

AatmaNirbhar Railway for Water

Submitted By:
Saksham Bansal

Introduction:

- The Water Scarcity has affected us and forced us to think the ways or to innovate tools to conserve water.
- The AatmaNirbhar Railway For Water project aims to conserve the ignored water which is generated by the Air Conditioners. The water is presently being let out in the form of droplet which eventually evaporate and are of no use.
- Once, the idea is implemented, the Indian Railway would be capable of conserving 7.34 Billion litres of water annually.
- This will help Railway save water and related bills without much investment or implementation cost.

Problem Statement:

- Water scarcity has affected almost every continent and was listed in 2019 by the World Economic Forum as one of the largest global risks in terms of potential impact over the next decade.
- Over the last around 100 years, the world has witnessed major shifts in water management:
- The use of simple technologies of harvesting and using rainwater declined and exploitation of rivers and groundwater through dams and tube wells became the key source of water.
- Water in rivers and aquifers was only a small portion of the total rainwater. So, there was an inevitable, growing and, in many cases, unbearable stress on them.
- The dependence on the State for water lead to high cost of water supply. Poor cost of recovery drove financial sustainability of water schemes aground and repairs and maintenance were in an abysmal state.
- With nobody interested in carefully using water, sustainability of water resources became doubtful — a problem India witnessed recently.
- The United Nations defines India as a water-stressed region with a per capita availability of water of 1,545 cubic metres. The Asian Development Bank has predicted that by 2030, India will have a water deficit of 50%.
- Villages in India are facing an acute shortage of water for households and agriculture activities with farmers bearing the brunt during cropping season. The agriculture sector, which consumes 80% of India's water resources and accounts for 90% of the groundwater withdrawals, uses water inefficiently.

Indian Railway water Usage:

Indian Railways is among the world's largest Rail network, and its route length network is spread over 1,23,236 kms, plying 23 million travelers and 3 million tons (MT) of freight daily from 7,349 stations.

Every coach has four overhead tanks — one above each toilet — with a total carrying capacity of 3,600 litres. This gets replenished about every 10 hours of the train's journey.

Cleaning a train carriage requires about 500 litres of water, washing a platform requires about 5 litres every square metre, and washing the stations' apron — cemented areas along the tracks — consumes about 10 litres every square metre.

Aim:

Optimally Recycle and Reuse Ignored Water.

How much and how can Railway Conserve Water

The water condensed from the Air Conditioner can be collected and reused by the Indian Railway.

The Calculation of the total water generated is mentioned below:

		VALUES	UNITS
1	Total Number of Passenger Trains in INDIA	12617	Numbers
2	No. of Full AC Trains (Superfast/Express Trains)	450	Numbers
3	No. of Normal Trains	12167	Numbers
4	Average Number of AC COACHES in 1-Full AC Trains	24	Numbers
5	Average Number of AC COACHES in 1-Normal Trains	6	Numbers
6	Total Number of AC COACHES (Full AC & Normal Trains)	83802	Numbers
7	Average AC TONNAGE in Each Coach	15	Tons
8	Average Water Discharge/Condense from 1-TON AC in 24 Hours	22-26 ~	Litres
9	Average Running of Each Trains Per day	16	Hours
10	Average Water Discharge/Condense from 1 AC Coach-15 Ton in a day	240	Litres
11	Total Water generated by ALL Trains in a DAY	20112480	Litres
12	Total Water Generated in an YEAR	7341055200	Litres

“Indian Railway is individually capable of Reusing 7.34 billion Litres of Water Annually”

Working:

1. Collect the water in the train overhead tanks, which is condensed from the Air Conditioner (Condenser) of running Trains. (**Water which at present is being drained out on railway track**)
2. Transfer the collected water at the major junctions or station tanks for further water treatment.
3. Water treatment (filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination; and the use of electromagnetic radiation such as ultraviolet light.)
4. Utilise the treated water (Water Bank) as per the desired requirements.

Benefits:

1. High-Cost reduction in the Railway Water Bills.
2. Saves billions of Water from getting wasted and ignored.
3. Less Implementation cost as the Tanks and the piping are also connected to transfer water from the stations to the Tank.
4. Railway connects isolated areas where water can be provided for many purposes.

Utility:

1. **Toilet Flush:** As Indian Railways doesn't have vacuum flush and use water. Therefore, this water can be transferred to flush tanks without any treatment.
2. **Cleaning Ac Ducts & Platforms:** These AC ducts, vehicles & stations need a lot of water for regular cleaning. So, the water can be used after treating at a certain level required.
3. **Trains:** Can be used to transfer water to remote areas where drinking water is also very scarce.
4. **Drinking (after ionization):** After Going through various Steps of Treatment, the water can be used for drinking.
5. **Irrigation:** India is a state wherein the 85.3% of water is consumed in irrigation. Still some isolated places find it difficult to get water for irrigation. This water can be transported by AC trains to the nearby water Banks.

Future Scope:

- This concept can also be implemented at Various Commercial Markets / Complexes/ Malls/ Govt Offices / Office Complex of Big Companies / Industries etc as a 1-ton AC wastes around 20 litres of water in a 24-hour run.
- Similar ideas can be implemented on long distance AC Buses and we can use existing Fuel stations for making our storage tank hubs.
- This idea can also be implemented in various Metro Trains across various cities.
- Government can commercialise this project idea, for example we can pay for every Gallon of water and also sell this water with some charges and generate revenue out of this project.

To whomsoever it may concern

I would like to mention that Saksham Bansal has brought out an out of the box idea of conserving the condensed water collected from the process of 'Air Conditioning' in his research paper 'AatmaNirbhar Railway for Water' on Indian Railways. It is applicable for all the air conditioning systems having an appreciable amount of such water.

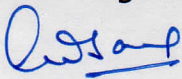
I had been approached by him when he had hit upon the idea of conserving condensed water in Indian Railways and to discuss the feasibility of the project. Considering my substantial experience in Railway system spanning over 30 years, I am of the considered opinion that the project has the potential of implementation in any such system including Metro Rails and Indian Railways where a large number of Air Conditioned coaches are plying. I believe that this type of thought process can come out only with the excellent initiatives.

Saksham had sought my views and guidance in relying on the data collected from various sources for completion of the project. It is heartening to know the outcome of the research paper and the fact that the Railway system can conserve a lot of water, as supported by substantial data, calculations, and his research.

Saksham is an enthusiastic learner who possesses exceptional research skills. His vision to innovate the things for betterment of our community is truly reflected in his ideas and reasoning. The analysis provided in the research paper is an indicative of his strong understanding of the concept and deep research.

I would highly recommend his research paper and wish him all the best for his future endeavours. For further information, I may be contacted on my email.

Warm Regards

 03.11.2022
(Ghansham Bansal)

Sr. Professor
IRICEN, Pune
PIN-411001
Email-gbansal123123@rediffmail.com