

# Outline on Module of Water resources

## ■ Session – 1

- a) *Introduction – Water resources*
- b) *Economic and social dimensions of water as a natural resource*
- c) *Legal and Policy framework of water management in India*

## ■ Session-2

- d) *Institutional structure for water management*
- e) *Composite Water Index*
- f) *Conflict management*

## ■ Session- 3

- g) *Management of Water Sector Projects*
- h) *Water conservation vis-à-vis augmentation*
- i) *Towards a sustainable solution*

# Session-3

- g) Management of water sector Projects*
- h) Water conservation vis-à-vis augmentation*
- i) Towards a sustainable solution*

*Management of water  
sector Projects*

# Features of a Water Sector Project

- *Implementation of a geographically distributed, large infrastructure project is a challenge;*
- *Issues such as land acquisition, rehabilitation and resettlement , obtaining statutory and other clearances, interstate, legal and contractual issues, political imperatives multiply challenges many fold;*
- *Political expediency compels thin spread of public resources;*
- *Environment of distrust;*
- *Fear of CVC, CBI and CAG compels the choice of L1.*

**“A mission to Mars is easier than planning, implementing and completing a water sector project in the country”.**

# Success Mantras

- *Complete buy in by all stakeholders;*
- *Ensuring financial closure to prevent the project becoming a 'Bottom-less pit';*
- *Detailed planning;*
- *Operational flexibility and delegation of power;*
- *Ebullient team spirit,*
- *Adoption of latest technology for investigation, planning, implementation and monitoring of project;*
- *Right selection of agencies and quick resolution of the issues raised;*
- *Direct monitoring by the highest political executive.*

# Use of Technology

- *Use of Google Maps – minimal social and environmental impact;*
- *LiDAR was used for ground survey.*
- *Drones for monitoring,*
- *Construction machinery & Equipment*
- *Real-Time Decision Support System*

# Detailed Project Re-engineering

## Google Maps:

- *Enabled re-engineering, redesigning of Kaleshwaram Project on a real time basis using Google Map.*

## LiDAR Survey:

- *Light Detection And Ranging (LiDAR) was used to do ground survey for proper citing of various structures under different projects.*
- *Monitoring of construction activities in Kaleshwaram Project by Drones.*



# Use of Technology

## LiDAR Survey of Proposed Location:

*LiDAR survey for 2,882 Sq.km of area and Ariel surveys conducted by the Dept have expedited the reengineering process by more than an year.*

## Drone based Project Monitoring

*Drone technology has been deployed by KPMG across project packages of the Kaleshwaram Lift Irrigation project with monthly analytical reports for efficient and effective review meetings.*

## IOT based Resource Monitoring

*Advanced technology like GPS enabled transit mixers with automatic alert generation in case of inactivity and availability of Wi-Fi network across 4 sq.km site for seamless communication was adopted by M/s L&T at Medigadda Barrage.*



# Legal Hurdles

- *Political expediency overtook public interest*
- *Out of 195 total cases filed by a few litigants, only 3 cases resulted into stoppage of work.*
- *Stoppage of work leads to tremendous financial costs*
- *Remobilization of specialized workers coming from different states is quite difficult.*
- *Follow the Court order by bringing the works to a safe level in order to ensure that there is no loss of property and danger to human lives.*
- *Engaging a top notch legal firm*
- *Conducting coordination meetings to harmonize affidavits / counters<sub>10</sub> filed by Government, Agencies and suppliers etc.,*

# Securing finance

- *Most of the public sector infrastructure projects are started without necessary financial closure.*
- *Resources are spread too thin over a longer time period than required.*
- *Leads to cost and time over run,*
- *Raising loans to the tune of ₹40,000 Cr from various public sector financial institutions*
- *Certainty about the payments instills a sense of confidence among working agencies,*
- *Progress of work is directly proportional to availability of finances.,*

# Making the difference

- *Meticulous planning and arranging in time financial resources*
- *Expeditious resolutions of issues of concerns raised by different agencies.*
- *Motivating engineers and workers*
- *Leading by example*
- *Unflinching Commitment of political leadership*

# Unmatched Pace of Construction

2016.....2019



2016

**Laxmi (Medigadda) Barrage, with a total length of 1.632 kms and 85 gates, has been completed in a record time of 3 years and was inaugurated on 21st June, 2019.**

