

Comparison of Offering Waste Management Regulations from the Perspective of Environmental Law in Indonesia and India

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Abstrak (Indonesia)	<p>Praktik keagamaan melalui sesajen di Indonesia dan India merefleksikan nilai spiritual, kebersamaan, dan penghormatan terhadap yang sakral, tetapi pada saat bersamaan melahirkan persoalan ekologis ketika residu persembahan, yaitu bunga, daun, dupa, wadah plastik, maupun air suci berakhir sebagai limbah tanpa pengolahan memadai. Paradoks antara penghormatan religius dan kebutuhan pelestarian ekologi menuntut kehadiran pengaturan yang jelas, Standar Operasional Teknis (SOP) yang rinci, serta strategi pengelolaan yang efektif sejak hulu. Penelitian ini merupakan penelitian hukum normatif yang menggunakan studi kepustakaan sebagai metode pengumpulan data terhadap bahan hukum primer, seperti UU No. 18/2008, PP No. 81/2012, berbagai kebijakan daerah, serta Solid Waste Management Rules 2016, bahan hukum sekunder yang terdiri atas artikel ilmiah, buku, laporan kebijakan, serta bahan tersier terdiri atas berita di internet. Penelitian ini bertujuan untuk menelaah perbedaan kerangka regulasi kedua negara, mengidentifikasi kendala sosial-budaya, kelembagaan, serta penegakan hukum yang ada, sekaligus merumuskan strategi pengelolaan yang sejalan dengan prinsip pencegahan, prinsip kehati-hatian, dan asas keberlanjutan dalam perspektif hukum lingkungan. Hasilnya menunjukkan bahwa pengaturan Indonesia masih umum dan bergantung pada diskresi pemerintah daerah sehingga SOP khusus sampah upakara belum seragam, sedangkan India lebih spesifik melalui klasifikasi bulk waste generator, kewajiban pemilahan di sumber, pelarangan bahan berbahaya pada prosesi, penataan fasilitas perendaman buatan, serta skema denda dan pemulihan. Tantangan utama di kedua yurisdiksi meliputi persepsi kesucian yang menghambat pemilahan, lemahnya koordinasi lintas aktor, keterbatasan sarana, dan minimnya data kuantitatif untuk evaluasi. Rekomendasi meliputi penyusunan SOP teknis nasional dan daerah yang operasional, penguatan koordinasi otoritas lokal atau dinas lingkungan, seperti pengurus rumah ibadah desa adat, edukasi publik berbasis kearifan lokal, penyediaan infrastruktur pemilahan dan kompos, insentif bagi praktik baik, serta target 3R yang terukur dengan pengawasan dan sanksi administratif.</p>

Abstrack

Religious practices, including offerings (sesajen) in Indonesia and India, reflect spiritual values, communal solidarity, and reverence for the sacred, yet simultaneously create ecological challenges when residues, such as flowers, leaves, incense, plastic containers, and holy water, are discarded without proper treatment. This paradox between religious devotion and ecological preservation highlights the need for clear regulations, detailed Standard Operating Procedures (SOPs), and effective upstream management strategies. This study employs a normative legal approach using a literature review of primary legal materials, including Law No. 18/2008, Government Regulation No. 81/2012, regional policies in Indonesia, and India's Solid Waste Management Rules 2016. Secondary sources comprise scholarly articles, books, and policy reports, while tertiary data include official websites and online news sources. The research aims to compare the regulatory frameworks of the two countries, identify socio-cultural, institutional, and enforcement barriers, and propose management strategies consistent with the principles of prevention, precaution, and sustainability in environmental law. Findings reveal that Indonesia's regulatory approach remains general and dependent on local government discretion, resulting in the absence of standardized SOPs for ritual waste. India's framework, by contrast, is more specific, covering bulk waste generator classification, mandatory segregation at the source, restrictions on hazardous materials, artificial immersion ponds, and penalty and recovery schemes. Both countries face similar challenges, including sacred perceptions hindering segregation, weak coordination, limited infrastructure, and insufficient monitoring data. Recommendations include formulating operational SOPs at national and local levels, enhancing collaboration among authorities and religious leaders, promoting education rooted in local wisdom, expanding segregation and composting facilities, incentivizing best practices, and setting measurable 3R targets supported by monitoring and sanctions.



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I. INTRODUCTION

Religious practices and offering traditions, such as *sesajen* in Bali and rituals in India's sacred rivers, are integral parts of the spiritual life of local communities, symbolizing devotion and reverence toward what is considered sacred. However, these activities also pose environmental challenges, as the remnants of offerings, both organic and inorganic, are often not adequately managed. There is a pressing need for better waste management, as such waste, which is believed to hold religious value, is frequently disposed of into bodies of water such as rivers, lakes, or ponds.¹ Research by Wijaya indicates that each temple in Bali generates approximately 2,000 liters of ceremonial waste per day, comprising an estimated 200 kilograms of solid waste, with 40% consisting of flowers that contain 80%

¹ Aastha Ahuja, "In These Mumbai Temples, Offerings of Faith Get a Green Turnaround as They Are Turned into Compost," *NDTV-Dettol Banega Swasth Swachh India*, September 4, 2018, <https://swachhindia.ndtv.com/mumbai-compost-flower-waste-temple-waste-to-wealth-24272/>.

moisture². Hindu religious practices in Bali utilize *sesajen*, which is composed primarily of natural materials, including flowers, leaves, fruits, coconuts, and bamboo, accounting for approximately 80% to 90% of the total. A smaller portion consists of inorganic materials, including plastic and Styrofoam. Research by Nugraha et al. (2024) further shows that organic materials remain the dominant component of temple waste accumulation in Bali³.

The disposal of offerings considered sacred is often done carelessly, resulting in inadequate treatment before they are released into the environment. In India, communities typically discard flowers, holy water, and incense from ritual activities into rivers or accumulate them with other waste, leading to the contamination of surrounding ecosystems.⁴ This situation highlights a conflict between the religious values that deem these offerings sacred and the pressing need for environmental preservation. Numerous studies have shown that the disposal of offerings into the Ganges River has severely impacted its water quality,⁵ despite the river being revered in Hindu tradition as the “holy mother” and deserving of deep respect⁶. This phenomenon emphasizes the urgent need for developing sustainable waste management policies for offerings that are attuned to religious sentiments.

