

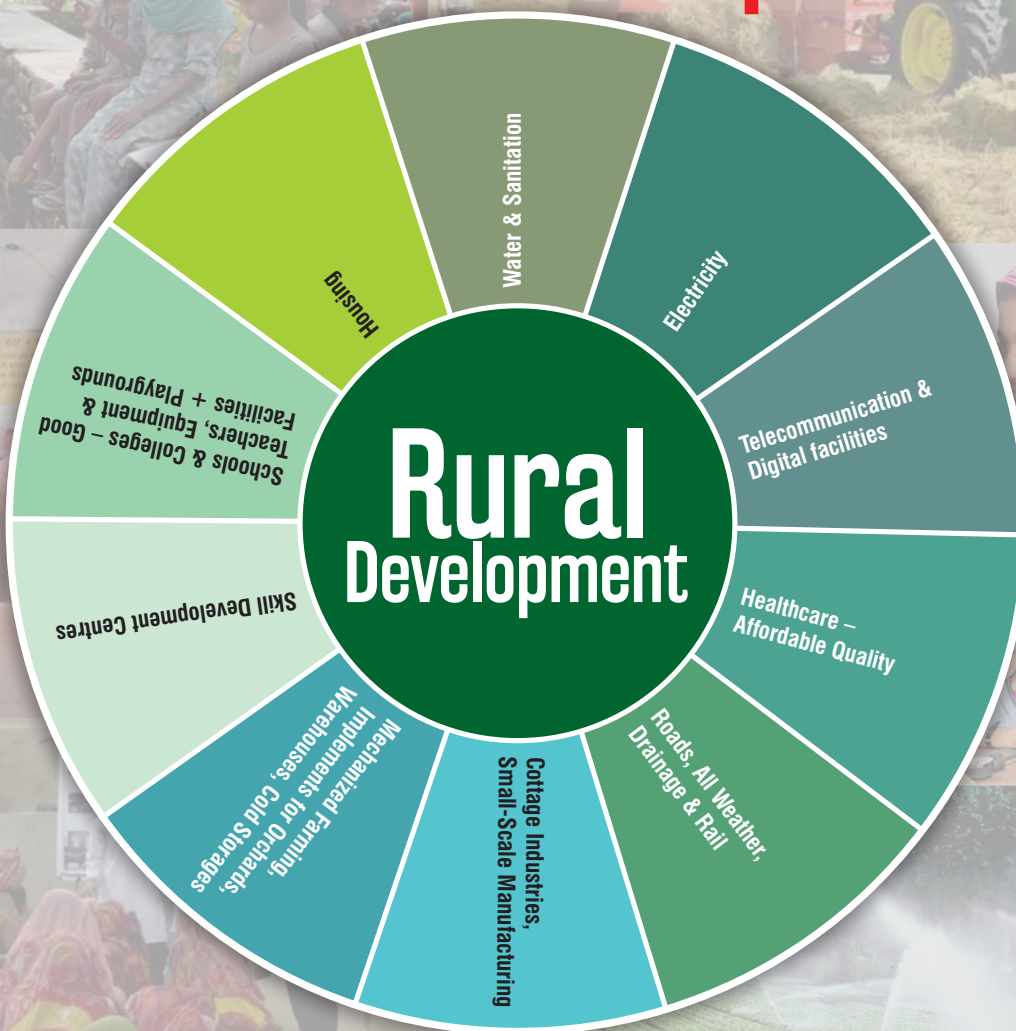
SEPTEMBER 2023

VIEWPOINT

OFFICIAL QUARTERLY MAGAZINE OF CEAI

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Consultancy for Rural Area Development





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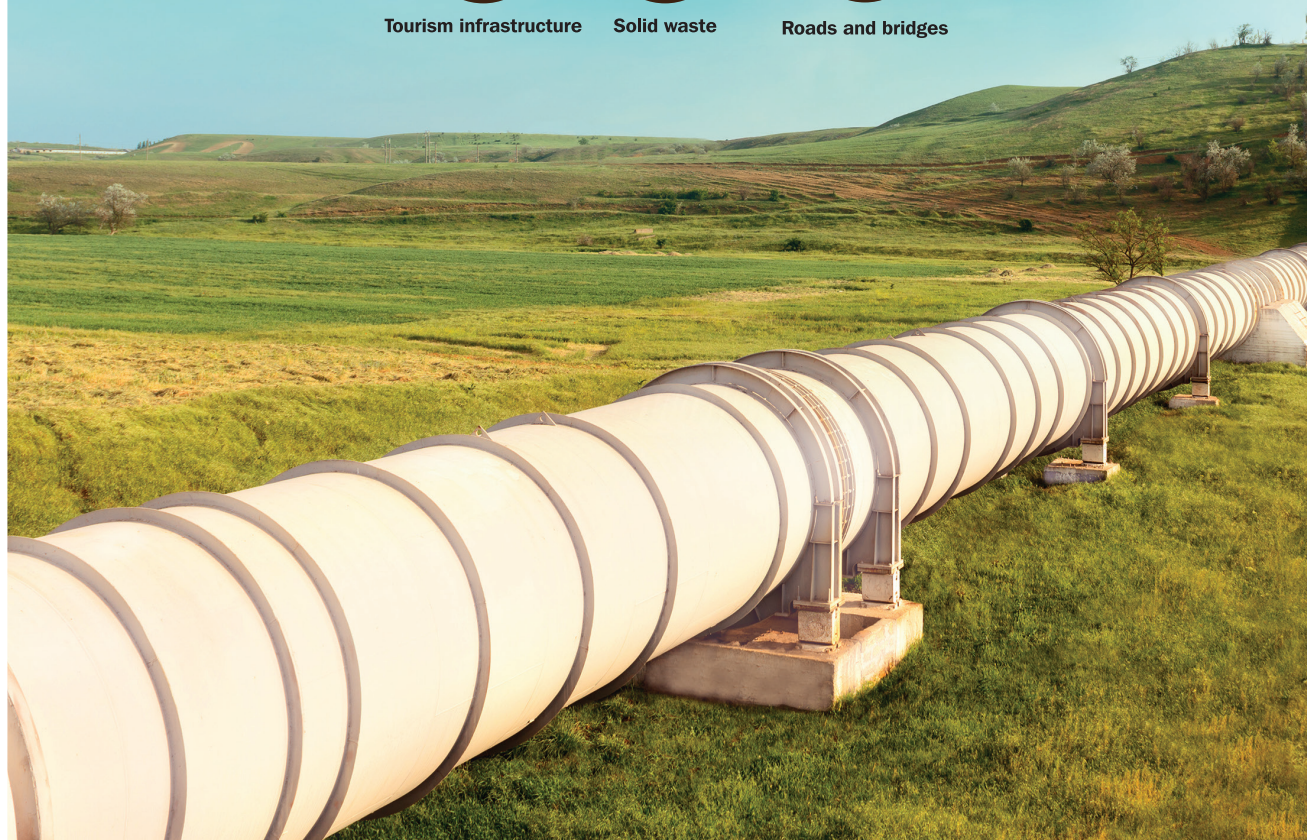
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About CEAI

Consulting Engineers Association of India (CEAI) is the apex body of consulting engineers in India having membership of organisations as well as individuals. The membership represents large, medium and small consultancy companies/ organisations both in the private and public sector and eminent individual consultants. EPC organisations are also members of CEAI since they have planning and design engineers, apart from construction management consultants.

CEAI is the Member Association, of the International Federation of Consulting Engineers, commonly known as FIDIC, the acronym for Fédération Internationale Des Ingénieurs-Conseils, representing the Consulting Engineering Fraternity in India. FIDIC has membership of more than 100 Member Association of various countries and is headquartered in Geneva.

CEAI was incorporated in 1996, with the merger of two leading national associations Association of Consulting Engineers (India) {ACE(I)}, incorporated in 1960 and National Association of Consulting Engineers {NACE}, incorporated in 1976. Thus, CEAI has, behind it six decades of accumulated knowledge and experience.

- CEAI promotes the interest and works to enhance the status of the consulting engineering profession in India
- CEAI advocates global networking and co-operation
- CEAI's activities include:
 - Quality development of Consultants.
 - Productivity enhancement.
 - Promotion of ethical practices.
 - Facilitation and interaction with government and other authorities/ bodies to streamline and improve the system of engagement of consultants.
- Regional Centres in Jaipur, Bengaluru, Kolkata and Mumbai to broad base activities.

Aims & Objectives

- Promote the professional interest and establish the rights and privileges of the status of consulting engineering profession in India
- Represent the consulting engineering profession within India and abroad. Connect the members locally and globally.
- Disseminate among the members information on all matters pertaining to engineering, especially knowledge and information related to consulting engineering profession by way of holding Conferences, Seminars, Courses, Workshops, Field/ Site Visits, etc. and thus assist in Continuing Education for the Professional Development of Members.
- Act as the principal champion for consulting engineering profession through constantly informing and educating the public and lawmakers about key engineering issues and making it possible to have the voice of the profession heard by the policy makers.
- Promote adoption of equitable forms of contracts and other documents used in consulting engineering practice.

Vision

- To represent, promote and enhance the status of consulting engineers in India as an honoured and dignified profession for nation building and propagate Indian engineering consultancy globally.

Mission

- Promote interests of the consulting engineering profession nationally and internationally.
- Promote sustainable, safe and sound engineering practices.
- Upgrade engineering knowledge and skill.
- Propagate code of professional ethics, safety, health and environment.

Values

- Commitment with tenacity to high ethical values, integrity, professionalism and achieving technical excellence and inclusive development.

Code OF Ethics

- CEAI has adopted a Code of Ethics, to which all members must abide. It is not just for the quality of the jobs they work on, but for the safety and well-being of the public at large.
- CEAI is the profession's most respected voice on the practice of ethical engineering.
- The code specifies the responsibilities of Consulting Engineers towards the society as well as the profession, to refrain from performing services unless competent to do so, to act in the legitimate interest of client, to be impartial, to maintain ethical relations with other consultants.



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- CEAI aids in skill development through regular training programmes including training on FIDIC Conditions of Contract and sharing of the legal issues based on the Indian context
- CEAI takes-up various issues confronting the profession with government and other authorities from time to time with the objective of making the conditions of engagement on a fair and equitable basis so that Consulting Engineers can function in the best interest of the country
- CEAI promotes the cause of Women Engineers with a view to ensure rightful places for them in the engineering consultancy arena
- CEAI helps to develop Young Engineers who are the Future Leaders

To Grow
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Message from Chief Editor

Dear Fellow Consulting Engineers & Readers,

Air, Water, Food – are the three essentials for life to subsist. The first, air, is ubiquitous and inspite of all the pollution caused by humans, it can still be accessed for life. The second water must be sourced and conveyed for it to be used since human habitations have grown and increased in numbers. They are no more on the banks of a river or on the shore of a water body. The third, food, is grown and produced not in the urban habitations but outside them, in the countryside. That underlines the reason for the theme - **“Consultancy for Rural Area Development”**.

The furtherance of urbanization is adversely affecting the growth of the rural areas. That leads to the question, can just urban development be the goal? To be able to answer that, one needs to understand that the term *‘development and growth for all’* - is to be the shibboleth of the nation. The last two words are really the crux of the intent. They imply that the development and growth must improve the quality of life for each and every being in the country. In order to achieve that it is necessary that the projects be spread across the country and encompass not only all the strata of human society but also address the requirements of the flora, fauna, and the mother earth itself, all in a sustainable manner. For that to be a reality the projects need to be tailored to suit the requirements of the local regions. The regions and the problems they have are known. What is required and necessary are viable solutions that are long lasting for alleviating the problems that the regions face.

Fortunately, fresh air is not an issue in the countryside but water is. Rainwater collection and conservation are the prime needs. In areas prone to drought, the storage would need to be for a minimum of two years or more depending on the history of that area. That, also needs to be relooked at and reconciled with the record of the past few years to take care of the departure from normal brought about by climate change.

Once air and water are taken care of the rest would follow. The rural areas are the country’s hearth and it is they that provide the nourishment for the humans to toil in the urban areas to sustain and grow the country’s economy and life to survive.

Aging population and migration to the towns and cities has created a situation where some villages have only senior persons living. They need to be provided with all facilities to be able to go about their daily repertoire with ease and perform their task since some continue to work till a ripe old age. To stem the tide of able-bodied persons moving out of the rural areas, and also to ease the situations in the bursting cities and metropolises, the development must shift to areas outside them.

India has put a lot of emphasis on the upliftment of the rural areas. Good digital facilities coupled with training the local population, encouraging cottage industries and women empowerment could go a long way in uplifting the economic conditions of the rural areas – to provide a better quality of life. Needless to add, the rural ecosystem needs better houses, schools with computers and internet connectivity plus playgrounds, well equipped colleges

in bigger villages, technical and computer skill training institutes, water supply, electricity, sewerage and drainage, sanitation, healthcare of affordable quality, telecommunication & digital links, all weather road and rail connections, markets, police & security systems, mechanized farming, implements for orchards, warehouses, cold storages, cottage industries, even small-scale manufacturing facilities to stem the migration to cities, etc.

Digitalisation has changed the face of the country including the rural one. The usage and benefits of computerization, IoT, etc. must be fully tapped for all to benefit. Apart from projects, digitalization would be a boon for all other areas as well - administration, finance, land, house and buildings records, socio-economic survey and records, education, skill development, health services, police & security, etc. With proper training, the rural areas can become the power house for all digital backend services.

The Government of India has announced many schemes for the development of the Rural areas. They need to be implemented in totality. Besides, when as a consequence of any natural disaster relief and support are being provided, the rural areas must also get them just as the urban areas do. When, the rural area does well the urban area and the country will also do well.

It is the Scientists and Engineers who are playing a key role in all the projects and schemes which are helping the country to rise. Agricultural Engineers are doing their share in helping to grow better crops, improving the yield and making farming a less tedious task. The Consulting Engineers in other disciplines are also contributing but their involvement must increase by leaps and bounds, voluntarily, where need be. Chandrayaan-3 and Aditya L1 have once again shown what India can do, however, what the rural areas need is not the Hi-Fi space technology of Chandrayaan-3 or Aditya L1 and other such missions, but the down to earth holistic planning for suitable and affordable technology to improve the ease of living on both fronts- home and work places, the latter being in fields, orchards, cottage and small-scale industries, etc. and even the forests and the deserts. Preference must be given to the usage of locally available raw and manufactured materials to give a fillip to the local revenue.

***Engineers MUST Pledge to Go Forth
Develop Rural Areas & Countryside
Be A Part of India's Growth***

Happy Reading & Learning



A P Mull



Message from Guest Editor

The word 'Rural' strikes a deep chord in most who are seeing the transformation of the country on account of migration to the urban areas. The question that arises is whether we wait and watch that happening or do we stem the tide and have a more balanced growth for all areas – rural, urban and the semi-rural or semi-urban.

The 'puras' as per our shastra were planned areas but now a days although there are town planning departments, the unplanned mushrooming of slums override all. The resulting agglomeration is for all to see. Most villages, where the majority of the population stays, are also unplanned developments and hence there is a need that any further development of those be planned keeping a long-term view in mind. Adequate direct sunlight, free air movement and greenery all around each built unit is a requirement that should not be impinged upon. Likewise natural waterbodies, streams, rivers etc. plus the physical features also must be preserved. The eight and area limits for buildings/ structures must be set and not allowed to be infringed unless warranted for reasons of national security. The current generation owes that to the future generations so that sustainability can be truly achieved for the human beings, animals and plants.

While most consultants are immersed in their work of building up the urban and semi-urban areas, it is just a handful of consultants and NGOs and of course the government departments in-charge, etc., that are looking at and developing the rural areas. However, many more need to pitch in. Further, there exist many opportunities for Consulting Engineers to contribute to planning, design and monitoring of developments in rural areas e.g. roads, water supply, solar pumps, drip irrigation, sanitation, sustainable habitats etc. Schemes launched by Ministry of Rural Development and Ministry of Jal Shakti are few standouts for learning and reporting as well.

In this issue there is an article which talks of the problems of constructing buildings in mountainous terrains. Perhaps it would be more prudent financially to use locally available materials and skilled labour, if there is, to build since it's maintenance would also be easier to do and it would cost less. Both harp on involving and empowering the local communities as the keys for development. There is another interesting article which contains a lucid analysis to show that catching and storing rainwater would suffice for rural areas. The author is helping to implement the schemes mentioned in the article. Villages are inseparably linked to agriculture and so the next article discusses the ways and means to manage water for irrigation.

IT gas spread its arms all over and it is now also changing the face of the rural areas as well, rather rapidly. The article mentions as to what all is being done to bring those areas up to speed with IT infrastructure.

