INDIGENOUS SUSTAINABLE CONSTRUCTION PRACTICES : PROJECT UDBHAV

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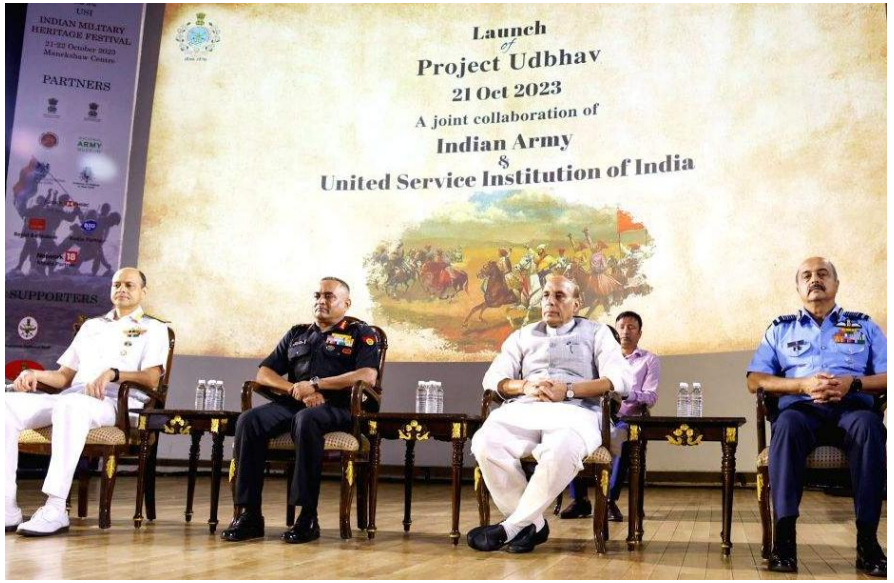
PROJECT UDBHAV

- Project UDBHAV, a collaboration between the Indian Army and the United Service Institution of India (USI), is an endeavour to revisit the roots of India's ancient military thoughts.

- **Key Objectives**

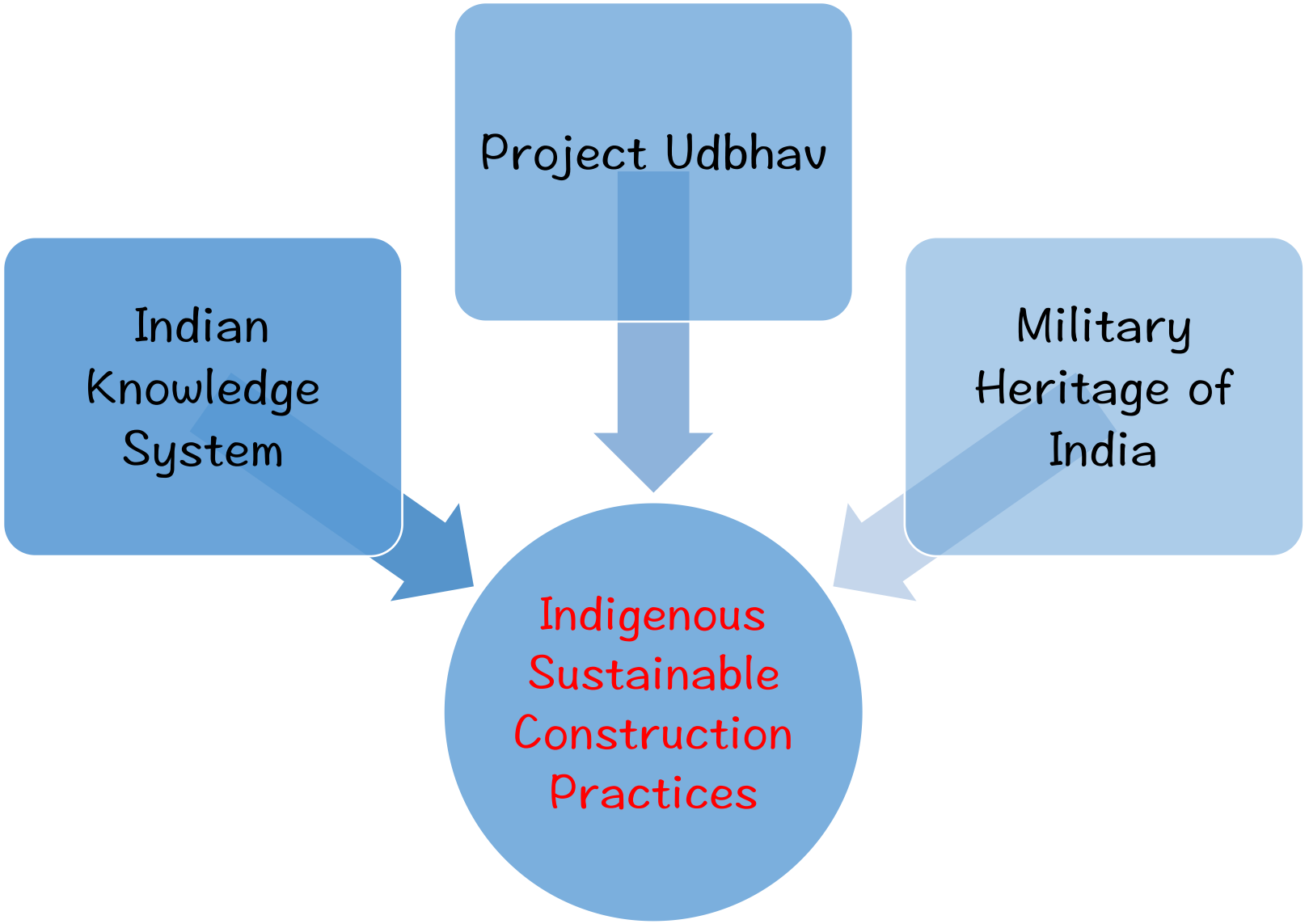
  - Integrate Ancient Wisdom
  - Develop Indigenous Culture
  - Enhance Military Pedagogy
  - Explore Historical Narratives