Research by Jitavati Das (2023) reveals that the idol immersion phase in the downstream area of the Ganges River has a significant impact on water quality. Dissolved Oxygen (DO), which determines the water's ability to sustain aquatic life, decreased from 8.8 mg/L before immersion to 8.2 mg/L during immersion and then rose again to 8.7 mg/L after the process. Biochemical Oxygen Demand (BOD), representing the amount of oxygen required by bacteria to decompose organic matter in water, increased from 2.4 mg/L to 2.9 mg/L during immersion and slightly decreased to 2.8 mg/L afterward, indicating a rise in organic load. Chemical Oxygen Demand (COD), which reflects the capacity

² I Made Wahyu Wijaya et al., “Recycling Temple Waste into Organic Incense as Temple Environment Preservation in Bali Island,” *Jurnal Ilmu Lingkungan* 19, no. 2 (2021): 365, <https://doi.org/10.14710/jil.19.2.365-371>.

³ I Made Wahyu Wijaya and I Kadek Ardi Putra, “Potensi Daur Ulang Sampah Upacara Adat di Pulau Bali,” *Jurnal Ecocentrism* 1, no. 1 (2021): 7, <https://doi.org/10.36733/jeco.v1i1.1763>.

⁴ Aastha Ahuja, *loc. cit.*

⁵ Raj Kumar Yadav, “Restoring the Sacred Ganga: A Multidimensional Approach to Combating Pollution and Preserving Ecological and Cultural Integrity in Haridwar and Rishikesh,” *Preprints*, 2025, 5, <https://doi.org/10.20944/preprints202506.1584.v1>.

⁶ Srijita Chakrabarty, “Factors Leading to Disposal of Toxic and Hazardous Sacred Waste and Its Effect on Urban River Contamination: Case of Adi Ganga, Kolkata, India,” in *Springer Geography Perception, Design and Ecology of the Built Environment* (Springer, 2020), 195, http://dx.doi.org/10.1007/978-3-030-25879-5_11.

of water to oxidize organic and inorganic compounds as well as its pollution level, also increased from 19.7 mg/L to 28.8 mg/L, then decreased to 22.3 mg/L due to the decomposition of idols and the subsequent incubation period, which intensified oxygen demand. The increase in BOD and COD, accompanied by a decrease in DO, indicates that oxygen was consumed during the decomposition of organic waste, chemical dyes, and persistent pollutants such as Plaster of Paris (POP), thereby heightening the risk of anaerobic conditions that threaten aquatic ecosystems.⁷

Offering practices conducted during religious ceremonies generate large amounts of waste that is disposed of in sacred rivers such as the Ganges and Yamuna, as well as temple areas, creating a paradox between the sanctity of rituals and environmental pollution.⁸ Research by Yadav shows that the Ganges River, although considered sacred, suffers from severe pollution due to the accumulation of offering waste, which degrades water quality and violates environmental law provisions.⁹ Each year, communities in India dispose of more than eight million tons of flower offerings into the river, which subsequently decay and release hazardous heavy metals, including arsenic, lead, and cadmium.¹⁰ In addition, the city of Haridwar in India produces 260 to 300 tons of waste per day from approximately forty million pilgrims annually, dominated by organic waste (60%), plastic (27%), and used fabrics (6.6%), with collection and transportation costs exceeding Rs 4.5 million per month.¹¹ Flower and fruit offerings in Kolkata, India, wrapped in plastic or disposable containers, further contribute to inorganic contamination, allowing organic waste to carry pollutants into the sacred rivers.¹²

The regulatory framework for waste management in Indonesia governs the classification, handling, and disposal of waste, encompassing preventive measures, processing, and final disposal. Law Number 18 of 2008 about Waste

⁷ Jitavati Das, "Impact of Durga Puja on River Ganga," *SSRG International Journal of Agriculture & Environment Science* 10, no. 3 (2023): 12, <https://doi.org/10.14445/23942568/ijaes-v10i3p102>.

⁸ Srijita Chakrabarty, *op. cit.*, hlm. 185.

⁹ Raj Kumar Yadav, *loc. cit.*

¹⁰ United Nations Climate Change, "India," *United Nations Climate Change*, 2022, <https://unfccc.int/climate-action/momentum-for-change/women-for-results/phool>.

¹¹ Harshvardhan Nigam, "Haridwar's Waste Management Saga a Microcosm of Urban India's Struggle to Balance Tradition with Modernity," *Down to Earth*, 2025, <https://www.downtoearth.org.in/waste/haridwars-waste-management-saga-a-microcosm-of-urban-indias-struggle-to-balance-tradition-with-modernity>.

¹² Srijita Chakrabarty, *op. cit.*, hlm. 227.

Management (called Law No. 18/2008) defines the difference between organic and inorganic waste and sets rules for reducing, sorting, and processing waste before it is thrown away.¹³ Meanwhile, regional regulations in Bali prohibit the disposal of ritual residue (*sisa upacara*) into the environment and mandate management practices based on local wisdom. The Government of India has established urban waste management regulations, including the Solid Waste Management Rules 2016 (called SWM Rules 2016) and the national program *Swachh Bharat*, which emphasize sanitation and waste management while encouraging the private sector and civil society to convert temple flowers into compost or value-added materials through initiatives such as the Green Temples program.¹⁴ Although these innovations have gained public attention, their implementation faces social and cultural obstacles, as religious customs and limited resources hinder compliance and enforcement effectiveness.

Based on the aforementioned background, this study identifies two main issues: the regulations in Indonesia and India that govern the management of waste generated from offering practices, along with the associated challenges and potential strategies to address them. Accordingly, the study seeks to analyze the legal frameworks in both countries regarding the management of offering waste, identify the various socio-cultural, institutional, and law enforcement barriers faced, and propose strategies that harmonize respect for religious values with efforts for environmental protection. Additionally, this study aspires to make an academic contribution by providing a comprehensive framework for environmental law to tackle the challenges of waste management in Indonesia and India.

II. METHODOLOGY

This study is a normative legal research project that aims to systematically analyze, organize, and interpret applicable laws.¹⁵ The primary method of data collection used is a literature study. The data utilized in this research are secondary in nature, referencing primary, secondary, and tertiary legal materials.

¹³ I Nyoman Wardi, "Pengelolaan Sampah Berbasis Sosial Budaya: Upaya Mengatasi Masalah Lingkungan di Bali," *Jurnal Harian Regional*, 2011, <https://jurnal.harianregional.com/blje/full-97>.

