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BUREAU OF INDIAN STANDARDS

MINUTES

Committee	*Meeting No.*	*Day, Date and Time*	*Venue*
Working Group on Sustainable Beaches, SSD 02/P6/WG01	**2nd Meeting**	**Tuesday, 29 October 2024, 1100 hrs.**	**Virtual**

Convenor: Shri Sundeep
Scientist – F, MoEFCC

Member Secretary: Shri Darpan Chalia
Scientist – C, BIS

Members Present: Please see Annex – A *(Page 4)*

KEY TAKEAWAYS FROM DISCUSSIONS HELD IN THE MEETING

1. Shri Sundeep, Convenor of SSD 02/P6/WG01, welcomed all members in the meeting of the Working Group on Sustainable Beaches. He informed all the members that BIS officials had conducted a site visit to the Blue Flag Beach in Puri, Odisha, and requested the Member Secretary to share insights from the visit. Additionally, he emphasized the importance of member participation and urged everyone to provide their inputs and suggestions on the document on "Sustainable Beaches" structured around seven core pillars.

2. Shri Darpan Chalia, Member Secretary, welcomed the Convenor and all members in the 2nd meeting of the Working Group on Sustainable Beaches. He informed the members that he, along with Shri S.K. Kanojia, Head of the Service Sector Department and Scientist – F, had visited Golden Beach, a Blue Flag certified beach in Puri, Odisha. He shared insights from the visit, noting the assessment of compliance with Blue Flag criteria. Further, he provided an overview of key aspects such as planning, infrastructure, beach services, daily supervision and monitoring processes, safety and security measures, ecological conservation efforts etc. He proposes to incorporate 'planning and site selection aspects for sustainable beaches' in the document. He also requested the members to share their views and feedback in this regard.

3. Member Secretary requested all the members to share the details of the contact person of those organizations from whom the nominations are still awaited and to whom BIS can approach for nomination:

a) Adventure Tourism Operators Association of India, New Delhi.
b) Karnataka State Coastal Zone Management Authority.
c) Beach Management Committee of Golden Beach, Puri.
d) Odisha Coastal Zone Management Authority.
e) IITM, Bhubaneshwar.

4. The members agreed to include planning aspects along with the initial seven pillars for the requirements for sustainable beaches, as outlined below:

a) Environmental Information;
b) Stakeholder Education and Participation;
c) Water Quality Management;
d) Beach Environment Management;
e) Safety & Security;
f) Ecological Conservation; and
g) Beach Infrastructure and Services.

The updated draft on 'Sustainable Beaches' is attached as **Annex – B**, and the inputs received from the members are attached as **Annex – C.**

5. The working group agreed to divide the requirements for the Sustainable Beaches document to ensure effective progress. Members took responsibility for providing inputs on various sections of the document as outlined below:

S. No.	Representative Name	Task Assigned
1.	Ms. Madhuri Mondal, Senior Programme Officer, Dakshin Foundation	**b)** Stakeholder education and participation **f)** Ecological conservation
2.	Dr. Anjuna Dhir, Member, RTSOI	**b)** Stakeholder education and participation **e)** Safety & Security **g)** Beach infrastructure and services
3.	Dr. S. R. Marigoudar, Scientist – E, National Centre for Coastal Research, Chennai	**c)** Water quality management **d)** Beach environment management
4.	Shri Vijay Lokesh, Consultant, National Disaster Management Authority, New Delhi	Beach Planning **e)** Safety and security
5.	Shri Dipnarayan Ganguly, Scientist – C, National Centre for Sustainable Coastal Management, Chennai.	Beach Planning **c)** Water quality management **e)** Safety and security
6.	Shri Braj Kishore Pradhan, Founder and CEO, Aahwahan Foundation	**a)** Environmental information **g)** Beach infrastructure and services

Further, it was decided that members would submit their inputs as assigned above to the BIS Secretariat by 30 November 2024.

6. The working group decided to create a WhatsApp group to facilitate smooth coordination in preparing the document.

7. The date and place of the next meeting would be decided after the consultation with the Convenor.

8. In the absence of any other business, the meeting ended with a hearty vote of thanks to the Chair and other eminent members present in the meeting.

ANNEX – A

1. Dr. S. R. Marigoudar, Scientist – E, National Centre for Coastal Research, Chennai.
2. Dr. Dipnarayan Ganguly, Scientist – C, National Centre for Sustainable Coastal Management, Chennai.
3. Shri Vijay Lokesh, Consultant, National Disaster Management Authority, New Delhi.
4. Dr. Anjuna Dhir, Member, Responsible Tourism Society of India, New Delhi.
5. Ms. Madhuri Mondal, Senior Programme Officer, Dakshin Foundation, Karnataka.
6. Shri Braj Kishore Pradhan, Founder & CEO, Aahwahan Foundation, Karnataka.

