Urban Resilience and Adaptation for India and Mongolia

Curricula, capacity, ICT and stakeholder collaboration to support green & blue infrastructure and nature-based solution

Report on:

Lecture Material
(Introduction to Infrastructure Planning)

Partner number: P12

Nirma University, Gujarat, India

Disclaimer

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Course Name: Introduction to Infrastructure Planning
Number of credits: 3 ECTS

Period: Spring semester

Coordinator	**Dr Swati Kothary**
Credits	3 ECTS
Lecturers	**Dr Swati Kothary**
Level	Bachelors
Host institution	Nirma University
Course duration	15 weeks

Summary

This 3 ECTS course is an elective course that will be taught by Dr Swati Kothary at Nirma University to B Arch (Bachelors in Architecture) students. The elective is offered to students of VIII, IX and X semesters.

Target student audiences

Bachelors in Architecture - VIII, IX and X semesters

Prerequisites

NA

Aims and objectives

The main course objective is to introduce basic concepts of essential structure to students at the city level. The focus will be more on water supply, stormwater drain, sewerage & sanitation and solid waste management. Other services will be introduced. The main objectives are:

- To define the lifeline infrastructure of a city.
- To identify the significance of lifeline infrastructure to human settlements, environment, public health and hygiene.
- To inculcate knowledge about stormwater drainage system, water supply system, wastewater drainage system, solid waste management and other services.
- To acquaint the students with the principles of demand, supply, and management of different resources in an urban fabric.

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ACTS, MANUALS, CODES AND STANDARDS USED IN INFRASTRUCTURE PLANNING - WATER

Introduction to Infrastructure Planning
Unit 1 Session 2

Water Supply and Management Traditional Scenario

- Water management was an integral part of life
- There was deep connection and understanding of water and other natural elements
- The systems respected and encouraged diversity
- There was social discipline in using natural resources
- Natural resources were not treated as free goods
- The recources could be accessed with a lot of effort.

Inefficient Infrastructure

- Inadequate Water Supply & Sanitation affect economic development through health & environment
- Working days loss due to illness
- Pollution levels in natural resources bring irreversible changes in Ecosystem
- Amongst other issues Agriculture & Tourism are permanently affected

Need for Efficient Infrastructure

- Reduces unsuitable demand on Natural Resources
- Safeguards Depletion of Environmental Resources
- Creates Sustainable Ecosystem
- Helps Maintain Global Cycles

Principles for Efficient Infrastructure

Adequate: Sufficient, Operation (PPP/Government), future Estimates

Reliable: Consistent (Time/ Quantity) , Continuity (minimum Breakdown), Quality (Duration/ Time)

Affordable: Tariffs, easy to pay, Levels of payment

Accessible: Basic services available to one and all (caste, class, gender, economic class, disability), Equity

Accountability: Identified responsibilities for ULBs, Government Service Delivery of required standard

Sustainability: Social, Economic, Resource, Financial, Environmental

Planning for Infrastructure

- Identification of Goals – Long Term, Short Term
- Objective – Physical, Financial, Institutional, Social, Environmental benefits at Micro, Macro, Regional, National Levels
- Implementation Measures- Actions and activities with specific timelines
- Location Identification
- Physical Infrastructure Component
- Technical Solution based on Objectives identified and Economic Feasibility
- Assessment – Social, Environmental, Financial

Water Supply

Water Resources – Surface & Ground
- Source
- Quality
- Quantity
- Location Of Source
- Location Of Water Intake
- Area Requirement Of Components Of Water Intake
- Water Requirement For Different Land Uses
- Factors Affecting Water Demand
- Per Capita Requirement And Its Relationship With Population Sizes, Variation

Water Treatment System
- Location
- Space Requirements

Water Distribution Systems
- Components
- Planning
- Provisions For Various Land Use
- Storage & Supply Network

Water in Indian Constitution

- Water is a state subject under the Indian Constitution
- States have the constitutional right to Plan, Implement Operate and maintain Water Supply Projects
- Water Supplies is under Legislative Jurisdiction of the State Governments (item 17, List II – State List) under 7th Schedule referred to in the Article 246 (3) of the Constitution
- CPHEEO (Central Public Health & Environmental Engineering Organisation) provides Policies, Strategies & guidelines to Governments including ULBs in implementation, operation & maintenance, adoption of latest technologies, etc

The Constitution's 74th Amendment Act

- Urban local bodies, to be known as Municipal Corporations, Municipal Councils and Nagar Panchayat depending on the population, shall be constituted through universal adult franchise in each notified urban area of the country.
- These shall be constituted for a period of five years and if dissolved earlier, an election to reconstitute it shall be completed before the expiration of a period of six months from the date of its dissolution.
- Not less than one-third of total number of seats in each urban local body shall be reserved for women.
- The Legislature of a State may by law entrust on these bodies such power and authority as may be necessary to enable them to function as institution of local self government, including those listed in the Twelfth Schedule.
- In order that the urban local bodies can perform the functions assigned to them, the Legislature of a State shall assign them specific taxes, duties, tolls and levies and authorise them to impose, collect and appropriate the same.
- Each State shall also constitute a Finance Commission which shall review the financial position of the urban local bodies and recommend the principles which should govern the devolution of resources, including grant-in-aid from the Consolidated Fund of the State of these bodies.
- The superintendence, direction and control of the preparation of electoral rolls for, and the conduct of, all elections to the urban local bodies shall vest in the State Election Commission.
- In each district a District Planning Committee shall be constituted to consolidate the plan prepared by the urban and rural local bodies.
- Similarly for each metropolitan area a Metropolitan Planning Committee shall be constituted to prepare a development plan for the metropolitan area a whole.

TWELFTH SCHEDULE (Article 243W) of the Constitution has listed the following functions of the Urban Local Bodies

- Urban Planning including town planning.
- Regulation of land-use and construction of buildings.
- Planning for economic and social development.
- Roads and bridges.
- Water supply for domestic, industrial and commercial purposes.
- Public health, sanitation, conservancy and solid waste management.
- Fire services.
- Urban forestry, protection of the environment and promotion of ecological aspects.
- Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded.
- Slum improvement and upgradation.
- Urban poverty alleviation.
- Provision of Urban amenities and facilities such as parks, gardens, playgrounds.
- Promotion of cultural, educational and aesthetic aspects.
- Burials and burial grounds; cremations, cremation grounds and electric crematoriums.
- Cattle pounds; prevention of cruelty to animals.
- Vital statistics including registration of births and deaths.
- Public amenities including street lighting, parking lots, bus stops and public conveniences.
- Regulation of slaughter houses and tanneries.

Twelfth Schedule added by the Constitution (Seventy-fourth Amendment) Act, 1992, s.4(w.e.f. 1-6-1993)
Source: https://legislative.gov.in/sites/default/files/COI_English.pdf

243ZD Committee for District Planning

(3) Every District Planning Committee shall, in preparing the draft development plan,-

(a) have regard to-

(i) matters of common interest between the Panchayats and the Municipalities including spatial planning, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

(ii) the extent and type of available resources whether financial or otherwise;

(b) consult such institutions and organisations as the Governor may, by order, specify.

Source: https://legislative.gov.in/constitution-seventy-fourth-amendment-act-1992

243ZE. Committee for Metropolitan planning.

(3) Every Metropolitan Planning Committee shall, in preparing the draft development plan,-

(a) have regard to-

(i) the plans prepared by the Municipalities and the Panchayats in the Metropolitan area;

(ii) matters of common interest between the Municipalities and the Panchayats, including co-ordinated spatial planning of the area, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

(iii) the overall objectives and priorities set by the Government of India and the Government of the State;

(iv) the extent and nature of investments likely to be made in the Metropolitan area by agencies of the Government of India and of the Government of the State and other available resources whether financial or otherwise;

(b) consult such institutions and organisations as the Governor may,by order, specify.

Source: https://legislative.gov.in/constitution-seventy-fourth-amendment-act-1992

280. Finance Commission

(1) The President shall, within two years from the commencement of this Constitution and thereafter at the expiration of every fifth year or at such earlier time as the President considers necessary, by order constitute a Finance Commission which shall consist of a Chairman and four other members to be appointed by the President.

(2) Parliament may by law determine the qualifications which shall be requisite for appointment as members of the Commission and the manner in which they shall be selected.

(3) It shall be the duty of the Commission to make recommendations to the President as to—

(a) the distribution between the Union and the States of the net proceeds of taxes which are to be, or may be, divided between them under this Chapter and the allocation between the States of the respective shares of such proceeds;

(b) the principles which should govern the grants-in-aid of the revenues of the States out of the Consolidated Fund of India;

1[(bb) the measures needed to augment the Consolidated Fund of a State to supplement the resources of the Panchayats in the State on the basis of the recommendations made by the Finance Commission of the State;]

2[(c) the measures needed to augment the Consolidated Fund of a State to supplement the resources of the Municipalities in the State on the basis of the recommendations made by the Finance Commission of the State;]

3[(d)] any other matter referred to the Commission by the President in the interests of sound finance.

(4) The Commission shall determine their procedure and shall have such powers in the performance of their functions as Parliament may by law confer on them.

Water (Prevention and Control of Pollution) Act 1974

The objectives of the Water (Prevention and Control of Pollution) Act are to provide for the Prevention and Control of Water Pollution and the maintenance or restoration of the wholesomeness of water for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

Nodal Ministries for Water Supply, Sanitation, Solid Waste Management

- Ministry of Urban Development
- Ministry of Rural Development
- Ministry of Environment, Forest and Climate Change
- Ministry of Jal Shakti (2019)

This was formed by merging of two ministries; Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation.

Ministries Formulate

- Policies
- Strategies
- Manuals
- Guidelines
- Codes
- Standards
- Provide Technical & Financial assistance to states

National Water Policy

Formulated by the Ministry of Water Resources of the Government of India to govern the planning and development of water resources and their optimum utilization.

- First National Water Policy was adopted in September, 1987.
- Reviewed and updated in 2002
- Re- Reviewed and updated in 2012

CPHEEO

CENTRAL PUBLIC HEALTH & ENVIRONMENTAL ENGINEERING ORGANISATION

- Technical wing of Ministry of Housing and Urban Affairs, Goverment of India
- Functions are related to Water Supply & Sanitation including Solid Waste Management
- 1954 – Constituted under former Ministry of Health & Family Welfare, Directorate General of Health Services (DGHS) on recommendation from Environmental Hygiene Committee
- 1973-74 – Affiliated to Ministry of Urban Development (Formerly Ministry of Works & Housing)
- Important Role in facilitating programs that need support from funding agencies such as World Bank, JBIC, ADB, other bilateral/ multilateral agencies e.g. JNNURM
- Advisory Role to support State Government & ULBs

Source: https://mohua.gov.in/cms/cpheeo.php

CPHEEO Manuals

1. Manual on Water Supply & Treatment, 3rd Edition, revised & Updated, 1999
2. Manual on Operation & Maintenance of Water Supply Systems, 2005
3. Manual on Sewerage & Sewage Treatment, 2013
4. Manual on Municipal Solid Waste Management, 2000
5. Manual on Municipal Solid Waste Management, 2016
6. Manual on Storm Water Drainnage Systems, 2019

Source: http://cpheeo.gov.in/

Codes & Standards

Bureau of Indian Standards - IS codes

Ministry of Environment Forest and Climate Change - Water Quality Specifications

IS CODES

IS 1172 : 1993Reviewed In : 2017	Code of basic requirements for water supply, drainge and sanitation (Fourth Revision)
SP 35 : 1987Reviewed In : 2014(Active)	Handbook on Water Supply and Drainage (with Special Emphasis on Plumbing)
IS 2065 : 1983Reviewed In : 2022(Active)	Code of practice for water supply in buildings (Second Revision)
IS 6295 : 1986Reviewed In : 2022(Active)	Code of practice for water supply and drainage in high altitudes and/or sub - Zero temperature regions (First Revision)
IS 10446 : 1983Reviewed In : 2022(Active)	Glossary of terms relating to water supply and sanitation
IS 12918 : 1990Reviewed In : 2017(Active)	Guide for removal of iron from water for rural drinking water supply (Chemical Treatment Method)
IS 17390 : 2020ISO/TS 24520 : 2017 (Active)	Service Activities Relating to Drinking Water Supply Systems and Wastewater Systems - Crisis Management - Good Practice for Technical Aspects
IS 17391 : 2020ISO 24523 : 2017 (Active)	Service Activities Relating to Drinking Water Supply Systems and Wastewater Systems - Guidelines for Benchmarking of Water Utilities
IS 17395 (Part 3) : 2020ISO 24516-3 : 2017(Active)	Guidelines for the Management of Assets of Water Supply and Wastewater Systems Part 3 Wastewater Collection Networks
IS 17482 : 2020(Active)	Drinking Water Supply Management System â€" Requirements for Piped Drinking Water Supply Service
IS 17676 (Part 1) : 2021ISO 24516- 1 - 2016(Active)	Guidelines for the management of assets of water supply and wastewater systems Part 1:Drinking water distribution networks
IS/ISO 24536 : 2019(Active)	Service activities relating to drinking water supply wastewater and stormwater systems — Stormwater management — Guidelines for stormwater management in urban areas

Source:
https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/Indian_standards/isdetails/

Core Infrastructure Elements In A Smart City

- Adequate Water Supply,
- Assured Electricity Supply,
- Sanitation, Including Solid Waste Management,
- Efficient Urban Mobility And Public Transport,
- Affordable Housing, Especially For The Poor,
- Robust It Connectivity And Digitalization,
- Good Governance, Especially E-Governance And Citizen Participation,
- Sustainable Environment,
- Safety And Security Of Citizens, Particularly Women, Children And The Elderly, And
- Health And Education.

Source: https://smartcities.gov.in/about-scm

Thank You

Reference Readings:

- First National Water Policy was adopted in September, 1987.
- Reviewed and updated in 2002
- Re- Reviewed and updated in 2012
- Water Quality Standards

Acknowledgement: All images are for the educational purpose and discussion during the class only; wherever available, the sources have been cited.

NATIONAL WATER POLICY

Central Water Commission,
New Delhi

Water, which is vital for sustenance of life and economic development is becoming an increasingly scarce resource in the country. The planning and execution of water resources development have by and large been carried out by individual states. As the major rivers in our country are inter-State in nature, it has not been possible for individual States to prepare master plans in respect of these rivers. It was felt that planning at national level for utilisation of water resources should be undertaken so that the greatest good is achieved and optimum benefits derived from the available water resources.