With the changing age profile of the country's population, the rural as well as urban areas must cater to the requirements of the senior persons and those who have some disabilities. There is an article discussing the main areas where these are required.

I wish the readers good reading and learning.

Girish Chandra Mishra
Principal Consultant & Director
SAVIRAM Engineering Consultants Pvt. Ltd.

Engineering for Rural Development – A Case Study for Uttarakhand Community Rehabilitation Program



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Asst. General Manager



Manos Kumar De
Discipline Head – Civil

TATA Consulting Engineers Limited

Introduction

Mahatma Gandhiji's had said that "India does not live in its towns but in its villages. We are inheritors of a rural civilization" [1]. The latest data shows that the percentage of rural population in India as of 2020 is at 64% [2], which has been steadily declining from the recorded data of 82% in 1960 on account of the spread of urbanization. However, there is still a considerable proportion of rural population in terms of numbers and that demands a different approach for generating and operating infrastructure and facilities in the rural areas. The strategies adopted for urban development that comprise high intensity growth, highly concentrated spatial accommodation, centralized public systems for facilities like mobility, water and power supply, health and sanitation, waste management, commercial institutions, education, and many others do not apply in the same manner in the rural context. Quoting again from Mahatma Gandhi, "the vastness of our country, the vastness of the population, the situation and the climate of the country have, in my opinion, destined it for a rural civilization. Its defects are well known but not one of them is irremediable" [1].

The needs and concept of development and governance are widely different for urban and rural lifestyles. Rural development needs greater emphasis on generation of resources for daily needs often resulting in improper or ill-planned manufacturing facilities and poor

infrastructure that is not always in harmony with the local resources and practices. Urban development, on the other hand, is focussed on better management of systems and implementation of new technologies, which could be at great economic and ecological costs. The difference in literacy level, adaptability, and flexibility to change and the mindset of the population differs widely between the two cases. It is but natural that the principles of engineering and consultancy services for facilities design and operation in these two different locales be also different in approach [3].

Strategies for Rural Development

The strategies and approaches to be adopted in programs for rural development have features that are unique and are related with the ecological, social, economic, and political settings of the locality and community. A rural society functions in a more participatory mode among the stakeholders compared to an urban setting. Creating awareness among the population in a rural setting and allowing for active participation are thus very important aspects of a successful development program. Rural economies are closely tied with the local conditions and major disturbances can quickly upend this fine bond. Development programs with objectives of improving economic capability of the community, providing health and educational facilities, protection from natural calamities that can destroy nature-based livelihood, facilitating role in policy framing and decision making,

autonomy and decentralized approach work best in such situations. Technology plays a key role through implementation of the best practices of engineering, economic and social design in rural development projects. These strategies and approaches have been reflected in the various “Five Year Plan” models adopted by the Indian Government as highlighted in Table-1. [4]

Table-1: Highlights of Rural Development in Five Year Plans [4]

Five Year Plan	Period	Approach Feature
First	1951 - 1956	Community Development Programme
Second	1956 - 1961	Industrialization
Third	1961 – 1966	Agricultural Development
Fourth	1969 – 1974	Grow with Social Justice
Fifth	1974 – 1979	Inter-sectorial linkages for balanced growth
Sixth	1980 – 1985	Integrated Rural Development
Seventh	1985 – 1990	Self-reliant economy
Eighth	1992 – 1997	Employment opportunities and Infrastructure
Ninth	1997 – 2002	Secondary employment, Poverty eradication
Tenth	2002 – 2007	Participatory strategy

Though rural development programs are aimed at improving the livelihood conditions of rural communities, integration to urban communities which are the major consumer of rural produce is an important point to be considered for the program to succeed. This demands the use of appropriate technologies that can help create products and skilled human resources that find usefulness with consumers across multiple sectors. Some of the major differences in executing engineering projects in a rural setting include [5]:

- Building strong relationship with the users to understand specific needs that adapt to local customs and practices. Such continuous communication helps develop and engineer a solution that apart

from technological correctness is also has an acceptable cultural connect and coherent economic perspective.

- Application of project management principles since there are many constraints that need to be effectively overcome to create a successful project design.
- Deal with delays due to multifarious reasons.

Among the sustainable development goals of UN, the goals 4, 8 and 9 relate to rural development and the supporting engineering work [6].



Partnering in a Rural Development Program

Engineering consultancy work per se is an urban livelihood concept since it demands high scientific skills and mindset to adapt scientific principles and methods in creating assets that benefit the human society. By its very nature, the faculty engaged with the profession develops an urban mindset and view the requirements and the design work for its successful implementation in a manner that may not suit a rural environment and scale. Engineering work for projects culminates in shaping the vision and dream of the designers into reality through construction and commissioning of the facilities. For most projects, the customer who invests in the project is the beneficiary of the commercial benefits accruing from the added or improved facility. On rare occasions, projects opportunities arise which provide direct benefits to rural communities after proper understanding of the rural context. Quoting again from Mahatma Gandhi “But if the cities want to demonstrate that their populations will live for the

villagers of India the bulk of their resources should be spent in ameliorating the condition of and befriending the poor” [1].

There are many challenges in successful execution of engineering projects if one tends to start with an urban engineering outlook. There is wide difference in availability of resources, skilled manpower, problems of access and approachability, handling facilities for the various items and myriad other matters that all need to be factored into the design. Another important factor to be considered is effectively communicating with the rural population while talking about technical matters. It needs to be done in a manner of building trust and partnership so that the population can understand and join hands for fruition of the design. A major factor to be considered is that rural systems are more vulnerable to effects of natural disasters since they cause major disruption to the rural systems. Successful completion of projects to ameliorate destruction brought about by natural disasters which can bring back smile on the faces of people who have lost valuable possessions during calamities provide an unparalleled level of satisfaction. This article presents the case study on the rehabilitation project work undertaken by Tata Group in Uttarakhand in the aftermath of the Kedarnath flood where Tata Consulting Engineers (TCE) partnered as engineering consultants for the project. The work highlights the unique experience of the project team in executing the challenging task in difficult terrain, with acute logistics problems, using local and often poorly skilled resources but the unique opportunity of bringing some happiness back into the lives of the people was and remains a heart-warming experience.

Project Details

The Tata Uttarakhand Programme (TUP) was aimed at providing immediate relief and long-term benefits to the people of Uttarakhand who suffered due to the Kedarnath flood in June 2013. The program was designed for aid of 6,000+ households in 63 villages across 3 Districts in the state. The theme of the rehabilitation programme was reconstruction of facilities for education and livelihood. The key elements included building public

infrastructure in the form of schools, Anganwadi centres and a weaving centre. The program was executed by Tata Relief Committee (TRC) with TCE providing the engineering support.

Rehabilitation Program details: Figure-1 shows the basic scheme of the overall rehabilitation framework for TUP. Figure-2 shows the location of the various sites across Uttarakhand.

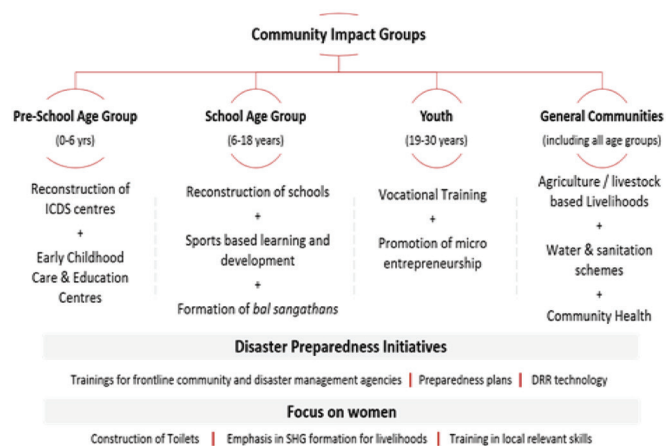


Figure-1: Scheme of TUP Rehabilitation Framework

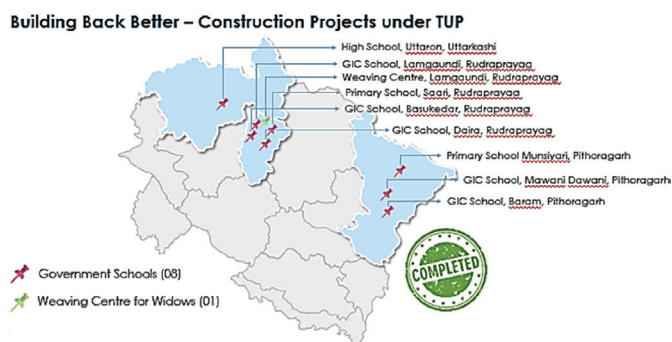


Figure-2: Layout of the projects

The rehabilitation program comprised construction of 8 schools, 19 anganwadi centres and 1 weaving centre in 26 villages in 3 programme Districts. The major elements of the construction work are highlighted in Table 2-below:

Table-2: List of Facilities

Name / Location of School	Beneficiary	No of rooms	Built Up Area	Budgetary Cost	Cost per sqm area
	(Nos)	(Nos)	(m ²)	(Rs. Lacs)	(Rs)
19 Anganwadi Centres in different villages	285	19	440	220.00	28,000
Government Inter College (GIC) at Baram (Pithoragarh)	556	19	2,192	414.45	18,907
GIC at Mawani Dhawani (Pithoragarh)	335	6	678	165.00	24,336
GIC at Munsiyari (Pithoragarh)	160	11	717	153.00	21,339
GIC at Diara (Rudraprayag)	250	11	600	131.67	21,944
GIC at Basukedar (Rudraprayag)	426	8	894	223.62	25,014
GIC at Lamgaundi (Rudraprayag)	326	6	476	121.88	25,604
Mandakini Mahila Bunkar Samiti (MMBS) Weaving Center, Lamgaundi (Rudraprayag)	173	4	790	281.81	35,672
Primary School at SAARI (Rudraprayag)	84	5	318	86.74	27,277
High School at Uttaron (Uttarkashi)	250	12	1,370	385.24	28,120
Total	2,387	101	8,255	2,183.40	

Planning & Design Highlights

The aim of the planning and design for the various facilities were to provide for the minimum functional requirements, basic amenities and ensure a design safe against the load from natural phenomena like wind and seismic forces. The layout plans and designs were generally based on provision of the National Building Code of India. The highlights of the design are listed below:

Architecture Design

1. The sizes of classrooms were proportioned as per IS 8827, each designed for minimum 40 students.
2. Most buildings were planned as two storey buildings to maximize number of beneficiaries with a low footprint area. All buildings are designed as framed structures to ensure ductile behaviour for high lateral forces in Seismic Zone V.
3. Minimum height of the classrooms was 3.00 m measured at any point from the surface of the floor to the lowest point of the ceiling.
4. Minimum clear headroom under the bottom of beams, fans and lights was kept as 2.6 m.

5. Length to width ratio of classroom was as per codal provision i.e., 1:1.5.
6. Window area of more than 20% of floor area provided for each classroom for lighting and ventilation.
7. Minimum clear distance between the chalkboard and front edge of the first row of desks when chalkboard is in use, considered as 2200 mm in classroom layout.
8. Staircase design - minimum tread 300 mm and maximum rise limited to 150 mm.
9. All schools provided with playground, place for open gathering, and kitchen for mid-day meal.
10. Provision for library and smart classes in schools, library and laboratory for inter colleges.
11. Landscaping design to blend in with natural surrounding using local trees and plants

Structural Design

1. Design Wind Speed - 47 m/s
2. Seismic Zone - V
3. Live Load for Classrooms - 3 kN/m²
4. Building Structure - RCC Frame Structure
5. Floor to Floor Height - 3.300 m

6. Type of foundation - Isolated Rectangular footings
7. Classroom size - 8.60 m x 6.50 m
8. Width of common corridor - 1.75 m

Architectural drawings were developed in 3D and structural analysis and design were carried out using Staad software

Challenges and Learnings from Project

The design and construction work for the various

components of the project were full of challenges due to difficult terrain, restricted access, lack of skilled resources and inclement weather. Special consideration was also given to local requirements. Rigor was maintained in applying sound technical knowledge, meeting statutory requirements specified in Indian Codes of Practice, and best available engineering practices even in the face of these challenges. Some of the challenges and mitigation measures adopted in design are highlighted in Table-3.

Table-3: Design and Construction Challenges and Mitigation

Challenges	Mitigation measures
Restriction in available flat ground for proposed school buildings to accommodate play area.	Open space on roof top was planned as playing area along with seating arrangement for viewers all along the parapet wall. Appropriate live load corresponding to assembly areas have been considered for the roof.
Seismic forces corresponding to Zone V.	The floor-to-floor height was optimized during the design stage to 3.30m as against initial consideration of 3.60m to reduce seismic load effect and optimize member sizes.
Large variation in contours posed problems for excavation and stability of cut slopes. In case of MMBS at Guptkashi, a 10m high slope collapsed during heavy rain.	Random Rubble (RR) masonry gravity wall was constructed to arrest the collapse before further construction, to render site safe for workmen.
Most of the sites are located far away from the nearest motorable road. That posed challenge for transportation of heavy construction materials. Often the carriers had to cross rivers where only a narrow footbridge existed.	Material carriage was possible only using pack animals or by manual labour. Reinforcement planning considered using lower size bars cut to required length for ease of transportation. TATA Pravesh doors and windows which were considered had to be substituted with local products to suit logistics.
Lack of availability of construction water sources	Water was being sourced from natural streams and springs. The low flow often hampered the progress of work.
Prolonged rainy season and unusual rainfall events	Rescheduling and replanning activities multiple times. Special detailing provisions had to be adopted to ensure continuity of structures after the stoppages.
Lack of availability of skilled labours (mason, carpenter, blacksmith)	Skilled manpower was hired from Haldwani and Dehradun which are about 300 kms and 250kms respectively, away from the project sites.
Due to difficulty of access to site, excavation machines could not reach site.	All excavation work for foundation construction carried out manually.

Challenges	Mitigation measures
Absence of testing facilities for concrete work.	To assure adherence to quality plan and quality assurance program, at insistence of TCE, tests were carried out at a facility in Dehradun. That resulted in construction delays.
Non-availability of local materials impaired the initial plan for use of alternative construction techniques like consolidated mud block walls and treated bamboo for the roof under-structures.	After investigation, locally available soil was found unsuitable for construction. Hence, the structures had to be built of exposed brick masonry. Similarly, after initial trials to use bamboo for the roofing structure, it was decided to limit the use of bamboo to only 3 roofs. Remaining roofs were constructed using steel truss.

The major highlight of the engineering was to enable the construction of the works in a safe manner, within cost, time and logistic constraints and meet the functional requirements. However, due to no connections with motorable road to the location posed a number of logistic constraints. Non availability of materials, etc. were other issues. All the same the basic aim of the endeavour which was to provide facilities for leading better lives after the loss in the disaster was achieved. Accompanying photographs show some of the challenges encountered in the projects and mitigation strategies deployed.

Photographs of some Projects



Uttaron High School, Uttarkashi:

During monsoons, heavy rainfall resulted into rainwater ponding behind and washing away of soil from the base of a retaining wall which collapsed. The wall was redesigned and built with extra safety factors. The extra work added Rs. 90 lakhs to the original project cost and a delay of 3 months.



Primary School, Saari, Rudraprayag:

Local community played an active and important role in dismantling of the old structure by “*shramdaan*” for one day which helped complete the activity in three days.



Stakeholder participation:

Meeting held at Jall Malla village – the women were involved in the livelihoods programme to understand the facilities required to be provided.



GIC at Baram:

Construction using manual concrete mixers and concrete construction with manual workers.

Light roof construction with truss built of hollow steel sections and brick masonry walls.



GIC Mawani Dhawani:

Construction of stone masonry wall (*phusta*) to retain earth along slope and develop a level area for the project site.



MMBS Lamgaundi:

Marking the layout as per actual land availability – required design change. Smiling faces of community stakeholders during the inauguration.



GIC at Lamgaundi:

Since access to the location was over very narrow and steep paths which were not suitable for carrying construction material, the contractor devised an ingenious bucket facility for lifting material up the slope. That made material transportation to site easier and safer.



GIC at Basukedar:

Since heavy earthmoving equipment could not get access to site, alternate arrangement was made for earthworks material handling.