- **Significance**

  - Strengthens civil-military collaboration and national security by leveraging deep cultural roots.
  - Aims to make the Indian armed forces more adaptable and globally relevant by drawing from a vast indigenous knowledge base.

PROJECT UDBHAV



SUSTAINABLE CONSTRUCTION PRACTICES

- **Intorduction**

  - Ancient Indian engineers developed construction systems those were inherently sustainable, climate-responsive, and resilient, long before modern sustainability frameworks existed.

  - By relying on local materials, passive design strategies, and deep environmental understanding, they created structures those have survived for centuries with minimal maintenance.

  - These principles are highly relevant for modern military construction, where durability, self-reliance, low logistics, and resilience under extreme conditions are critical.

SUSTAINABLE CONSTRUCTION PRACTICES

- **Use of Local and Indigenous Materials**

  - Ancient builders prioritized materials that were locally available, reducing transportation effort and ensuring compatibility with the regional climate.
  - Stone (sandstone, granite, basalt) used in forts like Chittorgarh, Gwalior, Golconda ensured exceptional durability and blast resistance.
  - Lime mortar (from limestone, shells, surkhi) provided flexibility, self-healing properties, and resistance to moisture - superior to cement in many conditions.
  - Timber, mud, and brick were used strategically for thermal insulation and seismic adaptability, as seen in traditional Himalayan and Deccan structures.

  - **Relevance for Military Construction Today**

    - ✓Reduced dependence on long supply chains in forward or border areas.
    - ✓Easier repair and replacement using local resources.
    - ✓Improved camouflage and integration with terrain.