ANNEX - B

DRAFT STRUCTURE OF STANDARD ON SUSTAINABLE BEACHES

TITLE – SUSTAINABLE BEACHES – REQUIREMENTS AND RECOMMENDATIONS

1. Scope

This standard specifies the requirements for environmental beach management, including

or

This document specifies the requirements and recommendations for the development and maintenance of sustainable beaches, addressing the following key aspects:

a) Environmental Information
b) Stakeholder Education and Participation
c) Water Quality Management
d) Beach Environment Management
e) Safety & Security
f) Ecological Conservation
g) Beach Infrastructure and Services

2. References

IS No.	*Title*
IS/ISO 13009: 2015	Tourism and Related services – Requirements and Recommendations for Beach operation

3. Terminology

3.1 beach
3.2 bathing area

Approach that may be adopted for the formulation of sustainable beaches standard:

Clause	Justification
	Comprehensive planning establishes a strong foundation by addressing all aspects including environmental, accessibility, community engagement, coastal ecosystem protection before development of sustainable beaches begins.

Planning for preparing Sustainable Beaches	*(This may be may be helpful in selecting zones on the beaches for developing sustainable beach areas.* *May be this would be recommendatory clause in the document that will help managements for site selections)* **Planning:** **a) Environmental Sensitivity:** Prioritize sites with minimal ecological disturbance, stable sediment levels. **b) Water Quality Assessment:** Initial water quality assessments. **c) Accessibility:** Visitors with or without disabilities have equal access and enjoyment of touristic activities. (Connectivity) **d) Biodiversity Protection Zones:** Designate areas for marine life protection. **e) Visitor Capacity:** Evaluate the site's infrastructure to accommodate visitor inflow, prioritizing areas where minimal new infrastructure is needed. **f) Community Engagement Potential:** Involve local communities from the beginning to foster shared responsibility, economic benefit, and sustainable practices. **g) Resource Efficiency**: Incorporate renewable energy sources, such as solar lighting, and design low-impact facilities to reduce resource usage. LAYOUT DESGIN (Creates zones) NOTE: Designated area for the development and maintenance of a sustainable beach should range between 800 meters and 1500 meters. *(May be more aspects be needed to address for the selection of site for the sustainable beach development.)*

Infrastructure	Proper infrastructure supports operational sustainability, minimizes environmental impact, and addressing accessibility and comfort for visitors. Layout for the beach and facilities, such as specific zones for parking, accessible pathways, ticket counters (if necessary), restrooms, information display boards, signage, lifeguard towers, control rooms, and waste management stations.
Operational Practices and Compliance	Practices focus on: **a)** Environmental Information **b)** Stakeholder Education and Participation **c)** Water Quality Management **d)** Beach Environment Management **e)** Safety & Security **f)** Ecological Conservation **g)** Beach Infrastructure and Services In this clause we may mentioned the all compliance related to sustainable beaches. *(Including day to day check list shall be prepare for monitoring of compliance of criteria for sustainable beaches)*
Roles and Responsibilities	Defined roles help distribute responsibility across all officers and staff. Further, communicate them effectively ensuring consistent management, safety, and compliance. *(Mandatory clause)*
Assessment and Continuous Improvement	Regular assessment allows for adaptation to changing conditions, stakeholder feedback, and emerging best practices, fostering long-term sustainability.

4. Classification of Beaches

Beaches can be classified based on the number of sustainability criteria met in their operations, as outlined in the operational clauses.

For example:

Class A beach would adhere to all specified criteria, demonstrating full compliance with sustainable practices.

Class B beach would meet a slightly reduced set of criteria.

Class C or more.

This classification system allows for clear distinctions in sustainability levels and guides improvements.

5. General Requirements

5.1 Statutory and Regulatory Requirements

(Highlighting all regulatory requirement)

The Beach Authority or Committee shall comply with all applicable statutory and regulatory requirements, obtaining necessary permissions from both local and national authorities. These requirements include, but are not limited to:

1. Coastal Regulation Zone (CRZ)
2. MoEFCC order, S.O. 125 (E).
3. Environment Protection Act, 1986
4. Water Quality Standards for Coastal Water Marine Outfalls
5. Biodiversity Act, 2002
6. Wildlife Protection Act, 1972
7. Solid Waste Management Rules, 2016

5.2 Beach Management Committee

Beach Management Committee (BMC) shall be established to oversee sustainable beach operations, under the Chairmanship of the District Collector or Magistrate. The Committee shall include representatives from various departments such as Environment/Forest, Ministry of Tourism, Science & Technology, Education, Transport, Health, Pollution Control, Disaster Management, Municipality/Gram Panchayat, Police/Marine Police, Coastguard, NGOs local businesses such as Hoteliers & Local Vendors' Association, Fishermen Community and others. Additionally, each member shall be assigned specific responsibilities for supervising and monitoring sustainable beach operations, as well as ensuring compliance with all regulatory requirements.

