



**SUBMARINE FLOW HARVEST  
AND  
JAFFNA WATER SUPPLY  
(ALTERNATE PROPOSAL TO DESALINATION)**

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BALA MANICS

WATER USE EFFICIENCY CONSULTANT

[WWW.RIVERFORJAFFNA.COM](http://WWW.RIVERFORJAFFNA.COM)

# BACKGROUND & ISSUES

- 150 years have passed with no reliable / sustainable / equitable water supply for the Jaffna Peninsula to meet their basic needs
- Domestic Water Supply with Low level of service in flow rate (Litre /day/percapita) and duration of supply, limited house connection and limited ground water resources
- Capillary saline infringement on productive lands in the periphery of the lagoon
- Coastal saline intrusion if and when ground water extraction exceed its limits
- Excessive submarine flow toward sea due to higher hydraulic conductivity in the limestone aquifer
- Unpredictable weather pattern due to climate change on water resource availability, security ,reliability and flooding

# PROJECT OBJECTIVES

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To provide an equitable, sustainable, reliable water supply with improved level of service to the community of the Jaffna peninsula

# PROJECT OBJECTIVE

TO PROVIDE A WATER SUPPLY SYSTEM WITH :

**Equitable**- Treating everyone equally and fairly

- Groundwater resource availability with location (spatially) and with time (temporal)
- Groundwater usability (capacity to draw both spatial & temporal)
- Groundwater storability (floating lens and porosity)
- Saline water intrusion (up coning limiting withdrawal rate) areas

**Sustainable**- Satisfy current and future generation needs by Managing resources and demand at every location at discrete time space within all limitations

- Management of Resources fit for social and environmental program and its needs
- Restoration of healthy water circulation
- Balancing demand against resource availability (spatially and temporally) with storages.
- Controlling extraction rate of groundwater resource

**Reliable**-dependable Infrastructure supply system in performing current and future needs

- Predictable water supply @ affordable cost
- Continuous water supply @ desired quality driven with population growth and spatial density changes
- On demand water supply (immediate response)
- Make use of already existing infrastructure to retrofit at reasonable cost

**Level of Service**- is a mechanism used to determine how well a water supply facility is operating from a customer's perspective

- Water quality
- Water pressure
- Delivery rates and supply duration
- Taste and odor

# PROJECT CONCEPT

## PROJECT CONCEPT FOR SOLVING ISSUES

- Temporal Swapping of water
- Harnessing, conserving and using untapped surplus water leading to sea Via Trans Basin Diversion ON:
  1. Suppressing Saline Intrusion (Primary)
  2. Integrated Town Water Supply with MAR during driest Months (Primary)
  3. Secured water (Irrigation /Stock /industry) requirement through storage network links.
  4. New Drip irrigation development for productive use from existing land
  5. Increased Cropping Intensity (towards 2.0) without deforestation
- Harvesting and using 5% Submarine Flow for Water supply ( Augmentation 60 – 100 days)
- Trading Water – Accessing From sleepers and SMART Irrigators
- Harvesting Ground water with EC ( 3000 -5000) for Stock usage via Solar Pumps
- Reducing Green House Gas Emission using high potential Green energy options



# RETURN ON INVESTMENT & VALUE PROPOSITION

- Invest \$A 220 Million (proposed US\$ 143.4 M ADB Phase 2 + negotiated Netherland Fund A\$ 20 M) on trans basin diversion and potential submarine flow harvest
- Recoup a return of Production Value of \$254 Million (minimum) in 15 yrs. life with Land price increase (No deforestation but includes only rainfed crop lands) from harvestable resources presently leading to sea with the following:
  1. Kanagarayan River Diversion & Uriyan Balancing Storage (Priority 1)
  2. ADB proposed Partially laid 1200mm dia & idle now (Priority 1)
  3. Cabinet approved proposed Sarasalai Storage and JWS booster station ( Priority 1)
  4. New 1200 mm parallel to ADB proposed pipe route ( Priority 2)
  5. Managed Aquifer Recharge – JWS @ ManalKadu ( Priority 2 extension to JWS)
  6. Maintain ground water mound and suppressing capillary salination around VEL ( Priority 2)
  7. Submarine Flow Harvest for a better LOS to JWS ( rural and Jaffna/Nallur) ( Priority 3)
  8. Yakachi Horticulture Irrigation Development (Priority 3)
- Inter connecting existing nearby irrigation areas to improve water reliability
- Thiruviyar Lift Irrigation energy saving and CO2 reduction offset with potential LB/RB mini hydro plant about 200 kw generating about 960 Mwhr/annum with 200 days continuous supply.
- Potential Isolation with adequate drainage facilities to Dri Dri storage presently used as a Balancing storage for Killinochi TWS towards town development.
- Benefits of ADB Phase 1 of (US \$113.6 M) is not fully materialised other than head works improvement. ADB transfer lines and distribution pipes that are being laid are currently not used.