*Located at Ambatipalli Village, Jayashankar Bhupalpally District.*



2019

# Outcome: After a lot of hardwork, comes sweet success!

*Under the direct control, continuous monitoring and encouragement by Hon'ble CM, this Colossal Project was completed in a record time of 24 months and inaugurated on June 21, 2019.*



# Key features of Kaleshwaram Project

- ❖ *One of the largest irrigation and drinking water project taken up by Telangana. Along with new ayacut creation, it would also stabilize existing ayacut in the state.*
- ❖ *Total Potential for irrigation is 45 Lakh acres per cropping season.*
- ❖ *The water stored by the construction of barrages at Medigadda, Annaram and Sundilla barrage and reservoirs is conveyed through a canal network to 13 districts of the state.*
- ❖ *Apart from supplying water for irrigation, the project also caters*
  - *30 TMC of drinking water to Hyderabad and Secunderabad cities*
  - *10 TMC of water to en route villages and,*
  - *16 TMC of water for Industrial use.*
- ❖ *The project has been divided into 7 links and further 28 packages, each link conveying water from a source to a storage system and in turn to distributing system to irrigate agricultural fields*

Salient Features		
Irrigation Potential	Irrigation Potential per cropping season	<b>45 Lakh Acres</b>
Water Storage & Usage	Total Storage capacity	<b>141 TMC</b>
	Irrigation	<b>169 TMC</b>
	Domestic Use	<b>40TMC</b>
	Industrial Use	<b>16 TMC</b>
Water Conveyance Network	Gravity Canal	<b>1531 Km</b>
	Tunnel	<b>203 Km</b>
	Pressure Mains	<b>98 Km</b>
	Pump Houses	<b>19 Nos.</b>
	Reservoirs	<b>16</b>
	Barrages	<b>3</b>
Project Cost	Total Cost	<b>80,190 Cr</b>
Power	Power Demand	<b>4627 MW</b>
		<b>13558 MU</b>

## National record

*A national record for pouring of 16,722 cum concrete at Laxmi (Meddigadda) Barrage of Kaleshwaram Project was achieved in a single day of the year 2018 from 22 December morning to 23 December morning. This feat was achieved by using batching plants (450 on I/S and 420 on R/S), 115 transit mixers, 19 Boom placers .*

*Compensatory afforestation completed in synch with the project.*



# Mission Kakatiya and Mission Bhagiratha – other initiatives

# Mission Kakatiya – Achievements

- *Increase in the storage capacity of tanks and other water bodies.*
- *Measures like mixing of the slit on farm land preparation reduced the use of chemical fertilizers and also improved the water retention capacity of soil.*
- *Development of fisheries and livestock and rise in the ground water levels in that area.*
- *Implementation in the form of peoples' movement led to ownership and long-term sustainability*



**Reconstruction  
of Apron**

# Mission Bhagiratha

- *Flagship programme of the State to provide safe, adequate, sustainable and treated drinking water for the entire rural and urban areas of the State.*
- *Envisaged to bring down disease burden, a causative factor for consuming contaminated water and improve health standards as well as family's economic status thereby*
- *To ensure **Per capita supply**:*
  - ✓ 100 LPCD ( litres per capita per day) for rural areas
  - ✓ 135 LPCD for Municipalities
  - ✓ 150 LPCD for Municipal Corporations
  - ✓ 10% to meet Industrial requirements
- *To provide tap connection to each household*



# *Water Conservation*

# Introduction

- *Rain Water Harvesting programme was taken up in Hyderabad Metro Area during the month of August' 1998 ;*
- *Enactment of Water, Land and Trees Act (WALTA) ,2002 making it mandatory for every premises to have rain water harvesting / conservation structures, trees and registration of bore wells .*
- *Integration with town planning;*

# Methods of Rain Water Harvesting

- *Recharge through Harvesting pits,  
(recharge from Roof top/ Surface collection of rainwater)*
- *Trenches (recharge from Roof top/ Surface collection of rain water)*
- *Open Dried-up wells recharge from Roof top / Surface collection of rain water)*
- *Invert Bore wells*
- *Mini percolation tanks*
- *Storm run off water collection and recharge*