<PURPOSE AND OBJECTIVE>
<COMPOSITION>

<ROLES AND RESPONSIBILITIES>
<MEETING SCHEDULE>
<DOCUMENTATION AND RECORD KEEPING>

6. Sustainable Beach Planning

<Need to be elaborate and may be moved before the operational aspects>

7. Environmental Information

8. Water Quality Management

8.1 Sampling and Analysis of Water Quality

Regularly test beach water to monitor for pollutants and ensure compliance with safety standards. (once/twice in a month)

BMC shall prepare and maintain the calendar specifying testing intervals.

One of the BMC members should be a member from the Pollution Control Board (PCC), and shall assigned the responsibility to monitor and ensure compliance with the calendar dates.

Depth for collection of water samples -?

Results of water quality analysis shall be made publicly available, both on-site (via information boards) and through digital platforms.

PRIMARY WATER QUALITY CRITERIA FOR BATHING WATER -?

8.2 Requirements for Water Quality
8.3 Physical Parameters
8.4 No Industrial Discharges in Sea

8.5 Water Waste Management

Types of waste commonly found on beaches and their respective management approaches include:

a) Organic Waste
b) Plastic Waste
c) Glass Waste etc.
d) Hazardous waste.

Designated bins for each waste type

9. Beach Environment Management

9.1 Biodiversity Protection

BMC shall regularly monitor and report to safeguard local flora and fauna

9.2 Sanitation

10. Safety & security

Beach Management Committee (BMC) shall deploy trained and certified lifeguards during the beach's operational hours, maintaining a ratio of one lifeguard for every 100 meters.

10.1 Emergency Procedures

10.2

11. Ecological Conservation

12. Beach Infrastructure and Services

Risk Assessment –

All beach management committees must conduct a detailed risk assessment to identify potential hazards related to environmental factors, visitor safety, and operational activities. This includes but not limited to

a) Natural risk – (Weather conditions)
b) Visitor related risk – (Overcrowding, waste disposal, and water quality concerns).
c) Operational Risks – (Evaluate, risks related to the condition and functionality of facilities, accessibility, and the effectiveness of security measures.)

ANNEX – C

INPUTS RECEIVED ON DRAFT STRUCTURE OF STANDARD ON "SUSTAINABLE BEACHES"

Ms. Nayana Udayashankar, Dakshin foundation - Green Color
Dr. K. Ramu, National Centre for Coastal Research – Purple Color
Dr. Dipnarayan Ganguly – Orange Color

13. Scope

The beaches are not only vital for tourism but also for the livelihoods of coastal communities and the protection of fragile marine ecosystems.

The Ministry of Environment, Forest and Climate Change (MoEFCC) has already decided to identify and develop beaches of internationally recognized "Blue Flag" certification to protect and conserve the beach environment and control and abate pollution in coastal beaches and sea waters. However, due to the unique environmental, cultural, and socio-economic settings along its extensive coastline, the development of country-specific standard criteria for sustainable beach management in India is crucial.

Sustainability guidelines by various international agencies may not fully address the specific challenges of the country, such as its monsoon-driven erosion patterns, biodiversity, and the socio-cultural importance of beaches for local populations. Specific standards would help balance environmental conservation with economic development, promoting practices that protect coastal ecosystems, mitigate pollution, and encourage responsible tourism.

These standards would also align with the country's legal and regulatory frameworks, ensuring practical implementation and fostering stakeholder cooperation, from government bodies to local communities. This standard specifies the requirements for environmental beach management, including:

This standard specifies the requirements for environmental beach management, including

h) Environmental Information
i) Stakeholder Education and Participation – (Stakeholder Consultation, Sensitization and Participation)
j) Water Quality Management – (Beach Water Quality)
k) Beach Environment Management
l) Safety & Security
m) Ecological Conservation
n) Beach Infrastructure and Services

4. Classification of Beaches –

Classifying sustainable beaches can provide a valuable tool for understanding and comparing different coastal environments. Beaches can be classified based on their natural features,

biodiversity and other available resources such as sand composition, dune systems, and coastal vegetation. They can also be classified based on the quality of their water, including levels of pollution, bacteria, and nutrients. A classification system for sustainable beaches could be based on the following criteria:

Class 1: Pristine Beaches: Beaches with limited human development and infrastructure, with minimal impacts from tourism or other activities. It should support diverse ecosystems, including coastal forests, wetlands, and marine habitats. These beaches should be subject to strict conservation regulations to protect their natural features. These beaches may have limited development and tourism activities (mostly high-end and zero-waste tourism). Examples: Remote Island beaches of India etc.

