛdu | |
| 4 | Chandovatī | Madhyā | Sa |
| 5 | Dayāvatī | Karuṇā | |
| 6 | Rañjanī | Madhyā | |
| 7 | Ratīkā | Mṛdu | Ri |
| 8 | Raudrī | Dīptā | |
| 9 | Krodhā | Āyatā | Ga |
| 10 | Vajrikā | Dīptā | |
| 11 | Prasāriṇī | Āyatā | |
| 12 | Prīti | Mṛdu | |
| 13 | Mārjanī | Madhyā | Ma |
| 14 | Kṣiti | Mṛdu | |

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| No. | Name of Śruti | Corresponding Jāti | Svara |
|---|---|---|---|
| 15 | Raktā | Madhyā | |
| 16 | Sāndīpanī | Āyatā | |
| 17 | Ālāpinī | Karuṇā | Pa |
| 18 | Madantī | Karuṇā | |
| 19 | Rohiṇī | Āyatā | |
| 20 | Ramyā | Madhyā | Dha |
| 21 | Ugrā | Dīptā | |
| 22 | Kṣobhiṇī | Madhyā | Ni |

**Table 2. Principal Grāmarāgas Mentioned in Nāradīya Tradition**

| Grāma | Grāma Rāgas (Nāradīya Śikṣā) |
|---|---|
| Ṣaḍja Grāma | 1.Śuddha-Sādhāraṇa<br>2.Ārṣabhī<br>3. Gāndhārī |
| Madhyama Grāma | 4.Madhyamā<br>5.Pañcamī<br>6. Dhaivatī |

**Table 3. Classification of Rāgagītis (Bṛhaddēśī)**

| **Sl.No** | **Category** | **No. of Rāgas** | **Evolved From** | **Rāgas Included** |
|---|---|---|---|---|
| 1. | Śuddha Grāmarāgas | 7 | Shadja Grama | 1. Kaishika-Madhyama 2. Sadharita 3. Shadjagrama |

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| Sl.No | Category | No. of Rāgas | Evolved From | Rāgas Included |
|---|---|---|---|---|
| | | | Madhyama Grama | 4. Madhyamagrama 5. Shadava 6. Panchama 7. Kaishika |
| 2. | Bhinna Grāmarāgas | 5 | Shadja Grama | 1. Bhinna Shadja2. Kaishika-Madhyama |
| | | | Madhyama Grama | 3. Kaishika4. Taana5. Bhinnapanchama |
| 3. | Gauda Grāmarāgas | 3 | Shadja Grama | 1. Gauda-Kaishika-Madhyama2. Gauda-Panchama |
| | | | Madhyama Grama | 3. Gauda-Kaishika |
| 4. | Veśara Grāmarāgas | 8 | Shadja Grama | 1. Takka2. Veshara-Shadava3. Sauviri |
| | | | Madhyama Grama | 4. Botta5. Malava-Kaishika6. Malava-Panchama |
| | | | Both Gramas | 7. Takka-Kaishika8. Hindola |
| 5. | Sādhāraṇī Grāmarāgas | 7 | Shadja Grama | 1. Rupa-Sadharani2. Shaka3. Bhasmana-Panchama |
| | | | Madhyama Grama | 4. Narta5. Gandhara-Panchama6. Shadja-Kaishika7. Kakubha |

**Table 4. Comparative Mela Systems**

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| Sl.No | Asampūrṇa (Without kaṭapayādi) | Asampūrṇa (With Kaṭapayādi) | Sampūrṇa Melakarta |
|---|---|---|---|
| 1. | Kanakambari | Kanakambari | Kanakangi |
| 2. | Ghenadyuti | Ghenadyuti | Ratnangi |
| 3. | Malavagoula | Mayamalavagoula | Mayamalavagoula |
| 4. | Ramakriya | Kashiramakriya | Kamavardhini |
| 5. | Bhushavali | Bhushavati | Vachaspati |

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