The necessity for an apex body to evolve national policies for development and use of water resources in conformity with the highest national interests was emphasised by various authorities including the Irrigation Commission, National Commission on Agriculture and Rashtriya Barh Ayog. The National Development Council at its meeting held on 14th March, 1982 also discussed the matter and the Council observed that a climate should be created in which national water plans are prepared keeping in view the national perspective as well as State and regional needs. In that context, the Council welcomed the proposal of the Government of India for setting up of National Water Resources Council (NWRC).

Accordingly, NWRC was set up on 10th March, 1983 under the Chairpersonship of Prime Minister of India with Union Minister of Irrigation (now Water Resources) as Vice Chairman. Union Ministers of Finance, Agriculture, Planning, Energy, Shipping & Transport, Tourism, Science & Technology, Works & Housing and the Chief Ministers/ Chief Commissioners/ Administrators of the States and UTs were the other members of the NWRC.

The functions of the National Water Resources Council will be as follows:

(a) To lay down the National Water Policy and to review it from time to time.

(b) To consider and review water development plans submitted to it (including alternative plans) by the National Water Development Agency, the River Basin Commissions, etc.

(c) To recommend acceptance of water plans with such modifications as may be considered appropriate and necessary.

(d) To direct carrying out such further studies as may be necessary for fuller consideration of the plans or components thereof.

(e) To advise on the modalities of resolving inter-State differences with regard to specific elements of water plans and such other issues that may arise during planning or implementation of the projects.

(f) To advise practices and procedures, administrative arrangements and regulations for the fair distribution and utilisation of water resources by different beneficiaries keeping in view optimum development and the maximum benefits to the people.

(g) To make such other recommendations as would foster expeditious and environmentally sound and economical development of water resources in various regions.

National Water Policy – 1987

The NWRC adopted the first National Water Policy in its 2nd meeting held in September, 1987. Important views and the same was circulated to the central ministries and States for implementation. Some of the important points of NWP-1987 are as follows:

- Water is a prime natural resource, a basic human need and a precious national asset. Planning and development of water resources need to be governed by national perspectives.

- The prime requisite for resource planning is a well-developed information system. A standardized national information system should be established with a network of data banks and data bases, integrating and strengthening the existing Central and State level agencies and improving the quality of data and the processing capabilities.

- The water resources available to the country should be brought within the category of utilizable resources to the maximum possible extent.

- Resource planning in the case of water has to be done for a hydrological unit such as a drainage basin as a whole, or for a sub-basin.

- Appropriate organisations should be established for the planned development and management of a river basin as a whole. Special multidisciplinary units should be set up in each state to prepare comprehensive plans taking into account not only the needs of irrigation but also harmonizing various other water uses, so that the available water resources are determined and put to optimum use having regard to subsisting agreements or awards of Tribunals under the relevant laws.

- Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another, based on a national perspective, after taking into account the requirements of the areas/basins.

- Water resource development projects should as far as possible be planned and developed as multipurpose projects. Provision for drinking water should be a primary consideration.

- Exploitation of ground water resources should be so regulated as not to exceed the recharging possibilities, as also to ensure social equity.

- Integrated and coordinated development of surface water and ground water and their conjunctive use, should be envisaged right from the project planning stage and should form an essential part of the project.

- In the planning and operation of systems, water allocation priorities should be broadly as follows:

    - Drinking water
    - Irrigation
    - Hydro-power

- Navigation
- Industrial and other uses.

- However these priorities might be modified if necessary in particular regions with reference to area specific considerations.
- There should be a close integration of water-use and land-use policies.

- Water allocation in an irrigation system should be done with due regard to equity and social justice. Disparities in the availability of water between head-reach and tail-end farms and between large and small farms should be obviated by adoption of a rotational water distribution system and supply of water on a volumetric basis subject to certain ceilings.

- Water rates should be such as to convey the scarcity value of the resource to the users and to foster the motivation for economy in wateruse. They should be adequate to cover the annual maintenance and operation charges and a part of the fixed costs.

- There should be a water zoning of the country and the economic activities should be guided and regulated in accordance with such zoning.

- There should be a master plan for flood control and management for each flood prone basin. Sound watershed management through extensive soil conservation, catchment-area treatment, preservation of forests and increasing the forest area and the construction of checkdams should be promoted to reduce the intensity of floods. Adequate flood-cushion should be provided in water storage projects wherever feasible to facilitate better flood management. An extensive network for flood forecasting should be established for timely warning to the settlements in the flood plains, along with the regulation of settlements and economic activity in the flood plain zones, to minimize the loss of life and property on account of floods.

- Drought-prone areas should be made less vulnerable to drought associated problems through soil-moisture conservation measures, water harvesting practices, the minimization of evaporation losses, the development of the ground water potential and the transfer of surface water from surplus areas where feasible and appropriate.

National Water Policy – 2002

After adoption of NWP 1987, new challenges emerged in the water resources sector, which necessitated review of the National Water Policy. Accordingly, the revised National Water Policy-2002 was adopted by the National Water Resources Council in its 5th meeting held on 1st April 2002. While there was a chord of similarity in essence and principles between the NWP-1987 and NWP-2002, yet the NWP-2002 introduced modification / addition / alteration pertaining to various issues namely Information system, Water resources planning, Institutional mechanism, Project planning, Private sector participation, Water quality, Monitoring of the projects, Water sharing/ distribution amongst the States, Performance improvement, Maintenance and modernization, Safety of structures, Land erosion by sea or river, Conservation of water in comparison to National Water Policy -1987. Some of these are highlighted below:

- Standards for coding, classification, processing of data and methods / procedures for its collection should be adopted.

- Non-conventional methods for utilisation of water such as through inter-basin transfers, artificial recharge of ground water and desalination of brackish or sea water as well as traditional water conservation practices like rainwater harvesting, including roof-top rainwater harvesting, need to be practiced to further increase the utilisable water resources. Promotion of frontier research and development, in a focused manner, for these techniques is necessary.

- With a view to give effect to the planning, development and management of the water resources on a hydrological unit basis, along with a multi-sectoral, multi-disciplinary and participatory approach as well as integrating quality, quantity and the environmental aspects, the existing institutions at various levels under the water resources sector will have to be appropriately reoriented / reorganised and even created, wherever necessary.

- Irrigation being the largest consumer of fresh water, the aim should be to get optimal productivity per unit of water. Scientific water management, farm practices and sprinkler and drip system of irrigation should be adopted wherever feasible.

- Reclamation of water logged / saline affected land by scientific and cost-effective methods should form a part of command area development programme.

- Management of the water resources for diverse uses should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users' Associations and the local bodies such as municipalities and *gram panchayats* should particularly be involved in the operation, maintenance and management of water infrastructures / facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups / local bodies.

- Private sector participation should be encouraged in planning, development and management of water resources projects for diverse uses, wherever feasible. Private sector participation may help in introducing innovative ideas, generating financial resources and introducing corporate management and improving service efficiency and accountability to users. Depending upon the specific situations, various combinations of private sector participation, in building, owning, operating, leasing and transferring of water resources facilities, may be considered.

- Effluents should be treated to acceptable levels and standards before discharging them into natural streams.

- Minimum flow should be ensured in the perennial streams for maintaining ecology and social considerations.

- Principle of 'polluter pays' should be followed in management of polluted water.

- Measures like selective linings in the conveyance system, modernisation and rehabilitation of existing systems including tanks, recycling and re-use of treated effluents and adoption of traditional techniques like mulching or pitcher irrigation and new techniques like drip and sprinkler may be promoted, wherever feasible.

- A close monitoring of projects to identify bottlenecks and to adopt timely measures to obviate time and cost overrun should form part of project planning and execution.

- The water sharing / distribution amongst the states should be guided by a national perspective with due regard to water resources availability and needs within the river basin. Necessary guidelines, including for water short states even outside the basin, need to be evolved for facilitating future agreements amongst the basin states.

- The Inter-State Water Disputes Act of 1956 may be suitably reviewed and amended for timely adjudication of water disputes referred to the Tribunal.

National Water Policy – 2012

India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. While engaged with the international community to collectively and cooperatively deal with this threat, India needed a national strategy to firstly, adapt to climate change and secondly, to further enhance the ecological sustainability of India's development path.

With a view to address the related issues, the National Action Plan on Climate Change (NAPCC) was prepared by the Government of India and released by the Hon'ble Prime Minister in 2008. The NAPCC had laid down the principles and had identified the approach to be adopted to meet the challenges of impact of climate change through eight National Missions one of which was National Water Mission.

This Comprehensive Mission Document of "National Water Mission" identifies the strategies for achieving the goals of (a) Comprehensive water data base in public domain and assessment of the impact of climate change on water resource, (b) Promotion of citizen and state actions for water conservation, augmentation and preservation, (c) Focused attention to vulnerable areas including over-exploited areas, (d) Increasing water use efficiency by 20%, and (e) Promotion of basin level integrated water resources management.

Under Goal 5 of the National Water Mission i.e 'Promotion of basin level integrated water resources management', Review of National Water Policy was one of the identified strategies.In pursuance to the strategy identified in National Water Mission Document as well as deliberations in National Water Board, Ministry of Water Resources had initiated the process of review of National Water Policy, 2002. A series of consultation meetings were held as follows;

1. With Hon'ble Members of Parliamentary Standing Committee on Water Resources, Consultative Committee for Ministry of Water Resources and Parliamentary Forum on Water Conservation and Management on 28th July,2010;
2. With Academia, Experts and Professionals on 26th October, 2010
3. With Non-Governmental Organizations was held on 11th & 12th January, 2011
4. With Corporate Sector was held on 21st March, 2011
5. With representatives of Panchayati Raj Institutions on 16th June, 2011 at Hyderabad, on 30th June, 2011 at Shillong, on 14th July, 2011 at Jaipur and on 2nd November, 2011 at Pune.

A Drafting Committee comprising of Dr. S.R. Hashim, former Member, Planning Commission and Chairman, Union Public Service Commission; Prof. Subhash Chander, former Professor,

IIT, Delhi; Shri A.D. Mohile, former Chairman, Central Water Commission; and Shri S.C. Jain, Programme Leader at Safe Water Network (an NGO) was also constituted for drafting of the National Water Policy. This Committee was supported by a team of officers from Ministry of Water Resources, Central Water Commission, Central Ground Water Board, National Rainfed Area Authority; National Institute of Hydrology and Planning Commission.

Considering the recommendations and feedback received during various consultation meetings, the Drafting Committee identified basic concerns in water resources sector and adopted basic principles which should be followed to address those concerns, and accordingly, evolved draft policy recommendations. The draft National Water Policy (2012), recommended by the Drafting Committee, was put up on the website of Ministry of Water Resources and comments were invited. The Draft National Water Policy (2012) was also circulated amongst all State Governments and related Union Ministries.

More than 600 comments were received on the Draft National Water Policy (2012). These comments along with newspaper reports, etc., were considered by the Drafting Committee and accordingly, Revised Draft National Water Policy (2012) was recommended.

Revised Draft National Water Policy (2012) was considered by the National Water Board (NWB) in its 14th meeting held on 07.06.2012 wherein modifications were suggested and modified Draft National Water Policy (2012) was recommended to National Water Resources Council (NWRC) for adoption and finalization.

Modified Draft National Water Policy (2012) recommended by NWB was considered by the NWRC in its 6th meeting Chaired by the Hon'ble Prime Minister on 28.12.2012. The NWRC adopted the National Water Policy (2012) as per the deliberation at the Council Meeting. The adopted National Water Policy (2012) was released during India Water Week, 2013.

Objective of NWP-2012

The objective of the National Water Policy is to take cognizance of the existing situation, to propose a framework for creation of a system of laws and institutions and for a plan of action with a unified national perspective.

Concerns on the present scenario of water resources and their management in India

- Issues related to water governance have not been addressed adequately.
- Wide temporal and spatial variation in water availability may increase further due to climate change.
- Climate change may also increase sea levels which may lead to salinity intrusion in GW aquifers/ SW and inundate coastal regions.
- Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in several areas.
- Access to safe water for drinking and other domestic needs still continues to be a problem in many areas. Skewed availability of water between different regions and different people in the same region and also the intermittent and unreliable water supply system has the potential of causing social unrest.

- Inter-regional, inter-State, intra-State, as also inter-sectoral disputes in sharing of water, strain relationships and hamper the optimal utilization of water through scientific planning on basin/sub-basin basis.
- Inadequate sanitation and lack of sewage treatment are polluting the water sources.
- The public agencies in charge of taking water related decisions tend to take these on their own without consultation with stakeholders, often resulting in poor and unreliable service characterized by inequities of various kinds.

Basic Principles of NWP –2012

Some of the important basic principles of NWP-2012 are as follows:

- Planning, development and management of water resources need to be governed by common integrated perspective considering local, regional, State and national context, having an environmentally sound basis, keeping in view the human, social and economic needs.
- Water needs to be managed as a common pool community resource held, by the state under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all.
- Water is essential for sustenance of eco-system, and therefore, minimum ecological needs should be given due consideration.
- Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner to promote its conservation and efficient use.
- Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in use of water and avoiding wastages.
- The impact of climate change on water resources availability must be factored into water management related decisions.

Contents of NWP-2012

Highlights of the important provisions contained in the NWP-2012 on various aspects of water resources planning, development and management is given below:

- Water Framework Law
  - ✓ There is a need to evolve a National Framework Law as an umbrella statement of general principles.
  - ✓ Such a framework law must recognize water not only as a scarce resource but also as a sustainer of life and ecology. Therefore, water, particularly, groundwater, needs to be managed as a community resource held, by the state, under public trust doctrine.

- ✓ There is a need for comprehensive legislation for optimum development of inter-State rivers and river valleys. Such legislation needs, inter alia, to deal with and enable establishment of basin authorities, comprising party States, with appropriate powers to plan, manage and regulate utilization of water resource in the basins.

❖ Uses of Water

- ✓ The Centre, the States and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easy reach of the household.
- ✓ Ecological needs of the river should be determined, through scientific study. A portion of river flows should be kept aside to meet ecological needs.

❖ Adaptation to Climate Change

- ✓ The anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination.
- ✓ Planning and management of water resources structures, such as, dams, flood embankments, tidal embankments, etc., should incorporate coping strategies for possible climate changes.