Class 2: Moderately Developed Beaches: These beaches may have some development and tourism activities, such as infrastructure permissible under the CRZ notification, but still maintain a relatively natural character. These beaches should implement sustainable management practices to minimize their environmental impact and to support important ecosystems and biodiversity. Example: Rural beaches of Mainland of India with moderate tourist footfall.

Class 3: Developed Beaches: These are mostly urban beaches which have high tourist footfall and extensive development, including resorts, infrastructure, and commercial activities. These beaches face challenges in achieving sustainable management due to the high level of development and competing interests and therefore may need greater conservation measures. Example: Urban beaches of India.

Class 4: Degraded Beaches: These beaches experience significant physical or ecological damage due to unstable coastline, high wave energy and/or human activities, such as pollution, over-exploitation, and coastal erosion. These beaches require urgent conservation measures to prevent further degradation and restore their ecological function. Examples: Some coastal stretches affected by pollution or coastal erosion, industrial areas along the coast etc.

5. General Requirements

Creating a sustainable beach requires a balance of environmental protection, community involvement, and responsible use of natural resources. It should clear provide guidelines for environmental protection, waste management, sustainable infrastructure, sustainable tourism, community engagement and partnerships, climate resilience and environmental regulations and enforcement. Implementation of these practices can ensure the long-term health and sustainability of beach ecosystems while also promoting enjoyable and responsible tourism.

5.1 Statutory and Regulatory Requirements

(Highlighting all regulatory requirement)

Regulations pertaining to issues relating to coastal zone planning, environmental management, waste-water legislation, environmental legislation, and others must be met for the beach to receive

and maintain the sustainable beach status. The following rules and regulations have to considered and followed strictly to ensure the sustainability of the beach.

1. Coastal Regulation Zone (as per CRZ 2019 notification) - CRZ III B
2. MoEFCC order, S.O. 125(E). Dated 9th January, 2020.
3. Environment (Protection) Act, 1986
4. Water Quality Standards for Coastal Water Marine Outfalls (https://cpcb.nic.in/wqm/coasteal_water_standards.pdf)
5. Biodiversity Act, 2002
6. Wildlife Protection Act, 1972
7. Solid Waste Management Rules, 2016

In addition, States may have their own regulations and policies for coastal management, which need to be followed in addition to national guidelines. For instance, Maharashtra and Goa have distinct policies regulating tourism, construction, and other activities on beaches.

5.2 Beach Management Committee:

To fulfil this objective a monitoring agency may be engaged in the form of Beach Management Committee (BMC). This committee may be formed under the Chairmanship of District Collector / Magistrate. Committee members include representatives from various departments such as environment/forest, tourism, science & technology, education, transport, health, pollution control, disaster management, municipality/ gram panchayat, police/marine police, coastguard, hotelier's & local vendor's association, fishermen community, local NGOs etc., each assigned with a responsibility of supervision & monitoring of beach operations and compliance to Blue flag criteria.

It is recommended that monthly meeting of BMC must be conducted for efficient coordination and management, however member secretary can request more meeting or consultation from BMC member, if required. BMC may like to engage a "Beach Manager" for providing pollution abatement, safety & security services.
The activities of BMC include monitoring & supervise the beach maintenance staff, beach infrastructure operations & safety of tourists etc. The general activities of BMC are listed below:

1. Environmental Coordination
2. Safety coordination
3. Education coordination
4. Accessibility Coordination
5. Monitoring and Reporting Team
6. National and International Coordination for certification

6. Sustainable Beach Planning

Sustainable Beach Planning includes systematic demarcation of the zones for various activities for management and efficient functioning of the beach. These include:

a) Infrastructure: Development of clean and healthy beaches by enhancing the green infrastructure for sustainable tourism (permissible)

b) Environmental education: Performing community awareness and environmental
c) Education programs for sustainable coastal management
d) Networking: Enhancement of the networking and involvement of local, regional, national and international organizations to promote sustainable tourism
e) Eco-labelling and management: Application for certification (ecolabelling) of the Beaches and their management
f) Pollution Control: Site-specific interventions to mitigate the pollution load if any (e.g. Beach litter, marine debris, plastics, solid waste, wastewater)
g) Employment generation for the local community
h) Strategy for Management Monitoring and reporting

B - Stakeholder Consultation, Sensitisation and Participation:

The process of certification ought to include a stakeholder consultation where current use and access of the proposed beach are recorded with a detailed map. The plan for beach certification should be shared with the stakeholders at such a consultation and their inputs heard.

