



# Indian Railway Water Policy

2017



Protection of the environment and conservation of water and forests are people's responsibility.

- Shri Narendra Modi  
*Prime Minister of India*



Indian Railways is committed to embed sustainability in its business and operational strategies.

- Shri Suresh Prabhakar Prabhu  
*Hon'ble Minister of Railways, Govt. of India*



## Ministry of Railways

Government of India

- 1.1 With the lowering of ground water level and occurrence of frequent droughts, water scarcity is being faced in many regions. Inadequate availability of water at stations and colonies in water scarce areas has been impacting railway working & operations as well.
- 1.2 In a case on Environment Pollution before NGT at Delhi, Orders have been issued directing Railways that effluents generated at railway stations & depots should not be permitted to seep into ground and they should be discharged into STP/ETP to be located near major stations and treated water shall be recycled for inferior uses.
- 1.3 It is observed that water consumption details for most of the railway establishments are not available and water demand is being assessed on yardstick/lumpsum basis. It results at times in improper planning of water augmentation works. Further at many locations, fresh water is being consumed for non-potable purpose for which recycled water after treatment can be used.
- 1.4 Instructions are already in place to carry out Rain Water Harvesting (RWH) in existing establishment as well as in future projects/buildings, undertaking water audit and providing WRPs at major water consumption centers. It is, however, observed that there is substantial scope of scaling up the progress on RWH, water audit including setting up of WRPs in Zonal Railways.
- 1.5 Government of India in its Intended Nationally Determined Contribution (INDC) submitted to UN Framework Convention on Climate Change (UNFCCC) in October 2015, has committed to improve the water use efficiency by 20%. This is a legally binding commitment on India.
- 1.6 Accordingly, Indian Railways, being a major consumer of water, ought to take adequate and effective measures to improve the management of demand as well as supply of water to be a part of the environmental objective as well as avoid water scarcity coming in the way of operation & maintenance of Railways. It has been decided to issue the policy instructions on water management on IR to facilitate clarity on this subject and ensure systematic approach in Water Management.
- 1.7 Central Ground Water Authority (CGWA)'s guidelines for ground water abstraction issued in Nov' 2015, shall be applicable for the areas as provided therein.

## Water Management Plan (WMP)

### Water Management Plan

2.1 Each Division/Workshop of Zonal Railways and PUs shall prepare a water management plan with smallest unit being a railway station, major staff colony, hospital, workshop, sheds/depots etc. This Plan shall have Demand and Supply side management segments as also water conservation measures. It will include but not limited to details of water consumption for potable and non-potable purposes, available water resources, quality of water, treatment method being used, details of major water supply

installations etc. This plan shall also include targets of water use efficiency, plan for audit of functioning of few existing Rain Water Harvesting Systems (RWHs), Targets for providing new recharge structures, undertaking water audits and setting up Water Recycling Plants (WRPs)/Effluent Treatment Plants (ETPs)/Sewage Treatment Plants (STPs), Use/Proliferation plan of water efficient fixtures, installation of water meters etc.

- 2.2 Zonal Railway shall endeavor to reduce the demand for fresh water by quantifying targets every year. Action plan for increasing the water use efficiency needs to be made accordingly in the WMP.

2.3

|                   |      |                                                                                   |
|-------------------|------|-----------------------------------------------------------------------------------|
| Watering Schedule | Sat  |  |
|                   | Fri  |  |
|                   | Thur |  |
|                   | Wed  |  |
|                   | Tues |  |
|                   | Mon  |  |
|                   | Sun  |  |

Based on the WMP, the railways shall assess the quantum of work required along with the cost, duly giving priorities in accordance with the water situation in the area and make an action plan for undertaking the works of water conservation in minimum possible time.

2.4

Each Zonal Railway/PU shall endeavor to make at least one unit (colony, workshop/shed, station etc.) every year to become water positive which implies that recycled water plus water harvested is more than water extracted & consumed.

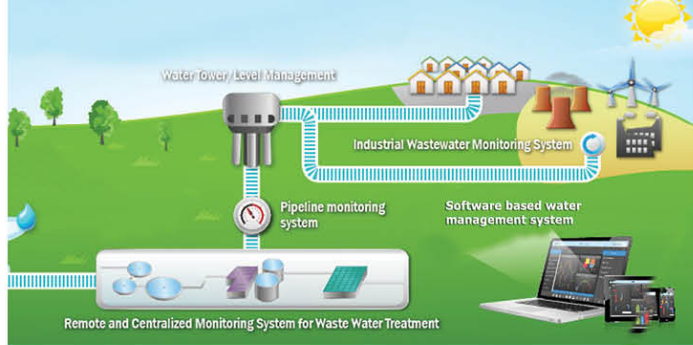
## Upgrading water supply systems

- 3.1 Water supply represents a vital problem for people, and this imposes the need to know the information regarding consumptions, resources and production. This implies a continuous supervision of the water supply process in order to allow any problem that could appear to be solved, and in the same time, to maintain normal functioning parameters.

