SILENT HARM: LEGAL LIABILITY AND REGULATION OF SUB-AUDIBLE NOISE POLLUTION IN INDIA

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Abstract

Sub-audible noise represents a "silent harm" that escapes human perception yet inflicts documented physiological, ecological, and behavioural damage. It encompasses infrasound and ultrasound, and is an overlooked yet significant issue in India. India's existing noise control laws—the Noise Pollution (Regulation and Control) Rules, 2000; the Environment Protection Act, 1986; the Factories Act, 1948 only pay attention to audible decibel levels.[2] There are no distinct legal provisions addressing sub-audible noise in India. Judicial interpretations of Articles 21, 48A, and 51A(g) of the Constitution have affirmed the right to a healthy environment, yet landmark judgments and policies remain silent on inaudible frequencies. This article aims to fill some of the critical gaps in the Indian framework by conducting a comparative analysis of UK, US, EU, and IMO guidelines, focusing on exposure limits, monitoring and mitigation requirements, and proposing thoughtful consideration of certain reforms. India would be able to eliminate silent harm by transforming it into an area of actively protected environmental and health regulation through public education campaigns and by including sub-audible noise into legal definitions.

KEYWORDS: Sub-audible, Noise, Pollution, Sonar, Infrasound, Environmental liability, Marine ecosystems, Acoustic ecology

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[2] The Bombay High Court, in a Criminal Writ Petition, observed that noise pollution is a significant health hazard and that the use of loudspeakers is not an essential part of any religion. | Gourav Shahane. https://www.linkedin.com/posts/gourav-shahane-b52b94192_case-court-court-activity-7288461653757612032-qsm_

What is Sub-Audible Noise Pollution?

Humans can detect sounds in a frequency range from about 20 Hz to 20 kHz.[3] Sub-audible noise pollution refers to sound waves that fall outside the typical human hearing range- either infrasonic/Infrasound (> 20 Hertz) or ultrasonic (< 20 kilohertz). Not all species of mammals have the same sensitivity to sound frequencies. These acoustics, although inaudible to humans, can lead to behavioural alterations and considerable damage to humans, animals, and the environment, thus being dubbed the "Silent Harm".[4]

Unlike traditional noise pollution, which is measured and regulated in terms of audible decibel levels, sub-audible noise operates silently and remains unchecked in industrial, medical, and marine sectors. In particular, bathymetric sonar—used for underwater mapping has been shown to disrupt echolocation, navigation, and communication in aquatic species such as whales and dolphins.[5]

Effects of Sub-Audible Noise Pollution

Sub-audible noise, often in the form of infrasound, may not be consciously perceived, but it can still produce physiological and psychological effects. The lower frequency sounds have the potential to raise blood pressure, cause hypertension, heart disease, and increase the likelihood of sleeplessness. Going a layer deeper, infrasound can trigger the vestibular system found in one's inner ear, which manages one's sense of balance, and lead to headaches, nausea, and dizziness.[6]

[3] Fletcher, H., & Munson, W. A. (1933). Loudness, its definition, measurement and calculation. The Journal of the Acoustical Society of America, 5(2), 82–108. https://doi.org/10.1121/1.1915637

[4] National Library of Medicine, USA, https://www.ncbi.nlm.nih.gov/books/NBK10924/ (last visited on July 12, 2025)

[5] Popper, A. N., & Hawkins, A. D. (2016). The effects of noise on aquatic life II. Springer. https://doi.org/10.1007/978-1-4939-2981-8

[6] Salt, A. N., & Hullar, T. E. (2010). Responses of the ear to low frequency sounds, infrasound and wind turbines. Hearing Research, 268(1-2), 12–21.

Chronic sub-audible noise acts as a pollutant in ecosystems. It is recognized as a major global stressor for biodiversity. Noise can shift predator-prey dynamics. Prey that rely on hearing predators (or vice versa) can be disadvantaged. Studies show noise increases stress hormones and reduces sleep in many species, which can weaken immunity and survival.[7] Low-frequency vibrations from industrial sources may affect soil and water properties. Hassan et al. (2018) suggested that such vibrations could alter soil compaction and water retention, potentially impacting soil health and plant growth.[8] It was also recently discovered that plants can detect low-frequency sounds, which might influence their growth patterns or stress responses.[9] Animals, especially those with sensitive or different hearing ranges, are particularly vulnerable to sub-audible noise. Some birds appear to use infrasound cues for navigation. A 2023 study found wandering albatrosses tend to fly toward "loud" microbarom infrasound generated by distant storms.[10] Marine species like whales and dolphins communicate and navigate using low-frequency sound.[11] It is well known that anthropogenic low-frequency noise like Sonars disrupt these signals, which leads to disorientation, stress, and compromised mating behaviours.[12]