● An empowered Beach Management Committee (BMC) that oversees the protection, monitoring and management of the beach in question should be set up. The constitution of such a committee would include members of the local Panchayat, village committee members, community representatives from coastal/fishing communities, forest department officials, fisheries department officials, tourism officials, local NGO/Civil society representatives.

● The BMC will be responsible for developing rules for use, protection, monitoring and management of the beach. The BMC will also be empowered to enforce rules and/ or guidelines made for certified beaches.

● A tourist fee in the form of a parking fee or an environmental charge on the visitor could be levied, which contributes to a beach management fund, which is managed by the BMC. It can be used for paying staff like lifeguards, cleaners, monitoring the beach and maintenance of infrastructure. The BMC can take a decision on spending the surplus amount for fulfilling local development needs.

● While levying such fees (tourist, parking etc.), care should be taken to ensure that local residents are not charged and local livelihoods are not affected. Coastal communities using the coastal commons should continue to have access and first priority in accessing these commons.

7. Beach Environment Management

a) Information about the sustainable beach Programme must be displayed
b) Environmental education activities must be offered and promoted to beach users
c) Information about bathing water quality must be displayed.
d) Information relating to local eco-systems, environmental elements and cultural sites must be displayed
e) A map of the beach indicating different facilities must be displayed

f) A code of conduct that reflects appropriate laws and/or regulations governing the use of the beach and surrounding areas must be displayed.

- Beach Environment Management, Ecological Conservation & Environmental Information.

  - Waste on the beach ought to be managed properly, with waste segregation being strictly followed. An attempt should be made to make the beaches a no-plastic zone and eventually, a zero-waste beach. As per the polluter pays principle, any businesses or individuals responsible for polluting air, water or soil in and around the beach will be levied a fine in proportion to the violation.

  - Activities like nature walks, bird walks and inter-tidal walks which promote environment education should be conducted.

  - An interpretation centre which provides information on local ecology and biodiversity and on local culture could be created.

  - A detailed assessment of the carrying capacity of the beach should be undertaken with respect to the ecological, social and economic criteria weighing the positive and negative externalities. The number of tourists per day should be limited based on this study

  - Except for restrictions based on ecological considerations such as turtle nesting sites or human safety considerations such as rough waves or crocodile encounters, beaches should be accessible for the public.

  - The BMC should monitor the activities and permit tour operators based on proper verification. Tour operators who conduct tours in an ecologically sensitive manner and contribute to building environmental sensitivity of tourists should be prioritized

  - Local community members should be hired by the BMC to monitor the activities run by the tour operators and also monitor tourist behaviour on a daily basis and see that no environmentally impactful activities are undertaken. They should also enforce the plastic free zones by ensuring that the tourists, tour operators and shopkeepers do not use any single-use plastic.

- Restricted Activities:

  - Tourism activities which disturb the local environment like water bikes, sea walks should not be allowed.

  - Baiting & feeding of wildlife shouldn't be allowed.

  - Driving on the beach shouldn't be allowed.

- No artificial lighting should be installed on the beach apart from low lighting within the infrastructure facilities.

- No music or activities should be allowed which create noise pollution.

8. Water Quality Management - (Beach Water Quality)

8.1 Sampling and Analysis of Water Quality – (Assessment of the beach water quality)

At the beginning the tourist season for all the sustainable beaches should be defined based on the seasonality. Unstable environmental conditions (monsoonal disturbance) should be excluded from the tourist season. A tentative water quality testing calendar needs to be prepared for the tourist season and followed for sampling the beach water. Sampling to be done within 4 days of specified date in the calendar in case of miss. Sampling frequency may be increased when results raise concern. One sample will be collected before the start of season. For each sampling point, there must be no more than 31 days between any two water samples during the tourist season.

Collection of water samples should adhere to, based on the sampling calendar. The sampling points will be decided in such a way that it will represent the areas with maximum bathers.

The sampling points should cover the other potential sources of pollution such as near creeks, estuaries or other inlets entering the beaches, to ascertain that inflows from these are not affecting bathing water quality. Sampling frequency will be increased when results raise concern.