- 3.2 **Introduction of Automatic Valves:** All the valves which are operated manually operated till now shall be changed to automatic valves with a built in actuating mechanism. Manually operated valves require someone in attendance to adjust them using a direct or geared mechanism attached to the valve stem. Power-operated valve actuators allowing a valve to be adjusted remotely which automatically regulates some flow, level or other process. Actuators may be only to open and close the valve, or may allow intermediate positioning; some valve actuators include switches or other ways to remotely indicate the position of the valve.



- 3.3 **Use of SCADA (supervisory control and data acquisition) based control systems:** SCADA systems, by monitoring the technological parameters in the water distribution stations, allow the optimum functioning of the pumping system and safety in the equipments and installations. It obtains efficient energy usage and optimum administration of the drinkable water.



3.4 Indian Railways, where ever possible and advisable, shall use SCADA based system which is configured to control various equipment and monitor the water throughout this entire process. Large coach watering stations, depots and colonies shall be the first focus areas. Analog and digital input and output modules can be connected (where ever necessary, and not limited to) to:

3.4.1 Level transducers that track water levels in large reservoirs and tanks.

3.4.2 Pressure transducers in pipes that measure pressure in pounds per square inch (psi) within each zone and ensure that water is pumped and is flowing efficiently as it is being delivered.

3.4.3 Flowmeters that measure how many litres of water per minute are being delivered.

3.4.4 Pressure-sustaining, pressure-reducing, and other valves that open and close incrementally to adjust the rate at which the water flows.

### 3.5 Phasing out of Valveman

**(or similar designation) as a category of staff:** Introduction of self actuated valves and/or use of SCADA based distribution shall result in reducing manpower, particularly in the category of Valveman whose primary work content is to open and close valves at an appointed time leading to extremely low man power productivity. It shall be the endeavor of every railway to complete installations of automatic valves and phase out Valveman by redeploying them in vacant positions within a period of 2 years (Jan 2019).

3.6 **Mandatory Provision of Solar water heaters:** Normally



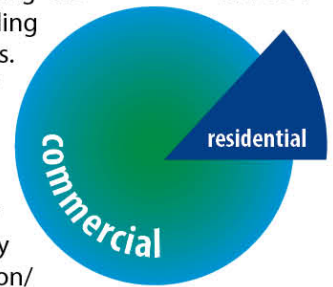
solar water heaters are retro fitted as an afterthought with the aim of conserving energy. This leads to unplanned and unsightly piping installations which become a blemish on aesthetically designed structures. No housing or building plan shall be approved without a solar water heating arrangement, where ever water heating is envisaged. Provision of electric water heaters shall be an exception, at locations where solar water heaters are not practicable.

Wherever needed, an instant electric geyser can be used along with a solar water heater to heat the water in the pipeline and thus avoid wastage of water.

## 4.0 Measurement and Accountal of Water Consumption

4.1 Presently most of the water supply to various Indian Railway establishments is not metered. It is necessary to know the actual water consumption vis- a- vis water supply from various sources by metering the major supply points, critical mains and major end-use points. This will enable in ascertaining the w a t e r w a s t a g e in the system including water saving opportunities.

In the light of this, water meters shall be installed in major service buildings, workshops, depots/sheds, stations, major utility buildings covering supply point(s) and major distribution/ end-use points. Smart meters may b e provided which will be useful for measurement, accountal and monitoring of water consumption. This database shall be used for planning appropriate water conservation and water supply augmentation works. For the performance assessment and monitoring, each Depot/Shed/Station/ Workshop incharge from the consumer side as well as water supply authorities must maintain the monthly data on supply/consumption of water from different sources.



4.2 **Application of differential water tariff:** Most of the Water Supply Boards or Municipalities and local bodies charge the Indian Railways on a differential tariff, primarily for residential and commercial uses. Some bodies have a few other intermediate categories also. In the case of Indian Railways, generally the water supply main feeds into a ground level reservoir from where water is supplied to residential and operational (commercial) areas. In many cases, the Indian Railways is paying for both the category of water use at the commercial (higher) rate because the residential and commercial supplies are not separately metered.