❖ Enhancing Water Available for Use

- ✓ The availability of water resources and its use by various sectors in various basin and States in the country need to be assessed scientifically and reviewed at periodical intervals, say every 5 years.
- ✓ There is need to map aquifers to know the quantum and quality of ground water resources.
- ✓ Declining ground water levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivizing efficient water use and encouraging community based management of aquifers. In addition, where necessary, artificial recharging projects should be undertaken so that extraction is less than the recharge. This would allow the aquifers to provide base flows to the surface system, and maintain ecology.
- ✓ Inter-basin transfers of water should be considered on the basis of merits of each case after evaluating the environmental, economic and social impacts of such transfers.

❖ Demand Management and Water Use Efficiency

- ✓ An institutional arrangement for promotion, regulation and evolving mechanisms for efficient use of water at basin/sub-basin level will be established at the national level.
- ✓ The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.
- ✓ Recycle and reuse of water, including return flows, should be the general norm.

- ✓ Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered.

❖ Water Pricing

- ✓ Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Water Regulatory Authority (WRA), set up by each State, after wide ranging consultation with all stakeholders.
- ✓ In order to meet equity, efficiency and economic principles, the water charges should preferably / as a rule be determined on volumetric basis.
- ✓ Recycle and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system.
- ✓ The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation; and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.
- ✓ Water User Associations (WUAs) should be given statutory powers to collect and retain a portion of water charges, manage the water allotted to them and maintain the distribution system. The WUAs should be given the freedom to fix rates subject to floor rates determined by WRA.
- ✓ The over-drawal of groundwater should be minimized by regulating the use of electricity for its extraction. Separate electric feeders for pumping ground water for agricultural use should be considered.

❖ Conservation of River Corridors, Water Bodies and Infrastructure

- ✓ Encroachments and diversion of water bodies (like rivers, lakes, tanks, ponds, etc.) and drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.
- ✓ Urban settlements, encroachments and any developmental activities in the protected upstream areas of reservoirs/water bodies, key aquifer recharge areas that pose a potential threat of contamination, pollution, reduced recharge and those endanger wild and human life should be strictly regulated.
- ✓ It needs to be ensured that industrial effluents, local cesspools, residues of fertilizers and chemicals etc. do not reach ground water.
- ✓ The water resources infrastructure should be maintained properly to continue to get the intended benefits. A suitable percentage of the costs of infrastructure development may be set aside along with collected water charges, for repair and maintenance. Contract for construction of projects should have inbuilt provision for longer periods of proper maintenance and handing over back the infrastructure in good condition.

❖ Project Planning and Implementation

- ✓ Water resources projects should be planned considering social and environmental aspects also in addition to techno-economic considerations in consultation with project affected and beneficiary families.
- ✓ All clearances, including environmental and investment clearances, be made time bound.
- ✓ All components of water resources projects should be planned and executed in a pari-passu manner so that intended benefits start accruing immediately and there is no gap between potential created and potential utilized.
- ✓ All water resources projects, including hydro power projects, should be planned to the extent feasible as multi-purpose projects with provision of storage to derive maximum benefit from available topology and water resources.

❖ Management of Flood and Drought

- ✓ While every effort should be made to avert water related disasters like floods and droughts, through structural and non-structural measures, emphasis should be on preparedness for flood / drought with coping mechanisms as an option. Greater emphasis should be placed on rehabilitation of natural drainage system.
- ✓ Land, soil, energy and water management with scientific inputs from local research and scientific institutions should be used to evolve different agricultural strategies and improve soil and water productivity to manage droughts.
- ✓ Flood forecasting is very important for flood preparedness and should be expanded extensively across the country and modernized using real time data acquisition system and linked to forecasting models.
- ✓ To increase preparedness for sudden and unexpected flood related disasters, dam/embankment break studies, as also preparation and periodic updating of emergency action plans / disaster management plans should be evolved after involving affected communities. In hilly reaches, glacial lake outburst flood and landslide dam break floods studies with periodic monitoring along with instrumentation, etc., should be carried out.

❖ Water Supply and Sanitation

- ✓ There is need to remove large disparity between stipulations for water supply in urban and in rural areas. Efforts should be made to provide improved water supply in rural areas with proper sewerage facilities.
- ✓ Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source with better reliability and quality needs to be assigned to domestic water supply.
- ✓ Urban domestic water systems need to collect and publish water accounts and water audit reports indicating leakages and pilferages, which should be reduced taking into due consideration social issues.
- ✓ In urban and industrial areas, rainwater harvesting and de-salinization, wherever techno-economically feasible, should be encouraged to increase availability of utilizable water.

- ✓ Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.
- ✓ Industries in water short regions may be allowed to either withdraw only the make up water or should have an obligation to return treated effluent to a specified standard back to the hydrologic system.
- ✓ Subsidies and incentives should be implemented to encourage recovery of industrial pollutants and recycling/ reuse, which are otherwise capital intensive.

❖ Institutional Arrangements

- ✓ There should be a forum at the national level to deliberate upon issues relating to water and evolve consensus, co-operation and reconciliation amongst party States. A similar mechanism should be established within each State to amicably resolve differences in competing demands for water amongst different users of water, as also between different parts of the State.
- ✓ A permanent Water Disputes Tribunal at the Centre should be established to resolve the disputes expeditiously in an equitable manner.
- ✓ Apart from using the "good offices" of the Union or the State Governments, as the case may be, the paths of arbitration and mediation may also to be tried in dispute resolution.
- ✓ The State Governments / urban local bodies may associate private sector in public private partnership mode with penalties for failure, under regulatory control on prices charged and service standards with full accountability to democratically elected local bodies.
- ✓ IWRM taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources. The departments / organizations at Centre / State Governments levels should be restructured and made multi-disciplinary accordingly.
- ✓ Appropriate institutional arrangements for each river basin should be developed to collect and collate all data on regular basis with regard to rainfall, river flows, area irrigated by crops and by source, utilizations for various uses by both surface and ground water and to publish water accounts on ten daily basis every year for each river basin with appropriate water budgets and water accounts based on the hydrologic balances. In addition, water budgeting and water accounting should be carried out for each aquifers.

❖ Transboundary Rivers

- ✓ Efforts should be made to enter into international agreements with neighbouring countries on bilateral basis for exchange of hydrological data of international rivers on near real time basis.
- ✓ Negotiations about sharing and management of water of international rivers should be done on bilateral basis in consultative association with riparian States keeping paramount the national interest.

- Database and Information System
  - ✓ All hydrological data, other than those classified on national security consideration, should be in public domain. A National Water Informatics Center should be established to collect, collate and process hydrologic data regularly from all over the country, conduct the preliminary processing, and maintain in open and transparent manner on a GIS platform.

- Research and Training Needs
  - ✓ Continuing research and advancement in technology shall be promoted to address issues in the water sector in a scientific manner.
  - ✓ An autonomous center for research in water policy should also be established to evaluate impacts of policy decisions and to evolve policy directives for changing scenario of water resources.
  - ✓ To meet the need of the skilled manpower in the water sector, regular training and academic courses in water management should be promoted.

Implementation of National Water Policy

As per NWP-2012, National Water Board should prepare a plan of action based on the National Water Policy. The State Water Policies may need to be drafted /revised in accordance with this policy.

A Committee was constituted by MoWR in June, 2013 under the Chairmanship of Dr S.R Hashim, Former Chairman UPSC and Former Member, PC for suggesting a roadmap for implementation of NWP, 2012. Members of the drafting committee of NWP and representatives of various central ministries, CWC, CGWB, Planning Commission etc. were its members After series of deliberations, the report of the Committee containing the Action Plan needed for implementation of NWP, 2012 has been submitted to MoWR in September, 2013.

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MINISTRY OF WATER RESOURCES

National Water Policy, 1987

Need for a National Water Policy

1.1 Water is a prime natural resource, a basic human need and a precious national asset. Planning and development of water resources need to be governed by national perspectives.

1.2 It has been estimated that out of the total precipitation of around 400 million hectare meters in the country, the surface water availability is about 178 million hectare meters. Out of this about 50% can be put to beneficial use because of topographical and other constraints. In addition there is a ground water potential of about 42 million hectare meters. The availability of water is highly uneven in both space and time. Precipitation is confined to only about three or four months in the year and varies from 10 cm in the western parts of Rajasthan to over 1000 cm at Cherrapunji in Meghalaya. Further, water does not respect state boundaries. Not merely rivers but even under ground aquifers often cut across state boundaries. Water as a resource is one and indivisible: rainfall, river waters, surface ponds and lakes and ground water are all part of one system; water is a part of a larger ecological system.

1.3 Floods and drought affect vast areas of the country, transcending state boundaries. A third of the country is drought-prone. Floods affect an average area of around 9 million hectares per year. According to the National Commission on floods, the area susceptible to floods is around 40 million hectares. The approach to the management of drought and floods has to be coordinated and guided at the national level.

1.4 Even the planning and implementation of individual irrigation or multi-purpose projects, though done at the State level, involve a number of aspects and issues such as environmental protection, rehabilitation of project-affected people and livestock, public health consequences of water impoundment, dam safety, etc. On these matters common approaches and guidelines are necessary. Moreover, certain problems and

weaknesses have affected a large number of projects all over the country. There have been substantial time and cost overruns on projects. In some irrigation commands, problems of water-logging and soil salinity have emerged, leading to the degradation of good agricultural land. There are also complex problems of equity and social justice in regard to water distribution.

The development and exploitation of the country's groundwater resources also give rise to questions of judicious and scientific resource management and conservation. All these questions need to be tackled on the basis of common policies and strategies.

1.5 The growth process and the expansion of economic activities inevitably lead to increasing demands for water for diverse purposes: domestic, industrial, agricultural, hydro-power, navigation, recreation, etc. So far, the principal consumptive use of water has been for irrigation. While the irrigation potential is estimated to have increased from 19.5 million hectares at the time of Independence to about 68 million hectares at the end of the Sixth Plan, further development of a substantial order is necessary if the food and fiber needs of a growing population are to be met. The country's population which is over 750 million at present is expected to reach a level of around 1000 million by the turn of the century.

1.6 The production of food grains has increased from around 50 million tons in the fifties to about 150 million tons at present, but this will have to be raised to around 240 million tons by the year 2000 A.D. The drinking water needs of people and livestock have also to be met. In keeping with the objectives of the International Drinking Water Supply and Sanitation Decade Programme (1981-1991), adequate drinking water facilities have to be provided to the entire population in both urban and rural areas and sanitation facilities to 80 % of the urban population and 25 % of the rural population by the end of the decade. Domestic and industrial water needs have largely been concentrated in or near the principal cities, but the demand from rural society is expected to

increase sharply as the development programmes improve economic conditions in the rural areas. The demand for water for Hydro & Thermal power generation and for other industrial uses is also likely to increase substantially. As a result what which is already a scarcer in future. This under scores the need for the utmost efficiency in water utilisation and a public awareness of the importance of its conservation.

1.7 Another important aspect is water quality. Improvements in existing strategies and the innovation of new techniques resting on a strong science and technology base will be needed to eliminate the pollution of surface and ground water resources, to improve water quality and to step up the recycling and re- use of water. Science and technology and training have also important roles to play in water resources development in general.

1.8 Water is one of the most crucial elements in developmental planning. As the country prepares itself to enter the 21st century, efforts to develop, conserve, utilise and manage this important resource have to be guided by national perspectives. The need for a national water policy is thus abundantly clear: water is a scarce and precious national resource to be planned, developed and conserved as such, and on an integrated and environmentally sound basis, keeping in view the needs of the States concerned.

Information System

2. The prime requisite for resource planning is a well-developed information system. A standardized national information system should be established with a network of data banks and data bases, integrating and strengthening the existing Central and State level agencies and improving the quality of data and the processing capabilities. There should be free exchange of data among the various agencies and duplication in data collection should be avoided. Apart from the data regarding water availability and actual water use, the system should also include comprehensive and reasonably reliable projections of future demands for water for diverse purposes.

Maximizing availability

3.1 The water resources available to the country should be brought within the category of utilizable resources to the maximum possible extent. The resources should be conserved and the availability augmented by measures for maximizing retention and minimizing losses.

3.2 Resource planning in the case of water has to be done for a hydrological unit such as a drainage basin as a whole, or for a sub-basin. All individual developmental projects and proposals should be formulated by the States and considered within the framework of such an overall plan for a basin or sub-basin, so that the best possible combination of options can be made.

3.3 Appropriate organisations should be established for the planned development and management of a river basin as a whole. Special multi-disciplinary units should be set up in each state to prepare comprehensive plans taking into account not only the needs of irrigation but also harmonizing various other water uses, so that the available water resources are determined and put to optimum use having regard to subsisting agreements or awards of Tribunals under the relevant laws.

3.4 Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another, based on a national perspective, after taking into account the requirements of the areas/basins.

3.5 Recycling and re-use of water should be an integral part of water resource development

Project Planning

4.1 Water resource development projects should as far as possible be planned and developed as multipurpose projects. Provision for drinking water should be a primary consideration. The projects should provide for irrigation, flood mitigation, hydro-electric power generation, navigation, pisciculture and recreation wherever possible.

4.2 The study of the impact of a project during construction and later on human lives, settlements, occupations, economic and other aspects should be an essential component of project planning.

4.3 In the planning, implementation and operation of projects, the preservation of the quality of environment and the ecological balance should be a primary consideration. The adverse impact, if any, on the environment should be minimised and should be off-set by adequate compensatory measures.

4.4 There should be an integrated and multi-disciplinary approach to the planning, formulation, clearance and implementation of projects, including catchment treatment and management, environmental and ecological aspects, the rehabilitation of affected people and command area development.

4.5 Special efforts should be made to investigate and formulate projects either in, or for the benefit of, areas inhabited by tribal or other specially disadvantaged groups such as Scheduled Castes and Scheduled Tribes. In other areas also, project planning should pay special attention to the needs of Scheduled Castes and Scheduled Tribes and other weaker sections of society.

4.6 The planning of projects in hilly areas should take into account the need to provide assured drinking water, possibilities of hydro-power development and the proper approach to irrigation in such areas, in the context of physical features and constraints such as steep slopes, rapid run-off and the incidence of soil erosion. The economic evaluation of projects in such areas should also take these factors into account.

4.7 Time and cost overruns and deficient realization of benefits characterizing most irrigation projects should be overcome by upgrading the quality of project preparation and management. The under-funding of projects should be obviated by an optimal allocation of resources, having regard to the early completion of on-going projects as well as the need to reduce regional imbalances.