The water samples (100 ml) should be collected at 30 cm below the surface. Special care will be taken to avoid contamination during transportation and handling
Water samples for microbial assay should be collected aseptically, in sterile glass bottles (Table 2) and will be stored in dark and cold conditions (<4 to 0°C) during transit to the laboratory (never will be kept at < 0º C). Analysis for physico-chemical parameters should be completed or initiated within 24 hours of the sampling. Similarly, microbial incubation for studying the microbial growth should be initiated within 24 hours of sampling.

8.2 Requirements for Water Quality – Water quality parameters (Physico-chemical and microbiology parameters)

Physico-Chemical Analysis

The surface water must be visually clean without any indication of pollution, e.g. oil, litter, sewage or other evidence of pollution. The key parameters should be measured for safe beach tourism are Colour and Odour, pH range, Floating Matters, Turbidity, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), *Escherichia coli* (Faecal Coliform bacteria), *Intestinal Enterococci* (streptococci) Analytical methods to be used for measuring various water quality parameters are provided below.

No.	Parameter	Analytical method	Reference
1	Colour and Odour	Visual & Sense method	PARAMETERS OF WATER QUALITY. Interpretation and Standards[1].
2	pH range	Potentiometric method (by pH meter)	APHA[2], 1995; Grasshoff *et al.*,[3] 1983
3	Floating Matters	Visual method	PARAMETERS OF WATER QUALITY[1].
4	Turbidity	Nephelometric or formazin method	APHA 2005[2]
5	Dissolved Oxygen (DO)	Winkler's method/ Probe Sensor	Grasshoff et al. 1983[3]
6	Biochemical Oxygen Demand (BOD)	Incubation method	APHA 2005
7	*Escherichia coli* (Faecal Coliform bacteria)	Membrane Filter Method	Kinzelman et al 2005
8	Intestinal Enterococci (streptococci)	Membrane Filter Method	Sinton et al[4] 1993; Winslow and Hunnewell [5]1902;

8.3 Physical Parameters - (Frequency of monitoring)

Several physical parameters need to be considered to ensure that both environmental and human needs are met while minimizing negative impacts. Here are some key physical parameters to consider for sustainability:

a) Coastal Erosion Rates: Eroding beaches should be avoided for any developmental activities.
b) Sediment Transport: It is important to understand longshore drift, wave action, tidal forces etc.
c) Beach Nourishment: Periodic replenishment of sand may be considered if necessary.
d) Dune Systems: Natural dunes needs to be preserved or restored to protect inland

8.4 No Industrial Discharges in Sea (Information on outfalls/discharge)

The BMC is required to assist local authorities/administration in monitoring no industrial, waste-water or sewage-related discharges affect the beach area. In the event that there are discharge points in the area of the beach, these must be duly documented. Where identified, combined

[1] Parameters of Water Quality. Interpretation and Standards. Published by the Environmental Protection Agency, Ireland. 2001.
[2] APHA 1995. Standard Methods for the Examination of water and waste water, p. 5-15, Washington, D.C., American Public Health Association 2005.
[3] Grasshoff, K. 1983. Determination of salinity and oxygen, pp-31-72; Determination of nutrients, pp. 125-187. In: K. Grasshoff, M. Ehrhard, K. Kremling, C. Verlag and Weinheim (eds.), Methods of Seawater Analysis, Verlag Chemie, Weinheim and New York.
4 Sinton L. W., A. M. Donnison & C. M. Hastie. 1993. Faecal streptococci as faecal pollution indicators: A review. Part I: Taxonomy and enumeration. New Zealand Journal of Marine and Freshwater Research. 27:1, 101-115.
[5] Winslow, C.E.A. and Hunnewell, M.P. (1902) Streptococci characteristic of sewage and sewage-polluted waters. Science 15, 827

sewage overflow discharges or other urban/industrial waste water discharges are within, or immediately adjacent to the beach, the BMC should inform to warn the public that there is an intermittent discharge which could, in the short term, impact the bathing water quality.

8.5 Water Waste Management. (Incidental remedial measures)

The toilet or changing room/shower facilities must have controlled sewage disposal and therefore, there must be a provision of zero wastewater treatment plant so that water can be recycled or reused for this purpose. Sewage or effluent from the toilets must not enter the ground or the water untreated and for this bio-toilets are installed. For facilities located outside of areas serviced by the municipal sewage system and/or remotely located beaches, individual treatment and regularly emptied holding tanks that prevent untreated sewage, effluent or seepage from entering the ground or the water - and which do not adversely affect the environment - are acceptable. Therefore the discharge from shower panels, wash basins and urinals must be recycled for further use. A Grey Water Treatment Plant preferably on FAB (FLUIDIZED AEROBIC BIO-REACTOR) process should be designed, supplied, installed &commissioned.