4.3 It shall be the endeavor of all zonal railways to ensure that that water supply is paid rationally, on the basis of actual use in the categories of residential and commercial (or any other as appropriate) by making suitable changes to the distribution network and installing meters. This shall be achieved in a period of two years (by Jan 2019).

5.1 The objective of water audit is to measure and assess the extent of fresh water use, water losses in the system and wastewater generated in order to find ways to optimize the use of the scarce resource, as well as reduce, reuse and recycle of wastewater. The detailed water audit contains water consumption and wastewater generation pattern, complete water balance of the facility, water saving opportunities, water use and conservation, method of implementing the various water saving proposals, investment required etc.

- 5.2 The professional water audit is undertaken by a multi-disciplinary team of engineers & water quality experts and with use of various instruments/equipment for the purpose.
- 5.3 As per Board's letter no. 2013/LMB-II/9/1 dt 25.03.15, Water Audit has to be carried out through third party at major water consumption centers on IR. In-house expertise may also be developed in Divisions/Headquarters for conducting such professional audits in due course to cover all the major consumption centres.
- 5.4 Water audit shall be carried out in all establishments (station, sheds/depots, colonies and Workshops/PUs etc.) where (a) water consumption is more than 5 lakh litres per day and/or (b) water supply is from ground water source and Ground Water Block falls in 'Semi-Critical', 'Critical' or 'Over-exploited' category as per Central Ground Water Board categorization and/or (c) where railway is purchasing substantial quantity of water from Municipality.
- 5.5 The exercise on water audit is completed after reports/recommendations are analysed to evolve short, medium & long term plan for water management. Follow up action on the recommendation of Water Audit shall be undertaken by railway within fixed time lines, so that savings in water consumption and water use efficiency are achieved as quickly as possible.

## Rain Water Harvesting (RWH)

- 6.1 Rain Water Harvesting and conservation is the process of collection of rain water for future productive use. The rain water so collected can be stored for direct use after disinfection or can be recharged into the ground water. The objective of RWH and conservation is to make optimum use of rain water at the place where it falls.
- 6.2 Vide Board's letter no. 2013/LMB/9/1 dt. 09.09.13, RWH systems have been made mandatory in construction of all buildup assets
- 6.3 It has been decided that RWH systems shall be provided in all existing establishments (station buildings, service buildings, residential quarter and other units) having roof top area of more than 200 sqm subject to techno-economic feasibility. Out of these, priority should be given to those areas where Ground Water Block falls in 'Semi-Critical', 'Critical' or 'Over-exploited' category as per Central Ground Water Board categorization. This is subject to the requirement for ground water recharge for a particular area as per the CGWA's guidelines.
- 6.4 There are two main techniques of Rain Water Harvesting viz., (i) Storage of rain water on surface for future use and (ii) Artificial recharge to ground water. CPWD Manual may be referred for the details, to decide about the RWH technique for given area. Knowledge of geological and hydrological features of the area is necessary for selecting



the site and type of recharge structures. Artificial recharge structures are generally pits, trenches, abandoned dug-well, hand pumps, gravity head recharge tube-wells, recharge shaft etc. The guidelines of the Central Ground Water Board and the CPWD Manual on "Rain Water Harvesting And Conservation" (available in public domain on website) can be referred for guidance/reference.

## 6.5 RWH may also be done by reviving old water bodies on railway land

and creating new water bodies wherever feasible. In this regard, Board's letter no. 2016/LMB-II/1/5 dt. 10.05.16 may be referred to.

- 6.6 Periodical maintenance of recharge structures is important to ensure its proper functioning.
- 6.7 **Mandatory adoption of small vegetated infiltration basins for stormwater management:**

- 6.7.1 Considering the excessive runoff during rainy season causing seasonal floods in urban areas, it is necessary that progressive and creative



stormwater management practices are adopted as is the norm in developed countries. These best management practices shall encourage use of vegetated infiltration basins to capture precipitation, retain, cleanse, detain and convey stormwater runoff. These allow urban area designers to use vegetated facilities to not only manage small large flow control events but also create self supporting ecological and aesthetical facilities.