# FINANCIAL RECOMMENDATIONS

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- Pool all the funds available in the pipeline and deliver a sustainable water supply project for Jaffna Peninsula
- ADB proposed Loans for additional financing and Technical assistant Grant ( Nov 2017) total amount US\$266M to be renegotiated for better outcome.
- Proposal of LKR 3 Billion on Elephant pass lagoon Split proposal 2018 – Phase 1 by Government of Netherlands to be renegotiated for a better outcome with Mahaweli Authority. Funding under negotiation.
- EU grant of LKR 8.26 Billion – A share of it is funding option could be mined in support of Justice, food safety and climate mitigation after COVID-19.
- Killinochi Irrigation Area Allocation water shall not be used. IF any swappable /shareable water due to smart Irrigation practices to be used as a commodity at prevailing rates through competitive “Water Trading” using IOT and Geometric Network.
- Based on Thiruviyaru Youth Pumping Scheme, Harvestable water options via pumping with green energy options at current “kWhr” rates is competitive than to purchase water at current “ML” rates.

# TECHNICAL RECOMMENDATIONS

- ADB recommended Iranamadu pipeline (partially laid along A9) to be retrofitted to suit the JWS requirement with all harvestable resources (Ref – Individual Resource & temporal distribution) other than desalination plant. This pipeline will produce an energy efficient ‘Thiruviyaru ‘ Pump station using additional hydraulic head from nearby Iranamadu Reservoir. (swapping green energy saving to other pump options that need green energy through national grid)
- Mahaweli Development Agency shall be requested again to review the trans basin diversion proposal with Water Use Efficiency projects that are beneficial to Killinochi District (ref President office letter) delayed due to Covid -19
- Professor RK Guganeharajah and ADS Gunawardena “Saralai Pumped Storage” with a smaller capacity of 6 GL & 150 ML/day pump station @ VEL to be implemented as a Central control for a reliable and better LOS to JWS.
- For generation, we are using Ground water as a source of Water supply for Jaffna and Rural area with all WQ constraints. This was achieved through village tanks / wells, It is worthwhile to capture and use 5% of submarine environmental flow for 2 – 3 months flowing to sea as a supplementation with appropriate treatment with all other identified untapped resources.
- At Identified SINKS Location (includes paddy field wells to be ground truth) for draw. Capacity is to be limited to 2000 L/hr. using Solar pump that will address saline intrusion , efficient green energy usage ( through accelerated Solar farm and Windmill Projects) and to suit the ground water recovery. For a rural town with a population 10,000 @100 L/day requires 80 Bore pumps or 20 agriculture wells with a draw of 8000 L/hr. Solar farm /Windmill .
- Temple Tanks shall be used as a collection sump with lining for efficient green energy option and as a Long Term treatment site as required based on space and community agreement.
- Managed Aquifer Recharge shall be implemented ( especially Manal Kaddu Aquifer) during July/Aug/Sep through water saving projects (Kanagarayan River Diversion & NCP water) by gravity for sustainability & resilience to climate change.
- Retrofit all existing WS with ADB laid pipes (Phase 1) , service tanks shall be incorporated to get the optimum use.



# SUMMARY

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- This is a Nature-Based Project with Integrated Solutions resilience to:
  - Coastal degradation by saline intrusion
  - Capillary Salination induced by evaporation in shallow lagoons and high tides.
  - Harnessing wasted water and convey by gravity to needed area (without deforestation) during driest period to additional Land ( 860 ha @ Uriyan and 750 ha @ Yakachi).
  - Improved level of service to peninsula portable water supply
  - Multi source scalable submarine flow harvest water supply option that could retrofit and adaptable to existing water supply.
  - Use of Brackish water 3500 – 5000 EC underlying below fresh water for livestock with solar pump in unused lagoon periphery lands for grazing.
  - Existing Irrigation areas full water entitlements are preserved.
  - Reclaiming Lands that are continuously affected by capillary salination

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# APPENDICES

## Solution to Issues

- Kanagarayan River Diversion
- ADB Iranmadu Pipeline
- Value Added ASDB Iranmadu Pipeline
- Temporal Water Swap
- [VEL Capillary Suppression & EPL](#)
- EPL harvest and Theme park
- ManalKadu Aquifer recharge
- Capillary Salination Suppression
- Cabinet Approved Sarasalai storage
- Improved Level of Service JWS
- Optional Submarine flow harvest
- Cost effective Multi source Loop supply

- Refer [www.riverforjaffna.com](http://www.riverforjaffna.com)
- Presentation for [Appendices](#)
- [Tour](#) of the project

## Cost facts

- Estimates Cost Break down
- A\$240M investment Phasing
- Value proposition of water
- Value proposition of energy

## Value Added facts

- Other Proposal Comparison
- Water as a Commodity
- Collaboration
- Technology Transfer
- Covid setback

## Project Beneficial Facts

- ✓ Uriyan Development 860 Ha & Aquaculture
- ✓ Harvestable Resources
- ✓ Sustainable One Pool JWS
- ✓ Sustainable solar Stock development
- ✓ Community Solar
- ✓ Potential By Pass Dri Dri Storage
- ✓ High valued Yakachi Irrigation Area
- ✓ Desalination Cost
- ✓ Desalination Energy & Carbon emission
- ✓ Thiruviyaru IA energy saving & Mini hydro
- ✓ Water Quality & Barrage Gates Installation
- ✓ Aquaculture (fresh, brackish and saline)
- ✓ Creating water for dry season (No storage)
- ✓ SMEC – ADB model Water Balance
- ✓ Environmental Flow & Coral reef
- ✓ District Population & Demand

# Thank You