Water Quality Management

- No effluents should be directly led in
- to the sea even from a distance (upto 10 kms).
- Regular monitoring of water quality should be done

9. Beach Environment Management

a. Biodiversity Protection

Ecological evaluations of the sustainable beach must be undertaken in order to ensure the preservation and enhancement of the ecology and environment of the beaches through appropriate interventions. The ecological impact of any beach tourism related development must be identified and minimized as much as possible. Endemic species use less water than non-endemic, and their use preserves the biodiversity of the surroundings. For painting works, less environmentally harmful paints that have an eco-label are used. When painting the buildings on the beach, only environmentally friendly interior and exterior paint should be used. Further, ecosystem-based solutions like beach nourishment and vegetation restoration can provide dual benefits of coastal protection and biodiversity enhancement

b. Sanitation

To achieve sustainable beach environments, effective sanitation management is crucial. This involves implementing systems that minimize pollution, ensure water quality, and promote public health. Key strategies include the use of ecological sanitation systems, proper waste management, and community engagement. A few essential components for sustainable beach sanitation are listed below:

a) Individual/mobile/community toilet

b) Bio-digester toilets
c) Solar-Powered, Self-Cleaning Toilet
d) STP

10. Safety & security

Safety and risk assessment are crucial components of sustainable beach management. They help to ensure the well-being of both beachgoers and the environment, while also protecting the long-term viability of the beach ecosystem. Safety and Risk Assessment (SRA) survey for the sustainable beach should be conducted to identify the safe bathing zone, prior to the Bathing Water Quality Testing. Beach safety and risk assessment must be carried out at least once at the beginning of each tourist season to identify the safe bathing zone. A few important criteria for the assessment of beach safety are provided below:

Criterion 1: Appropriate public safety control measures must be implemented.
This refers to the safety risk assessment, which is to be carried out by the appropriate national authorities, and the placement of rescue equipment, such as lifeguards. The following conditions must be considered for ensuring safe bathing/water sports etc. for the tourist.

Bathymetry: The coastal waters with steep gradients and irregular depth profiles are dangerous for swimming. The submerged rocks with irregular, sharp surfaces and corals can injure humans encountering them while swimming. Beach area can be classified as Low gradient (0-5°) Moderate gradient (< 5°), and very steep gradient (< 8°) through scientific field surveys. The breaker zone is by and large avoided by beach users due to the furious nature of the wave force at the breaking point and for fear of drowning. A moderate slope helps dissipate wave energy and minimizes erosion. Flat beaches may be more prone to flooding, while steep beaches may erode faster.

Waves: Wave approaching the shore in parallel to the coast are considered to be safe. Wave breaking zones should be considered while selecting the safe bathing zones of the sustainable beaches.
Currents: Gentle currents parallel to the shoreline are generally considered safe for bathing. In fact, these currents can be beneficial as they help to disperse pollution and prevent stagnation of the water. Any possibilities of Rip Current formations should be closely monitored and the identified locations must be strictly avoided for any bathing and water sports.

Biological organisms

The potential biological threats (Jellyfish, Sharks, Sea Urchins, Venomous Marine Animals, Marine Toxins and Harmful Algal Blooms etc.) need to be understood to provide a safer beach experience to the tourists while minimizing the risk of serious health issues

Safe Zone for bathing should be demarcated where – the water depth is about 1.5m (i.e. hip level depth for an adult) and wave height is less than 0.5 m.
Risk Zone should be demarcated where – the water depth is more than 1.5 m and wave height is more than 1.0 m, or rocky sea bed/ shifting shoals/ shifting sand pits. This zone may be considered suitable for water sports activities only and not suitable for bathing or swimming

Criterion 2: First aid equipment must be available on the beach. First aid refers to a) a lifeguard on-site, and/or b) an attended first aid station with trained personnel, and/or c) equipment located in a shop or other beach facility at the beach, and/or d) directly available to the public on the beach, e) safety signage. The beach needs to have qualified personnel on first aid-related issues. BMC should be equipped enough for any extreme weather events (storm surges) that can damage the infrastructure.

Criterion 3: Emergency plans to cope with pollution risks must be in place.

The emergency plan must provide a clearly identified procedure, facilitating efficiency in the case of an emergency. An emergency could result from oil spills, hazardous or toxic waste spills entering the beach from the sea, the discharge of storm water, hurricanes, algal blooms that could be dangerous, etc. An emergency in this context would be defined as an event that leads to a large-scale impact on the beach or bathing water.