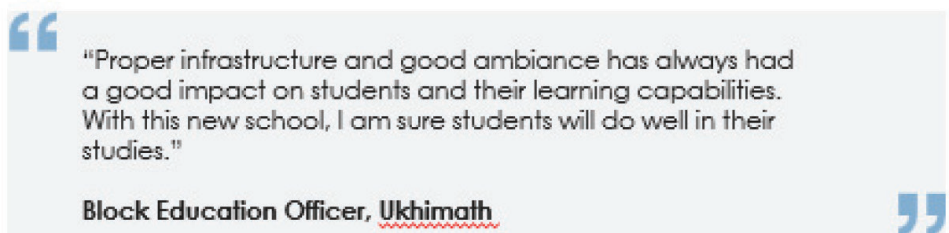
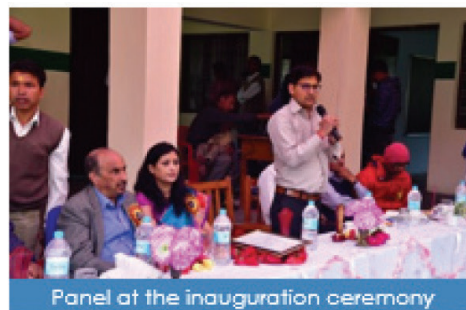
Other Highlights

Only local contractors were employed, but quality check and assurance, project planning and monitoring activities were carried out diligently to ensure appropriate acceptable quality. The local community participated with great eagerness to enable successful execution of the projects. In the case of the primary school at Saari, one member from each family gave a day's 'shramdaan' for demolishing the old school, hence the activity was completed in three days. The design and execution teams had a lot of valuable learning to take back from the project with respect to people connect, communication, managing multiple challenges simultaneously, designing for available construction technologies and material constraints. The team members felt a sense of fulfilment after working on the project and being able to give back to the community. That sense of fulfilment was a major driver to push them towards excellence in trying conditions. The interaction with the community members, school committee members, various beneficiaries during site visits infused a feeling of great pride for being part of the noble cause. Photographs show the joy on the faces of the local habitants during the inauguration.

Conclusions

Engineering consultancy work and the guidelines, codes and standards that provide the framework for application in projects are more tuned to large projects in urban or industrial settings. Projects in rural areas, especially the hilly and mountainous terrains, need a different approach for effective implementation. The principles and practice must be different. The size and scale of building construction, resource management, planning, logistics support, workforce requirement, skill requirement, construction practices are to be looked at afresh and improvised from site to site. The local stakeholder involvement is extremely essential. These differences need to be acknowledged in the engineering designs and their implementation.

Apart from the technical part, the cultural differences between urban or industrial setting and the rural environment bring in requirements that are to be addressed in the planning and designs of the facilities. As an example, for a facility, where the women would be working, high rise steps are inconvenient to negotiate when clad in a traditional attire of sari; hence the design for access needs to provide either low rise steps or alternatives like ramps.



Photograph: Inauguration of a school on completion

Another difference is linked to the difference in the level of education between clients in urban areas vis-à-vis those in the rural. The latter require a different approach and style of communication – simple straight forward language to clearly explain what is wished to be conveyed. For example – the planning and design of a school building in a city would get reviewed by technical experts appointed by the end user and the proposed design solutions accepted by the user based on the written documentation, the same system would not work in the rural area. A rural setting would require multiple sessions to explain directly to the community members the benefits resulting from the planned facilities and gain their acceptance and trust. The non-availability of construction equipment, lack of testing and quality checking facilities, inadequate supervision by the contractor, use of manual workforce as the prime mode of execution of construction activities, requires different materials and techniques be considered at the planning and design stages. However, once the differences and challenges are accepted by the designer with an open mind the designer can come out with innovative solutions. Completing such a project result in a different level of satisfaction of the work done – the whole community comes to see and appreciate it. The opportunities to offer one's knowledge and services to the community at large, where the interaction is directly with the beneficiaries, brings new learnings and provides new perspectives. Working on the TUP projects provided such opportunities to the design team where the participation and involvement with the local community throughout the project execution phase was a unique experience - the joy of learning new approaches to conventional engineering while also giving something back to the society. Added to that

was the spirit of teamwork from persons from different organizations of the TATA group that came together to uphold the principle of “ONE TATA” for this noble cause was one of the major highlights of the project.

Acknowledgements

The authors are grateful to TATA Consulting Engineers Limited for giving permission to submit this article.

The authors also express their gratitude to the Tata Group organizations who provided the opportunity to TCE to work on the project. The construction agencies also deserve a special mention to ensure the success of the project `since they enabled the buildings see the light of day despite the very difficult site conditions, all so that the local community could utilize them for their livelihood and upliftment.

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Empowering Communities: The Key to Rural Development



Lokesh Sinram

Project Executive

Development of Humane Action (DHAN) Foundation

Background of Rural Development

The soul of India lives on its villages as stated by Mahatma Gandhi. For the country to prosper there must be a steady supply of food for people to survive and contribute meaningfully for its development. The food comes from the rural areas and hence must be in the forefront of all planning. Rural India has undergone significant changes in the past two decades, thanks to the efforts of various professionals, including engineers, teachers, and doctors. The transformations have led to noteworthy achievements:

- **Sanitation - Toilet Construction:** In the last decade alone, 109 million toilets have been built in rural areas.
- **Access to Drinking Water:** Approximately 12 crore rural households, out of a total of 19.5 crores, now have access to clean drinking water through tap connections.
- **Electricity to every house:** Electricity access among the poorest 20% of households increased from 53% to 86% in the five-year period.
- **Improved Road Network:** The length of rural roads has increased from 97 thousand kilometers to 1.5 lakh kilometers in just ten years.
- **Telephonic/ Digital Communication:** more than nine in every ten have Mobile phone.

While India has made remarkable progress in terms of economic growth, there is still a need for a different approach to development, one that focuses on the community. Mahatma Gandhi and others in India advocated and so did Lao Tzu in China said that one must live with the people and build with local material, tools and people to raise their level of living. The approach, known as the “Community-driven Approach,” is highly relevant for rural development. It emphasizes working closely with rural communities, understanding their needs, and utilizing their resources to drive meaningful development - the PPPP (Public-Private-People Participation) model is what is needed.



Community Planning Exercises

Different Aspects of Rural Development: Vinoba Bhave, Mahatma Gandhi, and JC Kumarappa, all of them

emphasized the importance of value-based development as the vital key. Even Sustainable Development Goal 16 points out the need to promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels. This paper discusses two Rural development projects

1. Reviving Traditional Water Bodies at Rural Areas:

The enabling organisation needs to focus on conserving and developing traditional small-scale water resources in resource-poor areas in different contexts (rural, urban, coastal & tribal) by extensive policy advocacy initiatives through effective and vibrant networking with practitioners and other stakeholders, and intensifying and strengthening the program by performing the roles of a potential resource center.

Reviving traditional water bodies is not a quick task; it is a long-term process. the PALM approach (Participatory Rural Appraisal Learning Method) is followed. It involves various steps such as Transect Walks, Problem tree Analysis, Resource Mapping, Social Mapping, and Focused Group Discussions (FGDs). The steps help the facilitating organisation to understand the socio-economic conditions of the local people, the crops they cultivate, the current state of traditional water bodies, and available resources in the area. Simultaneously, it should organize Participatory Tank Appraisals (PTAs) to assess the past and present conditions of the traditional water bodies.

To illustrate the process, consider the example of reviving sewage-fed water bodies in the Madurai Rural



Adding the features of constructed wetlands to the traditional waterbody

area, specifically Kathiyanoor; a 14-acre traditional water body with a command area of 45 acres. The revival process unfolded in stages. Initially, the focus was on restoring the feeder channel and ensuring water supply to the tank. Subsequently, the attention turned to improving the water quality of the tank, which necessitated significant technical and financial investments. Hence, to achieve the objective, the option was for a constructed wetland as a Nature-Based Solution (NBS).

Nature-Based Solutions (NBS) draw inspiration from and mimic natural processes to enhance water management. In the context of NBS, it is crucial to tailor the technology to the specific needs of the area to ensure effectiveness of the treatment and sustainability. It required carefully planning of the execution, starting with:

1. Reviving the Feeder Channel: That involved clearing and restoring the channel to supply water to the tank.
2. Creating Pilot Square Ponds: The ponds, measuring 4m x 4m x 1.5m, were filled with raw sewage from the Kathiyanoor tank. Various combinations of floating wetlands, free surface flow wetlands, and submerged aquatic plants were experimented with in different water strata. Both native and exotic species were tested.
3. Experimenting with Fishes: Two ponds were used to experiment with free water surface treatment using fishes.
4. Floating Wetlands: These were created using PVC pipes, coir, and plastic nets of 1m x 1m. They



Floating wetlands absorb the nutrients in the wastewater

were tested to understand treatment efficiency and operational challenges.

5. **Monitoring Water Quality:** Regular monitoring helped gauge the treatment capacity of different models, as well as the evapotranspiration rates to understand water loss in different systems.
6. **Lining Experimental Ponds:** Nylon sheets were used to line the experimental ponds to prevent water percolation loss. The ponds were refilled regularly using decanting lorries.

Local farmers were deeply involved in the process, dedicating their time and effort day and night. There was a sense of satisfaction when the sewage water finally reached the tank. The Farmers' Association expressed their gratitude to the excavator operators for their patience during the excavation process, despite the unpleasant odor. Nature seemed to approve of the efforts as there was rainfall for the next two days after completing the tank work. Immediately after the intervention, farmers began cultivating paddy, breaking a five-year period of fallow land. The restoration of the tank also brought back various bird species like sparrows, swamp hens, cranes, ducks, and kingfishers to the ecosystem, signifying a successful ecological revival.

2. Promoting Goat Farming for Rural Livelihoods:

The Indian government has been taking significant steps to double the income of farmers, but the real challenges lie at the grassroots level. Professionals working in this field not only focus on completing projects but also on sustaining locally available solutions. In the Indian context, goat farming serves as an informal insurance for poor farmers, providing them with the opportunity to make money whenever they face risks. In regions like drought-prone Ramanathapuram and Virudhunagar Districts, which are also classified as aspirational districts, many rural farmers include goat farming as part of their integrated farming system. However, one persistent challenge has been the high mortality rate among goats due to poor management practices. To address the issue, a combination of traditional practices with modern technical features to enhance goat farming was proposed.

Successful goat farming is not just about raising goats; it requires proper management to address natural and artificial challenges. Goats need protection from extreme weather conditions and potential predator attacks. Providing suitable shelter that aligns with local climate conditions and production systems is essential for optimal goat production. In the Indian rural context, where the climate can be unpredictable, the type of shelter provided significantly influences goat productivity. There are various housing and floor design options available, depending on the production system and local climate. Factors such as construction cost, ease of cleaning, proper ventilation, drainage, and adequate lighting need to be considered when designing a goat house.

One innovative approach proposed was the “Perch” housing system, which ensures the safety and proper feeding of goats. Combining that housing method with a specific feeding approach results in the “Semi-intensive Perch Method.” That method involves partially confining goats and allowing them to graze under controlled conditions. It strikes a balance between extensive and intensive systems, making it suitable for flocks with limited grazing opportunities. One of the key benefits of the approach is that it allows for the easy disposal of manure, urine, and debris through a slatted floor. The simple separation process at the household level could lead to significant improvements in a farmers' income.



Household-level Goat shelter to reduce mortality rate



A simple floor impacts greater farmer's income and reduces the risk.

Conclusions

The two examples serve to illustrate the kind of small-scale initiatives that contribute to national-level goals. Engineers play various roles in micro-level planning for rural development. It is evident that community-driven actions are essential to ensure the long-term success of projects implemented in rural areas. Over the years, one comes to understand that the role of engineers in rural development begins with learning from traditional wisdom. Decentralization is crucial for rural development, and a socio-technical, community driven approach offers a better and more qualitative path to achieving these rural goals. Rural challenges like poverty require a professional approach rather than just relying on empathy. In the realm of environmental action, poverty stands out as the ultimate pollution.

Acknowledgement

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DHAN (Development of Humane Action) Foundation

DHAN is a national-level professional development organization, established by Mr. M. P. Vasimalai; it was

founded on the Gandhian Day of 2nd October 1997. The institution believes in “Community Swaraj,” which is key to sustainable development. Presently, DHAN is working with more than 3 million poor families in 16 states of India. It is known for its contributions to the themes of Water, Women’s empowerment, Livelihoods, and Development Finance. Its interventions are community-driven, self-sustainable, scalable models across India. Over the past 26 years, it has played an important role in facilitating about 5.4 lakhs members to come out of poverty and declare themselves as Moved out of poverty through its various interventions. It strongly considers Poverty Reduction and Grassroots Democracy as two eyes of Development. It has helped support in the promotion of more than 250 self-managed democratic community-based organizations across various states and themes.

As of September 2023, DHAN has facilitated the promotion of around 6,800 Vayalagam Water Users Associations and reached nearly 4 lakhs farming households. The community institutions have renovated over 4,000 traditional water bodies (tanks, ponds, ahar & pyne, and other water harvesting structures), and has a rich experience of implementing and guiding watershed development projects in India.

Infrastructure Facilities for Senior and Physically Challenged Persons in Rural and Urban Areas



Rama Shanker Sharma

President
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The country is upgrading and providing new facilities as it moves forward to provide better amenities for its habitants. With the migration to urban areas ever increasing and the rural population comprising mostly senior persons and the physically challenged, the planning and development in both rural and urban areas require addressing the issues of mobility, livability, and safety for all, with a long-term horizon in mind. The facilities for senior persons, especially the physically challenged and differently abled must be incorporated so that they can move around easily on their own to the maximum extent without any assistance. There are codes and standards for all those but awareness and the need to implement them is lacking with those charged to provide them. Integrated planning, design, and execution are sorely needed. Despite so much urban infrastructure being rebuilt or upgraded, the plight of the seniors and the physically challenged remains. In fact, it applies to all pedestrians. This paper discusses the principles which should be kept in mind while designing the rural and urban streets.

Design for All: The streets must be designed and operated to cater to enable safe access for all users. People of all ages and abilities should be able to safely move along and across streets in a community regardless of how they are traveling.

Livability: Streets need to have well-defined footpaths and bicycle routes to encourage healthy and active lifestyles. Repurposing of street space creatively helps connect the community by providing inviting public spaces for residents and visitors together.

Movability: A safe pedestrian network facilitated with street utilities makes the commute comfortable and enjoyable. A good street design should cater to people with disabilities, including people with varying levels of restrictions in mobility, vision, or cognitive abilities. The streets should be designed such that the space encourages people to walk and engage in social activities.

Safety: Continuous pedestrian networks help reduce conflicts between pedestrians and vehicles. Well-lit streets and walking zones without any obstruction help to ensure safety and create an inclusive and disabled-friendly walkable environment. Pedestrian safety should be kept in the forefront along with design addressing the differently abled by providing accessibility ramps and tactile paving plus also focus on areas for trees in order to ensure optimal climatic comfort.

Absence of segregated zones leads to conflicts between pedestrians and vehicles. Pedestrians are the most vulnerable road users and account for the maximum

number of fatalities on streets in India. While designing rural or urban streets where pedestrian movement is expected, priority should be given to pedestrians over vehicles to ensure safety of users.

Footpath: It is observed that the kerb heights are different from stretch to stretch on the same street. There is no uniformity whatsoever. Besides, no ramps are provided for those in wheelchairs. The wheelchair-bound people are thus at the mercy of others to help them negotiate pavements. The height of a kerb should ideally be 100 mm. That would allow pedestrians to negotiate easily. Besides, it would also permit doors of sedan cars to be opened over the pavement and allow for ease of egress from or ingress of senior persons. At all crossings and even at certain intervals along the streets, access ramps for wheelchairs should be provided.

In urban areas where there are pedestrian footpaths, they are being usurped unscrupulously by hawkers, two-wheelers, autorickshaws, cars, and small vans that use the footpaths as a parking lot. Two-wheelers also use them as thoroughfares during rush hours thus endangering the pedestrians. Barricades are essential to prevent such misuse of footpaths by two-wheelers and vehicles.

In rural areas, footpaths hardly exist. There are unpaved sidewalk strips or at the most a thin paving for pedestrians which again are usurped by handcarts, vans, etc. There also, barricades would help.

Hawkers and kiosks spring up all along the pavements or the side strip of the streets and thus force people to walk on the street and expose themselves to vehicle movement. That puts the pedestrians in danger apart from restricting the width of the motorway and creating conditions in which accidents could occur. Proper policing would keep them free of such encroachments.

Paver blocks, which have become ubiquitous are not laid properly to correct lines and levels. Very often they become loose and the gaps thus formed cause water and dirt to accumulate and make the place unhygienic as well as unsafe. The paver blocks should be confined

firmly to prevent them from loosening and dislocating. In areas that receive heavy rainfall, an anti-fungal coating is necessary so that they do not become slippery during the monsoon and remain usable.

Covers of chambers and manholes on the streets which should be kept flush with the street finish level are seldom flush. They are either proud, sunken, or tilted. Also due to a lack of coordination between various departments, the mismatch in levels remains for prolonged periods of time. That makes it difficult not only for pedestrians but also causes hardship for navigation for persons in wheelchairs.