- 6.7.2 These vegetated infiltration basins mitigate urban runoff by minimizing peak flows, reduce stormwater volumes, recharging ground water table and remove pollutants as well. Types of bio retention facilities commonly used are planters, swales, basins and vegetated filter strips. Detailed guidelines on their application, design, sizing and management shall be issued in due course. However, through this policy, the use of such facility is made mandatory for all future constructions, wherever applicable.

## Waste Water Management

7.1 Indian Railway largely consumes fresh water for non-potable uses at present. Therefore, there is substantial scope for recycling the waste water after treatment for using the same for non-potable purposes like washing of Platforms, Aprons, Coaches, gardening and flushing of toilets etc.

7.2 Waste water arising in railways is generally from railway tracks & PFs, pit lines, workshops/sheds as also sewage from residential/service buildings. The treatment methods and re-use potential depend upon the type of waste water.



Technology for treatment (i.e. design & type of WRP/ETP/STP) needs to be chosen to get maximum benefits with a minimum cost.

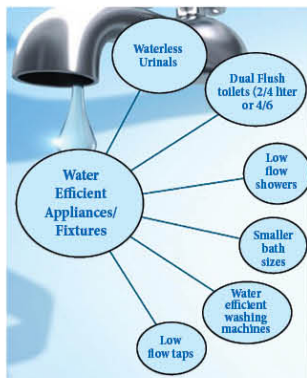
While deciding the technology, capital cost, O&M cost, treatment efficiency, resource recovery, ease of

operation and sustainability may be kept in view. Wherever feasible, Natural Sewage/Waste Water Treatment systems instead of conventional STPs may be used keeping in view of the advantage of sustainability.

- 7.3 STPs/ETPs/WRPs have to be provided at railway stations, colonies, workshops/sheds, hospitals etc., including other units as per the CGWA's guidelines and/or as per the recommendations of Water Audit report as in para 4.5 above.
- 7.4 Vide Board's letter no. 2006/LMB/9/1 dt. 04.08.06, Railways were directed to prioritise the installation of WRPs by proposing the works in the Annual Works Programme. Several instructions on the same were issued subsequently, the recent being vide Board's letter no. 2015/Environ/03.01 dt. 17.03.15.
- 7.5 Coaching depots are generally provided with manual coach washing system which consumes huge quantity of water. Water Recycling Plants along with the automatic coaching washing plants shall be provided at all major coaching depots to reduce fresh water consumption. All coaching depots washing 200 coaches and above in a day shall be taken up for such provision in first phase.
- 7.6 There are around 350 coach watering stations on IR. All these stations, a large amount of water is wasted due to overflow and leakages. It shall be mandatory to provide a water recycling plant in all such stations. Auto detachment of the flexible water filling pipe on completion of watering is also made mandatory in all coach watering stations. In case of a difficulty in doing this, approval of DRM shall be obtained and kept on record.

## Use of water efficient fittings

- 8.1 Water efficient fittings & fixtures play an important role in demand side management. Most of the water consumption by the end users is through valves, stop-cocks/faucets, flushing cistern, urinals etc., it is essential to choose such design of fittings and fixtures of sanitary fittings/fixtures which are efficient in water consumption.



- 8.2 Bathroom sinks and toilets including flushing tanks shall be equipped with low water consumption kits/fixtures. Waterless urinals need to be used progressively. Maintainability of these items/kits shall be kept in view while choosing the design/make of the fittings and fixtures.

## 9.0 Funds

- 9.1 Works of water management can be done under revenue as well as Plan expenditure depending upon the type of work, location etc. RWHs and water audit for the existing establishments need to be undertaken on priority using revenue funds as well as and through plan fund, whenever the same are being undertaken as a part of a sanctioned work. The work of WRPs/ETPs/STPs may be undertaken through regular works programme.

### Water Recycling Plants on BOOT

9.2 A paradigm shift in the policy on water recycling is being introduced with recognition of recycled water as a resource and installation of WRP's as revenue generating projects.

When recycled water is used for non-potable purposes (replacing the presently used fresh water), it saves substantial money by reducing the water bill, in addition to savings on consumption of freshwater. Therefore, all ZR's shall attempt to enter into BOOT agreements with interested parties by calling tenders with suitable eligibility criteria to install waste water recycling plants (on railway land if available or otherwise) and enter into long term arrangement ranging from 15 to 30 years, for buying back recycled water from the successful bidder. Equivalent amount of fresh water supply may be reduced from the daily consumption.