Safety & Security

- Sign boards with information on potential threats such as dangerous current, sudden depth transitions or saltwater crocodiles & detailed safety instructions should be installed.
- First aid boxes should be available and trained lifeguards should monitor the beach.
- Lifeguards should be trained in emergency first aid, evacuation plans and other emergency protocols.

11. Ecological Conservation

Ecological conservation efforts for sustainable beaches encompass a variety of strategies aimed at preserving marine ecosystems while promoting responsible tourism. These efforts are crucial for maintaining biodiversity, supporting local economies, and ensuring the long-term health of coastal environments. Conservation efforts by the BMC involve regular monitoring and reporting for the protection of local flora and fauna, erosion control measures, and waste reduction initiatives. The following conservation measured may be considered based on the suitability of the specific beaches:

a) Zonation of habitats
b) Reducing mechanical cleaning methods
c) Restoration of beach vegetation
d) Dune Restoration
e) Beach conservation aligned with community needs

12. Beach Infrastructure and Services

The beach zone is the area closest to the water and is where most of the recreational activities take place. This zone should include a wide strip of sand for sunbathing, and building sandcastles, lifeguard towers, changing rooms and showers, restrooms, food and beverage kiosks, beach umbrellas and chairs for rent, etc. All the infrastructures should be established based on the permissible activities recommended in the CRZ notification (2019). In addition, it is important to assess how many people the beach can sustainably support in terms of infrastructure (e.g., waste management, restrooms) and ecological impact. The capacity of the beach infrastructure will largely depend on the carrying capacity and expected tourist footfall in the beach.

Here are some key infrastructure elements to consider:

a) Restrooms and Changing Facilities: Providing clean and accessible facilities for visitors.
b) Parking Areas: Designing parking lots that minimize environmental impact and reduce congestion.
c) Access Paths: Creating safe and accessible paths (made of WPC) to the beach, especially for those with disabilities.
d) Shade Structures: Providing shade for visitors, especially during peak hours.
e) Lifeguard Stations: Ensuring visitor safety with trained lifeguards.
f) Renewable Energy: Using solar or wind power to reduce the carbon footprint of beach operations.
g) Water Conservation: Implementing water-saving measures like low-flow fixtures and rainwater harvesting.
h) Sustainable Materials: Using eco-friendly materials for construction and maintenance.
i) Educational Signage: Providing information about the beach's ecosystem and how visitors can help protect it.
j) Bio-digester /bio-tank unit: A "Bio Digester" block in which human waste is reduced to biogas and pure water with the help of bacterial inoculum. In addition, Grey Water Treatment Plant (GWTP) facility should have controlled sewage disposal and therefore, there must be a provision of zero wastewater treatment plant.
k) CCTV Cameras with Global access feature for security & surveillance
l) Information Display Hoarding Board (Unipole) and Beach Map Display Hoarding Board (Unipole)
m) Watch Tower (Bamboo)- upto 5 meters
n) Sand Cleaning Machine
o) Litterbins Pair made of Bamboo
p) Seating bench made of wood/bamboo
q) Amphibious Wheel Chair
r) Life Jackets, Rescue Tubes, Rescue Floaters, Rescue Throw Bags, Binoculars, First Aid Kit, Beach Safety flags
s) Sea Buoys, Rope & Anchor for cordon off the designated bathing area

Infrastructure

- Any development of infrastructure should be created in compliance with the Coastal Regulation Zone Notification 2019.
- Tourist-friendly amenities such as water refilling kiosks, toilets and change rooms should be put in place.
- Only temporary infrastructure should be permitted using locally available natural materials- such as bamboo. Construction should follow local architecture.
- Visitors/tourists should be encouraged to enjoy nature and the local environment of the beach. Infrastructure on the beach itself should be limited to the bare minimum needed. Any facilities planned to be built like food courts, restaurants, parking areas, accommodation facilities or lounge areas which require infrastructure should be built away from beach and dune areas in order to protect beach habitats and ecosystems.
- For beautification or creation of beach infrastructure/facilities, no existing trees/mangroves, biodiversity should not be disturbed or removed. Beach profile should not be changed. Dune

vegetation should not be removed. Exotic trees should not be planted and no landscaping should be done.

- Only local small businesses selling local unpackaged food and local handicrafts which manage waste in a proper manner can be allowed to be set up.

Suggestion:

In addition - it can be considered to include a section on **Beach sediment quality** as it is also important from the tourism point.