Stormwater drains: Uncovered stormwater drains create a hazard during the night. Even where the drains are covered, the covers of the access openings are either proud of the pavement or depressed or tilted or cracked or broken – all create conditions for people to trip or skid and fall. Plus, they make wheelchair movement difficult and at times impossible.

Ponding on the streets: Very often there is ponding on the streets due to the inlet to the stormwater drains being choked, which arises from many counts. Street side debris piling up and choking the inlet of the drains and even the drains themselves. There is no standard being followed for the stormwater drains – either for design or construction. The inlets used to be earlier provided with gratings but now they are not on the public streets. Thus, all the street dust and debris flow into the stormwater drains. Other utilities - water supply pipes, sewerage pipes, electric and communication cables, gas pipelines, etc. cross through the stormwater drains and adversely affect the flow of stormwater. Integrated planning and execution of all services/ utilities is essential.

The ponding makes it impossible for pedestrians to cross and they get stuck till the rain stops and the ponding clears.

Street lights: though these are being provided but due to the trees and other foliage the pedestrian paths and even the streets get very poor light. Low-level side lights would provide good lighting and would not get obstructed by foliage, shrubs, etc.

Tree guards: These are necessary for nurturing the trees – watering and protecting their roots. However, when not placed flush with the pavement or the street level they become a hazard for all – vehicles as well as pedestrians.

Benches: As the country's senior population increases there is a need to provide space for them to rest along the streets. Such facilities were there in some towns and cities some decades ago but now they have all been removed. Alas! It would be great to have them back.

Rain/ Storm shelters: these also are necessary for the same reason as the benches.

Public Toilets: Absence of public toilets encourages people to use the street side walls/ drains. Public toilets, well-lit and ventilated need to be located at convenient locations but close to the walking zones at reasonable spacing and should be integrated with the street design so that they are easily accessible as well as aesthetically integrated with the environment. Inappropriate placement on the frontage or walkway zones would interfere with pedestrian movement. The design and access of public toilets should be friendly for the differently abled. Vehicle parking spaces also need to be provided adjacent to them. Needless to add that the facility should be connected to sewage lines or septic tanks and should be cleaned regularly.

'Sulabh' has helped in providing public toilets at important locations, but the numbers are too few. They are all mostly accessible by high-rise steps which senior persons find very difficult to climb, whereas the physically challenged just cannot.

Urban planning in countries in Europe provides for seamless movement of pedestrians in the inhabited and commercial streets, even where streets are narrow like in Rome. There are constraints on parking spaces in most European towns, just like in India, but the traffic movement is planned in a manner that one-way movement of vehicles and pedestrian pathways, raised or at the same level and separated by barricades, are provided. In commercial areas where substantial movement of pedestrians takes place, some of the streets may be designated as walking streets where no vehicular movement is permitted during designated timings. Parking facilities may be provided close-by where visitors may park their vehicles or come through public transport. That would enhance the environment near that locality manifold.

The Indian Road Congress has laid down guidelines for the planning of urban streets. The urban authorities in various states and union territories should pay special attention to these necessary requirements and develop pedestrian-friendly streets in all the cities. CEAI will be willing to provide help in designing the pedestrian facilities on sample streets with the help of its members. Help from the International Road Federation (IRF) and other NGOs in the transport sector could also be sought.

India is becoming a leading country in some fields – it's time that it also becomes one which plans for its senior population. Once implemented it would enhance the serviceability of the streets and increase safety for pedestrians who are the most vulnerable street users and account for most fatalities in our country. If the Harappan era could plan infrastructure and amenities, surely digital India can do better.

Do We Really Need Ground Water for Survival?



Ulhas Paranjape
Founder Trustee
Jalvardhini Pratishthan

Introduction

Population rise, development of new townships, industrialization, change in the boundaries of village / towns and better life style are resulting in continuous increase in water demand. On the other hand, water scarcity is increasing due to limited availability of fresh water sources. For many urban/ rural areas, water is fetched from long distant sources due to centralized water systems, which requires major capital investment to convey the water. The Indian economy is growing and people have higher expectations on lifestyle, increased use of home equipments and higher water requirements. Hence, judicious planning of water system and management of the assets created is required to meet the expectations of citizens, manage the resources, operations and maintenance aspects considering higher delivery standards. The availability of fresh water sources are limited and that plays a major role in providing better services and consumer satisfaction.

People normally use water from tap, open well, bore well, river or pond/ talab for their day-to-day requirements. Rain water is the main source of all the storages mentioned above. Rain water as a source has huge potential but remains unutilized even as on today. Ground water is mostly used when piped water system is not available or to support the piped water system. If rain water is used as a source of water for all

activities, then the issues related to water availability can be handled better and ground water may not have to be used.

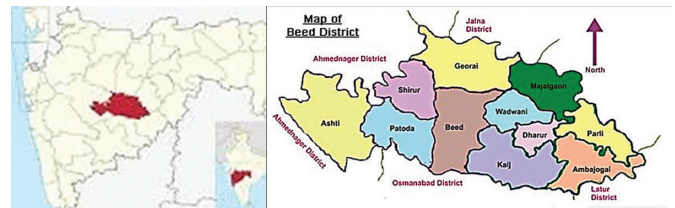
If treated wastewater is used after treatment, then the daily water requirement would be reduced further.

It is said that Money and Water can be best used if they are Stored. Money, everyone collects but very few are collecting/ storing Rainwater.

Case studies of rural areas of Beed District and Karjat Taluka in Raigad District of Maharashtra are discussed in detail.

Beed District

In Beed District, three types of Farm Pond are found: a) Below Ground b) Half above and half below ground, and c) Below ground, with inlet and out let arrangements.



The Geographical area of Beed District is 10,693 sq.km. The Administrative Divisions (as on 31-03-2011) were 11 Talukas, namely Beed, Georai, Ashti, Patoda, Shirur (Kasar), Wadwani, Ambajogai, Majalgaon, Kaij, Dharur

and Parli. There are 1,360 Villages with a Population of 21,61,000 (2011 Census). The average annual rainfall is 666 mm.

Beed District has many Farm Ponds but most of them are Half below Ground and Half above Ground. For all these water storage tanks, the water is brought from outside.

A different approach to solve the water problem of District Beed is proposed below.

A visit was made to Ambajogai and Beed from 9th to 14th July 2021, to conduct training for masons and farmers. The intent was to train the masons in “Water Conservation with Natural Fibre Cement Technology”. During the training they learned and constructed 2 types of tanks, one below ground and other above ground. During discussions, everyone was mentioning about water shortage and depleting ground water table or low water level. It was suggested to them to use rainwater with a better approach.

The annual water potential that was estimated was explained and shared with them, is given below.

Beed District Rainfall Potential for Water Collection & Storage

Area of Beed District – 10,693 sqkm = 10,69,300 hectare

1 sq.km. = 100 hectare = 100 x 10,000 = 10,00,000 sqm.

Area of Crop under Kharif Crop: 7,78,207 hectare (72.78 %) in 2022

Area of Crop under Rabbi Crop: 4,19,816 hectare (39.26 %) in 2022

Forest Land = about 2 %

Annual Average Rainfall = 666 mm = 0.666 m

One sq.km of land area has potential of catching rainwater = 6,66,000 cum

Assuming only 25% can be effectively collected then per one sq.km, one can store or collect only $666000 / 4 = 165500$ say 1,65,000 cum or 1,650 cu.m. per hectare.

At 55 LPCD, the quantum of water required per person = $55 \times 365 = 20,075$ litre, say 21 cum Hence 1,65,000 cum will be sufficient for $1,65,000 / 21 = 7857.14$, say 7800 persons.

The population as per 2011 Census was 21.61 lakhs. It is assumed that in 2023 it would be 30 lakhs. Hence, water required would be $30,00,000 / 7800 = 384.61$ sq.km or say 400 sq.km. which is only $400/10693 = 3.7$ % of total area of the District.

Which means that 25 % of annual average rainfall over 400 sq. km of land, if stored, would be sufficient for a population of 30 lakhs for one year.

Technologies Taught

Two different innovative technologies were taught to the masons, farmer, students, and others for the storage of rain water.

Drinking Water

For drinking water, use of Rooftop rain water was suggested. The collection could be in a 10,000 litre Ferrocement Tank. During the period 2000-2002 the “PAGOLI VIHAR YOJANA” was available in Maharashtra. Some people from Taluka Pen are still using water collected during the monsoon in a storage tank for entire year for drinking purpose.

Use of Natural Fibres in Water Retaining Structures

The use of Natural Fibres such as i) Coconut Coir, ii) Banana Fibre, and iii) Ambadi fibre in construction of water storage tanks below ground has been recommended and constructed accordingly. A study on the use of these natural fibres was done by the Indian Institute of Technology Bombay which has replaced Chicken mesh by Natural Fibres in Ferrocement Tank above Ground. It is an Innovative product which is being spread to many locations.

Mason, farmers, and students were taught how to construct the Water Storage Tank.



*10,000 litre Ferrocement Tank at More wadi,
Taluka Karjat Dist. Raigad*



Coconut coir Cement Tank



Ferro - Natural – Fibre Cement Tank

10 % Model for Water Conservation

Knowing the total rural and urban area and its annual average rainfall, it is possible to estimate the potential and the quantity of water that can be stored. If the rain water is stored, then the urban or rural problem can be either solved or eased. The total land required may not be more than 10% of the total land either in the rural or the urban areas. Some examples of the 10% model are given below.

10 % Model -- Field Study by Prof. S. N. Panda and others from the Indian Institute of Technology Kharagpur during 2002-2003 in the rainfed area of Kharagpur, situated in the District of West Madinapur in West Bengal.

PRADAN (Professional Assistance for Development Action), a Bihar NGO has the core idea of the 5% model of in-situ water harvesting is which every plot should have its own water- body, which should be able to hold rainwater which otherwise flows out of the plot.

Kokkarni from Kerala -- is a traditional water body – they are small farm ponds, that provide water for one or two protective irrigations.

Pokhris in the North Eastern states are small ponds in each house hold.

Chauka system in Rajasthan was initiated by Laxman Singh — of Gram Vikas Navyuvak Mandal, Laporla - GVNML). Chaulkas are constructed across the slope at a predetermined spacing for intercepting the runoff and retaining it on the greater part of the field till it is absorbed into the ground.

Bodi and *Phad* system in Vidarbha, Maharashtra are similar rainwater conservation models.

Raigad District

A different approach has been proposed to solve rural level water problem for Taluka Karjat Dist. Raigad, State Maharashtra.

Normally watershed development is a solution for rural water problem. Instead of watershed development, if

the village or pada or cluster of houses is considered as a unit then on the basis of the annual average rainfall and the land holding of that unit, it is possible to fulfil the water requirement of that unit.



6 Lac Litre Pond at Kalhe, Taluka Panvel Dist. Raigad

In addition, attention must be given to all other sources of water such as well, bore well, pond, lake, stream, river, etc, using rain water as a source of water.

Taluka Karjat, Dist. Raigad from Konkan Region (State Maharashtra) is taken as a representative case. The detailed calculations are given below.

1.	Total area of Taluka Karjat	65,117 Hectare
2.	Population (2001)	1,84,420
3.	Animals/ Cattle	25,832
4.	Land holding with people (Khatedar)	36,713 Hectare (56.38%)
	Out of above land holding	
	(i) Land under crop	17,168 Hectare (26.36%)
	(ii) Padik (Varkas) land	14,093 Hectare (21.64%)
	(iii) Pot kharaba	5,452 Hectare (8.37%)
5.	Forest land	18,140 Hectare (27.86%)
6.	Gavathan, Kurane, Devarai Government land, N. A. land, etc.	14,264 Hectare (21.91%)
7.	Annual Average Rainfall	3,316 mm (3.316 meter)

A. Water Required for Daily Needs of the People

For the total population of 1,84,420 in the city, water is provided at a rate of 135 liters per person per day (LPCD).

Yearly water required = $1,84,420 \times 135 \times 365 = 90,87,295.50 \text{ cum.} = 908.73 \text{ Hectare meter.}$

B. Water Required for Domestic Animals (Cow, Buffalo, etc.)

For the 25,832 animal population water is provided at a rate of 100 liters per animal per day.

Yearly water required = $25,832 \times 100 \times 365 = 9,42,868 \text{ cum.} = 94.29 \text{ Hectare meter.}$

C. Water required for Agriculture i.e., for Kharif crop (Rice)

Normally during monsoon Rice is grown and that is followed by wal, chawali like crop grown on the same land after the rice is harvested.

Assuming water requirement for Rice as 1600 mm (1.6m), the total water required will be
 $= 17,168 \times 1.6 = 27,468.80$ hectare meter.



15 Million Litre Pond at Talasari, Palghar



2 lac litre Pond at Panve Dist. Raigad

Water required for cultivation on Varkas land (Horticultural development) i.e., for tree plantation such as mango, cashew, etc.

Assuming around 200 trees are planted on one Hectare of land Water required for non-raining season i.e., for 240 days

Assuming water requirement as 5 litre per day tree, (initially the trees require about 1 litre per day if water is given by diffuser, etc.) the requirement will be =
 $14,093 \times 200 \times 5 \times 240$
 $= 33,82,320$ cum = 338.23 Hectare meter.

Hence total annual requirement of water is:

1.	For residential population Taluka Karjat	908.72 Hectare meter
2.	For animals	94.28 Hectare meter
3.	Agricultural purpose	27,468.80 Hectare meter
4.	Horticultural Dep	338.23 Hectare meter
	Total	28,810.05 Hectare meter, say 29,000 Hectare meter

In short, if about 29,000 Hectare meter water is available then it will satisfy the water need of Taluka Karjat.

Total available water considering Annual Average Rain fall as 3316 mm is = $65,117 \times 3.316$
 $= 2,15,927.97$ Hectare meter, say 2,15,928 Hectare meter.

Whereas requirement is about 29,000 Hectare meter, hence it is about
 $= \frac{29000}{2,15,928} = 13.43$ or 13.43 % say 14% of the total available water

Thus, about 14 % of the total available water from rain would be sufficient to provide water of Taluka Karjat.

Out of the 29,000 Hectare meter, 2,15,928 Hectare meter water is required for Kharif crop. Again, out of 27468 only part of water is required to be stored for dry spell during monsoon. Hence, there is a need to store water even for Kharif crop to get better yield.

That means $27468/29000 = 94.72$ % say 95% of water is required for agricultural purpose.

Hence, arrangements need to be made to store only 5% of 29,000 Hectare meter only or 1450 Hectare meter for other than agricultural use.
 $= (29,000 - 27,468) / (2,15,928)$
 $= 0.00709$, i.e., 0.71 %

Thus, only 0.71 % Rainfall needs to be properly stored.

It is therefore evident that Rain Water Managements can solve the problem of local water requirement. The

example of Taluka Karjat makes it very evident that if water is managed at individual level, or at a pada or village level then the problem can be successfully addressed.

Conclusions

The large schemes with centralized approach need high investments, manpower, expertise, and more time for making the benefits available to the people. Even after completion of the large projects, their maintenance needs to be ensured in terms of resources, energy, and manpower with a permanent establishment.

Addressing the solutions at a Local level and capturing the rainfall and storing it for various uses will improve the water supply situation for the consumers, and reduce their dependency on centralized schemes. All

the habitants need to be responsible and responsive citizens and use the water carefully.

The examples of Taluka Karjat, and District. Beed make it very clear that the solution lies in managing the Rain Water at an individual level, or at a pada or a village.

Jalvardhini Pratishthan

Jalvardhini Pratishthan, set up by the author, aims at supporting the rural and tribal population in Rain Water Harvesting and Management. The team at Jalvardhini Pratishthan has constructed with the participatory approach, Storage Tanks of up to 30,000 litres capacity, with donations from donors and provide technical support for Tanks/ ponds of up to 15 million litres capacity.

IBEF

INDIA BRAND EQUITY FOUNDATION

Indian Economy News

Prime Minister Mr. Narendra Modi launches PM Vishwakarma Scheme at New Delhi

Press Information Bureau September 18, 2023

Prime Minister Mr. Narendra Modi has unveiled the 'PM Vishwakarma' scheme, with an allocation of Rs. 13,000 crore (US\$ 1.56 billion) to support traditional artisans. The event was held in Dwarka, New Delhi, at the recently opened India International Convention & Expo Centre.

The newly launched scheme will provide skill enhancement through both basic and advanced training, a toolkit incentive of Rs. 15,000 (US\$ 180.48), collateral-free credit support of up to Rs. 1 lakh (US\$ 1,203.19) (first tranche) and Rs. 2 lakh (US\$ 2,406.37) (second tranche) at a 5% concessional interest rate, incentives for digital transactions, and marketing support.