Maintenance and Modernisation

5.1 Structures and systems created through massive investments should be properly maintained in good health. Appropriate annual provisions should be made for this purpose in the budgets.

5.2 There should be a regular monitoring of structures and systems and necessary rehabilitation and modernisation programmes should be undertaken.

Safety of Structures

6. There should be proper organizational arrangements at the national and state levels for ensuring the safety of storage dams and other water-related structures. The Central guidelines on the subject should be kept under constant review and periodically updated and reformulated. There should be a system of continuous surveillance and regular visits by experts.

Ground water Development

7.1 There should be a periodical reassessment on a scientific basis of the ground water potential, taking into consideration the quality of the water available and economic viability.

7.2 Exploitation of ground water resources should be so regulated as not to exceed the recharging possibilities, as also to ensure social equity. Ground water recharge projects should be developed and implemented for augmenting the available supplies.

7.3 Integrated and coordinated development of surface water and ground water and their conjunctive use, should be envisaged right from the project planning stage and should form an essential part of the project.

7.4 Over exploitation of ground water should be avoided near the coast to prevent ingress of sea water into sweet water aquifers.

Water Allocation Priorities

8. In the planning and operation of systems, water allocation priorities should be broadly as follows:

Drinking water
Irrigation
Hydro-power
Navigation
Industrial and other uses.

However these priorities might be modified if necessary in particular regions with reference to area specific considerations.

Drinking Water

9. Adequate drinking water facilities should be provided to the entire population both in urban and in rural areas by 1991. Irrigation and multipurpose projects should invariably include a drinking water component, wherever there is no alternative source of drinking water. Drinking water needs of human beings and animals should be the first charge on any available water.

Irrigation

10.1 Irrigation planning either in an individual project or in a basin as a whole should take into account the irrigability of land, cost-effective irrigation options possible from all available sources of water and appropriate irrigation techniques. The irrigation intensity should be such as to extend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximize production.

10.2 There should be a close integration of water-use and land-use policies.

10.3 Water allocation in an irrigation system should be done with due regard to equity and social justice. Disparities in the availability of water between head-reach and tail-end farms and between large and small

farms should be obviated by adoption of a rotational water distribution system and supply of water on a volumetric basis subject to certain ceilings.

10.4 Concerted efforts should be made to ensure that the irrigation potential created is fully utilised and the gap between the potential created and its utilisation is removed. For this purpose, the command area development approach should be adopted in all irrigation projects.

Water Rates

11. Water rates should be such as to convey the scarcity value of the resource to the users and to foster the motivation for economy in water-use. They should be adequate to cover the annual maintenance and operation charges and a part of the fixed costs. Efforts should be made to reach this ideal over a period, while ensuring the assured and timely supplies of irrigation water. The water rates for surface water and ground water should be rationalized with due regard to the interests of small and marginal farmers.

Participation of farmers and voluntary agencies

12. Efforts should be made to involve farmers progressively in various aspects of management of irrigation systems, particularly in water distribution and collection of water rates. Assistance of voluntary agencies should be enlisted in educating the farmers in efficient water use and water management.

Water Quality

13. Both surface water and ground water should be regularly monitored for quality. A phased programme should be undertaken for improvements in water quality.

Water Zoning

14. Economic development and activities including agricultural, industrial and urban development, should be planned with due regard to the constraints imposed by the configuration of water availability. There should be a water zoning of the country and the economic activities should be guided and regulated in accordance with such zoning.

Conservation of Water

15. The efficiency of utilisation in all the diverse uses of water should be improved and an awareness of water as a scarce resource should be fostered. Conservation consciousness should be promoted through education, regulation, incentives and disincentives.

Flood Control and Management

16. There should be a master plan for flood control and management for each flood prone basin. Sound watershed management through extensive soil conservation, catchment-area treatment, preservation of forests and increasing the forest area and the construction of check-dams should be promoted to reduce the intensity of floods. Adequate flood-cushion should be provided in water storage projects wherever feasible to facilitate better flood management. An extensive network for flood forecasting should be established for timely warning to the settlements in the flood plains, along with the regulation of settlements and economic activity in the flood plain zones, to minimize the loss of life and property on account of floods. While physical flood protection works like embankments and dykes will continue to be necessary, the emphasis should be on non-structural measures for the minimization of losses, such as flood forecasting and warning and flood plain zoning, so as to reduce the recurring expenditure on flood relief.

Land erosion by sea or river

17. The erosion of land, whether by the sea in coastal areas or by river waters inland, should be minimized by suitable cost-effective measures. The States and Union territories should also undertake all requisite steps to ensure that indiscriminate occupation and exploitation of coastal strips of land are discouraged and that the location of economic activities in areas adjacent to the sea is regulated.

Drought Management

18.1 Drought-prone areas should be made less vulnerable to drought-associated problems through soil-moisture conservation measures, water harvesting practices, the minimization of evaporation losses, the development of the ground water potential and the transfer of surface water from surplus areas where feasible and appropriate. Pastures, forestry or other modes of development which are relatively less water-demanding should be encouraged. In planning water resource development projects, the needs of drought-prone areas should be given priority.

18.2 Relief works undertaken for providing employment to drought-stricken populations should preferably be for drought proofing.

Science and Technology

19. For effective and economical management of our water resources, the frontiers of knowledge need to be pushed forward in several directions by intensifying research efforts in various areas, including the following :

- hydro-meteorology;
- assessment of water resources;
- snow and lake hydrology;
- ground water hydrology and recharge;
- prevention of salinity ingress;
- water-harvesting;
- evaporation and seepage losses;

- economical designs for water resource projects;
- crops and cropping systems;
- sedimentation of reservoirs;
- the safety and longevity of water-related structures;
- river morphology and hydraulics;
- soils and material research;
- better water management practices and improvements in operational technology;
- recycling and re-use;
- use of sea water resources.

Training

20. A perspective plan for standardized training should be an integral part of water resource development. It should cover training in information systems, sector planning, project planning and formulation, project management, operation of projects and their physical structures and systems and the management of the water distribution systems. The training should extend to all the categories of personnel involved in these activities as also the farmers.

Conclusion

21. In view of the vital importance of water for human and animal life, for maintaining ecological balance and for economic and developmental activities of all kinds, and considering its increasing scarcity, the planning and management of this resource and its optimal, economical and equitable use has become a matter of the utmost urgency. The success of the national water policy will depend entirely on the development and maintenance of a national consensus and commitments to its underlying principles and objectives.

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Government of India
Ministry of Water Resources

NATIONAL WATER POLICY (2012)

1. PREAMBLE

1.1 A scarce natural resource, water is fundamental to life, livelihood, food security and sustainable development. India has more than 18 % of the world's population, but has only 4% of world's renewable water resources and 2.4% of world's land area. There are further limits on utilizable quantities of water owing to uneven distribution over time and space. In addition, there are challenges of frequent floods and droughts in one or the other part of the country. With a growing population and rising needs of a fast developing nation as well as the given indications of the impact of climate change, availability of utilizable water will be under further strain in future with the possibility of deepening water conflicts among different user groups. Low consciousness about the scarcity of water and its life sustaining and economic value results in its mismanagement, wastage, and inefficient use, as also pollution and reduction of flows below minimum ecological needs. In addition, there are inequities in distribution and lack of a unified perspective in planning, management and use of water resources. The objective of the National Water Policy is to take cognizance of the existing situation, to propose a framework for creation of a system of laws and institutions and for a plan of action with a unified national perspective.

1.2 The present scenario of water resources and their management in India has given rise to several concerns, important amongst them are;

(i) Large parts of India have already become water stressed. Rapid growth in demand for water due to population growth, urbanization and changing lifestyle pose serious challenges to water security.

(ii) Issues related to water governance have not been addressed adequately. Mismanagement of water resources has led to a critical situation in many parts of the country.

(iii) There is wide temporal and spatial variation in availability of water, which may increase substantially due to a combination of climate change, causing deepening of water crisis and incidences of water related disasters, i.e., floods, increased erosion and increased frequency of droughts, etc.

(iv) Climate change may also increase the sea levels. This may lead to salinity intrusion in ground water aquifers / surface waters and increased coastal inundation in coastal regions, adversely impacting habitations, agriculture and industry in such regions.

(v) Access to safe water for drinking and other domestic needs still continues to be a problem in many areas. Skewed availability of water between different regions and different people in the same region and also the intermittent and unreliable water supply system has the potential of causing social unrest.

(vi) Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in several areas.

(vii) Water resources projects, though multi-disciplinary with multiple stakeholders, are being planned and implemented in a fragmented manner without giving due consideration to optimum utilization, environment sustainability and holistic benefit to the people.

(viii) Inter-regional, inter-State, intra-State, as also inter-sectoral disputes in sharing of water, strain relationships and hamper the optimal utilization of water through scientific planning on basin/sub-basin basis.

(ix) Grossly inadequate maintenance of existing irrigation infrastructure has resulted in wastage and under-utilization of available resources. There is a widening gap between irrigation potential created and utilized.

(x) Natural water bodies and drainage channels are being encroached upon, and diverted for other purposes. Groundwater recharge zones are often blocked.

(xi) Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. In many parts of the country, large stretches of rivers are both heavily polluted and devoid of flows to support aquatic ecology, cultural needs and aesthetics.

(xii) Access to water for sanitation and hygiene is an even more serious problem. Inadequate sanitation and lack of sewage treatment are polluting the water sources.

(xiii) Low consciousness about the overall scarcity and economic value of water results in its wastage and inefficient use.

(xiv) The lack of adequate trained personnel for scientific planning, utilizing modern techniques and analytical capabilities incorporating information technology constrains good water management.

(xv) A holistic and inter-disciplinary approach at water related problems is missing.

(xvi) The public agencies in charge of taking water related decisions tend to take these on their own without consultation with stakeholders, often resulting in poor and unreliable service characterized by inequities of various kinds.

(xvii) Characteristics of catchment areas of streams, rivers and recharge zones of aquifers are changing as a consequence of land use and land cover changes, affecting water resource availability and quality.

1.3 Public policies on water resources need to be governed by certain basic principles, so that there is some commonality in approaches in dealing with planning, development and management of water resources. These basic principles are:

(i) Planning, development and management of water resources need to be governed by common integrated perspective considering local, regional, State and national context, having an environmentally sound basis, keeping in view the human, social and economic needs.

(ii) Principle of equity and social justice must inform use and allocation of water.

(iii) Good governance through transparent informed decision making is crucial to the objectives of equity, social justice and sustainability. Meaningful intensive participation, transparency and accountability should guide decision making and regulation of water resources.

(iv) Water needs to be managed as a common pool community resource held, by the state, under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all.

(v) Water is essential for sustenance of eco-system, and therefore, minimum ecological needs should be given due consideration.

(vi) Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner to promote its conservation and efficient use.

(vii) All the elements of the water cycle, i.e., evapo-transpiration, precipitation, runoff, river, lakes, soil moisture, and ground water, sea, etc., are interdependent and the basic hydrological unit is the river basin, which should be considered as the basic hydrological unit for planning.

(viii) Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in use of water and avoiding wastages.

(ix) Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia including the use of economic incentives and penalties to reduce pollution and wastage.

(x) The impact of climate change on water resources availability must be factored into water management related decisions. Water using activities need to be regulated keeping in mind the local geo climatic and hydrological situation.

2. WATER FRAMEWORK LAW

2.1 There is a need to evolve a National Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States and the local governing bodies. This should lead the way for essential legislation on water governance in every State of the Union and devolution of necessary authority to the lower tiers of government to deal with the local water situation.

2.2 Such a framework law must recognize water not only as a scarce resource but also as a sustainer of life and ecology. Therefore, water, particularly, groundwater, needs to be managed as a community resource held, by the state, under public trust doctrine to achieve food security, livelihood, and equitable and sustainable development for all. Existing Acts may have to be modified accordingly.

2.3 There is a need for comprehensive legislation for optimum development of inter-State rivers and river valleys to facilitate inter-State coordination ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water) and ensuring holistic and balanced development of both the catchment and the command areas. Such legislation needs, inter alia, to deal with and enable establishment of basin authorities, comprising party States, with appropriate powers to plan, manage and regulate utilization of water resource in the basins.

3. USES OF WATER

3.1 Water is required for domestic, agricultural, hydro-power, thermal power, navigation, recreation, etc. Utilisation in all these diverse uses of water should be optimized and an awareness of water as a scarce resource should be fostered.

3.2 The Centre, the States and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easy reach of the household.

3.3 Ecological needs of the river should be determined, through scientific study, recognizing that the natural river flows are characterized by low or no flows, small floods (freshets), large floods, etc., and should accommodate developmental needs. A portion of river flows should be kept aside to meet ecological needs ensuring that the low and high flow releases are proportional to the natural flow regime, including base flow contribution in the low flow season through regulated ground water use.

3.4 Rivers and other water bodies should be considered for development for navigation as far as possible and all multipurpose projects over water bodies should keep navigation in mind right from the planning stage.

3.5 In the water rich eastern and north eastern regions of India, the water use infrastructure is weak and needs to be strengthened in the interest of food security.

3.6 Community should be sensitized and encouraged to adapt first to utilization of water as per local availability of waters, before providing water through long distance transfer. Community based water management should be institutionalized and strengthened.

4. ADAPTATION TO CLIMATE CHANGE

4.1 Climate change is likely to increase the variability of water resources affecting human health and livelihoods. Therefore, special impetus should be given towards mitigation at micro level by enhancing the capabilities of community to adopt climate resilient technological options.

4.2 The anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination. States should be incentivized to increase water storage capacity, which inter-alia should include revival of traditional water harvesting structures and water bodies.

4.3 The adaptation strategies could also include better demand management, particularly, through adoption of compatible agricultural strategies and cropping patterns and improved water application methods, such as land leveling and/or drip / sprinkler irrigation as they enhance the water use efficiency, as also, the capability for dealing with increased variability because of climate change. Similarly, industrial processes should be made more water efficient.

4.4 Stakeholder participation in land-soil-water management with scientific inputs from local research and academic institutions for evolving different agricultural strategies, reducing soil erosion and improving soil fertility should be promoted. The specific problems of hilly areas like sudden run off, weak water holding capacity of soil, erosion and sediment transport and recharging of hill slope aquifers should be adequately addressed.