¹⁴ Legacy, "Floral Waste is Boosting Circularity in Economy," *Legacy IAS Academy*, 2024, <https://www.legacyias.com/floral-waste-is-boosting-circularity-in-economy/>.

¹⁵ Titik Triwulan Tutik, "Hakikat Keilmuan Ilmu Hukum ditinjau dari Sudut Filsafat Ilmu dan Teori Ilmu Hukum," *Mimbar Hukum - Fakultas Hukum Universitas Gadjah Mada* 24, no. 3 (2012): 443–458, <https://doi.org/10.22146/jmh.16114>.

Primary legal materials consist of Law Number 18 of 2008 concerning Waste Management, Government Regulation Number 81 of 2012, Bali Governor Regulation Number 97 of 2018, Bali Governor Regulation Number 47 of 2019, as well as Indian regulations such as the SWM Rules 2016 and the Guidelines for Idol Immersion issued by the Central Pollution Control Board (CPCB). Secondary legal materials include books, legal journals, academic articles, and previous studies on ritual waste management. Tertiary legal materials consist of information obtained from official government websites and reputable online sources. Overall, this study seeks to offer a comprehensive understanding of the legal framework surrounding waste management.

The study employs two primary approaches, including the statutory approach to examine the regulatory framework and the conceptual approach to identify relevant principles and theories in environmental law. The analysis is conducted using content analysis, which involves examining legal texts to uncover underlying principles and comparing their application in Indonesia and India. The reasoning follows a deductive method, starting with general norms and progressing to specific arguments related to waste management issues. Through this approach, the study aims to contribute to the academic literature on environmental law and provide strategic recommendations for implementing effective waste management, drawing from local wisdom and international best practices.

III. RESULTS OF RESEARCH AND DISCUSSION

A. Regulations on Waste Management from Offering Practices in Indonesia and India

The practice of offering rituals commonly performed in Indonesia and India holds sacred significance. However, after the ceremonies conclude, the remnants of the offerings become waste that must be treated like ordinary garbage. This phenomenon raises an environmental law issue, as sacred objects ultimately become waste that requires proper management in accordance with legal provisions to prevent environmental pollution.

a. Regulation of Waste Management from Offering Practices in Indonesia

Data from Denpasar reveals that during major religious celebrations, such as *Galungan* or *Kuningan*, waste volume can increase by as much as 50%.¹⁶ This increase is predominantly made up of remnants from offerings. Waste management practices in Indonesia are governed by several legal frameworks. According to Article 2, paragraph (3) of Law No. 18 of 2008, offering remnants are classified as solid waste from social facilities and are treated as household-like waste. Law No. 18 of 2008 outlines the obligation to implement the 3R principles (Reduce, Reuse, and Recycle). It also mandates waste segregation at the source and requires places of worship to provide segregation facilities.¹⁷ The goal is to prevent indiscriminate disposal into the environment, particularly into waterways. Therefore, waste management must consider both religious values and aspects of environmental protection.

Law No. 18 of 2008, particularly Article 13, stipulates that managers of residential areas, commercial spaces, industrial zones, special areas, public facilities, social facilities, and other types of facilities must provide public access to waste segregation facilities. This requirement is not merely an administrative formality, it aims to ensure that various types of waste are separated at the source according to their categories, such as organic and inorganic waste. This provision is particularly significant in the context of offerings, as the materials used often consist of a diverse range of components, including flowers, leaves, food, and plastic wrappers, which cannot be processed together. By segregating waste at the source, we can carry out subsequent processing more efficiently, prevent environmental pollution, and minimize the careless disposal of waste into rivers and drainage systems. This practice is essential for preserving the quality of aquatic ecosystems. Furthermore, the importance of managing ceremonial waste has become increasingly apparent, especially considering the substantial volume of waste generated during religious rituals in Bali.

Ceremonial waste is primarily composed of organic materials, and the volume of waste generated from religious activities in Bali is quite significant. Survey results show that these religious activities lead to considerable waste

¹⁶ Pemerintah Kota Denpasar, "Pasca Kuningan, Volume Sampah di Denpasar Meningkat Hingga 50 Persen," *Pemerintah Kota Denpasar*, 2025, <https://www.denpasarkota.go.id/berita/pasca-kuningan-volume-sampah-di-denpasar-meningkat-hingga-50-persen>.

¹⁷ I Made Wahyu Wijaya and I Kadek Ardi Putra, *loc. cit.*, hlm. 2.

accumulation. Over three million Hindus in Bali conduct ceremonies each month, resulting in an estimated daily production of approximately 4.28 tons of temple waste.¹⁸ During daily rituals, an average temple generates around 2,000 liters of offering waste, which is directly disposed of at final disposal sites.¹⁹ For example, Besakih Temple, the largest temple in Bali, produces about 5.06 cubic meters of waste per day. This amount can increase to 46.71 cubic meters on ceremonial days, with 79.13% of the waste having the potential to be converted into compost. Additionally, research conducted at Tanah Kilap Temple shows that approximately 292 kilograms of waste accumulates per ceremony, with organic waste accounting for 90.16% of the total. At the household level, the average amount of ceremonial waste is 0.8 kilograms per day on regular days, which increases to 2.4 kilograms during religious festivals.²⁰

The obligation to conduct waste segregation, as outlined in Article 13, is just one small part of the larger national waste management system. A central issue, equally important, is the need to raise public awareness so that the technical guidelines established in regulations can be effectively implemented. This necessity is clearly stated in Article 5, along with Article 6, letter a, of Law No. 18 of 2008, which explicitly requires both the central and regional governments to promote public awareness by introducing and implementing the 3R principles and by facilitating integrated efforts for waste reduction, management, and utilization.²¹ This provision raises a reflective question regarding the effectiveness of a complex and systematic regulation if, in practice, it is not implemented as intended, since real change can only emerge when individual awareness is genuinely developed and actualized.

The Province of Bali has implemented regulations that provide clear guidelines for the proper management of all generated waste to avoid accumulation or improper disposal. These regulations are detailed in Bali Governor Regulation No. 47 of 2019, concerning Source-Based Waste Management. This regulation states that every manager is fully responsible for handling and managing waste produced from their activities. This obligation is

¹⁸ *Ibid*, hlm. 1.

¹⁹ *Ibid*.