PM Mr. Modi said "Under PM Vishwakarma scheme, govt has focussed on providing special training to the Vishwakarma partners and Rs. 500 (US\$ 6.02) will be provided to you while the training is underway. You will also get a Toolkit voucher worth Rs. 1,500 (US\$ 18.05). The government will also help you in branding, packaging, and marketing the products you make. In return, the Government wants you to purchase Toolkits from shops that are GST registered only".

The plan will register 'Vishwakarmas', who create with their hands and tools, at no cost through Common Services Centres, utilising the biometric based 'PM Vishwakarma' platform. These artisans and craftspeople will be recognised with a certificate and ID card from PM Vishwakarma.

It will aid artisans and craftspeople in both rural and urban India. It includes eighteen traditional crafts, such as carpenter, boat maker, armourer, blacksmith, hammer and tool kit maker, locksmith, goldsmith, potter, sculptor, stone breaker, cobbler (shoemith/footwear artisan), mason (rajmistri), basket, mat, broom maker, coir weaver, doll and toy maker (traditional), barber, garland maker, washerman, tailor, and fishing net maker.

The fundamental goal of PM Vishwakarma Scheme is to improve the quality and reach of products and services created by artists and craftspeople, ensuring their inclusion in both domestic and global value chains.

Source: <https://www.ibef.org/news/prime-minister-mr-narendra-modi-launches-pm-vishwakarma-scheme-at-new-delhi>



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Introduction

On an average, water resources available in India is about 4400 BCM (principally from rainfall and snowmelt in the Himalayas) of which about 1100 BCM (700 BCM of surface water and 400 BCM of groundwater) are usable. About 700 BCM (450 BCM of surface water and 250 BCM of groundwater) are presently withdrawn. Inter-basin water transfer (IWRS,1996) under the national perspective plan proposed by NWDA (2005), if and when fully completed, could add about 200 BCM water more (Thatte.2017). In addition, about 100 BCM could be saved by improving water-use efficiency to meet the ultimate needs of 1180 BCM of water for the estimated population of 1.85 billion by 2050, provided 300 BCM could be added.

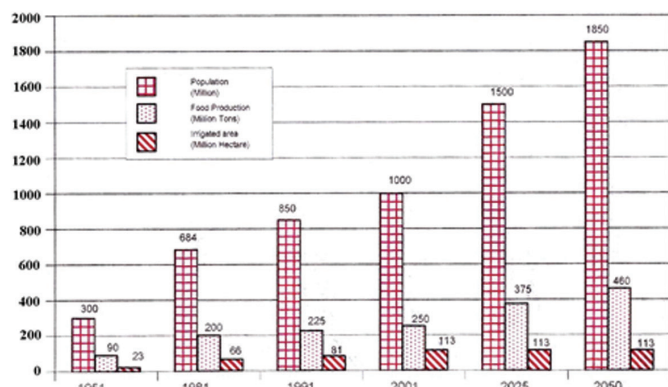


Figure-1: Growth of Population, Food Production and Irrigated Area in India during 1951-2050

Figure-1 shows the projected growth of population, food production and irrigated area in India during 1951-2050. The Per Capita water availability in some of the countries in the world is given in Table-1. The water availability will reduce further, especially in India, due to uncontrolled population growth. Table-2 shows the projected demand of water from different sectors up to 2050 (INAE,2011) by when the total water demand will exceed the utilizable water available now.

Table 1: Per Capita Availability of Water (cum) in Different Countries in the World (as of 2011)

USSR	USA	China	Australia	India	Ethiopia
19,500	9,900	5,000	2,420	1,545	250

Table-2 Projected Water Demand in India from Different Sectors (INAE,2008)

Sl. No.	Total Water Requirement for Different Uses (in BCM)			
	Uses	Year 2010	Year 2025	Year 2050
		High Demand scenario	High Demand scenario	High Demand scenario
1.	Irrigation	557	611	807
2.	Municipal	43	62	111
3.	Industries	37	67	81
4.	Power (Energy)	19	33	70
5.	Others	54	70	111
	Total	710	843	1180

Table-2 shows that water diverted for irrigation is 78% and likely to be 72% and 68% in the years 2025 and 2050 respectively only for food production which will be from areas lying mostly in rural India. Besides agriculture, water is needed also to meet domestic and other needs. It is a fact that more and more people are migrating from rural to urban areas in search of jobs and better quality of life in urban areas. It is estimated that 60% of India's population is going to live in the cities by 2050. Obviously, more water is to be diverted to urban areas leaving very little for rural people employed mostly in the agriculture sector. Thus, there is an urgent need for irrigation water management in the rural areas with finite water resources, unless cheaper technology develops for desalination of sea water. Rural development needs not only water but also several other infrastructural support – housing, health, communications, education, etc. Water management for flood prone rural areas is one of the most important aspects for rural development. This paper focuses on water management for irrigation only. The current crisis of water due to non-availability of water- in rural areas is brought out starkly in photographs 1 and 2.



Photo-1: People gathering to fetch ground water



Photo-2: Parched land due to lack of water

Water Development Projects in India

When India achieved freedom in 1947, it had only 23 million ha of irrigated land as most of the irrigated areas lying in the Indus valley went to Pakistan after partition. Several major multipurpose projects e.g., DVC, Bhakra-Nagal, Hirakud, Nagarjun Sagar, etc. were executed for irrigation, water supply, hydro power, etc. These mighty projects contributed immensely to India's agricultural growth for food security through assured water for irrigation even during the drought years. As of today, the country possesses more than 6000 major and medium storage dams spread throughout the country, apart from innumerable schemes for water diversion from perennial rivers.

Inefficiency of Water Use

In most of the river-valley projects, water stored in reservoirs in the mountain/ hilly areas are released through a network of channels for irrigating the farmlands to meet the water requirement of the crops. In most of the major river-valley projects, irrigation efficiency is poor (Mazumder,2002; CWC,2010)- being an average of 35% in the case of major and medium schemes as compared to 55% in China and 70% in Japan. While emphasizing the present day need of intensive irrigation for maximizing yield per unit of area, Bharat Singh (1991) identified the following major shortcomings of the irrigation schemes:

- Gap between the creation of irrigation potential and its utilization
- Unreliable and inadequate supply
- Inequitable distribution of water between head and tail enders.
- Non-responsive and authoritarian administration
- Lack of control and increasing malpractices, poor maintenance of canal systems and lack of on-farm management of irrigation water.

The Planning Commission renamed as Niti Ayog, Government of India, recognized the three major shortcomings responsible for poor performance of irrigation schemes in India, namely:

- Unlined channels
- Lack of land consolidation, improper leveling and sizing of irrigated land
- Poor on-farm management of irrigation water beyond outlets.

Zimmermann (1966) examined several drawbacks of protective type extensive irrigation practice being followed in India where the available water is spread over vast areas through a widely spaced unlined canal network. Most of the water in such a system is lost in conveyance and most of the remaining water is lost because of inefficient irrigation management (IWRS,2007). Several steps for improving irrigation efficiency by reducing avoidable losses have been outlined by Mazumder (2007). It is estimated that even a marginal improvement of efficiency by 10% through improved water management, will result in saving about 100 BCM water (Thatte.2017).

Crop Yield and Ground Water Depletion in Rural Areas

Due to unreliable water supply in most of the command areas in India and the existing method of charging irrigation water on area-crop basis, farmers at the head end draw more water leaving very little for farmers at the tail end, thus compelling them to pump more and more ground water to save their crops. This has resulted in water logging in head reaches and on the other hand, severe depletion of ground water table, salinity, arsenic contamination, etc. in the tail reaches thus leading to soil pollution and thereby reducing crop yield. Figure-2 shows the yield of cereal crops in India vis-à-vis some neighboring countries.

Conclusions

Rural areas in India are going to face severe water crisis in the near future due to the increase of population, diversion of flow to city areas and inefficient use of available water for irrigated agriculture. Farmers are

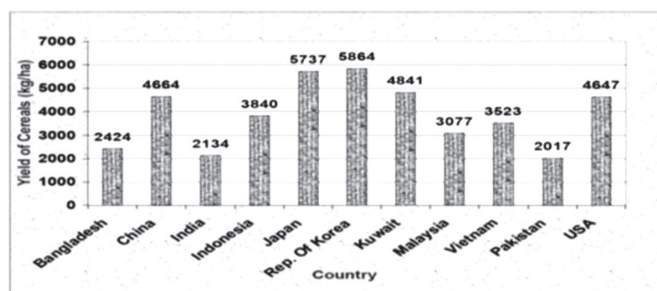


Figure-2 Yield of Cereals (kg/ha) in India vis-vis Neighboring Countries

compelled to draw ground water to save their crops resulting in severe depletion of ground water level and pollution of the soil. Management of water - both surface and sub-surface is essential for development of the rural areas in India.

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Smart Automation in Rural Development



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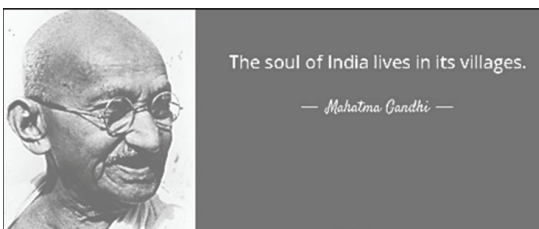
Synopsis

Sustainable Development Goals (SDG) adopted by the UN General Assembly highlight the importance of peace and prosperity for the planet and its people, for the present and the future generations. SDG recognizes that ending poverty is possible with strategies that improve health and education; reduce inequality and stimulate economic growth - while at the same time tackling climate change related matters. SDG Goal 11 to make “*Cities and settlements safe, inclusive, resilient and sustainable*” aims for growth and sustainability in both the Urban and the Rural areas alike, by considering the current transformation of implementing innovative technologies across all spheres of life across the globe.

India’s visionary scheme of development of Smart and Model villages considering the special development needs for rural areas is gaining importance to ensure Overall Growth and Economic Development of the country. 69% of India’s population is rural with an approximation of 6,40,930 villages. To address the issue of slow development of rural areas, the Central

and State governments have taken up visionary schemes for development of Model Village(s) to meet the needs of people living in rural areas. Rural development includes reinforcement of physical and institutional infrastructure, in which the minimum needs of all the sections of the rural population are fully met thus enabling their harmonious livelihood among themselves and Mother Nature. It also includes implementation of the latest technological developments for enabling progressive and dynamic settlements. The villages need to be endowed with all the facilities necessary for dignified living, thereby creating an environment in which all the residents are empowered to utilize their potential and latest technology to the fullest.

This article spotlight’s the role of SMART Automation, Information and Communication Technology (ICT) in facilitating the simple day to day repetitive operations, remote monitoring and controls, communication, digital education, electricity, healthcare, agriculture, water management systems providing affordable drinking water.



Introduction

Consultancy in Rural development plays an important role due to the diverse nature of the requirements and the

infrastructure constraints. There are multiple sectors of rural development generally covered as part of a growth strategy. The sectors Identified and the Key Objectives for them are shown in Figure-1.

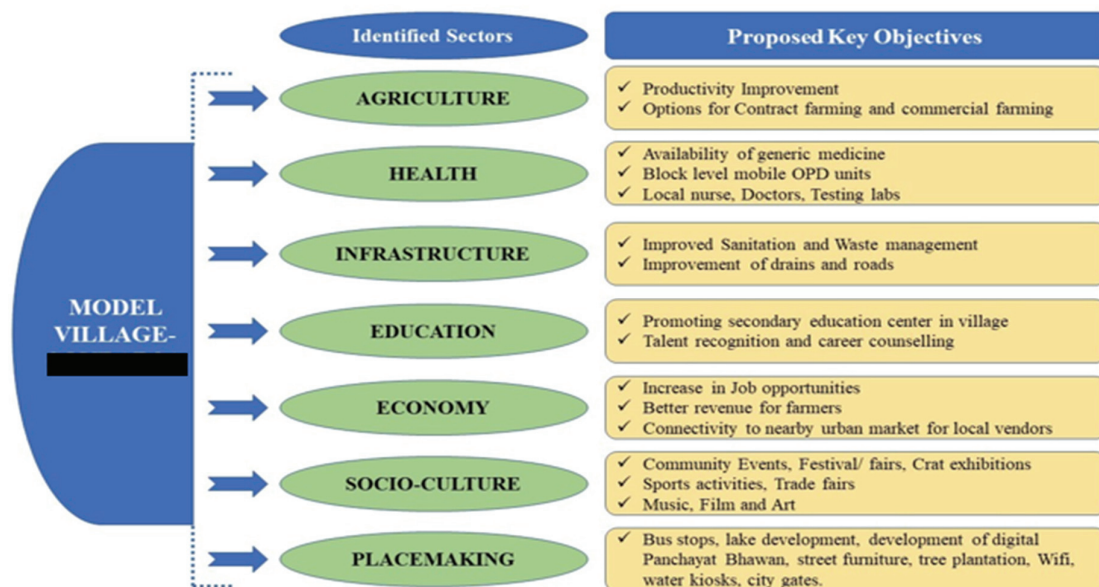


Figure-1: Rural Development Sectors and Key Objectives

The sectors are interlinked and scalable once the basic infrastructure is created and can be customized based on specific interests of the people and the geographical

requirements. The key development areas are shown in Figure-2.



Figure-2: Key Development Areas

Smart Automation

Smart automation plays an important role in all the identified Rural development sectors. The “Digital First” initiative of the Digital India Programme has highlighted the opportunity to catalyse and energise rural development smart automation. Smart Village development ensures primary healthcare, education, improved energy management, sanitation and water management enabling water conservation, etc. using IoT technologies and automation.

Some of the SMART automation initiatives for rural development include implementation of:

1. Smart Schools
2. Smart Integrated Health Management System & Telemedicine
3. Smart Agriculture
4. Smart Water Management System
5. Micro grid for electrification and solar lighting
6. E-Governance and Digital Literacy Centre’s

1. Smart Schools

Smart schools are characterized with information and communication technology incorporated at the core including internet, uninterrupted power supply, CCTV system, Audio visual system including projectors, Camera- mic enabled conferencing system, management system software, cyber safety measures, interactive boards wherein teachers teach and interact with students using multimedia tools, interface with “Swayam” and e skill apps. Automated Animations are of superior quality to easily explain complex events like Heart function (biology), chemical lab reactions (chemistry), critical nuclear reactions (physics), etc. Animations and related interactive subject matter would be such that they assist the “Teaching and Learning” process in a simple and effective manner. The key criteria of “smartness” is the student engagement level while using smart tools. Effective use of technology in a classroom makes it a haven, stimulating healthy creative discussions with fundamental thinking and peer learning furthering student unity and collaboration. In smart classrooms, learning is also promoted on relevant multiple topics with the Teacher becoming a facilitator.

In addition to the above, smart management software facilitates efficient administration. The software permits multiple login(s) - School Administrative Head, Teachers, Parents, Students, School Receptionist, Librarian, Accountant, Sports, etc. It is tailor made to suit the respective school requirement covering all monitoring and administrative needs. Further, management software systems could be integrated with CCTV, access controls, lighting, mobile phone apps (with real time password protection) for instant messaging to registered parents regarding student’s details like study progress and attendance. Automated software also facilitate teachers to get access to “On line” individual and consolidated students, class room and school reports ensuring good governance in addition to Parents, School staff alerts.

The Government of India has taken landmark initiatives to transform the Indian education sector to benefit all rural students by streamlining rural education in both Online and Offline modes as shown in Figure-3.