4.5 Planning and management of water resources structures, such as, dams, flood embankments, tidal embankments, etc., should incorporate coping strategies for possible climate changes. The acceptability criteria in regard to new water resources projects need to be re-worked in view of the likely climate changes

5. ENHANCING WATER AVAILABLE FOR USE

5.1 The availability of water resources and its use by various sectors in various basin and States in the country need to be assessed scientifically and reviewed at periodic intervals, say, every five years. The trends in water availability due to various factors including climate change must be assessed and accounted for during water resources planning.

5.2 The availability of water is limited but the demand of water is increasing rapidly due to growing population, rapid urbanization, rapid industrialization and economic development. Therefore, availability of water for utilization needs to be augmented to meet increasing demands of water. Direct use of rainfall, desalination and avoidance

of inadvertent evapo-transpiration are the new additional strategies for augmenting utilizable water resources.

5.3 There is a need to map the aquifers to know the quantum and quality of ground water resources (replenishable as well as non-replenishable) in the country. This process should be fully participatory involving local communities. This may be periodically updated.

5.4 Declining ground water levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivizing efficient water use and encouraging community based management of aquifers. In addition, where necessary, artificial recharging projects should be undertaken so that extraction is less than the recharge. This would allow the aquifers to provide base flows to the surface system, and maintain ecology.

5.5 Inter-basin transfers are not merely for increasing production but also for meeting basic human need and achieving equity and social justice. Inter-basin transfers of water should be considered on the basis of merits of each case after evaluating the environmental, economic and social impacts of such transfers.

5.6 Integrated Watershed development activities with groundwater perspectives need to be taken in a comprehensive manner to increase soil moisture, reduce sediment yield and increase overall land and water productivity. To the extent possible, existing programs like MGNREGA may be used by farmers to harvest rain water using farm ponds and other soil and water conservation measures.

6. DEMAND MANAGEMENT AND WATER USE EFFICIENCY

6.1 A system to evolve benchmarks for water uses for different purposes, i.e., water footprints, and water auditing should be developed to promote and incentivize efficient use of water. The ‘project’ and the ‘basin’ water use efficiencies need to be improved through continuous water balance and water accounting studies. An institutional arrangement for promotion, regulation and evolving mechanisms for efficient use of water at basin/sub-basin level will be established for this purpose at the national level.

6.2 The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.

6.3 Recycle and reuse of water, including return flows, should be the general norm.

6.4 Project financing should be structured to incentivize efficient & economic use of water and facilitate early completion of ongoing projects.

6.5 Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered.

6.6 Use of very small local level irrigation through small bunds, field ponds, agricultural and engineering methods and practices for watershed development, etc, need to be encouraged. However, their externalities, both positive and negative, like reduction of sediments and reduction of water availability, downstream, may be kept in view.

6.7 There should be concurrent mechanism involving users for monitoring if the water use pattern is causing problems like unacceptable depletion or building up of ground waters, salinity, alkalinity or similar quality problems, etc., with a view to planning appropriate interventions.

7. WATER PRICING

7.1 Pricing of water should ensure its efficient use and reward conservation. Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Water Regulatory Authority, set up by each State, after wide ranging consultation with all stakeholders.

7.2 In order to meet equity, efficiency and economic principles, the water charges should preferably / as a rule be determined on volumetric basis. Such charges should be reviewed periodically.

7.3 Recycle and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system.

7.4 The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation; and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.

7.5 Water Users Associations (WUAs) should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction. WUAs should be given the freedom to fix rates subject to floor rates determined by WRAs.

7.6 The over-drawal of groundwater should be minimized by regulating the use of electricity for its extraction. Separate electric feeders for pumping ground water for agricultural use should be considered.

8. CONSERVATION OF RIVER CORRIDORS, WATER BODIES AND INFRASTRUCTURE

8.1 Conservation of rivers, river corridors, water bodies and infrastructure should be undertaken in a scientifically planned manner through community participation. The storage capacities of water bodies and water courses and/or associated wetlands, the flood plains, ecological buffer and areas required for specific aesthetic

recreational and/or social needs may be managed to the extent possible in an integrated manner to balance the flooding, environment and social issues as per prevalent laws through planned development of urban areas, in particular.

8.2 Encroachments and diversion of water bodies (like rivers, lakes, tanks, ponds, etc.) and drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.

8.3 Urban settlements, encroachments and any developmental activities in the protected upstream areas of reservoirs/water bodies, key aquifer recharge areas that pose a potential threat of contamination, pollution, reduced recharge and those endanger wild and human life should be strictly regulated.

8.4 Environmental needs of Himalayan regions, aquatic eco-system, wet lands and embanked flood plains need to be recognized and taken into consideration while planning.

8.5 Sources of water and water bodies should not be allowed to get polluted. System of third party periodic inspection should be evolved and stringent punitive actions be taken against the persons responsible for pollution.

8.6 Quality conservation and improvements are even more important for ground waters, since cleaning up is very difficult. It needs to be ensured that industrial effluents, local cess pools, residues of fertilizers and chemicals, etc., do not reach the ground water.

8.7 The water resources infrastructure should be maintained properly to continue to get the intended benefits. A suitable percentage of the costs of infrastructure development may be set aside along with collected water charges, for repair and maintenance. Contract for construction of projects should have inbuilt provision for longer periods of proper maintenance and handing over back the infrastructure in good condition.

8.8 Legally empowered dam safety services need to be ensured in the States as well as at the Centre. Appropriate safety measures, including downstream flood management, for each dam should be undertaken on top priority.

9. PROJECT PLANNING AND IMPLEMENTATION

9.1 Considering the existing water stress conditions in India and the likelihood of further worsening situation due to climate change and other factors, water resources projects should be planned as per the efficiency benchmarks to be prescribed for various situations.

9.2 Being inter-disciplinary in nature, water resources projects should be planned considering social and environmental aspects also in addition to techno-economic considerations in consultation with project affected and beneficiary families. The integrated water resources management with emphasis on finding reasonable and

generally acceptable solutions for most of the stakeholders should be followed for planning and management of water resources projects.

9.3 Considering the heavy economic loss due to delay in implementation of projects, all clearances, including environmental and investment clearances, be made time bound.

9.4 Concurrent monitoring at project, State and the Central level should be undertaken for timely interventions to avoid time and cost over-runs.

9.5 All components of water resources projects should be planned and executed in a pari-passu manner so that intended benefits start accruing immediately and there is no gap between potential created and potential utilized.

9.6 Local governing bodies like Panchayats, Municipalities, Corporations, etc., and Water Users Associations, wherever applicable, should be involved in planning of the projects. The unique needs and aspirations of the Scheduled caste and Scheduled Tribes, women and other weaker sections of the society should be given due consideration.

9.7 All water resources projects, including hydro power projects, should be planned to the extent feasible as multi-purpose projects with provision of storage to derive maximum benefit from available topology and water resources.

10. MANAGEMENT OF FLOOD & DROUGHT

10.1 While every effort should be made to avert water related disasters like floods and droughts, through structural and non-structural measures, emphasis should be on preparedness for flood / drought with coping mechanisms as an option. Greater emphasis should be placed on rehabilitation of natural drainage system.

10.2 Land, soil, energy and water management with scientific inputs from local, research and scientific institutions should be used to evolve different agricultural strategies and improve soil and water productivity to manage droughts. Integrated farming systems and non-agricultural developments may also be considered for livelihood support and poverty alleviation.

10.3 In order to prevent loss of land eroded by the river, which causes permanent loss, revetments, spurs, embankments, etc., should be planned, executed, monitored and maintained on the basis of morphological studies. This will become increasingly more important, since climate change is likely to increase the rainfall intensity, and hence, soil erosion.

10.4 Flood forecasting is very important for flood preparedness and should be expanded extensively across the country and modernized using real time data acquisition system and linked to forecasting models. Efforts should be towards developing physical models for various basin sections, which should be linked to each other and to medium range weather forecasts to enhance lead time.

10.5 Operating procedures for reservoirs should be evolved and implemented in such a manner to have flood cushion and to reduce trapping of sediment during flood season. These procedures should be based on sound decision support system.

10.6 Protecting all areas prone to floods and droughts may not be practicable; hence, methods for coping with floods and droughts have to be encouraged. Frequency based flood inundation maps should be prepared to evolve coping strategies, including preparedness to supply safe water during and immediately after flood events. Communities need to be involved in preparing an action plan for dealing with the flood/ drought situations.

10.7 To increase preparedness for sudden and unexpected flood related disasters, dam/embankment break studies, as also preparation and periodic updating of emergency action plans / disaster management plans should be evolved after involving affected communities. In hilly reaches, glacial lake outburst flood and landslide dam break floods studies with periodic monitoring along with instrumentation, etc., should be carried out.

11. WATER SUPPLY AND SANITATION

11.1 There is a need to remove the large disparity between stipulations for water supply in urban areas and in rural areas. Efforts should be made to provide improved water supply in rural areas with proper sewerage facilities. Least water intensive sanitation and sewerage systems with decentralized sewage treatment plants should be incentivized.

11.2 Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source with better reliability and quality needs to be assigned to domestic water supply. Exchange of sources between uses, giving preference to domestic water supply should be possible. Also, reuse of urban water effluents from kitchens and bathrooms, after primary treatment, in flush toilets should be encouraged, ensuring no human contact.

11.3 Urban domestic water systems need to collect and publish water accounts and water audit reports indicating leakages and pilferages, which should be reduced taking into due consideration social issues.

11.4 In urban and industrial areas, rainwater harvesting and de-salinization, wherever techno-economically feasible, should be encouraged to increase availability of utilizable water. Implementation of rainwater harvesting should include scientific monitoring of parameters like hydrogeology, groundwater contamination, pollution and spring discharges.

11.5 Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.

11.6 Industries in water short regions may be allowed to either withdraw only the make up water or should have an obligation to return treated effluent to a specified standard back to the hydrologic system. Tendencies to unnecessarily use more

water within the plant to avoid treatment or to pollute ground water need to be prevented.

11.7 Subsidies and incentives should be implemented to encourage recovery of industrial pollutants and recycling / reuse, which are otherwise capital intensive.

12. INSTITUTIONAL ARRANGEMENTS

12.1 There should be a forum at the national level to deliberate upon issues relating to water and evolve consensus, co-operation and reconciliation amongst party States. A similar mechanism should be established within each State to amicably resolve differences in competing demands for water amongst different users of water, as also between different parts of the State.

12.2 A permanent Water Disputes Tribunal at the Centre should be established to resolve the disputes expeditiously in an equitable manner. Apart from using the „good offices" of the Union or the State Governments, as the case may be, the paths of arbitration and mediation may also to be tried in dispute resolution.

12.3 Water resources projects and services should be managed with community participation. For improved service delivery on sustainable basis, the State Governments / urban local bodies may associate private sector in public private partnership mode with penalties for failure, under regulatory control on prices charged and service standards with full accountability to democratically elected local bodies.

12.4 Integrated Water Resources Management (IWRM) taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources. The departments / organizations at Centre / State Governments levels should be restructured and made multi-disciplinary accordingly.

12.5 Appropriate institutional arrangements for each river basin should be developed to collect and collate all data on regular basis with regard to rainfall, river flows, area irrigated by crops and by source, utilizations for various uses by both surface and ground water and to publish water accounts on ten daily basis every year for each river basin with appropriate water budgets and water accounts based on the hydrologic balances. In addition, water budgeting and water accounting should be carried out for each aquifers.

12.6 Appropriate institutional arrangements for each river basin should also be developed for monitoring water quality in both surface and ground waters.

12.7 States should be encouraged and incentivized to undertake reforms and progressive measures for innovations, conservation and efficient utilization of water resources.

13. TRANS-BOUNDARY RIVERS

13.1 Even while accepting the principle of basin as a unit of development, on the basis of practicability and easy implementability, efforts should be made to enter into

international agreements with neighbouring countries on bilateral basis for exchange of hydrological data of international rivers on near real time basis.

13.2 Negotiations about sharing and management of water of international rivers should be done on bilateral basis in consultative association with riparian States keeping paramount the national interest. Adequate institutional arrangements at the Center should be set up to implement international agreements.

14. DATABASE & INFORMATION SYSTEM

14.1 All hydrological data, other than those classified on national security consideration, should be in public domain. However, a periodic review for further declassification of data may be carried out. A National Water Informatics Center should be established to collect, collate and process hydrologic data regularly from all over the country, conduct the preliminary processing, and maintain in open and transparent manner on a GIS platform.

14.2 In view of the likely climate change, much more data about snow and glaciers, evaporation, tidal hydrology and hydraulics, river geometry changes, erosion, sedimentation, etc. needs to be collected. A programme of such data collection needs to be developed and implemented.

14.3 All water related data, like rainfall, snowfall, geo-morphological, climatic, geological, surface water, ground water, water quality, ecological, water extraction and use, irrigated area, glaciers, etc., should be integrated with well defined procedures and formats to ensure online updation and transfer of data to facilitate development of database for informed decision making in the management of water.

15. RESEARCH & TRAINING NEEDS

15.1 Continuing research and advancement in technology shall be promoted to address issues in the water sector in a scientific manner. Innovations in water resources sector should be encouraged, recognized and awarded.

15.2 It is necessary to give adequate grants to the States to update technology, design practices, planning and management practices, preparation of annual water balances and accounts for the site and basin, preparation of hydrologic balances for water systems, benchmarking and performance evaluation.

15.3 It needs to be recognized that the field practices in the water sector in advanced countries have been revolutionized by advances in information technology and analytical capabilities. A re-training and quality improvement programme for water planners and managers at all levels in India, both in private and public sectors, needs to be undertaken.

15.4 An autonomous center for research in water policy should also be established to evaluate impacts of policy decisions and to evolve policy directives for changing scenario of water resources.

15.5 To meet the need of the skilled manpower in the water sector, regular training and academic courses in water management should be promoted. These training and academic institutions should be regularly updated by developing infrastructure and promoting applied research, which would help to improve the current procedures of analysis and informed decision making in the line departments and by the community. A national campaign for water literacy needs to be started for capacity building of different stakeholders in the water sector.

16. IMPLEMENTATION OF NATIONAL WATER POLICY

16.1 National Water Board should prepare a plan of action based on the National Water Policy, as approved by the National Water Resources Council, and to regularly monitor its implementation.

16.2 The State Water Policies may need to be drafted/revised in accordance with this policy keeping in mind the basic concerns and principles as also a unified national perspective.

Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	**A**	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	**B**	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	**C**	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	**D**	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	**E**	pH betwwn 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

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भारत का राजपत्र
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पर्यावरण और वन मंत्रालय

अधिसूचना

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सा. का. नि. 742(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1996 (1996 का 29) की धारा 6 और धारा 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण (संरक्षण) नियम, 1996 का और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात् :—

1. (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) संशोधन नियम, 2000 है।

(2) इस अधिसूचना में अन्यथा जैसा उपबंधित है उसके सिवाय, वे राजपत्र में प्रकाशन की तारीख को प्रवृत्त होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 में,—

(1) अनुसूची 1 में पटाखों के लिए शोर मानकों से संबंधित क्रम संख्याक 89 और उससे संबंधित प्रविष्टियों के पश्चात् निम्नलिखित क्रम संख्यांक और उनसे संबंधित प्रविष्टियां अन्त:स्थापित की जाएंगी, अर्थात् :—

"90. कोयला खानों के लिए मानक

1. वायु क्वालिटी मानक

निम्नलिखित धूल उत्पादक स्रोतों से 500 मीटर की दूरी पर प्रबल हवा की दशा पर विचार करते हुए नीचे की ओर हवा की दिशा में निलंबित कणिकीय पदार्थ (एस. पी. एम.), अन्त: श्वसनीय कणिकीय पदार्थ (आर. पी. एम.), सल्फर डाईआक्साइड (एस ओ$_2$) और नाइट्राजन आक्साइड (एन ओ$_2$) का संकेन्द्रण नीचे दी गई सारणी-I, और II, और III में विनिर्दिष्ट मानकों से अधिक नहीं होगा।

धूल उत्पादन के स्रोत

लदाई या उतराई, कर्षण सड़क, कोयला परिवहन सड़क, कोयला हथालने का संयंत्र (सी. एच. वी.) रेल सरकवां, विस्फोट, छेदन, अधिक ऊंचे ढेर या कोई अन्य धूल उत्पादन के बाहरी स्रोत जैसे कोक भट्टी (कठोर तथा मुलायम), इष्टिका उद्योग, पास की सड़क आदि।

टिप्पण :—1. जहां उपचारित बहिस्राव ऐसे नगर सीवर में डाला जाता है जो अंतिम उपचार संयंत्र में जाता है, वहां जैव-रसायन आक्सीजन मांग (बी ओ डी) की 100 मि.ग्रा./लि. तक और रसायन आक्सीजन मांग (सी ओ डी) की 400 मि.ग्रा./लि. तक छूट दी जा सकेगी।

2. बहिस्राव की क्वालिटी (एक लिटर प्रति किलोग्राम उत्पाद) संयुक्त सूती वस्त्र उद्योग संयुक्त ऊनी वस्त्र उद्योग और टैक्सटाइल प्रसंस्करण उद्योग में क्रमश: 100, 250 और 80 होगी।

93. **स्नान-जल के लिए प्राथमिक जल क्वालिटी मानदंड**

जलाशय या उसके भाग में के जल का कई प्रकार से उपयोग किया जाता है। जल के उपयोगों और क्रियाकलापों के प्रकार पर निर्भर रहते हुए जल क्वालिटी की कसौटी किसी विशिष्ट प्रयोजन के लिए उसकी उपयुक्तता अवधारित करने के लिए विनिर्दिष्ट कर दी गई है। विभिन्न प्रकार के उपयोगों में एक उपयोग यह भी है जो जल के उच्चतर स्तर की क्वालिटी या शुद्धता की मांग करता है और उस जलाशय के विस्तार में उसे "अभिहित सर्वोत्तम उपयोग" के रूप में जाना जाता है। इस पर आधारित प्राथमिक जल क्वालिटी की कसौटी के निबंधनों के अनुसार विभिन्न उपयोगों के लिए जल क्वालिटी अपेक्षाएं विनिर्दिष्ट की गई हैं। सारणी 1 में स्नान-जल के लिए प्राथमिक जल क्वालिटी की तर्कयुक्त कसौटी विनिर्दिष्ट की गई है।

सारणी 1

स्नान-जल के लिए प्राथमिक जल क्वालिटी मानदंड

(संगठित बाह्य स्नान के लिए प्रयुक्त जल)

मानदंड		तर्कआधार
1. फिकल	500 (वांछनीय)	निम्न मल जल संदूषण सुनिश्चित करने के लिए,
कोली फॉर्म	2500 (अधिकतम अनुज्ञेय)	फिकल कोलीफार्म और फिकल स्ट्रेप्टोकोक्की के
एम. पी. एन./100 मि.लि.		बारे में यह माना गया है कि वे जीवाणु रोगोत्पादकता
2. फिकल स्ट्रेप्टोकोक्की	100 (वांछनीय)	को दर्शित करते हैं। वांछनीय और अनुज्ञेय सीमाएं पर्यावर्णिय दशाओं में उतार-चढ़ाव
एम. पी. एन./100 मि.लि.	500 (अधिकतम अनुज्ञेय)	को अनुज्ञात करने के लिए सुझाव देती हैं जैसे कि मौसमी परिवर्तन, बहाव की दशाओं में परिवर्तन आदि।
2. पी. एस.	6.5 से 8.5 के बीच	यह रेंज त्वचा और आँख, नाक, कान आदि जैसे कोमल अंगों को संरक्षण प्रदान करती है जो बाह्य स्नान के दौरान सीधे प्रभावित होते हैं।
3. घुली हुई आक्सीजन		5 मि.ग्रा./लि. के न्यूनतम घुली हुई आक्सीजन संकेन्द्रण ठीक ऊपरीधारा में आर्गनिक प्रदूषण युक्त आक्सीजन लेने से युक्तियुक्त मुक्ति सुनिश्चित करते हैं जो तलछट से अनाइरोबिक गैसों (आबनोक्सीयस गैसों) के उत्पादन को निवारित करने के लिए आवश्यक है।
4. जैव-रसायन आक्सीजन मांग (बी ओ डी) (27^{o} से. पर 3 दिन)		3 मि.ग्रा./लि. या इससे कम जल की जैव रसायन आक्सीजन मांग आक्सीजन डिमांडिग प्रदूषकों से युक्तियुक्त मुक्ति सुनिश्चित करती है और आबनाक्सीयस गैसों के उत्पादन को रोकती है।"

(2) अनुसूची 6 के शोर मान दंडों से संबंधित भाग ङ में, मोटरगाड़ियों के लिए शोर सीमा से संबंधित भाग क के पश्चात् निम्नलिखित अन्त: स्थापित किया जाएगा :—

"कक. 1 जनवरी, 2003 से मोटर यानों के लिए शोर सीमा

मोटर यानों के लिए निम्नलिखित शोर सीमा 1 जनवरी, 2003 से लागू होगी। अनुसरण किए जाने वाली परीक्षण पद्धति भा मा.

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 25th September, 2000

G.S.R. 742(E).— In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely.

1. (1) These rules may be called the Environment (Protection) Amendment Rules, 2000.

(2) Save as otherwise provided in this notification, they shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986,—

(1) In Schedule I, after serial number 89 relating to Noise standards for fire crackers and the entries relating thereto, the following serial numbers and entries shall be inserted, namely:—

"90. Standards for coal mines

1. Air Quality Standards

The Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NOx) concentration in downwind direction considering predominant wind direction, at a distance of 500 metres from the following dust generating sources shall not exceed the standards specified in the Tables I, II and III given below:

Dust Generating Sources

Loading or unloading, Haul road, coal transportation road, Coal handling plant (CHP), Railway sliding, Blasting, Drilling, Overburden dumps, or any other dust generating external sources like coke ovens (hard as well as soft), briquette industry, nearby road etc.

93. Primary Water Quality Criteria for Bathing Waters.

In a water body or its part, water is subjected to several types of uses. Depending on the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various types of uses there is one use that demands highest level of water quality or purity and that is termed as "Designated Best Use" in that stretch of water body. Based on this, water quality requirements have been specified for different uses in terms of primary water quality criteria. The primary water quality criteria for bathing water are specified along with the rationale in table 1.

Table 1.

PRIMARY WATER QUALITY CRITERIA FOR BATHING WATER
(Water used for organised outdoor bathing)

CRITERIA		RATIONALE
1. Fecal Coliform MPN/100 ml:	500 (desirable) 2500 (Maximum Permissible)	To ensure low sewage contamination. Fecal coliform and fecal streptococci are considered as they reflect the bacterial pathogenicity.
2. Fecal Streptococci MPN/100 ml:	100 (desirable) 500 (Maximum Permissible)	The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal change, changes in flow conditions etc.
2. pH:	Between 6.5 -8.5	The range provides protection to the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing.
3. Dissolved Oxygen:	5 mg/l or more	The minimum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment.
4. Biochemical Oxygen demand 3 day,27°C:	3 mg/l or less	The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases";

Press Information Bureau
Government of India
Ministry of Water Resources

11-March-2011 14:19 IST

Salient Features of The National Water Policy

The Government has informed Lok Sabha that the National Water Policy – 2002 was adopted by the National Water Resources Council under the Chairmanship of the Prime Minister of India in its 5th meeting held on 1st April, 2002. The Salient features of National Water Policy – 2002 are as follows:

• Water is a prime natural resource, a basic human need and a precious national asset. Planning, development and management of water resources need to be governed by national perspectives.

• A well developed information system for water related data at national/state level should be established with a net-work of data banks and data bases integrating and strengthening the existing central and state level agencies.

• Water resources available to the country should be brought within the category of utilizable resources to the maximum possible extent.

• Non-conventional methods for utilization of water such as through inter-basin transfers, artificial recharge of ground water and desalination of brackish or sea water as well as traditional water conservation practices like rainwater harvesting, including roof-top rainwater harvesting, need to be practiced to further increase the utilizable water resources. Promotion of frontier research and development, in a focused manner, for these techniques is necessary.

• Water resources development and management will have to be planned for a hydrological unit. Appropriate river basin organizations should be established for the planned development and management of the river basins.

• Water should be made available to water short areas by transfer from other areas including transfer from one river basin to another, after taking into account the requirements of the areas/basins.

• Planning of water resources development projects should, as far as possible, be for multi-purpose with an integrated and multi-disciplinary approach having regard to human and ecological aspects including those of disadvantaged sections of the society.

• In the allocation of water, first priority should be given for drinking water, followed by irrigation, hydro-power, ecology, agro-industries and non-agricultural industries, navigation and other uses, in that order.

• The exploitation of groundwater should be regulated with reference to recharge possibilities and consideration

of social equity. The detrimental environmental consequences of over-exploitation of ground water need to be effectively prevented.

• Adequate emphasis needs to be given to the physical and financial sustainability of existing water resources facilities. There is need to ensure that the water charges for various uses should be fixed such as to cover at least the operation and maintenance charges initially and a part of the capital costs subsequently.

• Management of the water resources for diverse uses should incorporate a participatory approach by involving users and other stakeholders alongwith various governmental agencies, in an effective and decisive manner.

• Private sector participation should be encouraged in planning, development and management of water resources projects for diverse uses, wherever feasible.

• Both surface water and ground water should be regularly monitored for quality. Effluents should be treated to acceptable levels and standards before discharging them into natural streams. Minimum flow should be ensured in the perennial streams for maintaining ecology.

• Efficiency of utilization should be improved in all the diverse uses of water and conservation consciousness promoted through education, regulation, incentives and disincentives.

• Land erosion by sea or river should be minimized by suitable cost-effective measures. Indiscriminate occupation of, and economic activity in coastal areas and flood plain zones should be regulated.

• Needs of drought-prone areas should be given priority in the planning of project for development of water resources. These areas should be made less vulnerable through various measures.

• The water sharing / distribution amongst the states should be guided by a national perspective with due regard to water resources availability and needs within the river basin.

• Training and research efforts should be intensified as an integral part of water resources development.

This information was given by Shri Salman Khurshid, Minister of Water Resources, in written reply to a question in the Lok Sabha.

KKP/ska

इंटरनेट मानक

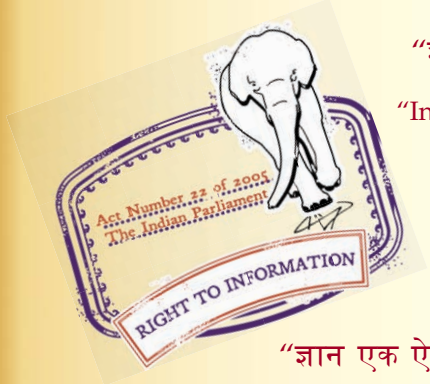
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 1172 (1993): Code of Basic Requirements for Water Supply, Drainage and Sanitation [CED 24: Public Health Engineering.]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 1172 : 1993
(Reaffirmed 2002)

भारतीय मानक

जल अपूर्ति, जल निकास और स्वास्थ्य की मूल अपेक्षाओं की संहिता

(चौथा पुनरीक्षण)

Indian Standard

CODE OF BASIC REQUIREMENTS FOR WATER SUPPLY, DRAINGE AND SANITATION

(Fourth Revision)

UDC 628 1/·3 : 006·76

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1993

Price Group 7

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water Supply and Sanitation in Building Sectional Committee had been approved by the Civil Engineering Division Council.

This Indian Standard was first published in 1957 and subsequently revised in 1963, 1971 and 1983. In this revision, requirements of water supply for residences has been listed based on population of the community. However, for Lower Income Group (LIG) and Economical Weaker Section of Society (EWS), the value of minimum requirement of water supply has been retained as 135 litres per head per day. Fire demand in buildings has been catered to, by giving reference to a suitable standard.

This code represents a standard of good practice and, therefore, takes the form of recommendations.

Indian Standard

CODE OF BASIC REQUIREMENTS FOR WATER SUPPLY, DRAINAGE AND SANITATION

(Fourth Revision)

1 SCOPE

1.1 This standard lays down basic requirements for water supply, drainage and sanitation for residential, commercial, industrial and other types of buildings in urban areas including railway platforms, bus stations and terminals, seaports, airports and market yards.

1.2 This standard does not take into consideration the requirements of water for industrial plants and processes which have to be provided for separately dependin gupon individual requirements. It also does not take into account overcrowding, both casual and permanent, and is based on the assumption that the average size of a family is 5, and 9 m^2 floor area is occupied by not more than two persons. It does not provide for municipal water supply requirements such as for street cleaning, etc.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
2064 : 1993	Code of practice for selection, installation and maintenance of sanitary appliances (*second revision*)
4878 : 1986	Byelaws for construction of cinema buildings (*first revision*)
9668 : 1990	Code of practice for provisions and maintenance for water supplies for fire fighting

3 GENERAL REQUIREMENTS

3.0 All buildings shall conform to the following general requirements in regard to water supply, drainage and sanitation.