²⁰ I Made Aditya Nugraha and I Gusti Made Ngurah Desnanjaya, "The Feasibility of Processing Waste from Religious Ceremonies in Bali as Clean Energy," *International Journal of Electrical and Computer Engineering (IJECE)* 14, no. 5 (2024): 4922, <https://doi.org/10.11591/ijece.v14i5.pp4921-4928>.

²¹ Undang-Undang Nomor 18 Tahun 2008 tentang Pengelolaan Sampah

specifically outlined in Article 7, paragraph (2), letter f, which addresses waste management within the category of “other facilities.” While the term “other facilities” may initially seem vague, this is clarified in Article 11, which explicitly includes places of religious worship within the regulatory framework, ensuring that these sacred locations are subject to the same waste management responsibilities.

A closer examination of Articles 12 and 13 reveals a recommendation to discontinue the use of plastic in religious ceremonial offerings. This suggestion stems from the fact that most of the monomers used to create plastic, such as ethylene and propylene, are derived from non-renewable fossil hydrocarbon sources.²² Plastic is classified as hazardous inorganic waste due to its resistance to decomposition, toxic nature, and potential to contaminate soil, water, and air.²³ Almost all modern plastics are non-biodegradable, leading to their accumulation in landfills or their dispersion throughout natural environments, where they never fully decompose. While efforts to replace conventional plastics with biodegradable alternatives are being explored, this approach should not be seen as a complete solution. Simply switching to biodegradable plastics does not eliminate the need for sustainable waste management systems. Moreover, the widespread practice of indiscriminate waste disposal by the public remains unaddressed.²⁴ Relying solely on biodegradable plastics without substantial changes in waste management practices could create new contradictions, further complicating existing environmental problems.

The Provincial Government of Bali has established a regulation that prohibits the use of plastics and similar materials. This is outlined in Bali Governor Regulation Number 97 of 2018, which focuses on limiting the generation of single-use plastic waste and is still in effect today. This regulation highlights the important role of *desa adat* and *desa pakraman*, the traditional legal communities in Bali. Article 15 specifies that these communities must actively work to limit the generation of single-use plastic waste. For example, they are

²² Roland Geyer, Jenna R. Jambeck, and Kara Lavender Law, “Production, Use, and Fate of All Plastics Ever Made,” *Science Advances* 3, no. 7 (2017): 1, <https://doi.org/10.1126/sciadv.1700782>.

²³ Chanidia Ari Rahmayani and Aminah Aminah, “Efektivitas Pengendalian Sampah Plastik Untuk Mendukung Kelestarian Lingkungan Hidup di Kota Semarang,” *Jurnal Pembangunan Hukum Indonesia* 3, no. 1 (2021): 19, <https://doi.org/10.14710/jphi.v3i1.18-33>.

²⁴ Science Advice for Policy by European Academies, “Biodegradability of Plastics in the Open Environment,” *SAPEA* (Berlin: Science Advice for Policy by European Academies, 2020): 15, <https://www.euro-case.org/wp-content/uploads/Eurocase/SAPEA/pdf-report/sapea-report08.pdf>.

encouraged to avoid using single-use plastics during customary, religious, or other local activities.²⁵ However, if plastics or other non-degradable materials are used during religious ceremonies, Article 12, paragraph (2), letter g of Bali Governor Regulation No. 47 of 2019 requires that this waste be directed to a Waste Bank or Waste Collection Facility (WCF). These designated facilities are established to collect and manage non-biodegradable waste for reuse or recycling purposes.²⁶

The Provincial Government of Bali has implemented specific regulations to restrict the use of single-use plastics, however, the Government of Indonesia has yet to establish comprehensive regulations for the management of ritual waste. This situation means that waste handling primarily relies on regional policies and local technical directives. Existing national regulations are rather general, addressing all categories of non-hazardous and non-toxic waste (non-B3), which places remnants within the larger framework of national waste management. In response, several regional governments have issued more specific technical regulations. For instance, Bali Governor Circular Letter Number 03 of 2023 was enforced during major ceremonies at Besakih Temple. This circular prohibits the use of single-use plastics in offerings, requires worshippers to bring their own waste bags, and forbids the disposal of used offerings (*lungsuran*) within the temple area. Additionally, it mandates that vendors operating around the temple separate organic and inorganic waste. These provisions demonstrate respect for the sacred nature of offerings while also promoting environmental discipline.

b. Regulation of Waste Management from Offering Practices in India

Managing waste is a complex issue since its volume often increases during specific ritual periods, and its composition is primarily organic with a mix of inorganic materials. This situation underscores the need for clear regulations to ensure that waste management does not harm the environment or society. In line with international law, India has implemented the SWM Rules 2016 as a national regulation.²⁷ These rules extend waste management responsibilities beyond urban areas and include religious sites such as places of worship, pilgrimage locations,

²⁵ Peraturan Gubernur Bali Nomor 97 Tahun 2018 tentang Pembatasan Timbulan Sampah Plastik Sekali Pakai

²⁶ Peraturan Gubernur Bali Nomor 47 Tahun 2019 tentang Pengelolaan Sampah Berbasis Sumber

²⁷ Mithun Ray and Mijanur Rahaman, "An Overview of Legal Framework for Waste Management System in India with Special Allusion to SWM Rules, 2016," *International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS)* 4, no. 1 (2016): 16.

and historical sites, which are often significant sources of waste due to ritual activities. According to the SWM Rules of 2016, places of worship that produce more than 100 kilograms of waste per day are classified as bulk waste generators. These sites are required to manage their waste at the source to enable systematic segregation and handling from the beginning.²⁸

The SWM Rules 2016 place direct responsibility on waste generators, including households, organizers of mass events, and ceremony planners. These individuals and groups are required to separate organic waste, inorganic waste, and household hazardous waste at the point of generation. They must also pay a user fee to sanitation service providers and may face fines for improper disposal of waste.²⁹ These requirements extend to large-scale events as well. Organizers of events with at least 100 participants must notify the local government at least three days in advance. Additionally, they are required to prepare a waste management plan in collaboration with the Urban Local Bodies (ULBs) or local authorities. Both the Municipal Solid Waste Rules of 2000 and the SWM Rules of 2016 serve as guidelines for ULBs in managing waste processes,³⁰ including coordinating with institutional waste generators to ensure proper segregation and management of waste.³¹

Indian regulations on waste segregation and management pay special attention to religious rituals that can lead to water pollution, particularly idol immersion. In May 2020, the CPCB issued the Revised Guidelines for Idol Immersion, which enhanced existing provisions. These guidelines require that all offering materials, such as flowers, leaves, fabrics, and paper or plastic decorations be removed and collected before the immersion ceremony takes place.³² The CPCB explicitly prohibits hazardous materials, including POP,

²⁸ Ministry of Housing and Urban Affairs, *Bulk Solid Waste Generators* (Ministry of Housing and Urban Affairs, Government of India, 2017), 10, <https://sbmurban.org/storage/app/media/pdf/Bulk%20Waste%20Generator%20Book.pdf#:~:text=or%20Undertakings%2C%20Local%20Bodies%2C%20Public,all%20waste%20streams%20put%20together.>

²⁹ Government of India, “Solid Waste Management Rules, 2016,” Mygov.in, 2016, <https://jharkhand.mygov.in/en/group-issue/solid-waste-management-rules-%E2%80%93-2016>.