Existing Indian Legal and Regulatory Framework

[7] Frontiers, https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2023.1130075/full (last visited on July 13, 2025)

[8] Hassan, S. A., Ali, M., & Khan, M. A. (2018). Impact of industrial noise on soil properties. Environmental Monitoring and Assessment, 190(12), 1–10.

[9] Gagliano, M., Mancuso, S., & Robert, D. (2012). Towards understanding plant bioacoustics. Trends in Plant Science, 17(6), 323–325.

[10] Phys Org, https://phys.org/news/2023-10-evidence-albatrosses-infrasound-journeys.html (last visited on July 14, 2025)

[11] Knowlton, C. (2017, February 26). ultrasonic. https://dosits.org/glossary/ultrasonic

[12] Southall, B. L., Bowles, A. E., Ellison, W. T., Finneran, J. J., Gentry, R. L., Greene, C. R., ... & Tyack, P. L. (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals, 33(4), 411–521.

The primary legislation governing noise pollution in India is the 'Noise Pollution (Regulation and Control) Rules, 2000', enacted under the Environment Protection Act, 1986.[13] [14] These rules establish ambient air quality standards for noise across different zones. Noise was included in the definition of air pollutant in the Air (Prevention and Control of Pollution) Act in 1987.[15] Thus, the provisions of the Air Act, became applicable in respect of noise pollution, also.[16] However, the rules do not explicitly mention sub-audible noise (infrasound, below 20 Hz), ultrasound (above 20 kHz), or sonar and focus primarily on audible decibel levels. However, the broad scope of this Act could allow authorities to regulate sub-audible noise under environmental protection measures if sufficient evidence of its impact is presented.

For industrial noise, the Factories Act, 1948, addresses occupational health and safety, including noise-induced hearing loss, listed as a notifiable disease in the Third Schedule. But, these regulations also do not address sub-audible noise or ultrasound, as these frequencies are outside the human hearing range and have different health impacts. State-specific rules, such as the Maharashtra Factories Rules, 1963, follow a similar preoccupation with only audible noise.

The Environmental Impact Assessment (EIA) Notification, 2006, under the Environment Protection Act, 1986, mandates environmental clearance for projects listed in its schedule, including but not limited to petroleum refining industries. Chemical plants. Highways, ports, airports, etc. The EIA process requires assessing environmental impacts, including noise, which for offshore projects includes underwater noise due to its impact on marine life. Nonetheless, the notification does not address sub-audible noise, ultrasound, or sonar explicitly.[17]

The 'Central Pollution Control Board' (CPCB), operating under the Ministry of Environment, Forest and Climate Change, is the apex body for environmental regulation in India. The

[13] Latest Laws; https://www.latestlaws.com/latest-caselaw/2005/july/2005-latest-caselaw-356-sc/ (last visited on July 10, 2025)

[14] https://www.casemine.com. (2016, September 21). Bimal Singh Karnawat Ors. v. West Bengal Pollution Control Board Ors, National Green Tribunal, Judgment, Law, casemine.com. https://www.casemine.com/judgement/in/5c064b75b338d127125a71a8

[15] J.S. Laura; https://ebooks.inflibnet.ac.in/esp09/chapter/legal-provisions-and-act-for-noise-pollution/ (last visited on July 10, 2025)

[16] In Re: Noise Pollution - Implementation of the Laws for restricting use of loudspeakers and high volume producing sound systems (18.07.2005 - SC) : 2005 INSC 297, Paragraph 109

[17] Environmental Impact Assessment (EIA) Notification, S.O. 1533(E), Appendix I Form 1, 2006

CPCB's framework primarily addresses audible noise, but the broad definition of noise pollution under the Environment (Protection) Act, 1986, as any sound "injurious to human beings or other living creatures," encompasses sub-audible noise as well.