3.1 All premises intended for human habitation, occupancy or use shall be provided with the supply of potable water, neither connected with unsafe water supply nor subject to the hazards of backflow or back-siphonage.

3.2 Plumbing fixtures, devices and appurtenances shall be supplied with water in sufficient volume and at pressures adequate to enable them to function satisfactorily under all normal conditions of use.

3.3 Plumbing shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

3.4 Devices for heating and storing water shall be so designed and installed as to prevent dangers from explosion through overheating.

3.5 Every building having plumbing fixtures installed and intended for human habitation, occupancy or use on premises abutting on a street, alley or easement in which there is a public sewer, shall have connection with the sewer.

NOTE — An easement is a right which the owner or occupier of certain land possesses, as such, for the beneficial enjoyment of that land, to do and continue to do something, or to prevent and continue to prevent something being done, in or upon or in respect of, certain other land not his own (definition taken from Indian Easements Act, 1882).

3.6 Each family dwelling unit on premises abutting on a sewer or with a private sewage-disposal system shall have, at least, one water closet and one kitchen sink. It is desirable that a bath room with a tap or shower should be installed to meet the basic requirements of sanitation and personal hygiene.

3.7 All other structures for human occupancy or use on premises abutting on a sewer or with a private sewage-disposal system shall have adequate sanitary facilities, but in no case less than one water-closet and one other fixture for cleaning purposes.

4 WATER SUPPLY REQUIREMENTS

4.1 Water Supply for Residences

A minimum of 70 to 100 litres per head per day may be considered adequate for domestic needs of urban communities, apart from non domestic needs as flushing requirements. As

a general rule the following rates per capita per day may be considered minimum for domestic and non domestic needs:

1) For communities with population up to 20 000 and without flushing system	
a) water supply through standpost	40 lphd (*Min*)
b) water supply through house service connection	70 to 100 lphd
2) For communities with population 20 000 to 100,000 together with full flushing system	100 to 150 lphd
3) For communities with population above 100 000 together with full flushing system	150 to 200 lphd

NOTE — The value of water supply given as 150 to 200 litres per head per day may be reduced to 135 litres per head per day for houses for Lower Income Groups (LIG) and Economically Weaker Section of Society (EWS), depending upon prevailing conditions.

4.1.1 Out of the 150 to 200 litres per head per day, 45 litres per head per day may be taken for flushing requirements and the remaining quantity for other domestic purposes.

4.2 Water Supply for Buildings Other Than Residences

Minimum requirements for water supply for buildings other than residences shall be in accordance with Table 1.

Table 1 Water Requirements for Buildings Other than Residences

Sl No.	Type of Building	Consumption Per Day, litres
(1)	(2)	(3)
i)	Factories where bath rooms are required to be provided	45 per head
ii)	Factories where no bath rooms are required to be provided	30 per head
iii)	Hospital (including laundry) :	
	a) Number of beds not exceeding 100	340 per head
	b) Number of beds exceeding 100	450 per head
iv)	Nurses' homes and medical quarters	135 per head
v)	Hostels	135 per head
vi)	Hotel	180 per head
vii)	Offices	45 per head
viii)	Restaurants	70 per seat
ix)	Cinemas, concert halls and theatres	15 per seat
x)	Schools:	
	a) Day schools	45 per head
	b) Boarding schools	135 per head

NOTE — For fire demand in buildings refer IS 9668 : 1981.

5 DRAINAGE AND SANITATION REQUIREMENTS

5.1 General

There shall be at least one water tap and arrangements for drainage in the vicinity of each water-closet or group of water-closets in all buildings.

5.2 Residences

5.2.1 Dwellings with individual conveniences shall have at least the following fitments:

a) One bath room provided with a tap,

b) One water-closet, and

c) One nahani or sink either in the floor or raised from the floor with a tap.

Where only one water-closet is provided in a dwelling, the bath and water-closet shall be separately accommodated.

NOTE — Water-closets, unless otherwise indicated, shall be of Indian style (squatting type).

5.2.2 Dwellings without individual conveniences shall have the following fitments:

a) One water tap with draining arrangement in each tenement,

b) One water-closet and one bath for every two tenements, and

c) Water taps in common bath rooms.

5.3 Buildings Other Than Residences

The requirements for fitments for drainage and sanitation in case of buildings other than residences shall be in accordance with Tables 2 to 12.

6 WATER SUPPLY, DRAINAGE AND SANITATION REQUIREMENTS FOR RAILWAY PLATFORMS, BUS STATIONS, BUS TERMINALS AND AIRPORTS

6.1 General

The water supply, drainage and sanitation requirement specified in **6.2** to **6.4** for railway stations, bus stations, bus terminals, sea ports

airports include provisions, for waiting rooms and waiting halls. They do not however, include requirements for retiring rooms.

6.2 Water Supply

Requirements for water supply according to the following:

Nature of Station	*Where Bathing Facilities are Provided litres/capita*	*Where Bathing Facilities are not Provided litres/capita*
a) Railways, bus stations and sea ports		
i) Intermediate stations (excluding mail and express stops)	45	25
ii) Junction stations and intermediate stations where mail or express stoppage is provided	70	45
iii) Terminal stations	45	45
b) Airports		
International and domestic airports	70	70

NOTES

1 The number of persons shall be determined by average number of passengers handled by the station daily; due consideration may be given to the staff and vendors likely to use facilities.

2 Consideration should be given for seasonal average peak requirements.

6.3 Drainage

Adequate arrangements shall be made for satisfactory drainage of all sewage and waste water. The drainage shall be so designed as to cause no stagnation at the maximum discharge rate for which the different units are designed.

6.4 Sanitation

6.4.1 The minimum sanitary convenience to be provided at any railway station, bus station or bus terminal and sea ports shall be as given below:

Nature of Station	*WC for Males*	*WC for Females*	*Urinals for Males Only*
Junction stations and intermediate stations and bus station	3 for first 1 000 persons and 1 for every additional 1 000 persons or part thereof	4 for first 1 000 persons and 1 for every additional 1 000 persons	4 for every 1 000 persons and 1 for every additional 1 000 persons
Terminal stations and bus terminals	4 for first 1 000 persons and 1 for every subsequent 1 000 persons or part thereof	5 for first 1 000 persons and 1 for every subsequent 2 000 persons or part thereof	6 for first 1 000 persons and 1 for every subsequent 1 000 persons or part thereof

6.4.2 The sanitary conveniences to be provided at airports shall be as given below:

Type of Airport	*WC for Males*	*WC for Females*	*Urinals for Males Only*
Domestic airports (minimum)	2*	4*	2
for 200 persons	5	8	6
for 400 persons	9	15	12
for 600 persons	12	20	16
for 800 persons	16	26	20
for 1 000 persons	18	29	22
International airports			
for 200 persons	6	10	8
for 600 persons	12	20	16
for 1 000 persons	18	29	22

NOTE — Separate provision shall be made for staff and workers, at these traffic terminals stations.

* At least one Indian style water-closet shall be provided in each toilet. Assume 60 male to 40 female in any area.

6.4.2.1 The following provisions shall be made:

a) For wash basins at the following rates:

Domestic airports	Minimum of 2 each for male and female with the scale of provisions as for international airports for increase in population
International airports	10 for 200 persons 15 for 400 persons 20 for 600 persons 25 for 1 000 persons

b) Shower stalls with wash basin in the enclosure per stall should be provided at the following locations:

i) 4 stalls each in the ladies and gents toilets in the transit or departure lounge.

ii) 4 stalls in the ladies and gents toilets in the main concourse

6.4.3 Adequate scavenging arrangements shall be provided so that each terminal is kept clean of all refuse. Refuse containers shall be placed at convenient points.

Table 2 Office Buildings

(*Clause* 5.3)

Sl No.	Fitments	For Male Personnel	For Female Personnel
(1)	(2)	(3)	(4)
i)	Water-closets*	1 for every 25 persons or part thereof	1 for every 15 persons or part thereof
ii)	Ablution taps	1 in each water-closet 1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closet and urinals	1 in each water-closet
iii)	Urinals	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons 3 for 46 to 70 persons 4 for 71 to 100 persons From 101 to 200 persons add at the rate of 3 per cent For over 200 persons, add at the rate of 2·5 percent.	—
iv)	Wash basins	1 for every 25 persons or part thereof	
v)	Drinking water fountains	1 for every 100 persons with a minimum of one on each floor	
vi)	Cleaner's sink	1 per floor, *Min*, preferably in or adjacent to sanitary rooms	

*This may include adequate number of European style of water-closets, if desired.

Table 3 Factories

(*Clause* 5.3)

Sl No.	Fitments	For Male Personnel	For Female Personnel
(1)	(2)	(3)	(4)
i)	Water-closet*	1 for 1 to 15 persons	1 for 1 to 12 persons
		2 for 16 to 35 pesrons	2 for 13 to 25 persons
		3 for 36 to 65 persons	3 for 26 to 40 persons
		4 for 66 to 100 persons	4 for 41 to 57 persons
			5 for 58 to 77 persons
			6 for 78 to 100 persons
		From 101 to 200 persons add at the rate of 3 percent	From 101 to 200 persons add at the rate of 5 percent
		For over 200 persons, add at the rate of 2·5 percent	For over 200 persons add at the rate of 4 percent
ii)	Ablution taps	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals	
iii)	Urinals	Nil up to 6 persons	
		1 for 7 to 20 persons	
		2 for 21 to 45 persons	—
		3 for 46 to 70 persons	
		4 for 71 to 100 persons	
		From 101 to 200 persons add at the rate of 3 percent	
		For over 200 persons, add at the rate of 2·5 percent	
iv)	Washing taps with draining arrangements	1 for every 25 persons or part thereof	
v)	Drinking water fountains	1 for every 100 persons or part thereof with a minimum of one on each floor	
vi)	Baths (preferably showers)	As required for particular trades or occupations	

NOTES

1 For many trades of dirty or dangerous character, more extensive provisions are required by law.

2 Creches, where provided, shall be fitted with water-closets (one for 10 persons or part thereof) and wash basins (one for 15 persons or part thereof) and drinking water tap with draining arrangements (one for every 50 persons or part thereof).

*Some of the water-closets may be of European style, if desired.

Table 4 Cinemas*, Concert Halls and Theaters

(*Clause* 5.3)

Sl No.	Fitments	For Male Public	For Female Public	For Male Staff	For Female Staff
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water-closets	1 per 100 persons up to 400 persons; and for over 400 persons, add at the rate of 1 per 250 persons or part thereof	3 per 100 persons up to 200 persons; and for over 200 persons add at the rate of 2 per 100 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons	1 for 1 to 12 persons 2 for 13 to 25 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tape with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals			
iii)	Urinals	1 for 25 persons or part thereof	—	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons	—
iv)	Wash basins	1 for every 200 persons or part thereof	1 for every 200 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons	1 for 1 to 12 persons 2 for 13 to 25 persons
v)	Drinking water fountains	←——— 1 per 100 persons or part thereof ——→			

NOTES

1 Some of the water-closets may be of European style, if desired.

2 It may be assumed that two-thirds of the number are males and one-third females.

3 Provisions for water tap may also be made in place of drinking water fountains, the scale of which may be 1 per 100 persons or part thereof.

**See also* IS : 4878-1986.

Table 5 Art Galleries, Libraries and Museums

(*Clause* 5.3)

Sl No.	Fitments	For Male Public	For Female Public	For Male Staff	For Female Staff
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water-closets	1 per 200 persons up to 400 persons; and for over 400 persons, add at the rate of 1 per 250 persons or part thereof	1 per 100 persons up to 200 persons, and for over 200 persons, add at the rate of 1 per 150 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons	1 for 1 to 12 persons 2 for 13 to 25 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals			
iii)	Urinals	1 per 50 persons	—	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons	—
iv)	Wash basins	1 for every 200 persons or part thereof; and for over 400 persons, add at the rate of 1 per 250 persons or part thereof	1 for every 200 persons or part thereof; and for over 200 persons, add at the rate of 1 per 150 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons	1 for 1 to 12 persons 2 for 13 to 25 persons
v)	Cleaner's sinks	←——— 1 per floor, *Min* ———→			
vi)	Drinking water fountain	←——— 1 per 100 persons or part thereof ———→			

NOTES

1 Some of the water-closets may be of European style, if desired.

2 It may be assumed that two-thirds of number are males and one-third females.

Table 6 Hospitals, Indoor and Outdoor Patient Wards

(*Clause* 5.3)

Sl No.	Fitments	Requirements	
(1)	(2)	(3)	
		Indoor Patient Wards (For Males and Females)	
i)	Water-closets	1 for every 8 beds or part thereof	
ii)	Ablution taps	1 in each water-closet plus one water tap with draining arrangements in the vicinity of water-closets and urinals for every 50 beds or part thereof	
iii)	Wash basins	2 up to 30 beds; add 1 for every additional 30 beds or part thereof	
iv)	Baths	1 bath shower for every 8 beds or part thereof	
v)	Bed pan washing sinks	1 for each ward	
vi)	Clearner's sinks	1 for each ward	
vii)	Kitchen sinks and dish washers (where kitchen is provided)	1 for each ward	
		Outdor Patient Wards and Visitors	
		For Males	*For Females*
viii)	Water closets	1 for every 100 persons or part thereof	2 for every 100 persons or part thereof
ix)	Ablution taps	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals	
x)	Urinals	1 for every 50 persons or part thereof	—
xi)	Wash basins	1 for every 100 persons or part thereof	1 for every 100 persons or part thereof
xii)	Drinking water fountain	←——————1 per 500 persons or part thereof——————→	

NOTES

1 Some of the water-closets may be of European style, if desired.

2 Additional and special fitments for specific needs of hospitals may be provided.

Table 7 Hospitals (Administrative Buildings, Medical Staff Quarters and Nurses' Homes)

(*Clause* 5.3)

Sl No.	Fitments	For Administrative Buildings		For Medical Staff Quaters (Hostel Type)		For Nurses' Homes (Hostel Type)
		For Male Personnel	For Female Personnel	For Male Staff	For Female Staff	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets	1 for every 25 persons or part thereof	1 for every 15 persons or part thereof	1 per 4 persons	1 per 4 persons	1 for 4 persons or part thereof
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vinicity of water-closets and urinals				
iii)	Urinals	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons 3 for 46 to 70 persons 4 for 71 to 100 persons From 101 to 200 persons, add at the rate of 3 percent; and for over 200 persons, add at the rate of 2·5 percent	—	—	—	—
iv)	Wash basins	1 for every 25 persons or part thereof	1 for every 25 persons or part thereof	1 for every 8 persons or part thereof	1 for every 8 persons or part thereof	1 for every 8 persons or part thereof
v)	Baths (with shower)	—	—	1 for 4 persons or part thereof	1 for 4 persons or part thereof	1 for 4 to 6 persons or part thereof
vi)	Drinking water fountains	←——1 per 100 persons or part thereof with a minimum of 1 on each floor——→				
vii)	Cleaner's sink	←——1 per floor, *Min*——→				

*Some of the water-closets may be of European style, if desired.