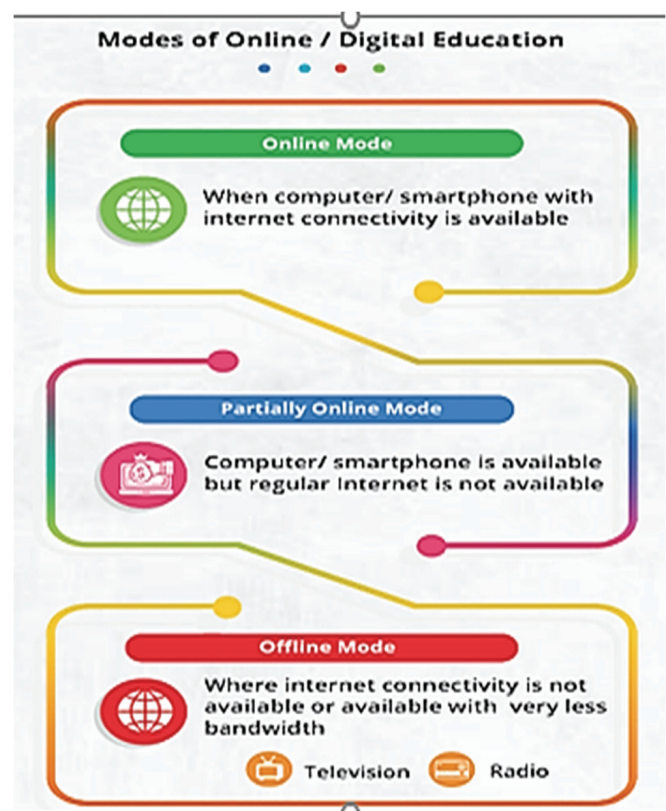


Figure-3: Modes of Education

Some of the government initiatives to promote rural education with the assistance of SMART automated tools are listed below:

- e-VIDYA to unify all efforts related to digital/online/ on-air education
- DIKSHA (Digital Infrastructure for Knowledge Sharing) as One Nation One Digital Platform having e-Books and e-Contents,
- TV channels- Swayamprabha
- National Digital Education Architecture (NDEAR) for creating a unifying national digital infrastructure to energise and catalyse the education ecosystem;
- Implementation of a scheme “New India Literacy Programme or ULLAS” targeting all nonliterate of age 15 years and above.
- Global Initiative for Academic Network (GIAN) implemented to tap the talent pool of scientists and entrepreneurs from abroad, including those of Indian origin, to augment the country’s existing academic resources.

The Government of India has also initiated “National Education Program 2020” (NEP) in regional languages wherein educational videos are made available on YouTube. NEP also provides for facilitation of research and teaching collaborations in addition to exchange of faculty and students with high-quality Overseas institutions. NEP also encourages high performance Indian universities to establish campuses in other countries, and vice versa, For e.g., the Top 100 universities of the world would be facilitated to provide education in India. The initiative benefits the rural population with access to distant education and global collaboration.

2. Smart Integrated Health Management System and Telemedicine

Healthcare in rural India faces multitude of challenges - overcrowding, non-availability of medical history records, delayed reporting leading to emergency situations, inadequate palliative care, mismanagement of medical/ clinical resources to name a few.

Automation enables consolidation of different consulting and specialist doctors within a hospital facility, patient records in a common repository accessible to authorized medical practitioners online from anywhere and from any device with internet access, advanced analytics keeping track of incidents across different hospitals and departments in a centralized database. The database also includes integration with multiple medical imaging devices for 2D/3D image views enabling multi-image comparison. Advanced analytics implementation provides predictive insights based on patient history for disease surveillance and preventive medication or procedures. Furthermore, Apps are available for: online consultation with doctors through teleconferencing, audio & video collaborations thus facilitating remote expert consultant guidance for critical surgeries and making it possible to perform guided operations. Integrated health management system also includes administrative roles like scheduling appointments and billing, user management and access control, inventory (medical equipment and medicine) management, advanced hospital management & information system with analytical information, patient health and action plan alerts, etc. as illustrated in Figure-4.



Figure-4: Integrated Health Management and Telemedicine system

SMART Paediatric Intensive Care Units (PICU) at Community Health Centres (Figure-5) are built to take care of seasonal outbreaks like dengue and encephalitis which have high fatality rates among rural children. A properly designed, organised, and maintained SMART PICU improves the quality of paediatric care and would effectively treat severe complications of high affliction

using low-cost interventions. PICUs are equipped with Centralised Health and Inventory Management Systems with connected database including patient details (laboratory reports, imaging, medications, life support systems, integrated diagnostics, etc.) and administrative software teamed up with CCTV, real time location tracking, analysers and testing machines

in laboratory setup, cardiac monitors, pulse oximetry, defibrillators, audio visual alarms, battery backup, portable ventilators, etc. to provide constant local and remote monitoring thus creating seamless supervision within and outside the walls of the hospital to enable optimum child care with clinical excellence.



Figure-5: SMART Paediatric Intensive Care Units

With healthcare becoming more digitised and SMARTER, patient care will shift from hospitals to the homes of the patients with hospitals playing a key role in the near future.

3. Smart Agriculture

Food is an essential ingredient for survival of all

living beings on the planet and hence it is necessary that due emphasises be given to equip the farming communities with the latest technology to reap collective benefits. Information and communication technology components help farmers improve income by effective utilisation of natural resources with advanced technology.

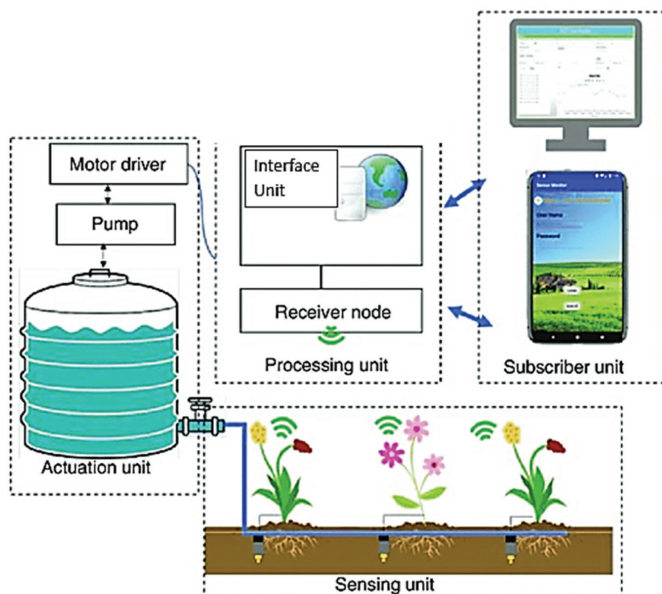


Figure-6: Automated Irrigation System

Advanced technology initiation and automation in agriculture starts with registration at a soil testing laboratory to analyse and recommend crop selection and the nutrients required for enhancement of crop yield. The Industrial Internet of Things coupled with smart sensors (temperature, soil moisture, humidity, etc.) connected to cloud through mobile or internet network enables obtaining real-time data information for local as well as remote monitoring and also automate irrigation and waste management systems (Figures-6 and 7) or make timely augmented decisions.

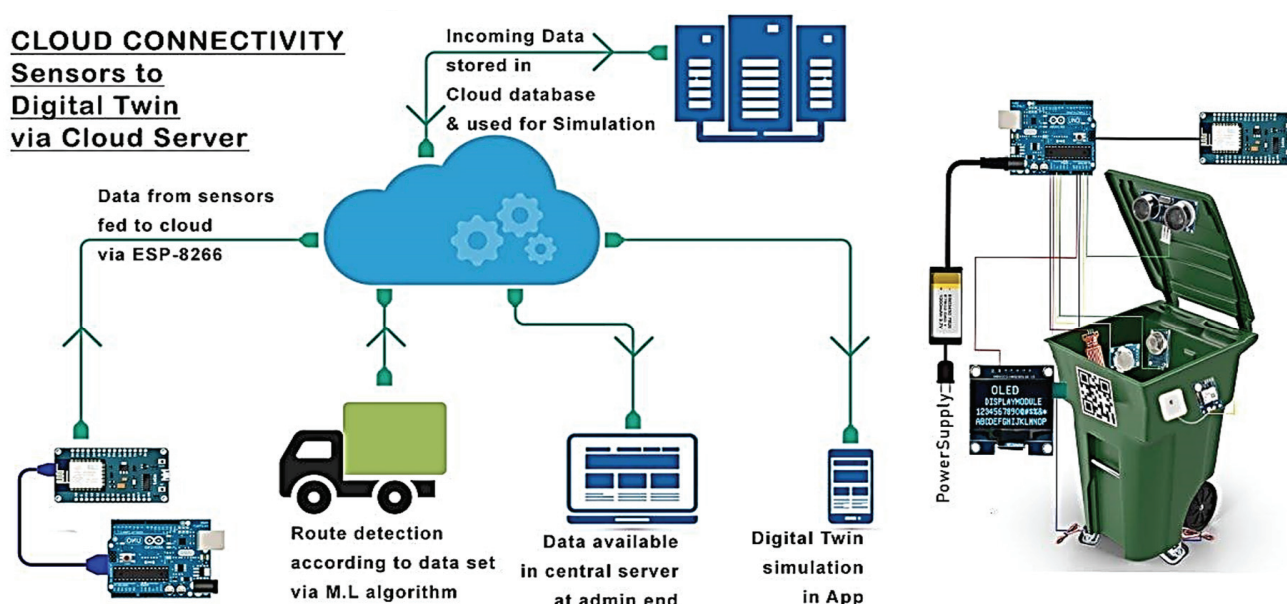


Figure-7: Automated Waste Management System with embedded IOT sensors in bins for garbage collection data monitoring saving fuel costs

Incorporation of a Digital twin, which is the ‘duplicate of a physical system that is always learning’ as a part of software simulation provides comprehensive insights on each physical asset through continuous learning, allowing continuous online remote monitoring and triggering preventive maintenance of agricultural equipment for continued good performance, thereby decreasing equipment trip and downtime. IOT, therefore enhances farming efficiency in comparison to conventional farming. A few more examples of similar applications are Water tank level monitoring, tracking seed growth and consumption of resources, time taken for seed to grow into a fully developed yielding plant.

Green house farming in “Smart Green-House” with IOT based sensors to control the greenhouse climate and lighting without manual intervention reduces energy and production cost. Farmers can perform agricultural tasks in much lesser time and also increase the crop produce by utilising IOT based accurate real time data. It is also advantageous in terms of environment conservation since it supports optimisation of soil treatment (fertilisers) and water conservation.

Drones are being used for a multitude of applications.

Real time monitoring ground and aerial drones assist in crop health monitoring and assessment, pesticide spray, automatic watering or drip irrigation, capturing images thus saving time for the farmer and empower improvement in crop quality and quantity. Drone collected data also facilitates farmers to get an overview of the plant health index, counting number of plants, crop prediction, water requirement and availability mapping, crop stockpile measurements, weed presence mapping, etc. Advance automation also includes drone survey kits integrated with weather monitoring system signals to protect crops. Wireless IOT based RFID sensors to track livestock location cuts down labour cost and is preferred by Agriculturist(s).

4. Smart Water Management System

Smart Water Management System comprises smart IOT enabled sensors installed in various asset locations of piped water scheme to capture real time data like water flow, water quality indicators at defined time intervals. Data is transmitted to respective location SCADA or Data Centres, and also a Centralised Command and Control Centre. In the Central Command and Control Centre, data is analysed for multiple critical aspects on water supply quantity and quality through various

graphs in conjunction with geographic sensor mapping to facilitate strategic planning of water resources; followed by tracking operation and maintenance activities at Gram Panchayat level. Data Centres also facilitate metered billing to consumers. Figures-8 and 9 show typical water management system flow schematic and Command and control centre screen shot.

Data Centre software would be further interfaced with CRM grievance and notifications App which could be downloaded on mobile for real time grievance redressal. The Smart Water Management System can also be interfaced with flood forecasting and Early Warning System(s) using weather monitoring stations providing real time information to villagers in case of a foreseen calamity and thus help saving lives.

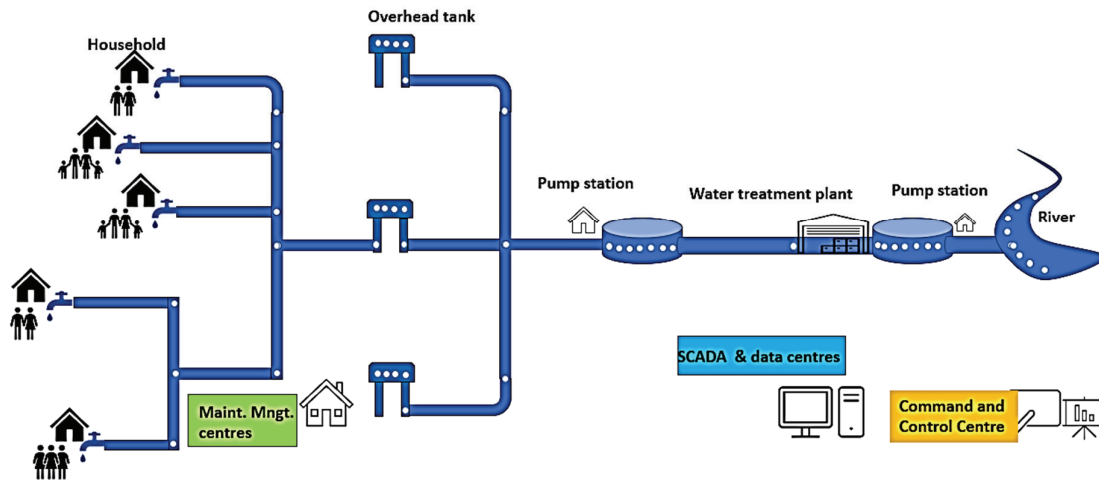


Figure-8: Typical Smart Water Management System Flow Scheme

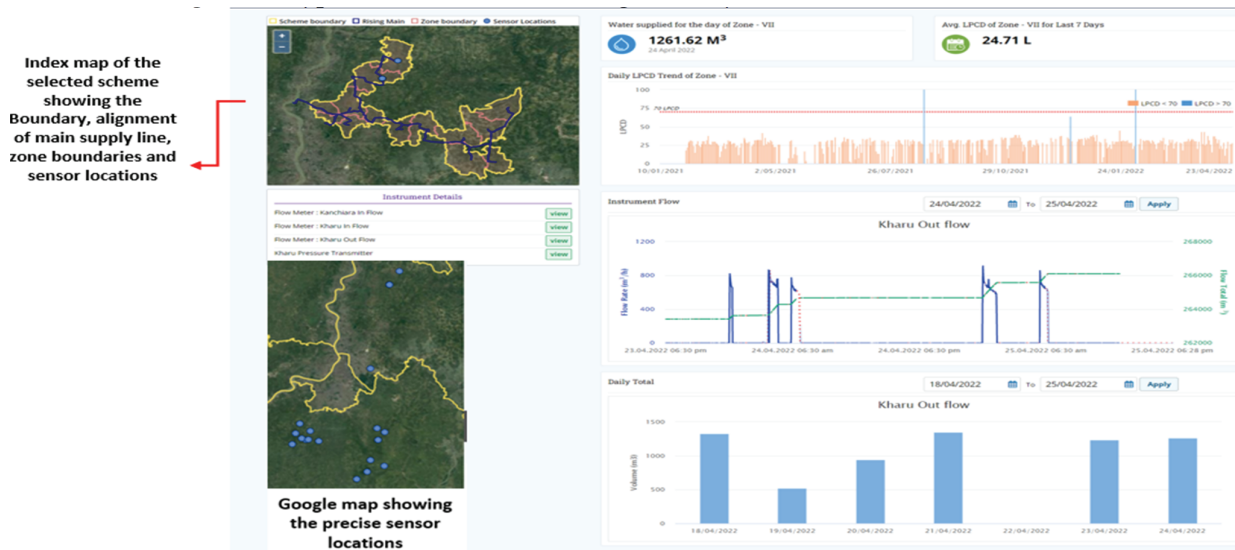


Figure-9: Screen shot for SMART Water Management System

5. Micro Grid for Electrification and Solar Lighting

- a) A Microgrid is a scaled down version of the centralized power grid and is an optimum solution to rural power cut woes. Microgrid can generate,

distribute, and control power in a rural setup or a small community. Microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single automated controllable entity with respect

to the grid as in Figure-10. It can disconnect from the traditional grid and operate autonomously too in island mode.

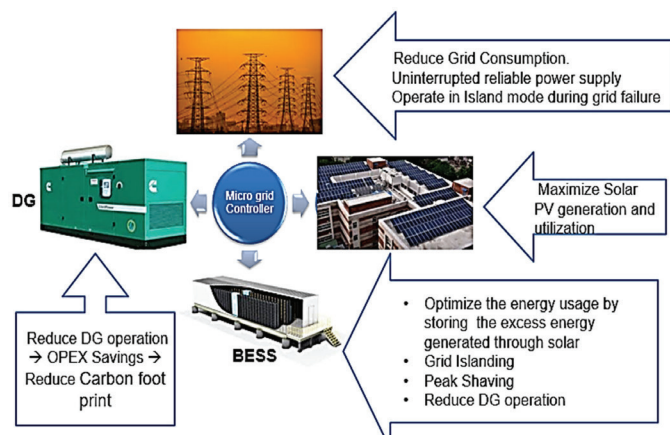


Figure-10: Microgrid

Monitoring, managing, and saving energy in a local area is referred to as Smart Energy Management. The system is characterised with energy management plan employing systems and processes to decrease and optimise energy utilisation. SMART energy management of a microgrid involves the following steps:

1. Tracking energy consumption data utilizing IoT.
 2. Identification of energy-saving possibilities and evaluation of potential energy saving methods using IOT. Typically, it would examine the Energy meter data to identify and quantify usual energy waste.
 3. Analysis of electricity meter data to evaluate efficacy of energy-saving measures implemented and progress tracking.
- b) Solar lights and solar panels at various strategic locations (Figure-11), for maximum use of renewable energy and a pollution free environment in the village with local as well as Remote On/Off facility from a centralized monitoring control room are also being planned.