# FIG. SHOWING THE TYPE OF STRUCTURES



*Towards sustainable water  
management*



# CONCLUSION

- *Like the proverb “Charity begins at home”, it is every one’s responsibility to save water and they have to think twice before they use water for anything other than bare necessity.*

*SO, If we*

- > Over utilise*
- >Do not conserve*
- >Do not Recharge*
- >Do not stop polluting*

*GROUND WATER*

- *Then you can imagine our fate & also the fate of our future generations.*

*HENCE*

*“HARVEST RAIN WATER & SAVE FOR FUTURE GENERATIONS*

# Piped Irrigation systems

# OPEN CANAL SYSTEM

- *Conventional Irrigation was by gravity from dams and tanks;*
- *Water conservation was not a priority;*
- *Land cost was cheaper and constituted a little of the total project cost;*
- *Inclination to sacrifice some land for common good as the land holdings were bigger;*
- *Abundance of cheap manual labor;*

# Disadvantages of Open Canal System

- *Evaporation losses;*
- *Unauthorized tapping of water;*
- *Seepage losses;*
- *Land acquisition issues;*
- *Tail end ayacut issues;*
- *Water logging and poor drainage;*
- *Loss of irrigable lands;*
- *Social problems like canal crossing etc.,*

# Unauthorized Tapping



# SOIL DETERIORATION DUE TO WATER LOGGING AND POOR DRAINAGE



# SOCIAL PROBLEMS LIKE CANAL CROSSING



Social cause



# Pressure Pipes-An Alternative

- *Evolution of pipe industry and better understanding of pipe hydraulics;*
- *Only right of way required;*
- *Can irrigate undulated terrains;*
- *No evaporation and seepage losses resulting in savings of about 40% to 45% of water;*
- *Quick and equitable distribution of water to the entire Ayacut avoiding tail end problems;*
- *Less Operation & Maintenance cost;*
- *Early completion of the project (18 months);*



No permanent land acquisition – huge savings in time and money  
+ No loss of fertile agricultural land