Ministry of Earth Sciences (MoES) and its constituent NIOT have conducted research into underwater acoustics. In Parliament (July 2023) MoES reported that NIOT has developed and deployed an Autonomous Deep-Water Noise Measurement System (DANMS) in the Arabian Sea and Bay of Bengal. NIOT's Ocean Acoustics project has fixed and drifting hydrophones that continuously listen for ambient underwater sound. These activities collect data on anthropogenic noise levels (e.g. shipping, seismic surveys) in Indian waters, but they have not translated into regulations.[18]

Thus, no laws in India directly address sub-audible noise. The existing legal framework offers indirect mechanisms. If sub-audible noise results in health issues or disturbances, it could be addressed under the law of torts as a private nuisance (affecting an individual) or public nuisance (affecting a community) under Section 270, Bharatiya Nyaya Sanhita (BNS) read with Section 152, Bharatiya Nagarik Suraksha Sanhita (BNSS). Legal action could be pursued in civil courts for remedies such as injunctions or damages.[19]

Constitutional Provisions and Judicial Interpretation

The Indian Constitution does not explicitly mention noise pollution. However, Article 21 guarantees the right to life, securing personal liberty.[20] Article 47 in Part IV of the Constitution puts a duty on the State to raise the standard of living and to improve public health.

After the 42nd Amendment Act, Article 48A further puts a constitutional duty on the State to protect and improve the environment and to safeguard the forests and wildlife. Complementing Article 48A, Article 51A(g), enacted in the Emergency era assigns a fundamental duty on the citizens to protect and preserve the environment.

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[18] Rajya Sabha Question, https://moes.gov.in/sites/default/files/RS-English-83-27-07-2023.pdf#: (last visited on July 11, 2025)

[19] Ratanlal, & Dhirajlal. (2019). The law of torts (28th ed.). LexisNexis. P. 352-355

[20] Legal Service India; https://www.legalserviceindia.com/legal/article-16944-right-to-life-and-personal-liberty-under-article-21-of-the-indian-constitution-.html#google_vignette (last visited on 9 July, 2025)

These provisions have been expansively interpreted by the judiciary to include the right to a healthy environment.

In *Subhash Kumar v. State of Bihar* (1991)[21], the Court held that the right to life under Article 21 encompasses the right to enjoy pollution-free water and air, laying the groundwork for environmental protection and, by extension, prevention of noise pollution as a fundamental right.

As early as 1958, the Supreme Court in *The State of Rajasthan Vs. G. Chawla and Ors*[22] held valid the state's authority to regulate noise pollution.

In the case of *Church of God (Full Gospel) in India v. K.K.R. Majestic Colony Welfare Assn. (2000)*[23], the Supreme Court held that excessive noise from religious activities violated residents' rights under Article 21.

The landmark judgement on Noise Pollution came in 2005 *as Re: Noise Pollution - Implementation of the Laws for restricting use of loudspeakers and high volume producing sound systems*.[24] The judgment establishes noise pollution as a violation of fundamental rights under Article 21 (right to life) and provides a legal foundation that can extend to sub-audible noise. The court held that the Noise Pollution (Regulation and Control) Rules, 2000 define noise pollution as "sound at levels that are annoying, distracting, or physically harmful. While focused on audible noise, the broad phrasing "physically harmful" could encompass sub-audible noise if its adverse effects are scientifically proven.

Global Perspectives

Several nations have enacted separate legislations to tackle noise pollution like- UK Noise Act, 1996; Japan Noise Regulation Law; Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise (adopted on October 29, 1996); Australia's

[21] Subhash Kumar Vs. State of Bihar and Ors. (1991) 1991 INSC 3

[22] The State of Rajasthan vs. G. Chawla and Ors. (16.12.1958 - SC) : 1958 INSC 118

[23] Church of God (Full Gospel) in India Vs. K.K.R. Majestic Colony Welfare Association and Ors. (2000) 2000 INSC 424

[24] In Re: Noise Pollution - Implementation of the Laws for restricting use of loudspeakers and high volume producing sound systems (18.07.2005 - SC) : 2005 INSC 297

Noise Control Act, 1975 and many others. While most of them tackle audible noise pollution, some pioneering legislations have made room for sub-audible noise pollution too.

The United Nations UNCLOS (Law of the Sea) obliges states to "prevent, reduce and control" marine pollution from vessels (Article 211), which can be interpreted to cover noise pollution, though UNCLOS does not define specific noise rules.