- 9.3 Railway may also undertake some of the aforesaid works through Corporate Social Responsibility (CSR) as per the extant Board's policy circular no. 2015/EnHM/06/06 d. 03.02.16 by involving Private Corporates and PSUs. In addition, such environmental sustainability works can also be undertaken using 1% lumpsum provision for environment related works to be drawn from various estimates for works vide Board's letter no. 2016/EnHM/13/02 dt. 13.05.2016 and 20.09.2016.



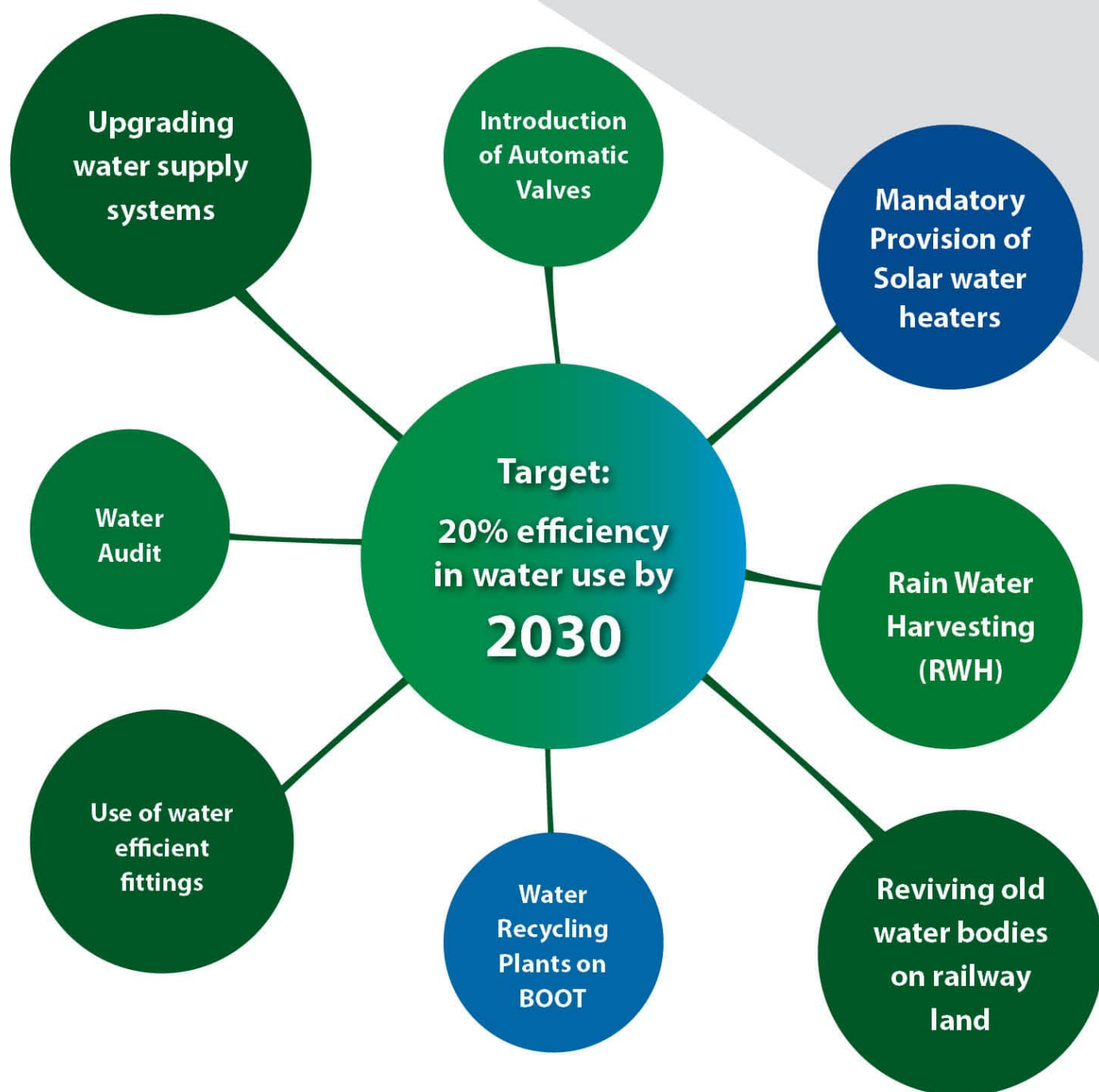
*This is issued in consultation with L&A, Mechanical and Electrical Dtes. and with the concurrence of Finance.*

*Advisor,  
Environment & Housekeeping, Railway Board  
22nd March, 2017*

**focus  
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**INDIAN RAILWAYS**



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