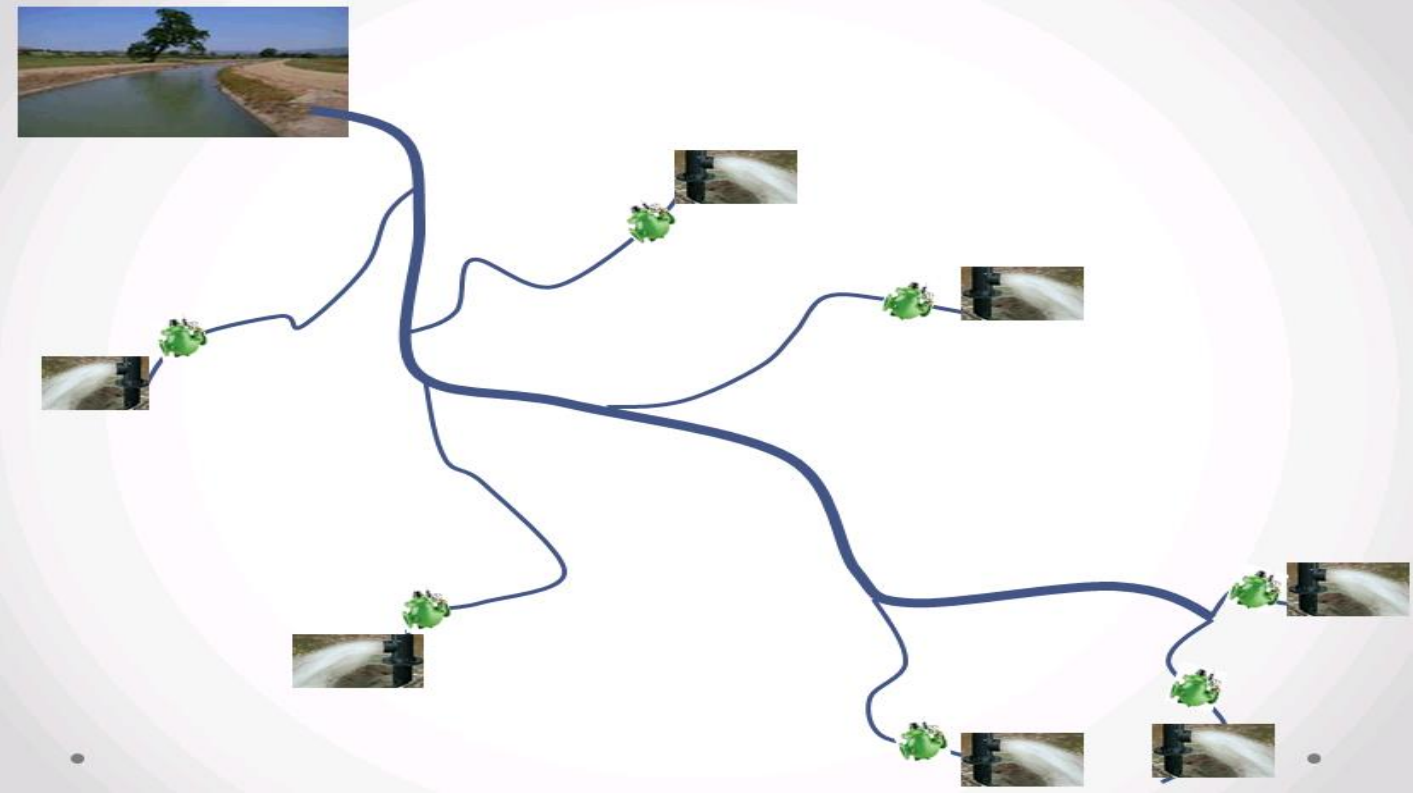
# Little Or No Loss Of Water

*About 40% savings in water by preventing evaporation and seepage  
Water saved may be used to irrigate additional ayacut. 40% savings in  
water → 40% saving in energy for lifting*



# Equitable Distribution

All areas of the command receive their share of water, no tail-end problems



Minors



Sub-Minors

# TIME SCALE



**The Conventional Open Canal System will take minimum 5 Years for Completion**

**The Pipe System can be completed With-in 1.5 year**

**The completion of the Project 3.5 years ahead of normal time Will have several financial benefits including huge savings in Interests on Capital and early income to Farmers**

# Advantages

- *Globally all major nations have recognized the advantages of pipeline irrigation system and shifted to using only pipeline system based irrigation;*
- *Developed nations have further started replacing existing canal based systems also to pipeline based systems in a phased manner*
- *Advanced technologies are being developed to ensure efficient, equitable and controlled flow of water to the entire Ayacut duly avoiding tail-end problems*
- *Less operational and maintenance cost*
- *Correct solution for undulated terrains*

# PROJECT COST COMPARISION- Package 21

S.NO	DESCRIPTION	OPEN CANAL SYSTEM	PRESSURE PIPE SYSTEM
1	Allocated water (in TMC)	13.50	13.50
2	Ayacut covered	1,70,000	3,00,000
3	Cost of the Project (Rs in Cr)	468	1,780
	Land acquisition cost	554	-
	<b>Total Project Cost</b>	<b>1,022</b>	<b>1,780</b>
4	<b>Cost per Ac (in Rupees)</b>	<b>60,118</b>	<b>59,333</b>

# RECURRING COST COMPARISON FOR 10 YEARS

S.NO	DESCRIPTION	OPEN CANAL SYSTEM	PRESSURE PIPE SYSTEM	SAVINGS
1	Pumping cost per Ac for 10 years	52000	29500	22500
2	O&M Cost per Ac for 10 years	2500	1000	1500
	<b>Total</b>	<b>54500</b>	<b>30500</b>	<b>24000</b>

# AGRO ECONOMIC ANALYSIS

In addition to Cost benefits, huge socio-economic benefits shall be derived directly by the farmers in terms of increase in production, decrease in usage of the fertilizers, labor, power etc.,





# FLOW RATE CALCULATIONS AT OUT LETS OPEN CANAL VS PIPE NETWORK

Crops	Water saving (%)	Increase in yield (%)
Banana	45	52
Cauliflower	68	70
Chilly	68	28
Cucumber	56	48
Grapes	48	23
Ground nut	40	152
Pomegranate	45	45
Sugarcane	50	99
Sweet lime	61	50
Tomato	42	60
Watermelon	66	19

Source – National committee on plasticulture applications in Horticulture (NCPAH).