Figure-11: Solar Street Lighting

Microgrid and Solar light systems increase self-reliability of the villagers and would also result in the efficient use of energy and its conservation.

6. e-governance and Digital Literacy Centers

e-governance in rural development generally includes Panchayat Bhawan with administration support services for the rural population integrated with respective Head office(s) as in Figure-12. Accessible ICT Infrastructure to the general public including optic fibre and wireless network, telecom towers, mobiles, personal computers or laptops, availability of bandwidth for mobile phones, internet, etc. play a basic role in e-governance. The administrative functions of e-governance include decentralised albeit participatory governance enabling implementation of actual rural societal needs and inclusive growth with technology implementation/upgradations.

e-governance supports availability of a localised own distinct and configurable website with local area data managed by village governance by the respective Gram Panchayat. e-governance enables generation

of alternate income for the rural population which is IT literate either locally or in remote mode, based on vacancy information broadcast on the website.

e-governance is also integrated with digital literacy including Educational Training and Capacity Building of Farmers, familiarization of Smart Health system, Government welfare schemes, Mobile applications for financial transactions and Social Media applications.

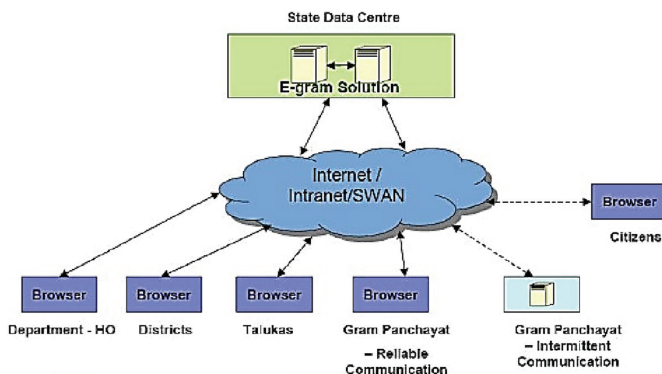


Figure-12: Integrated E Governance schematic

Partnering Rural Development

Consultants are necessary for the preparation of Detail Project Reports which includes Data Collection and Demographic Studies, Site Visits and Reconnaissance Surveys, Data Collection, Analysis, and Establishment of baseline data; Population Projections, Demand Projections including assessment for present and future, Gap Analysis, Field Surveys and Investigations, Identification of Project Components for Implementation, Assessment of Land requirements including Identification of Appropriate Parcels of Land, making Footprints - 3D Views and Walkthrough's and Detail Cost Estimates. Typical profiling and proposed design snapshots are displayed in Figure-13. Consultants are later also involved in Design and Detailed Engineering, Project Management Consultancy, Smart Automation and Execution Supervision of multiple sector social and physical rural infrastructure development and upgradation projects.



Figure-13: Profiling and Proposed Designs

Conclusions

The Rural areas are necessary and essential for sustenance hence their development is vital in Nation building and development. Currently, the villages lag behind the urban areas in terms of social and economic development. Further, with the exponential increase in population, cities across the globe are becoming more populated. To accelerate the country's economic development in a sustainable manner wherein more produce would be required to feed the increasing inhabitants, it is imperative that advanced SMART automation solutions are utilised as a part of rural development. The rural areas have vast space for infrastructure and technology development and its implementation. However, that could lead to depletion in agricultural lands and reduction of available natural resources. Hence, increasing crop yields while reducing farming time by means of remote monitoring tools using SMART automation technology would be an optimum solution. Reduced time requirement would also enable farmers to multitask. They could perform other jobs/tasks and earn more. Digital Platforms to connect farmers with Agricultural Experts are being planned for implementation. In addition, there are multiple start-ups in the country eager to provide advanced services and innovative solutions to enabling farming to progress.

Advance technology implementation in rural development would provide the much-needed SMART automation and support for improving quality of life of the populous. To achieve that goal, every village

associated with services needs to be digitized and automated. SMART automation augmented with IOT, digital-twins incorporated in villages to promote Education, Health, Agriculture, Energy generation and conservation, Infrastructure management and e governance would go a long way for successfully promoting SDG-11 with continuous support and financing from respective institutions.

In conclusion it can be said on a positive note, SMART automation applications in rural development would provide more prosperity for the farmers and their families and fast track the overall National development.

Acknowledgement

The author is grateful to TATA Consulting Engineers Limited for giving permission to submit this article.

TCE's Role in Rural Development Tata Consulting Engineers Limited are involved in a few Government of India initiated rural development projects with focus on planning and implementation of rural development objectives for enhancing skill development and providing better quality life for rural population.

TCE's consultancy services include design engineering

services and technical advisory support of Rural development initiatives involving Strengthening Smart Water Management, Climate and Disaster Resilience of selected Districts. Project involves gradual transformation of the Public Health Engineering Department into a digitally driven system with model rural water service delivery, digital operations and smart monitoring, improvisation in level of water production and reliable, safe and cost-effective distribution services, flood forecasting and early warning systems. TCE is likewise involved in Rural Electrification, Biomass Power projects and implementation of Pilot Projects.

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CEAI NATIONAL AWARDS 2023

Consulting Engineers Association of India (CEAI) is pleased to announce the **CEAI National Awards 2023** for Excellence in Engineering Consultancy Services, and invite nominations for the following awards from organisations as well as individuals:

FOR ORGANISATIONS

1) Awards for Excellence in Engineering Consultancy Services in each of the following categories:

Category A) Excellence in Project Engineering

Category B) Excellence Engineering Innovation

The Awards will be given separately for two groups of firms. The firms would be defined on the basis of average turnover for the previous 3 years:

- a) Group 1: Upto Rs. 50 crores
- b) Group 2: Above Rs. 50 crores

FOR INDIVIDUALS

2) Achievement Awards in Consultancy Services for individuals

This award will be given in each of the following categories:

Category A) Excellence in Project Engineering

Category B) Excellence in Engineering Innovation

The last date for receipt of nomination is 31st October 2023.

Please write to CEAI Secretariat at ceai.ceai@gmail.com for Nomination forms

Webinar on “Sub-Critical Flow Transition Design in Hydraulic Structures”



The fourth webinar organised by the YP Forum of CEAJ was held on 19th July 2023 on the topic “*Sub-Critical Flow Transition Design in Hydraulic Structures*” by Prof. S K Mazumder who has 62 years of teaching, research, design & consultancy experience in hydraulics & water resources engineering and has published 216 technical papers in reputed journals and conferences in India and abroad.

Synopsis: Transitions are provided in regulating and cross drainage structures such as canal falls, aqueducts, intakes etc. where the normal waterway is often restricted for economy. Different types of head loss in inlet and outlet transitions, afflux and scour etc. were explained with figures. Classification and types of transitions were illustrated with specific energy diagram. Historical evolution of transition including Hinds transition- popular in India, USA and Europe- are not only costly but are based on certain hypothesis which are not verified. Several hydraulic parameters developed for fluming (b/B), head loss coefficients (C_i & C_o), hydraulic efficiencies (η_i & η_o), Coriolis coefficients (α_1 and α_2), standard deviation of bed shear distribution (σ), flow stability (S), used for comparing performances of conventional and newly developed transitions, were narrated with formulae and figures.

Based on a large number of experiments, it was found that the Jaeger type inlet transition with 2:1 average side splay provided excellent results with 90% hydraulic efficiency. As regards outlet transition (or expansion), existing design procedure should be replaced with straight expansion provided with boundary-layer flow control devices. One such method, namely, use of a symmetric pair of short triangular vanes at entry to expansion were highly effective in improving performance and

eliminating flow separation. Length, height, spacing and inclination of the vanes for different flows for achieving best performance were illustrated with figures and photographs.

Another excellent device of flow control in expansion is to provide adverse bed slope to the expansion floor ($\beta_{opt.}$) - value of which can be determined from equations/figures derived from momentum and continuity principles. Overall economy achieved by adopting flow control devices in an expansion were shown with figures/photographs. Performance of the conventional and the innovative/economic design, developed by Prof. Mazumder and co-workers were compared to establish superiority and economy of the new design. For more information on other classes of transitions, speaker recommended his book on “*Flow Transition design in Hydraulic Structures*” published in 2020 by CRC press, Taylor & Francis group, London and New York.

Report:

Transitions are provided in regulating and cross drainage structures such as canal falls, aqueducts, intakes etc. where the normal waterway is often restricted for economy. In India, several shapes of transitions have been evolved over time (Chaturvedi, 1963; Mazumder, 1971a; Vittal and Chiranjivi, 1983). For important hydraulic structures, Hind's (1928) warped type transitions (Figure-1) is popular in USA and Europe. They are based on certain hypothesis which are not verified.

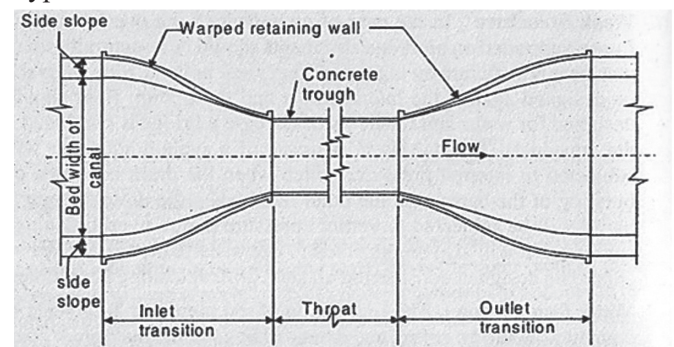


Figure-1: Hinds Warped shaped Transition

Head losses in inlet and outlet transitions (Figure-1) can be expressed in terms of head loss coefficients (C_i and C_o). Respective hydraulic efficiencies (η_i & η_o) can be derived in terms of C_i and C_o by Equations 1 and 2

$$\eta_i = 1/(1+C_i) \quad (1)$$

$$\eta_o = (1 - C_o) \quad (2)$$

Higher the head losses i.e., C_i and C_o -values, lower are the efficiencies and higher will be afflux upstream of the structure.

Mazumder and Ahuja (1978) tested performance of Jaeger (1956) type inlet contracting transitions of different axial lengths given by Equations 3 and 4

$$V_x = V_1 + a(1 - \cos\Phi), \text{ where, } \Phi = \pi x / L \quad (3)$$

$$y_x = y_1 - a/g [(a+V_1)(1 - \cos\Phi) - 1/2 a \sin 2\Phi],$$

where, $a = 1/2 (V_0 - V_1)$ (4)

(Mazumder, 1966) conducted experiments with eddy shaped (Ishbash & Lebedev, 1961) curved expansions of different axial lengths for different discharges. Figure-2 shows the variation of hydraulic efficiencies for inlet (η_i) and outlet (η_o) curved transitions with different axial lengths governed by average side splay as indicated. It may be seen that for inlet transition, η_i is very high compared to η_o for all axial lengths. Highest value of efficiency $\eta_i = 94\%$ in inlet transition occurred at 3.3:1 average splay while the same for outlet transition is only $\eta_o = 76\%$ even for a long axial length given by average splay of 8.3:1.

All curved type outlet transitions (or expansions) popularly used in India and abroad are not only costly, they are inefficient too. Highly non-uniform velocity and scour occur in tail channel due to flow separation. Expansive sub-critical flow is subjected to positive pressure gradient in the flow direction causing boundary layer separation. Hence expansion design should be based on the principles of boundary-layer flow control device as in aeronautics. However, the devices used in aeronautics cannot be directly employed in case of hydraulic structures from cost consideration. (Mazumder and Rao, 1971b) developed a unique method of boundary-layer flow control by using a pair of symmetric short triangular vanes at the entry of expansion as shown in Figure-3.

Design curves for determining length (L), height (H), spacing (U) and inclination of the vanes for different flows (Q) and Froude's number (F_0) at entry to the expansion were determined for the best performance of the expansion defined in terms of hydraulic efficiency (η_o), velocity and shear stress distribution at the exit, scour and separation of flow in the tail channel.

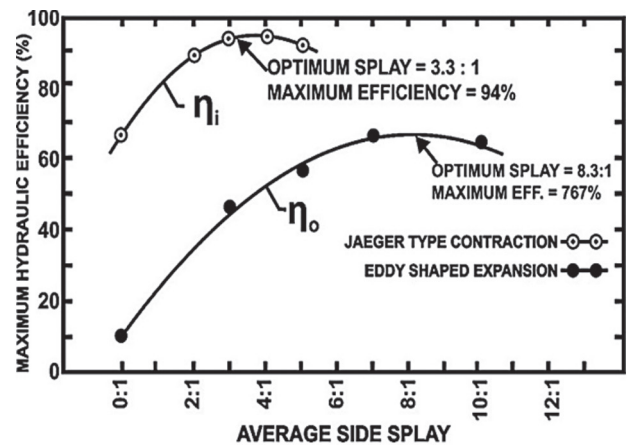


Figure-2: Variation of Efficiency with side-splay

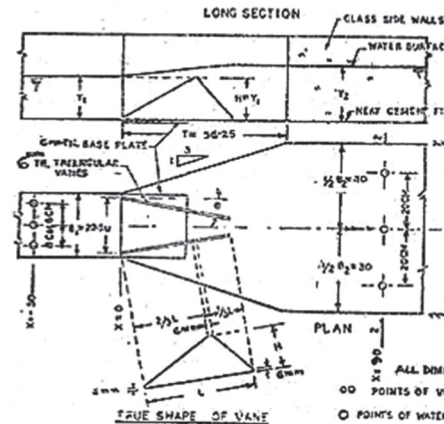
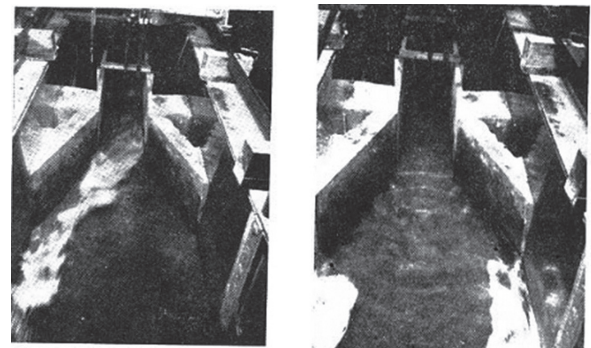
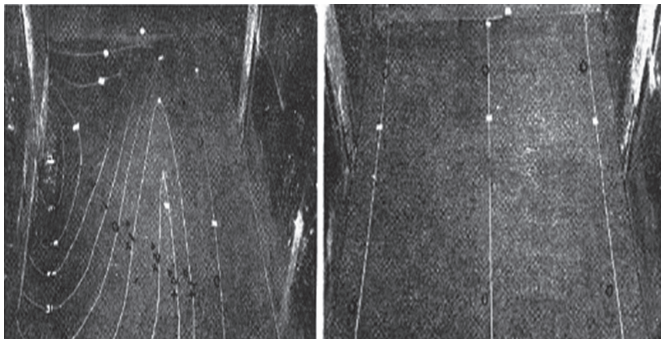


Figure-3: Triangular Vanes in Expansion (plan & section)



a. Separation without vanes b. No separation with vanes

Figure-4: Flow condition in expansion



a. Huge scour without vanes in expansion b. No scour with vanes

Figure-5: Scour condition in tail channel

Whereas the highest η_o was only 76.7% in curved conventional expansions with average splay 8.3:1, the same was 80% in a short straight expansion with 3:1 side splay. Separation and scour in tail channel with and without vanes are compared in Figure-4 and Figure-5.

Another excellent device of boundary flow control in expansion is to provide adverse bed slope to the expansion floor. More information with design examples for different types of transitions and flow control devices are given in the book “Flow transition design in hydraulic structures” (Mazumder, 2020).

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YouTube link: https://www.youtube.com/watch?v=W6MW6u69C_s

Soft Skill Training on “Be A Constructive Leader”



CEAI Academy conducted Soft Skill Trainings for young engineers on 26th and 31st July 2023 at the CEAI Centre, New Delhi on how to “Be A Constructive Leader.”

It is extremely important in consulting industry to develop skills which enable an engineer to work effectively and gel with others by having a positive influence on Clients, Co-workers and people around. Highly-developed presentation skills, networking abilities, and etiquette awareness can help win new



clients and gain more work from existing clients. Grooming young and middle level engineers by honing their abilities to resolve conflicts, solve problems, and provide excellent customer service can lead to stronger relationships with colleagues, vendors, and other professional contacts. Ultimately, strong soft skills can help engineers to gain confidence, an invaluable trait in the consulting business.