³⁰ Poulomee Ghosh et al., “Scenario of Solid Waste Management in Indian Cities: A Study of Pune, Visakhapatnam, and Tirupati,” *Indian Society for Ecological Economy (INSEE)* 8, no. 1 (2025): 56, <http://dx.doi.org/10.37773/ees.v8i1.1119>.

³¹ Citizen Consumer and Civic Action Group, “Salient Features of SWM Rules 2016” (Citizen Consumer and Civic Action Group, 2017): 2, https://www.cag.org.in/sites/default/files/database/report_swm_rules_2016_salient_features_20170707_0.pdf#:~:text=b.at%20any%20licensed%2F%20unlicensed%20place.

³² Government of India, “Policy for Environmentally Safe Making & Immersion of Idols/Tazia and Its Enforcement” (Government of India, 2022), 11, <https://images.assettype.com/barandbench/2022-08/07503c85-1db1-4a50-ba58->

chemical paints, single-use plastics, and thermocol, because of their harmful effects on water quality.³³ Instead, the use of environmentally friendly materials, such as clay, recycled paper, and organic dyes, is strongly encouraged. Additionally, the guidelines stress the importance of using artificial tanks for post-ritual waste treatment and allowing only clear, neutralized water to be discharged into natural water bodies.³⁴

The Ganges River is known as the most polluted river in India³⁵ and one of the most contaminated rivers in the world.³⁶ As a result, it has become the primary focus of environmental policy in the country. To tackle the pollution affecting the Ganges, the National Mission for Clean Ganga (NMCG) issued directives based on Article 5 of the Environment Protection Act (EPA) of 1986. These directives serve as guidelines to prohibit idol immersion activities in the river and its tributaries.³⁷ To support this policy, the Guidelines for Idol Immersion in Rivers, Lakes, and Ponds specify that idol immersion should only occur in ponds or artificial tanks lined with impermeable clay or eco-synthetic liners. The provisions emphasize the need to shift traditional practices toward more environmentally friendly methods while still respecting the community's religious beliefs. This approach aims to strike a balance between preserving cultural practices and protecting aquatic ecosystems.

The technical guidelines create practical mechanisms for local authorities (ULBs). If immersion in natural bodies of water is unavoidable, designated locations must be established that have restricted access, shallow depths, and protective barriers made of wood or steel. Additionally, all decorative items, such as artificial ornaments, flowers, and fabrics, must be removed in advance to reduce non-organic waste in the water. For example, *ghats* (bathing sites) along

[37c1eea681b7/Final Policy on idol immersion final.pdf#:~:text=should%20prefer%20to%20adopt%20innovative,11.](#)

³³ Badri Chatterjee, "CPCB Bans Use of PoP, Thermocol, Plastic for Idol-Making, Sets Revised Guidelines for Immersion," *Hindustan Times*, 2020, <https://www.hindustantimes.com/mumbai-news/cpcb-bans-use-of-pop-thermocol-plastic-for-idol-making-sets-revised-guidelines-for-immersion/story-n1012DUheqN3WZakNJ4AtK.html>.

³⁴ Express News Service, "Immersing Idols on Yamuna & Other Water Bodies in Delhi to Bring a Fine of Rs 50,000 for Violators," *The Indian Express*, 2023, <https://indianexpress.com/article/cities/delhi/immersing-idols-yamuna-water-bodies-delhi-fine-rs-50000-violators-8944827/>.

³⁵ Dipanwita De, "Public Perception Regarding Pollution of the River Ganga: Case Study at Dakhineswar," *International Journal of Research in Social Sciences* 8, no. 5 (2018): 451, https://www.ijmra.us/project%20doc/2018/IJRSS_MAY2018/IJMRA-13752.pdf.

³⁶ Deepankar Misra and Ritesh Kumar, "Pollution in Ganga," *Amity Journal of Energy & Environment Studies* 3, no. 2 (2017): 25, <https://amity.edu/abs/AJEES/pdf/V3N2/4.pdf>.

³⁷ Express News Service, *loc. cit.*

the Ganges River should be fenced off to prevent unauthorized immersion. Local governments are also required to provide artificial immersion ponds for the community. The Director of the National Mission for Clean Ganga (NMCG) enforces these regulations by requiring each state to submit regular monitoring reports. Any party that violates these guidelines may face a fine of 50,000 rupees as environmental compensation.³⁸

The Delhi Pollution Control Committee (DPCC) enforces national regulations by strictly prohibiting idol immersion practices in the Yamuna River and other water bodies within the Delhi region, and violators are subject to fines for non-compliance.³⁹ In accordance with this policy, local authorities (ULBs) are required to provide artificial ponds or tanks in residential areas for immersion activities that meet environmental standards. Regulations issued by the Goa State Pollution Control Board (GSPCB) and the DPCC emphasize the need to provide specially colored containers for collecting offering materials, such as flowers, leaves, and decorations, prior to the immersion ceremony. The wastewater generated from the immersion process must undergo clarification treatment using coagulants. This treated water can then be reused for non-consumptive purposes, such as garden irrigation. Additionally, the remaining sludge should be dried and utilized as compost.⁴⁰

The legal basis for the Central Government of India's authority to issue environmental protection directives is outlined in Article 5 of the EPA of 1986. This provision gives the government the authority to direct individuals, institutions, and other authorities to prevent and control pollution. Article 15 of the EPA further strengthens law enforcement by imposing criminal and administrative penalties for violations, including noncompliance with official directives, such as the illegal practice of idol immersion. Specifically, Article 15 stipulates penalties of up to five years' imprisonment and/or a maximum fine of 100,000 rupees. If a violation continues after the initial judgment, the court may impose an additional fine of up to 5,000 rupees per day.⁴¹ These provisions

³⁸ Harikishan Sharma, "Rs 50,000 Fine for Idol Immersion in River Ganga and Its Tributaries: Centre," *The Indian Express*, 2019, <https://indianexpress.com/article/india/rs-50000-fine-for-idol-immersion-in-ganga-its-tributaries-centre-6049652/>.

