



Why Stronger Is Not Enough: Re-engineering Water Infrastructure through Systems Thinking

Rethinking Material Systems for Low-Carbon, Circular Futures

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Engineering for a Billion+ Futures

Sustainable | Durable | Wise

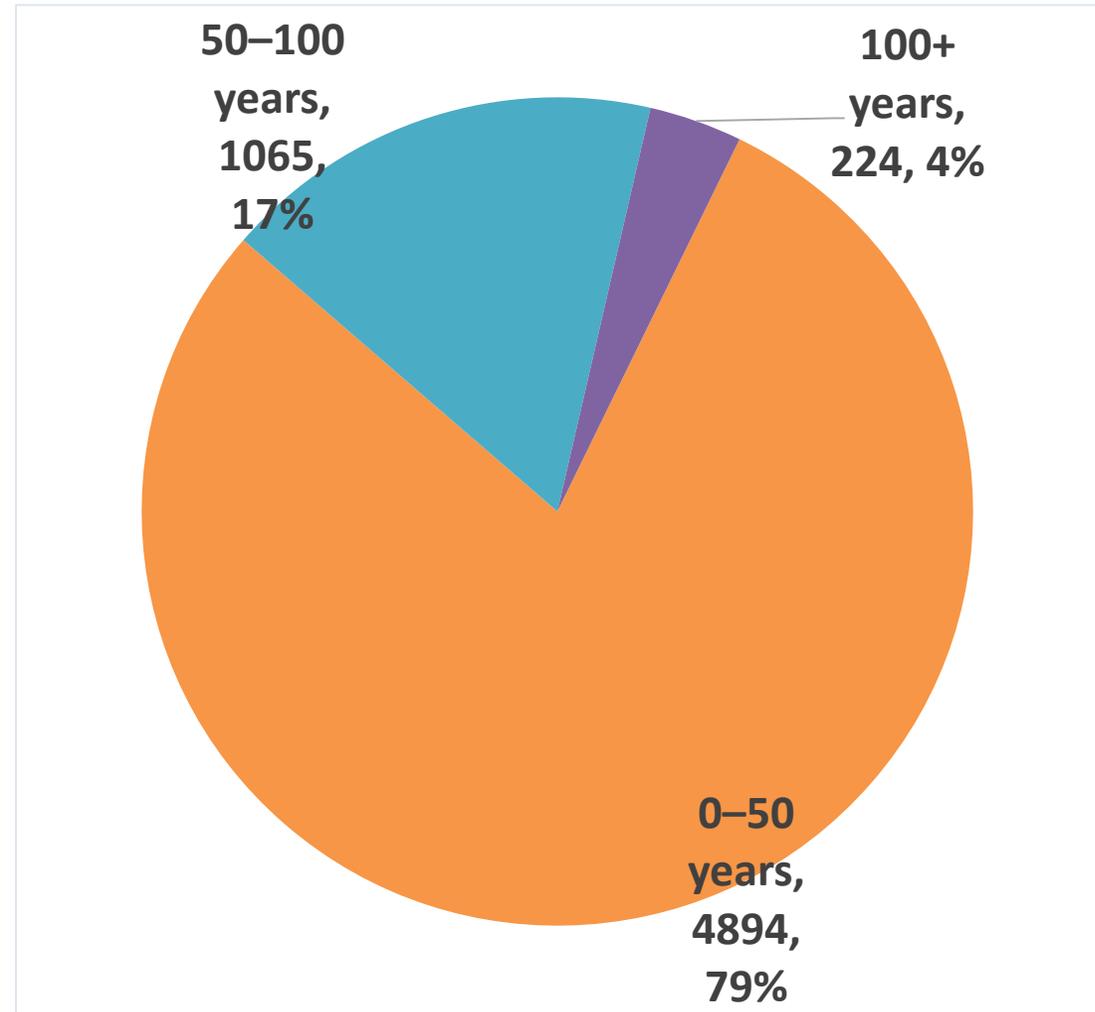
A wiser water future we could build

India's Water Challenge

- More people, less water/person.
- Dams are ageing; risks are rising.
- Climate, sediment, seismic & seepage hazards intensifying, our (in)actions