Marine Mammal Protection Act (MMPA) of the United States of America specifies that any activity (seismic surveys, military sonar, pile-driving) that "takes" (harasses) marine mammals by noise must obtain a permit, often with binding mitigation measures. NOAA Fisheries publishes acoustic exposure criteria and requires proactive acoustic risk assessment and mitigation for protected species.[25]

Recently, the European Union has also prescribed guidelines to control marine noise pollution through the Marine Strategy Framework Directive (MSFD) under which member States must ensure underwater noise does not adversely affect marine life. In November 2022, the EU adopted legally binding threshold values for ambient undersea noise to protect marine ecosystems.[26]

In 2014 and 2023 the International Maritime Organization (IMO) published voluntary guidelines for the reduction of "Underwater Radiated Noise (URN)" from ships. These guidelines recommend the implementation of design and operational measures such as "quiet" hulls and propellers, or speed reduction to less than 20% of the ship's maximum speed to minimize noise impacts on marine life. As a member of the IMO, India helped in formulating these guidelines, and is even co-hosting a GEF–UNDP–IMO partnership project called "GloNoise"[27] which aims to enhance capabilities for the management of underwater noise.

[25] NOAA Fisheries, US Government, https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools#:~:text=Purpose%20of%20the%20Updated%20Technical,Guidance (last visited on July 14, 2025)

[26] European Commission, EU, https://environment.ec.europa.eu/news/zero-pollution-and-biodiversity-first-ever-eu-wide-limits-underwater-noise-2022-11-29_en#:~:text=The%20new%20limits%20mean%2C%20that,over%20a%20year (last visited on July 14, 2025)

[27] IMO, https://www.imo.org/en/ourwork/partnershipsprojects/pages/glonoise-partnership.aspx (last visited on July 14, 2025)

Still, these guidelines remain non-binding, and India has not adopted domestic legislation on shipping noise regulations.[28]

Other countries are also contemplating taking steps to address this problem, for instance Canada whose federal agencies have committed to a national Ocean Noise strategy. In sum, developed countries are increasingly treating underwater and industrial sub-audible noise as a distinct pollution issue, whereas India's framework remains largely in a "catch-all" category of general noise pollution.

Reform Ideas and Concluding Remarks

" The Statutes and the Rules framed thereunder are not comprehensive enough so as to deal with all the problems and issues related to noise pollution. This impression of ours stands reaffirmed on a comparative reading of legislation in India with those in other countries of the world"

Chief Justice of India, R.C. Lahoti[29]

Twelfth International Congress on Sound and Vibration observed on similar lines that Low Frequency Noise (LFN) (<500 Hz) laws "are highly deficient" and no concrete controls exist for excessive LFN.[30]

The lack of a specific definition for sub-audible noise in existing laws limits regulatory action. Current decibel-based standards apply only to audible noise, leaving sub-audible noise unchecked. There is an urgent need to establish frequency-specific or vibration-based standards for sub-audible noise, tailored to industrial, residential, and ecological zones.

Instruments used by regulators generally use A-weighting or 1/3-octave band analysis. There is no standardized procedure in India to measure or report sub-audible noise, creating a lack of evidence. Complaints about rumble or vibration are rarely pursued under noise laws because

[28] India Shipping News, https://indiashippingnews.com/imo-addressing-underwater-noise-from-ships-draft-revised-guidelines-agreed/#:~:text=LONDON%20%3A%20Draft%20revised%20Guidelines,27%20January (last visited on July 11, 2025)

[29] In Re: Noise Pollution - Implementation of the Laws for restricting use of loudspeakers and high volume producing sound systems (18.07.2005 - SC) : 2005 INSC 297 : Paragraph 130 (1)

[30] Twelfth International Congress on Sound and Vibration, https://docs.wind-watch.org/low-frequency-noise-legislation.pdf#: (last visited on July 10, 2025)

of this omission. Thus, law enforcement, too, requires new instruments, devices, and complementary training to detect and enforce sub-audible noise pollution violations.

The judiciary can also play a proactive role by interpreting Article 21 to encompass infrasound and ultrasound (as part of "unhealthy environment") and by encouraging the legislature/regulators to act. The National Green Tribunal (NGT) can *suo motu* order studies or restrict subaudible noise in hotspot areas. Article 142 special powers of the Supreme Court (as used in *In Re Noise Pollution*) could enforce interim measures until formal norms are in place.

Ultimately, we must strive to boost public awareness of this topic and mainstream its advocacy in the broader Environmental Activism and politics. We can incorporate subaudible noise pollution topics in environmental education and inform developers and communities about the unseen risks of these unheard vibrations.

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