³⁹ Express News Service, *loc. cit.*

⁴⁰ The Times of India, "To Curb Pollution, Govt Issues Guidelines for Idol Immersion," *The Times of India*, 2025, <https://timesofindia.indiatimes.com/city/goa/to-curb-pollution-govt-issues-guidelines-for-idol-immersion/articleshow/123511022.cms>.

⁴¹ The Environment (Protection) Act, 1986

demonstrate the Government of India's commitment to upholding legal compliance as a vital tool for achieving sustainable environmental protection.

B. Obstacles and Strategies for Handling Sacrificial Waste in Indonesia and India

Waste management in Indonesia and India faces a range of complex challenges that are deeply rooted in socio-cultural, religious, regulatory, institutional, legal, technical, infrastructural, and compliance issues. These overlapping obstacles hinder the development and implementation of effective waste management strategies in both countries. One of the primary challenges is the perception of the sanctity of “offering remnants.” This belief generates resistance to the segregation or processing of such waste, as it is thought to desecrate their sacredness.⁴² As a result, there is a tendency to immerse these offerings in rivers or the sea or to accumulate them in sacred areas, leading to significant environmental pollution.⁴³ In India, the tradition of immersing offerings in the Ganges River continues even though it contributes to the deterioration of water quality. Similarly, in Bali, the value of purity is highly revered. A study of Balinese rituals indicates a prevailing taboo against touching offerings after they have been worshipped. This cultural practice often results in ceremonial waste either accumulating or being immersed without separation.⁴⁴

From a legal standpoint, Indonesia has established a framework for waste management through Law No. 18 of 2008 and Government Regulation No. 81 of 2012. These laws are further supported by regional and gubernatorial regulations, including prohibitions on single-use plastics. However, these legal instruments have not yet been developed into Standard Operating Procedures (SOPs) that specifically address ritual waste (*sampah upacara*). In 2023, the provincial government of Bali issued a circular letter requiring worshippers to bring personal waste bags and prohibiting the use of plastics during ceremonies

⁴² Mrinal Vaidya, “The Holy Composting Unit,” *India Waterportal*, 2021, <https://www.indiawaterportal.org/water-quality-and-pollution/pollution/holy-composting-unit#:~:text=,Director%2C%20Jeevitnadi%20Living%20River%20Foundation>.

⁴³ Faraz Ali, Sanjeev Maheshwari, and Mohammad Arif Kamal, “Emerging Developments in Solid Waste Management for Urban Areas in India: Present Scenario, Obstacles and Prospects,” *Architecture Engineering and Science* 5, no. 2 (2024): 72–86, <https://doi.org/10.32629/aes.v5i2.2171>.

⁴⁴ Maria Ioannis Kellis Kamvyselis, “Melukat: Exploring the Educational Significance of Purity in Balinese Ritual Practices and Religious Leadership Development,” *Journal of Education and Learning* 12, no. 5 (2023): 105, <https://doi.org/10.5539/jel.v12n5p102>.

at Besakih Temple. The circular also highlights the community's responsibility in maintaining the temple's cleanliness. Unfortunately, the implementation of these measures is inconsistent and largely relies on local initiatives. This situation underscores the gap between broad regulatory frameworks and the need for more specific technical guidelines, resulting in uneven success in managing ritual waste.

The lack of specific SOPs for managing ritual waste can be examined through Lawrence M. Friedman's theory of the legal system, which highlights the interplay between legal structure, substance, and culture.⁴⁵ In Indonesia, the legal framework does not clearly designate a specific "actor" responsible for waste management, nor does it establish a coordinated network of stakeholders that includes ULBs, temple administrators, *banjar* leaders, and environmental agencies. As a result, oversight is limited to mere recommendations. Additionally, the legal substance consists primarily of general norms found in laws, government regulations, regional regulations, and circular letters, with no detailed technical guidelines for segregating, collecting, transporting, and treating ritual waste residues. The community's legal culture often views *lungsuran* as sacred objects, which can lead to non-compliance with plastic ban and waste segregation obligations during rituals. According to Friedman's triadic framework, these regulatory gaps hinder the effective implementation of written laws into tangible actions within society.

Despite the existence of formal regulations, such as the ban on disposing of offerings in the Sacred Area of Besakih, enforcement is inadequate. Supervision mainly consists of announcements made through loudspeakers and voluntary educational efforts instead of strict law enforcement actions. Although authorities at Besakih request that worshippers separate their plastic bags for collection, vendors continue to sell them despite the prohibition. As a result, during significant rituals, waste from offerings accumulates, collection containers overflow, and trash scatters throughout the temple area. This situation disrupts visitor comfort, diminishes the site's aesthetic value, and undermines the image of this sacred location.⁴⁶ Additionally, obtaining quantitative data is challenging because temple administrators have not determined the exact volume of ritual

⁴⁵ Farid Nur Mustaqim *et al.*, "Penegakan Hukum Tindak Pidana Korupsi di Indonesia dari Perspektif Teori Lawrence," *Jurnal Ilmiah Nusantara (JINU)* 2, no. 2 (2024): 155–156, <https://doi.org/10.61722/jinu.v2i2.3595>.

⁴⁶ Ni Ketut Sutrisnawati and A.A.A Ribeka M. Purwahita, "Fenomena Sampah Dan Pariwisata Bali," *Jurnal Ilmiah Hospitality Management* 9, no. 1 (2018): 51, <https://doi.org/10.22334/jihm.v9i1.143>.

waste generated. The lack of integrated monitoring during ceremonies often leads to violations going unpunished. Ultimately, the effectiveness of these policies relies on the awareness of worshippers, which the management of Besakih states “remains low.”⁴⁷

Quantitative data on waste management in India is rarely made publicly available. Official measurements, such as comparisons of waste volume before and after major festivals, are seldom conducted. For instance, the water quality monitoring program for India's Kumbh Mela only recorded data before the event and lacked comprehensive follow-up afterward.⁴⁸ A similar situation exists in Bali, where no sustainable monitoring mechanisms have been established, such as ritual waste audits at the temple or *banjar* level. The absence of data makes waste management policies appear partial, non-transparent, and reactive. A report by the Institute for Essential Services Reform (IESR) emphasizes that Bali's waste crisis requires a comprehensive strategy involving all stakeholders.⁴⁹ However, without detailed information on the volume, composition, and impact of waste generated from offerings, it is challenging to assess the effectiveness of waste management programs. This results in decision-making that often lacks a solid evidence-based foundation.