Solutioning

- Fix well (*today*)
- Build wisely (*for generations*)
- Run sustainably & intelligently





Aligning With the Global Sustainability Shift: What India Must Learn and Lead

- Infrastructure is now judged over its entire life cycle, LCSA
- Full life-cycle greenhouse-gas accounting - materials, construction, & reservoir emissions.
- Circular-economy design is emerging as standard
- Protecting ecosystems and biodiversity is non-negotiable, environmental flows and habitat protection
- AI and digital-twin operations are transforming dam management,
- Sustainable, ESG-aligned projects attract better global financing

“Make in India” for Water Infrastructure

Policy • Design • Materials • Monitoring • Operation

Doing it wisely and indigenously

1. **Policy:** embed LCSA + lifecycle GHG in every DPR, aligned to SDG-6/9/13.
2. **Design:** hazard-aware, climate-ready, durability-first engineering for Indian conditions.
3. **Materials:** low-carbon, high-durability, India-developed solutions.
4. **Monitoring:** AI, sensors, digital twins built for India’s terrains & ageing fleet.
5. **Operations:** extend life, recover storage, and run systems sustainably & intelligently.





Climate is changing, true! Are we?

Parameter	M15 Conventional Concrete	M15 – Roller compacted Concrete	Benefit / Savings
Strength achievement age	28 days	180 days	—
Cement used (tons)	25,000	8,000	17,000 t less cement
Fly ash used (tons)	0	17,000	17,000 t circular material used
CO ₂ emissions from cement (tons)	21,250 t CO₂	6,800 t CO₂	14,450 t CO₂ reduction
Limestone consumption (tons)	35,000 t	11,200 t	23,800 t limestone saved

Assumption: 1 t of cement production consumes 1.4 t of limestone and generates 0.85 t of CO₂

Start Small. Save Big. Build Sustainably

Concrete Volume	Cement Saved (tons)	CO ₂ Saved (tons)	Limestone Saved (tons)	<i>Impact at This Scale</i>
100,000 m ³	17,000	14,450	23,800	Cuts emissions equal to removing 3,000+ cars from the road
500,000 m ³	85,000	72,250	119,000	Similar to a small city's annual CO₂ footprint erased
1,000,000 m ³ (10 lakh)	170,000	144,500	238,000	Saves resources comparable to emptying a full limestone quarry
10,000,000 m ³ (100 lakh)	1,700,000	1,445,000	2,380,000	CO ₂ avoided equals a 500-MW coal plant shut for an entire year

**2.437 km single stage
concrete pumping**





Local Answers for a Stronger, Safer, Sustainable India

- **Rehabilitate and strengthen India's ageing dams to meet India's risks.**

India has 6,138 dams, with 1,065 aged 50–100 years and 224 over 100 years.
- **Secure India's water future with storage solutions built for Indian climate and population pressures.**

Per-capita water availability is projected to fall from 1,486 m³ (2021) to 1,367 m³ by 2031.
- **Design infrastructure for India's hazard spectrum — extreme monsoon rain, cyclones, sediment load, seismicity and seepage.**

These risks are uniquely Indian and require localised engineering responses.
- **Build circularity the Indian way — reuse Indian earth, reduce raw extraction and cut India's carbon footprint.**

Circular, low-carbon materials must be developed and scaled indigenously.
- **Protect India's rivers and biodiversity — environmental flows, sediment balance and habitat safeguards in every project.**

River systems must stay healthy for dams to remain sustainable.
- **Make dam operations intelligent using AI, sensors and digital twins adapted to India's terrains and ageing fleet.**

Smart operations must be designed for India's geography, not imported as-is.

Practical priorities – A recommendation

- ✓ Upgrade India's Ageing Dam Fleet with Proven, Indian Engineering Solutions
- ✓ Build Storage Where It Matters — Region-Specific, Hazard-Wise, Material-Savvy
- ✓ Embed Circularity, Low-Carbon Choices & Biodiversity Safeguards Into Every Project
- ✓ Operate Wisely — Monitor High-Risk Dams with India-Adapted Sensors & Decision Tools



MYK Arment

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MYK Arment became one of the leading manufacturer in the Construction Chemical Industry. The cornerstone of our business is formulated around the belief that the industry expects much more than just the product / service offered.