# Response of Different Crops to Pipeline System v/s Open Canal System

Description	Open Canal	Piped Network
Conveyance Efficiency	70%	95%
Filed efficiency	65%	75%
Combined Efficiency	45.5%	71.25%
Flow Available at out let(5 Ha)	1.128 lps/ 5 Ha	1.069 lps/5 Ha

# Data requirements (Supply and Demand)

## Historical and Current Water

- Current Rainfall, ground water, river gauge points
- Water inflows and outflows in reservoirs and canals
- MI Tanks and water conservation structures

## Agriculture

- Agricultural data (crop wise at village level)
- Horticultural data (crop wise at village level)

## Drinking, domestic & industry

- Population data at village level in digital format
- Industrial water requirement at block level
- Live stock population data at village level

## Spatial data

- Admin, hydrological, command area shapedfile
- Cadastral maps, canal shape files
- Land use, land cover and soil data

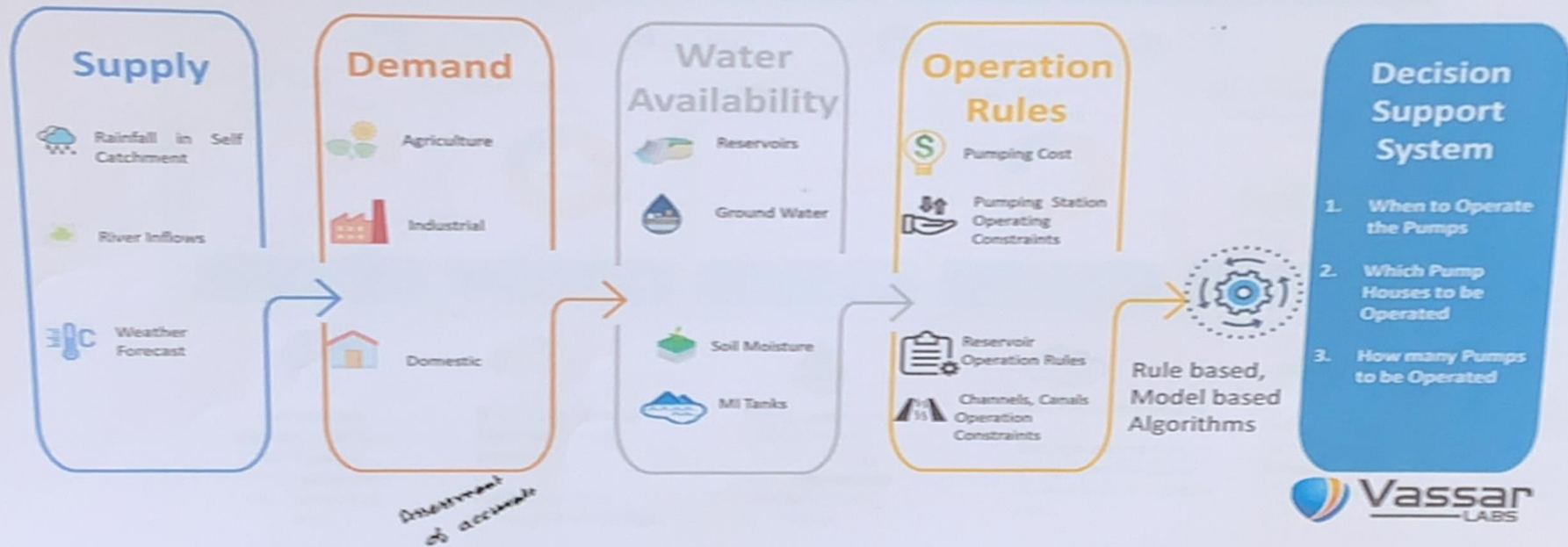
## Weather current and forecast

- Temperature, rainfall, humidity, wind speed and wind direction

# Real Time Decision Support System

7/11

## Kaleshwaram DSS - Methodology



# Towards a sustainable solution

## INDIVIDUALS, INSTITUTIONS AND PROCESSES

**Thank you...**  
**for further details please contact**  
**[skjoshioffice@gmail.com](mailto:skjoshioffice@gmail.com)**