Effective waste management fundamentally requires collaboration among various stakeholders, including *desa adat* or *banjar*, temple administrators, government institutions (such as environmental agencies and public works departments), the tourism sector, and the wider community. However, coordination among these groups often remains fragmented.⁵⁰ For instance, in Bali, while provincial policies promote *banjar*-based management, implementation frequently stalls at the temple level due to limited participation from ceremony committees or *pekaseh* (traditional coordinators). A discussion led by the IESR emphasized the need for a comprehensive, circular economy-based approach that includes the government, customary institutions, and business

⁴⁷ Sapariah Saturi, “Larangan Pakai Plastik Sekali Pakai di Pura Besakih,” *Mongabay.co.id*, 2023, <https://mongabay.co.id/2023/05/01/larangan-pakai-plastik-sekali-pakai-di-pura-besakih/>.

⁴⁸ The Sunday Diplomat, “Maha Kumbh Festival Increases Water Pollution in the Ganges and Yamuna,” *The Sunday Diplomat*, 2025, <https://thesundaydiplomat.com/maha-kumbh-festival-increases-water-pollution-in-the-ganges-and-yamuna/>.

⁴⁹ Kurniawati Hasjanah and Uliyasi Simanjuntak, “Mengatasi Krisis Persampahan di Bali: Kurangi Sampah dari Sumbernya dan Pengembangan Infrastruktur Pengelolaan Sampah,” *IESR*, 2025, <https://iesr.or.id/mengatasi-krisis-persampahan-di-bali-kurangi-sampah-dari-sumbernya-dan-pengembangan-infrastruktur-pengelolaan-sampah/>.

⁵⁰ Balipost, “Minim Fasilitas dan Rendahnya Budaya Pemilahan Sampah,” *BALIPOST.com*, 2025, <https://www.balipost.com/news/2025/08/17/481119/Minim-Fasilitas-dan-Rendahnya-Budaya...html>.

actors.⁵¹ Unfortunately, implementation is often inconsistent, and there are no collective targets, like the 3R goals in sacred areas or a unified monitoring system. The lack of an intersectoral coordinating body leads to each stakeholder operating independently, which hinders efficiency. As a result, environmental volunteers often lack adequate data support, and the tourism sector rarely engages in educational initiatives.

The sociocultural and theological factors significantly hinder effective waste management in India. Traditions like *visarjan* and *nirmalya*, which involve immersing offerings or idols in sacred waters, often create resistance to waste segregation and land-based processing efforts. Many view these practices as violations of their sacred traditions. However, official guidelines, such as the Guidelines for Idol Immersion issued by the CPCB, emphasize that materials used in these rituals, such as flowers, fabrics, incense, and idols, can seriously contaminate water bodies, necessitating strict regulations. The environmental burden is particularly severe during large-scale bathing rituals, like the Kumbh Mela held in Haridwar and Prayag in 2010, which significantly elevated pollutant levels at major ghat sites. In response to these environmental risks, authorities have issued guidelines for managing waste in religious places to mitigate ecological impacts in areas of worship.

Structural weaknesses in law enforcement and compliance continue to hinder the effective management of religious waste in India. Compliance often appears to be seasonal, as many prohibitions and directives are not consistently implemented during major festivals. To address this issue, the National Green Tribunal (NGT) has banned the direct disposal of idols into rivers and designated specific immersion points. They have also installed barricades to prevent debris from entering the main flow of the Yamuna River. The CPCB Guidelines of 2010 establish technical standards, such as using natural materials or environmentally friendly dyes and selecting controlled immersion sites. However, these guidelines lack precise mechanisms for enforcement. As a result, law enforcement relies heavily on local authorities, leading to compliance gaps at various ghats and temples.

From a technical and infrastructural perspective, the challenges of managing waste become increasingly evident during major celebrations held at

⁵¹ Kurniawati Hasjanah and Uliyasi Simanjuntak, *loc. cit.*

sacred sites. Data from the 2010 Kumbh Mela in Haridwar indicates a significant increase in waste generation. In just seven days, 7,615 kilograms of waste were produced at Mansa Devi and 4,992 kilograms at Chandi Devi, with approximately 65% of this waste was biodegradable.⁵² These figures emphasize the importance of proper waste segregation and the establishment of designated collection points at temples and ghats. A similar situation occurred during the 2004 Ardh Kumbh at Har Ki Pauri, where waste volumes sharply increased on peak days. This led to bottlenecks at temporary disposal sites and overwhelmed transportation fleets. Although the SWM Rules of 2016 mandate source segregation, field practices often fall short during high-density events. This highlights a lack of consistency in the technical implementation of these regulations.

To enhance waste management strategies, the governments of Indonesia and India need to strengthen their legal frameworks concerning waste offerings by implementing more specific regulations. In addition to Law No. 18 of 2008 and Government Regulation No. 81 of 2012, regional governments in Indonesia can establish regional regulations (*Perda*) or regional head regulations (*Perkada*) focused on “Ritual Waste Management.” These regulations could define the sacred status of offerings, mandate waste segregation at temples, prohibit direct disposal of waste into rivers, and require SOPs for post-ritual collection. In India, ULBs should consider adopting specific bylaws, such as creating separate immersion tanks and banning the use of single-use plastics in offerings, in alignment with CPCB guidelines.⁵³ Additionally, as part of the permit process for religious events, organizers should be required to develop a comprehensive waste management plan that includes designated collection points, transportation arrangements, and registered waste processing vendors.⁵⁴ These policies must respect the right to religious freedom while prioritizing the principles of proportionality and the “polluter pays” principle, all while promoting sustainable circular economy practices.

To ensure the proper management of offerings at sacred sites such as temples, shrines, or ghats, it is essential to establish an Offering Management

⁵² The Lakshmi Mittal and Family South Asia Institute, “India’s Kumbh Mel,” *Harvard University*, 2012, 7, <https://mittalsouthasiainstitute.harvard.edu/wp-content/uploads/2013/05/Research-References.pdf>.