The topics covered were Leadership Quotient, Right Communication, Emotional Quotient, Motivational Quotient, Problem solving, etc.

The faculty for the training was Ms. Vijayshri Attri who has experience of 16 years in Learning & Development. She is a Professional Skills Training Expert and her passionate and result oriented approach was very good.

“Construction Law Course”

The course organised by CEAI-Western Region Centre in Mumbai started off with the Inaugural function held on 10th June 2023. The first lecture session started on 11th June 2023 and thereafter there were lectures on every Saturday and Sunday with interaction sessions till the 6th August 2023. The attendance for the course was excellent, right through. To evaluate the effectiveness of the course a Comprehension Evaluation Test was conducted through Google Forms on the 12th August 2023. The performance of the participants was excellent. Thereafter, Moot Courts (MC) were held based on a briefing for an Arbitration Case. The participants liked that experience too.

The Felicitation function was held later the same day. Hon. Justice (Retd) Mr. R D Dhanuka, former Chief Justice of Bombay High Court very kindly graced the occasion as the Chief Guest. Mr. R S Sharma, President CEAI and Mr. Amit Sharma, MD, TATA Consulting Engineers Limited were the Guest of Honour.

A few participants were invited to share their experiences and views about the course. All spoke that it was an excellent course from which they learnt a lot and look forward to more such courses.



Hon. Justice (Retd) Mr R D Dhanuka, former Chief Justice of Bombay High Court giving his address



A participant sharing his views about the course



L to R: Mr. Jeffrey Nambiar, Ms. Vrushali Shah, Dr. Milind Wankhede, Dr. Vandana Bhatt, Mr. Amit Sharma, Hon. Justice (Retd) Mr. R D Dhanuka, Mr. R S Sharma, Dr. Harshavardhan Subbarao, Mr. A P Mull, Mr. Rajiv Maini



Group of some Participants, Faculty Members and CEAI-WRC Members

Webinar on “Project Financing”



CEAI Eastern & North Eastern Region organised a webinar on “**Project Financing**” on 8th August 2023. The presentation was made by Mr Subhendu Moitra who has over 33 years of leadership experience across Infrastructure Finance/ Advisory, Investment Banking, Project Finance, Resolution of Stressed Assets, Government Advisory, M&A, and Development Banking, across sectors. He is currently an Independent Advisor and Founder Director of M/S Coeus Advisors Pvt Ltd., an Investment Banking Advisory company.

He explained that Project Finance is a non-recourse method of financing projects. It is an attractive financing alternative enabling project sponsors to shed risk to the other stakeholders and thus allows the sponsors to develop other projects and become serial developers. Therefore, the knowledge of risks and structures of project finance to handle risk is paramount in achieving the best structure from a financier’s perspective.

Project finance has a certain uniqueness vis-à-vis the traditional corporate finance – projects with large investments, longer maturity, and above all non-recourse or limited recourse to the sponsors. It is the most effective method of funding large infrastructure projects.

Project finance became popular when economic development took center-stage in developed countries and subsequently in the developing countries, where huge capital was required. More and more private developers with expertise in project execution became developers and were short of capital. The capital required for development of a large projects could only be generated through project finance. Further, with infrastructure projects being funded through PPP structure, which are projects with no tangible assets, the traditional asset-based financing has been replaced by project financing, which depends more on future cash flow and assignment of rights, as primary security, as against the tangible project assets in conventional lending for projects.

In India, with last few decades of liberalization the Government has invited private sector developers for development of large projects, especially in the infrastructure



sectors. That also necessitated project finance by lenders, for such large projects with huge debt requirements. Subsequently with increased overall growth in economy in the last decade, the investments in such projects increased further. The sudden increase in demand and the use of project finance route to finance such large requirement of debt for such projects has necessitated requirement of understanding of risk of such projects, measuring those risks and suggest appropriate built-in mitigation measures for countering the adverse effects of such risks, for the lenders as also other stakeholders.

Soft Skill Training on ‘Be a Constructive Leader’



After the successful run of the Soft Skill Training on 26th and 31st July 2023, CEAI Academy organised another on **“Be A Constructive Leader”** for engineers of M/s Consulting Engineers Group Ltd. on 20th August 2023 at Jaipur.

The topics covered were Leadership Quotient, Right Communication, Emotional Quotient, Motivational Quotient, Problem-solving, etc.

The faculty for the training was Ms. Vijayshri Attri who has 16 years of experience in Learning & Development. She is a Professional Skills Training Expert and her passionate and result oriented approach was very good.

Webinar on “Transportation, Planning, Road Safety and Traffic Engineering”

The Future Leaders Forum of CEAI organized a webinar on **“Transportation Planning, Road Safety and Traffic Engineering”** on 25th August 2023.

Mr. Suvendu Seth, a Transportation Consultant, presented the present transportation scenario and then moved on to give an overview of the transport policy, multi-modal integration, transit-oriented development (TOD) and inland waterways. Urban ferry services in several cities were also mentioned. Talking about Road Safety, he presented the existing scenario and the engineering approaches to address them. Crash Analysis, Road Safety Audit and International Road Safety Assessment Programme (iRAP) were presented. Traffic Engineering covered the basic concepts of traffic volume, speed, capacity and level of service. Traffic forecasting for future years was explained. Traffic Impact Assessment for upcoming development projects was also explained.



Training Course on FIDIC Conditions of Contracts

CEAI organised an Open-House FIDIC Training Course on *'Practical Use of Conditions of Contracts'* on 4th & 5th September 2023 at New Delhi and In-house training on "Management of Claims and Dispute Resolution" on 6th September 2023 for the employees of DFCCIL, New Delhi.

The faculty was Mr. Taner Dedezade, an international expert and a FIDIC accredited trainer on FIDIC Conditions of Contract.

The investment in infrastructure is growing and would continue to grow at an accelerated rate in the near and distant future across the Globe and especially in developing economy like India.

The multilateral financial institutions are providing the funds and want to be a part of India's growth story. The MDBs invariably use the FIDIC Conditions of Contract which are acclaimed as the Gold Standard of Conditions of Contract globally.

The participants were given insights regarding claim management and the dispute resolution provisions under the FIDIC Conditions of Contract. The training covered the identification of project risks, their allocation, and the various causes of claim which can emerge over a construction contract and the way FIDIC addresses those claims. The training also explained how to handle claims – preparation, submission, assessment, determination under FIDIC Contracts, and how disputes could be prevented or otherwise resolved.



*FIDIC Trainer
Mr. Taner Dedezade*



*Welcome address by Mr R S
Sharma, President CEAI*



Webinar on "Bulk Material Handling with Special Reference to Ports"

The CEAI Future Leader Forum organised a webinar on "Bulk Material Handling with Special Reference to Ports" on 20th September 2023. The speaker was Mr. Prabir Kumar Datta, a reputed Senior Consultant

in marine and material handling and a Chartered Mechanical Engineer, with over 54 years of experience in the domain. Though the span of the subject is large, Mr. Datta very meticulously and carefully managed to share his experience of 55 years within the time frame of the webinar.



Mr. Datta briefed about the history of evolution of material handling and the ports in India and abroad. He explained regarding the old and modern trends in the planning, operation, project management, design, safety and construction of bulk material handling terminals in the ports. He presented the different types of equipment deployed in ports, thermal power stations and steel plants for bulk material handling. He also explained the historical developments of the ports and the vessel sizes along with the recent developments in the methods of material handling with increasing vessel sizes.

The webinar was very well appreciated by the participants.

Business Opportunities Seminar, Hyderabad

A “*Business Opportunities*” seminar was organised by the Asian Development Bank and the Exim Bank in collaboration with CEAI, National Highway Builders Federation (NHBF), FIEO, BAI and FICCI on September 12th at Hotel Taj Krishna, Hyderabad. It was very well attended – by about 200 participants.

ADB funded projects both in India and other countries, offer many business opportunities for business

community. The Government of India and ADB are keen to support participation of good quality contractors, consultants, and suppliers in ADB financed projects both within and outside India, to facilitate successful implementation of the projects.



Participation in ADB funded projects offers various advantages like interest free mobilization advances, customs and excise duty exemptions, transparent and fair procurement procedures, and International Federation of Consulting Engineers (FIDIC) Conditions of Contract.

Senior officials of ADB and Exim Bank were explained the various business opportunities for Consultants and Contractors by.

- an online demonstration of the ADB website access to ADB's business opportunities;
- presentations by Government agencies implementing ADB funded projects on business opportunities available in their respective projects; and
- Case studies on how to bid successfully in ADB.

The seminar provided an opportunity for participants to seek clarifications from the procurement specialists of ADB.

Mr. Rajkumar Kacharla, Chairman, CEAI Southern Regional Centre made a presentation about CEAI and its aims and objectives, CEAI Academy and benefits of CEAI Membership. He emphasised CEAI's role in FIDIC and also mentioned regarding the election of Mr. Prashant Kapila, MD, ICT to the FIDIC Board.

Dr Ajay Pradhan, Past President, Mr. J V L Narayana, Vice President and Mr. Rajiv Maini, Director attend the event on behalf of CEAI.

SEPC Conclave on “Global Services Export Conclave on Engineering and Environmental Services”

CEAI partnered with the Services Export Promotion Council (SEPC) for a one day **“Global Services Export Conclave on Engineering and Environmental Services: Sustainable Energy, Transportation, and Infrastructure”** for Indian companies and Indian subsidiaries of foreign companies across the Engineering, Construction & Environment services sectors. It was held at New Delhi on 15th September 2023.

Shri Piyush Goyal, Hon'ble Minister of Commerce and Industry, Consumer Affairs, Food & Public Distribution,



Textiles, was the Chief Guest and inaugurated the Conclave.

Mr. R S Sharma, President CEAI addressed the participants and briefed regarding the activities of CEAI and its efforts to further the cause of Consulting Engineers.

The conclave was to enhance engineering export services to diverse countries and for that deliberations were held on the following:

- Consulting Opportunities for Indian Companies
- Emerging Business Opportunities in Consultancy Services funded by Multilateral Funding Agencies (for overseas opportunities)
- India's Differentiated Offering for Global Markets: Sustainable Energy, Transportation & Infrastructure
- Experiences, Issues and Challenges in doing business in global environment (Sustainable Transportation)
- Emerging Global Opportunities in Sustainability & Energy and India's role in shaping the journey

Soft Skill Training on “Effective Professional Development”

After the successful and overwhelming response on training **“To be a Constructive Leader,”** CEAI Academy conducted trainings for young engineers on 28th September 2023 at CEAI's Office on **“Effective Professional Development”** conducted by Ms. Vijayshri Attri.



The topics covered were Effective Personality, Effective Communication, Effective Interpersonal Skills, Professional Ethical Standards and Value of Networking, etc.

2023 FIDIC Member Association Excellence Awards – Ceai a Recipient

FIDIC announced the winners of the 2023 FIDIC Member Association Excellence Awards at a glittering gala dinner event held on 12th September in Singapore. FIDIC announced the winners of the 2023 FIDIC

Member Association Excellence Awards at a glittering gala dinner event held on 12th September 2023 in Singapore.

The awards recognise individuals, teams, campaigns, initiatives, publications, and events and celebrate excellence in how FIDIC's global member associations serve

Following a record number of entries in the competition this year, the 2023 Member Association Excellence Awards saw prizes presented across five categories viz.

- Diversity and Inclusion Initiative.
- Events and Conferences.
- Significant or Outstanding Achievement.
- Advocacy/Lobbying Campaign.
- Industry Collaboration.

In the Advocacy/Lobbying Campaign category the judges awarded the special recognition for Advocacy/Lobbying Campaign to '**Seminar on Goodbye L1**' by the **Consulting Engineers Association of India**.



Mr Prashant Kapila Elected as Member of FIDIC Board



CEAI's Governing Council had nominated Mr. Prashant Kapila, a Governing Council Member of CEAI for contesting the election to the FIDIC Board 2023.

The election results were declared during the FIDIC Annual Conference held at Singapore in September 2023.

Mr Prashant Kapila has been elected as a Member of the FIDIC Board for 4 years.

VIEWPOINT

The theme for CEAI's quarterly magazine *"ViewPoint"* December 2023 issue is *"Consultancy in the Industrial Sector"*. Dr. Rajashekhar R Malur is the Guest Editor for the issue.

The Industrial sector for this issue also includes Chemical, Oil & Gas sectors. They are the spring board for development and form a major part of the GDP. There are a good number of projects in the private as well as the PSU sectors which provide opportunities to the consulting engineers to use their expertise across various disciplines of engineering.

Professionals are invited to share case studies of how they addressed the challenges faced, practical issues experienced and the solutions to those, etc. in the various disciplines of engineering. Photographs, charts, diagrams, drawings, etc. would benefit readers for a better appreciation of the issues encountered and the manner in which they were addressed.

The themes for the balance issues for the term 2023-2024 are:

1. March 2024 – Consultancy for Start-Up and MSME
2. June 2024 – Affordable Housing.
3. September 2024 – Energy Transition
4. December 2024 – Recycling & Reuse of Building Materials in Construction Industry.

The articles for an issue need to reach CEAI at least 3 weeks prior to the end of the month of the ViewPoint issue. Articles need to be in Times New Roman 12 with single line spacing with before and after 6 pt and normal margin, on A4 size. A recent clear and bright passport size photograph of the author(s) is to be sent along with the article. For details of formatting please refer to *"Format for Articles for CEAI Viewpoint"* on CEAI's website, under 'Publications'.

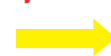
Advertisement in ViewPoint

ViewPoint is circulated to all CEAI Members, FIDIC, Ministries of the Government of India, Public & Private Sector Undertakings, Construction Firms, Contractors, Consultants, Foreign Missions and Funding Institutions in India and other organisations related to or dealing with the engineering profession. Thus, all stakeholders partnering development and progress are its readers.

Catch the Customers Eye

Get Wide Exposure

Improve Visibility



VIEWPOINT

Support from CEAI members and stakeholders are sought for increasing the number of advertisements, so that ViewPoint gains in its stature as a unique Technical Publication for the fraternity and the public at large to spread information of how Consulting Engineers are helping society for improving the quality of life and doing so sustainably.

The rates for advertisements in *VIEWPOINT* with effect from 1st January 2023 are given below:

Item	Rate Per issue* (Rs)	Discounted rate at 10% for 2 consecutive issues* (Rs)	Discounted rate at 20% for 4 consecutive issues* (Rs)
Back Cover	25,000.00	45,000.00	80,000.00
Inside Front Cover	18,000.00	32,400.00	57,600.00
Inside Back Cover	18,000.00	32,400.00	57,600.00
Full Page (Colour)	12,000.00	21,600.00	38,400.00
Full Page (Colour), if a specific page position is required.	14,000.00	25,200.00	44,800.00
Full Page (B&W) (such advertisements will be taken up for printing only when there are 4 or multiple of 4 advertisements for an issue)	8,000.00	14,400.00	25,600.00

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Tech Quiz

1. Which is the oldest existing village in India?
 - a. Mehrgarh
 - b. Kalibangan
 - c. Malana
 - d. Mana
 - e. Mehrauli
2. Ancient villages had a democratic structure
 - a. True
 - b. False
3. Which State or Union Territory in India has the least number of villages?
 - a. Chandigarh
 - b. Lakshadweep
 - c. Goa
 - d. Dadra & Nagar Haveli
 - e. Puducherry
4. What is the length of Rural Roads in India?
 - a. More than 4 million km
 - b. More than 5 million km
 - c. More than 6 million km
5. Every village in India has mobile phone connectivity
 - a. True
 - b. False
6. What share of internal migrant workers is more?
 - a. Male
 - b. Female
7. What percentage of India's population lives in its villages?
 - a. 35%
 - b. 60%
 - c. 65%
8. Which is the largest village in terms of area?
 - a. Gahmar
 - b. Reotipur
 - c. Bonthapalle
9. All villages are on banks of rivers
 - a. True
 - b. False
10. Which village is located near a meeting point of three countries?
 - a. Tawang
 - b. Munsyari
 - c. Gnathang
 - d. Kibiuthu

The first person who mails the correct answers to CEAI ceai.ceai@gmail.com will get a congratulatory mail and will be acknowledged by publishing the persons photograph in the next issue.

Contributed by A P Mull

Answers to Tech Quiz June 2023 issue

1. (d), 2. (b), 3. (e), 4. (a), 5. (a), 6. (b), 7. (b), 8. (a), 9. (b), 10. (a)



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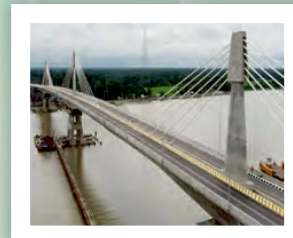
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