Table 8 Hotels

(*Clause* 5.3)

Sl No.	Fitments	For Residential Public and Staff	For Public Rooms		For Non-Residential Staff	
			For Males	For Females	For Males	For Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets	1 per 8 persons omitting occupants of the room with attached water-closets; minimum of 2 if both sexes are lodged	1 per 100 persons up to 400 persons; and for over 400, add at the rate of 1 per 250 persons or par. thereof	2 per 100 persons up to 200 persons; and for over 200 add at the rate of 1 per 100 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons 3 for 36 to 65 persons 4 for 66 to 100 persons	1 for 1 to 12 persons 2 for 13 to 25 persons 3 for 26 to 40 persons 4 for 41 to 57 persons 5 for 58 to 77 persons 6 for 78 to 100 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals				
iii)	Urinals	—	1 per 50 persons or part thereof	—	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons 3 for 46 to 70 persons 4 for 71 to 100 persons	—
iv)	Wash basins	1 per 10 persons omitting the wash basins installed in the room suite	1 per water-closet and urinal provided	1 per water-closet provided	1 for 1 to 15 persons 2 for 16 to 35 persons 3 for 36 to 65 persons 4 for 66 to 100 persons	1 for 1 to 12 persons 2 for 13 to 25 persons 3 for 26 to 40 persons 4 for 41 to 57 persons 5 for 58 to 77 persons 6 for 78 to 100 persons
v)	Baths	1 per 10 persons omitting occupants of the room with bath en suite	—	—	—	—
vi)	Slop sinks	1 per 30 bedrooms; minimum 1 per floor	—	—	—	—
vii)	Kitchen sinks and dish washers	← 1 in each kitchen →				

NOTES

1 Some of the water-closets may be of European style, if desired.

2 It may be assumed that two-thirds of the number are males and one-third females.

Table 9 Restaurants

(*Clause* 5.3)

Sl No.	Fitments	For Male Public	For Female Public	For Male Staff	For Female Staff
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water-closet	1 for 50 seats up to 200 seats; and for over 200 seats, add at the rate of 1 per 100 seats or part thereof	1 for 50 seats up to 200 seats; and for over 200 seats, add at the rate of 1 per 100 seats or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons 3 for 36 to 65 persons 4 for 66 to 100 persons	1 for 1 to 12 persons 2 for 13 to 25 persons 3 for 26 to 40 persons 4 for 41 to 57 persons 5 for 58 to 77 persons 6 For 78 to 100 persons
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals			
iii)	Urinals	1 per 50 seats	—	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons 3 for 46 to 70 persons 4 for 71 to 100 persons	—
iv)	Wash basins	← 1 for every water-closet provided →			
v)	Kitchen sinks and dish washers	← 1 in each kitchen →			
vi)	Slop or service sinks	← 1 in the restaurant →			

NOTES

1 Some of the water-closets may be of European style, if desired.

2 It may be assumed that two-thirds of the number are males and one-third females.

Table 10 Schools and Educational Institutions

(Clause 5.3)

Sl No.	Fitments*	Nursery Schools	Educational Institutions (Non-Residential)		Educational Institutions (Residential)	
			For Boys	For Girls	For Boys	For Girls
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets†	1 per 15 pupils or part thereof	1 per 40 pupils or part thereof	1 per 25 pupils or part thereof	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
ii)	Ablution taps	1 in each water closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 pupils or part thereof in the vicinity of water-closets and urinals				
iii)	Urinals	—	1 per 20 pupils or part thereof	—	1 for every 25 pupils or part thereof	—
iv)	Wash basins	1 per 15 pupils or part thereof	1 per 60, *Min* 2	1 per 40, *Min* 2	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
v)	Baths	1 bath-sink per 40 pupils or part thereof	—	—	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
vi)	Drinking water fountains or taps	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof
vii)	Cleaner's sinks	← 1 per floor, *Min* →				

*For teaching staff, the schedules of fitments to be provided shall be the same as in the case of office buildings (*see* Table 2).

†Some of the water-closets may be of European style, if desired.

Table 11 Hostels

(*Clause* 5.3)

Sl No.	Fitments	For Residents and Residential Staff		For Non- Residential Staff		Rooms Wherein Outsiders are Received	
		For Males	For Females	For Males	For Females	For Males	For Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Water-closet*	1 for every 8 persons or part thereof	1 for every 6 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons 3 for 36 to 65 persons 4 for 66 to 100 persons	1 for 1 to 12 persons 2 for 13 to 25 persons 3 for 26 to 40 persons 4 for 41 to 57 persons 5 for 58 to 77 persons 6 for 78 to 100 persons	1 per 100 persons up to 400 persons; and for over 400 persons, add, at the rate of 1 for 250 persons or part thereof	2 per 100 persons up to 200 persons, and for over 200 persons, add at the rate of 1 for 100 persons or part thereof
ii)	Ablution taps	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
		1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals					
iii)	Urinals	1 for 25 persons or part thereof	—	Nil up to 6 persons 1 for 7 to 20 persons 2 for 21 to 45 persons 3 for 46 to 70 persons 4 for 71 to 100 persons	—	1 per 50 persons or part thereof	
iv)	Wash basin	1 for 8 persons or part thereof	1 for 6 persons or part thereof	1 for 1 to 15 persons 2 for 16 to 35 persons 3 for 36 to 65 persons 4 for 66 to 100 persons	1 for 1 to 12 persons 2 for 13 to 25 persons 3 for 26 to 40 persons 4 for 41 to 57 persons 5 for 58 to 77 persons 6 for 78 to 100 persons	1 per each water-closet and urinal provided	1 per each water-closet provided
v)	Baths	1 for 8 persons or part thereof	1 for 6 persons or part thereof	—	—	—	—
vi)	Cleaner's sinks	← 1 per floor, *Min* →					

*Some of the water-closets may be of European style, if desired.

Table 12 Fruit and Vegetable Markets

(*Clause* 5.3)

Sl No.	Fitments	Requirements
(1)	(2)	(3)
i)	Urinals	Not less than 2 for every 50 persons
ii)	Water-closets*	2, *Min*, and an additional one for every 50 persons
iii)	Ablution taps	2, *Min*, and an additional tap for every 50 persons
iv)	Bathing places	Suitable numbers with talking platforms

NOTES

1 Separate and adequate provision of water-closets shall be made for females.

2 Adequate washing places for fruit and vegetables shall be provided.

*Some of the water-closets may be of European style, if desired.

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The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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64.0 WATER QUALITY STANDARDS FOR COASTAL WATERS MARINE OUTFALLS

In a coastal segment marine water is subjected to several types of uses. Depending of the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various types of uses there is one use that demands highest level of water quality/purity and that is termed a "designed best use" in that stretch of the coastal segment. Based on this, primary water quality criteria have been specified for following five designated best uses:-

Class	**Designated best use**
SW-I (see Table 1.1)	Salt pans, Shell fishing, Mariculture and Ecologically Sensitive Zone.
SW-II (see Table 1.2)	Bathing, Contact Water Sports and Commercial fishing.
SW-III(see Table 1.3)	Industrial cooling, Recreation (non-contact) and Aesthetics.
SW-IV (see Table 1.4)	Harbour.
SW-V (see Table 1.5)	Navigation and Controlled Waste Disposal.

The standards along with rationale/remarks for various parameters, for different designated best uses, are given in Table 1.1 to 1.5.

Table 1.1 Primary Water Quality Criteria For Class SW-I Waters
(For Salt pans, Shell fishing, Mariculture and Ecologically Sensitive Zone)

S. No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.5-8.5	General broad range, conducive for propogation of aquatic lives, is given. Value largely dependant upon soil-water interaction.

(Contd.....)

(Contd.....)

2.	Dissolved Oxygen	5.0 mg/l or 60 percent saturation value, whichever is higher.	Not less than 3.5 mg/l at any time of the year for protection of aquatic lives.
3.	Colour and Odour	No noticeable colour or offensive odour.	Specially caused by chemical compounds like creosols, phenols, naptha, pyridine, benzene, toluene etc. causing visible colouration of salt crystal and tainting of fish flesh.
4.	Floating Matters	Nothing obnoxious or detrimental for use purpose.	Surfactants should not exceed an upper limit of 1.0 mg/l and the concentration not to cause any visible foam.
5.	Suspended Solids	None from sewage or industrial waste origin	Settleable innert matters not in such concentration that would impair any usages specially assigned to this class.
6.	Oil and Grease (including Petroleum Products)	0.1 mg/l	Concentration should not exceed 0.1 mg/l as because it has effect on fish egs and larvae.
7.	Heavy Metals: Mercury (as Hg) Lead (as Pb) Cadmium (as Cd)	 0.01 mg/l 0.01 mg/l 0.01 mg/l	Values depend on: (i) Concentration in salt, fish and shell fish. (ii) Average per capita consumption per day. (iii) Minimum ingestion rate that induces symptoms of resulting diseases.

Note : SW-1 is desirable to be safe and relatively free from hazardous chemicals like pesticides, heavy metals and radionuclide concentrations. Their combined (synergestic or antagonistic) effects on health and aquatic lives are not yet clearly known. These chemicals undergo bio-accumulation, magnification and transfer to human and other animals through food chain. In areas where fisheries, salt pans are the governing considerations, and presence of such chemicals apprehended/reported, bioassay test should be performed following appropriate methods for the purpose of setting case-specific limits.

Table 1.2 Primary Water Quality Criteria for Class SW-II Waters

(For Bathing, Contact Water Sports and Commercial Fishing)

S. No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.5-8.5	Range does not cause skin or eye irritation and is also conducive for propagation of aquatic life.
2.	Dissolved Oxygen	4.0 mg/l or 50 percent saturation value whichever is higher.	Not less than 3.5 mg/l at anytime for protection of aquatic lives.
3.	Colour and Odour	No noticeable colour or offensive odour.	Specially caused by chemical compounds like creosols phenols, naptha, benzene pyridine, volume etc. causing visible colouration of water and tainting of and odour in fish flesh.
4.	Floating Matters	Nothing obnoxious or detrimental for use purpose.	None in concentration that would impair usages specially assigned to this class.
5.	Turbidity	30 NTU (Nephelo Turbidity Unit)	Measured at 0.9 depth.
6.	Fecal Coliform	100/100 ml (MPN)	The average value not exceeding 200/100 ml. in 20 percent of samples in the year and in 3 consecutive samples in monsoon months.
7.	Biochemical Oxygen Demand (BOD) (3 days at 27°C)	3 mg/l	Restricted for bathing (aesthetic quality of water). Also prescribed by IS:2296-1974.

Table 1.3 Primary Water Quality Criteria for Class SW-III Waters
[For Industrial cooling, Recreation (non-contact) and Aesthetics]

S. No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.5-8.5	The range is conducive for propagation of aquatic species and restoring natural system.
2.	Dissolved Oxygen	3.0 mg/l or 40 percent saturation value which-ever is higher.	To protect aquatic lives.
3.	Colour and Odour	No noticeable colour or offensive odour.	None in such concentration that would impair usages specifically assigned to this class.
4.	Floating Matters	No visible/obnoxious floating debris, oil slick, scum.	As in (3) above.
5.	Fecal Coliform	500/100 ml (MPN)	Not exceeding 1000/100 ml in 20 percent of samples in the year and in 3 consecutive samples in monsoon months.
6.	Turbidity	30 NTU	Reasonably clear water for Recreation, Aesthetic appreciation and Industrial cooling purposes.
*7.	Dissolved Iron (as Fe)	0.5 mg/l or less	It is desirable to have the collective concentration of dissolved Fe and Mn less or equal to 0.5 mg/l to avoid scaling effect.
*8.	Dissolved Manganese (as Mn)	0.5 mg/l or less	

* Standard included exclusively for Industrial Cooling purpose. Other parameters same.

Table 1.4 Primary Water Quality Criteria for Class SW-IV Waters
(For Harbour Waters)

S. No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.5-9.0	To minimize corrosive and scaling effect.
2.	Dissolved Oxygen	3.0 mg/l or 40 percent saturation value whichever is higher	Considering bio-degradation of oil and inhibition to oxygen production through photosynthesis.
3.	Colour and Odour	No visible-colour or offensive odour.	None from reactive chemicals which may corrode paints/metallic surfaces.
4.	Floating materials Oil, grease and scum (including Petroleum products)	10 mg/l	Floating matter should be free from excessive living organisms, which may clog or coat operative parts of marine vessels/equipment.
5.	Fecal Coliform	500/100 ml (PAN)	Not exceeding 1000/100 ml in 20 percent of samples in the year and in 3 consecutive samples in monsoon months.
6.	Biochemical Oxygen Demand (3 days at 27°C)	5 mg/l	To maintain water relatively free from pollution caused by sewage and other decomposable wastes.

Table 1.5 Primary Water Quality Criteria for Class SW-V Waters
(For Navigation and Controlled Waste Disposal)

S. No.	Parameter	Standards	Rationale/Remarks
1.	pH range	6.0-9.0	As specified by New England Interstate Water Pollution Control Commission.
2.	Dissolved Oxygen	3.0 mg/l or 40 percent saturation value which ever is higher	To protect aquatic lives.

(Contd.....)

(Contd.....)

3.	Colour and Odour	None is such concentration that would impair any usages specifically assigned to this class.	As in (1) above
4.	Sludge deposits, Solid refuse floating oil, grease & scum.	None except for such small solids, amount that may result from discharge of appropriately treated sewage and/or individual waste effluents.	As in(1) above
5.	Fecal Coliform	500/100 ml (MPN)	Non exceeding 1000/100 ml in 20 percent of samples in the year and in 3 consecutive samples in monsoon months.

Source : EPA, 1986
[GSR 7, dated Dec. 22, 1998]