SUSTAINABLE CONSTRUCTION PRACTICES

- **Passive Climate - Responsive Designs**

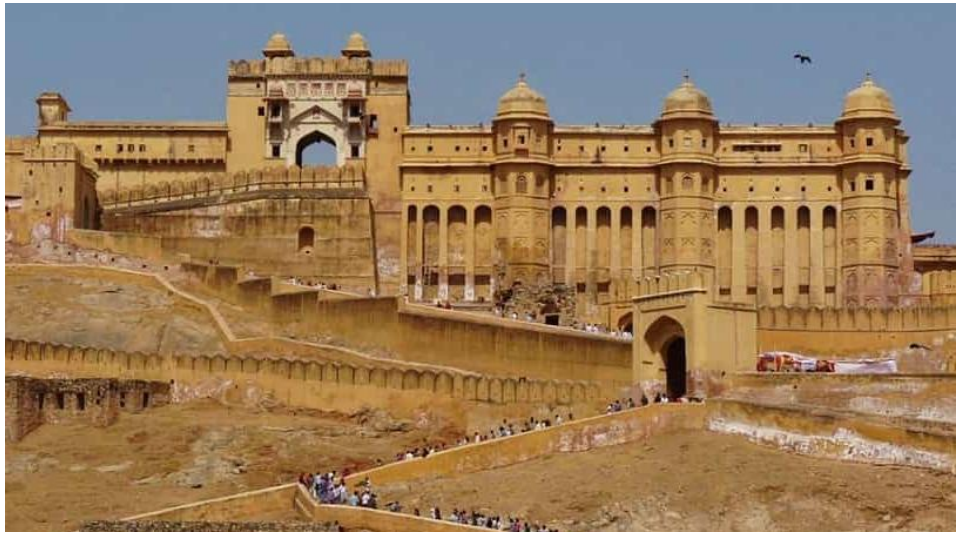
  ➢ **Key Techniques**

  - ✓ Thick masonry walls: High thermal mass delayed heat transfer, keeping interiors cool in hot climates and warm in cold regions.
  - ✓ Courtyards (Angan): Enabled natural ventilation, daylighting, and temperature regulation.
  - ✓ Stepwells (Baolis/Vavs): Ingenious water-harvesting and cooling systems that moderated microclimates.
  - ✓ Orientation & shading: Structures aligned to minimize solar gain and maximize prevailing winds.

  ➢ **Military Applications**

  - ✓ Reduced energy demand in remote posts.
  - ✓ Operational readiness during power outages or hostile disruptions.
  - ✓ Improved habitability for troops in extreme climates (deserts, high altitudes).

SUSTAINABLE CONSTRUCTION PRACTICES



SUSTAINABLE CONSTRUCTION PRACTICES

- **Structural Resilience and Longevity**

  - Dry stone masonry and interlocking systems provided flexibility during earthquakes.
  - Sloped walls and battered profiles in forts enhanced stability and defense.
  - Lime-based systems allowed structures to "breathe," reducing long-term degradation.

  - **Benefits for Military Infrastructure**

    - ✓Long service life with low life-cycle costs.
    - ✓Resistance to seismic activity, blasts, and harsh weather.
    - ✓Reduced maintenance burden in inaccessible areas.

SUSTAINABLE CONSTRUCTION PRACTICES

- **Water Management and Self-Sufficiency**

  - Rainwater harvesting systems, tanks, and underground cisterns were integral to fort planning.
  - Percolation tanks and stepwells ensured year-round water availability.
  - Natural drainage patterns were respected, preventing erosion and flooding.

  - **Modern Military Relevance**

    - ✓On-site water autonomy for cantonments and border posts.
    - ✓Reduced vulnerability of water supply lines.
    - ✓Sustainable operations in arid and semi-arid regions.

SUSTAINABLE CONSTRUCTION PRACTICES

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- Bamboo-Based Structural Systems

➢ Use of treated bamboo as primary structural or secondary framing material.

➢ Military Use:

- ✓ Temporary camps
- ✓ Observation posts
- ✓ Rapid deployment shelters in NE India

➢ Why Sustainable:

- ✓ Renewable and fast-growing
- ✓ High strength-to-weight ratio
- ✓ Locally available in eastern & northeastern India

PROPOSALS FOR MODERN MILITARY CONSTRUCTIONS

Drawing from indigenous sustainable practices, the following strategies can be adopted:

- **Hybrid Construction Systems :** Combine modern structural design with lime-based mortars, local stone, and earth materials.
- **Passive First Design Philosophy :** Mandate passive cooling, daylighting, and ventilation before mechanical systems.
- **Region - Specific Standard Designs :** Develop standard military building typologies tailored to deserts, hills, coastal, and forest regions - similar to ancient contextual design.
- **Decentralized Water & Energy Systems :** Integrate rainwater harvesting, solar orientation, and thermal mass for self-sufficiency.
- **Low-Visibility, Terrain - Integrated Architecture :** Indigenous materials naturally blend with surroundings, enhancing camouflage and survivability.

CONTEMORARY RELEVANCE

- Strengthens Atmanirbhar Bharat in defense thinking.
- Enhances leadership training in institutions like NDA, IMA, and Staff Colleges.
- Promotes sustainable and locally adapted military infrastructure.
- Reaffirms India's civilizational confidence in strategic affairs.

CONCLUSIONS

- The integration of Indian Knowledge System, Military Heritage of India, and Project Udbhav represents a civilizational resurgence - reviving ancient wisdom to address modern security challenges. It reinforces the idea that India's future military strength is deeply rooted in its past.
- Ancient Indian engineering offers a time - tested blueprint for sustainable, resilient, and low-maintenance construction.
- By intelligently adapting these indigenous principles, modern military infrastructure - particularly under organizations like MES - can achieve enhanced durability, operational independence, and environmental harmony.
- Embracing this heritage is not a step backward, but a strategic advancement toward resilient nation-building.

THANK YOU