⁵³ United Nations Environment Programme, “A Colourful Solution to Flower Waste,” *UNEP*, 2019, <https://www.unep.org/news-and-stories/story/colourful-solution-flower-waste>.

⁵⁴ The Tribune, “With Right to Gather Comes the Duty to Clean,” *The Tribune*, 2025, <https://www.tribuneindia.com/news/ludhiana/with-right-to-gather-comes-the-duty-to-clean/>.

Unit at each location. This unit should include a coordinator, a logistics officer, and an environmental facilitator. The OMU's main responsibilities will include organizing waste segregation during ceremonies and promoting environmentally friendly practices among worshippers. In Bali, the *desa adat*, *banjar*, and *pecalang* play a crucial role in enforcing *perarem* (customary regulations). A similar approach can be applied in India, where ghat or temple management committees can collaborate with ULBs and State Pollution Control Boards (SPCBs). The coordination committee model used in Maharashtra, which involves cooperation between the police, NGOs, and temple administrators, may serve as a useful reference.⁵⁵ To enhance collaboration, it is necessary to establish a Memorandum of Understanding (MoU) among temple administrators, environmental agencies, and Small, Medium-sized Waste Management Enterprises (SMMEs), with specific goals set in advance. During major religious festivals, appointing a cross-agency festival manager will be vital for maintaining cleanliness through the implementation of joint SOPs.

Funding for ceremonial waste management can be generated through various sources, including religious donations, Corporate Social Responsibility (CSR) programs, and transparent sanitation fee schemes. This approach ensures budget continuity and is thought to enhance accountability. Local governments may provide incentives, such as official recognition or reduced fees, for communities that achieve a waste segregation rate of over 60%. Collaboration with local Micro, Small, and Medium Enterprises (MSMEs) creates sustainable opportunities, such as producing compost for organic farming, extracting bio-enzymes from leaves, and converting flowers into incense. One notable example of this collaboration is the HelpUsGreen initiative in India. Established in 2015 in Uttar Pradesh, HelpUsGreen processes temple flower waste into valuable products, including charcoal-free incense, organic compost, and eco-friendly packaging, using innovative Flowercycling technology. So far, HelpUsGreen has recycled over 11,000 tons of flowers, reduced pesticide used by 11 tons, and empowered women by providing decent employment opportunities. This

⁵⁵ Maharashtra Pollution Control Board. "Suggested Code of Practice for Environment Friendly Celebration of Ganesh Festival." *Maharashtra Pollution Control Board*, 4, <https://mpcb.gov.in/sites/default/files/focus-area-reports-documents/guidelinesforimmersion.pdf#:~:text=v%29%20A%20co,purpose%20of%20immersion%20of%20idol&>.

initiative addresses the issue of temple waste contaminating the Ganges River and groundwater with pesticide-laden flowers.⁵⁶⁵⁷

The strategy for managing offering waste in Bali should be rooted in local traditions and involve community structures such as *desa adat*, *banjar*, and *pecalang* as formal regulatory enforcers. Customary *perarem* may ban the use of plastics in temples and include traditional sanctions to act as deterrents. This waste management initiative could be integrated with sustainable tourism efforts by encouraging hotels and travel agencies to support flower composting through CSR programs, while also promoting Tri Hita Karana education among tourists. In India, municipal governments and ULBs primarily oversee national efforts to ensure urban sanitation by integrating solid waste management systems with community awareness and education.⁵⁸ *Ghat* management committees are strengthened, festivals are monitored through inspections and outreach programs by the CPCB, and compliant temples receive incentives. While India tends to emphasize a command-and-sanction approach, Bali is better positioned to adopt a cultural and educational strategy.

V. CONCLUSION

Regulations regarding waste management in Indonesia and India both stem from the recognition that religious rituals generate significant amounts of waste that can harm the environment. In Indonesia, waste management is governed by several key laws, including Law No. 18 of 2008, Governor Regulation No. 47 of 2019, and Governor Regulation No. 97 of 2018. These regulations highlight the principles of 3R, mandate waste segregation, and impose restrictions on single-use plastics. However, there is currently no national regulation that specifically addresses ritual waste management. As a result, practices largely depend on regional policies, such as the Bali Governor's Circular Letter. In contrast, India has established more comprehensive regulations through the SWM Rules 2016 and the CPCB Guidelines of 2020. These regulations require waste segregation, the payment of service fees, and prohibit the immersion of hazardous waste in

⁵⁶ Ideas Online, "Recycling Floral Waste in India," *Ideas Online*, 1–3, <https://www.ideasonline.org/public/pdf/IndiaRecyclingFlowers-ENG.pdf>.

⁵⁷ United Nations Climate Change Secretariat, "Momentum for Change: Women for Results Category HelpUsGreen India," *United Nations Climate Change Secretariat*, <https://unfccc.int/sites/default/files/resource/HelpUsGreen.pdf>.

⁵⁸ Faraz Ali, Sanjeev Maheshwari, and Mohammad Arif Kamal, *op. cit.*, hlm. 78.

rivers, along with strict penalties for non-compliance. This comparison reveals that Indonesia tends to focus on general and culturally specific approaches to waste management, while India prioritizes technical regulations and legal penalties as primary tools for environmental protection.

The management of waste in Indonesia and India faces multiple challenges that include socio-cultural, religious, regulatory, institutional, technical, and enforcement issues. The perception of the sacredness of certain offerings often leads to practices such as immersing them in rivers or seas, which creates resistance to waste segregation and processing efforts. Additional weaknesses are apparent, including insufficient regulations, weak oversight, limited inter-agency coordination, and a lack of adequate quantitative data. These factors result in policies that tend to be incomplete and inconsistent. To address these issues, both countries need to develop more specific regulations regarding ritual waste, strengthen local institutional capacities, and enhance coordination across sectors. As a strategy, both countries are required to strengthen more specific derivative regulations concerning ritual waste, enhance local institutional capacity, and improve cross-sectoral coordination. Indonesia can optimize local wisdom through *desa adat*, *banjar*, and customary sanctions, while India emphasizes technical approaches through the CPCB guidelines, ULBs mechanisms, and legal penalties. Sustainable funding, community participation, and the application of the circular economy principle, such as transforming flower waste into value-added products, serve as key factors in providing effective, sustainable, and respectful waste management that respects the sacredness of rituals.

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COMPETING INTEREST

The authors will be asked to sign this statement once the submission has been accepted.

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