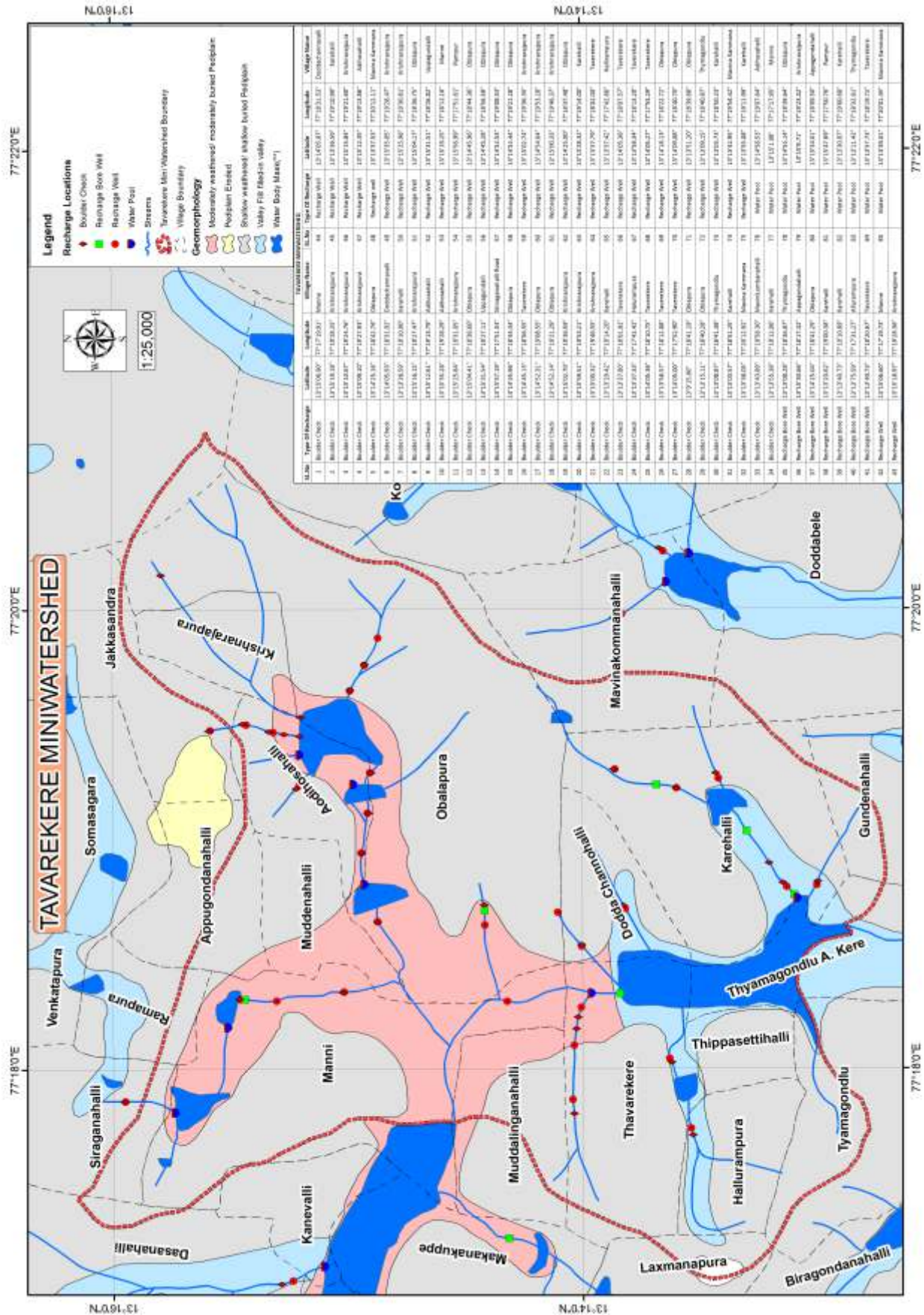




*Rejuvenation of*  
**Tavarekere Mini Watershed**  
**Kumudvathi River Basin**  
*Sponsored by*  
**Hindustan Aeronautics Limited**  
Bengaluru



*An initiative of*  
**International Association for Human Values**  
*Art of Living International Centre, Bengaluru*





## Preamble

Kumudvathi River is a tributary to river Arkavathi and originates from Shivagange Hills in Nelamangala Taluk of Bangalore rural district.

The river basin is spread over 460 Sq. Kms, covering 278 villages of Nelamangala Taluk, Bangalore Rural district and Magadi Taluk, Ramanagara district.

Both Arkavathi and Kumudvathi flow into Tippagondanhalli reservoir which was serving 30-40% water requirements of Bangalore 3 decades ago.

Although Region has received good average rainfall over three decades, the river system is now highly degraded with drastically reduced water flow and is available only during monsoon season.

An Action Plan has been prepared to rejuvenate the Kumudvathi river using satellite remote sensing data with integrated thematic maps analysis. International Association of Human Values (IAHV) has initiated the implementation of the Action Plan.

Hindustan Aeronautics Ltd (HAL), as a part of their Corporate Social Responsibility, under an MOU with IAHV, sponsored rejuvenation of Kumudvathi river in the Tavarekere Mini watershed, one of 18 Mini watersheds of river basin.

## Objectives

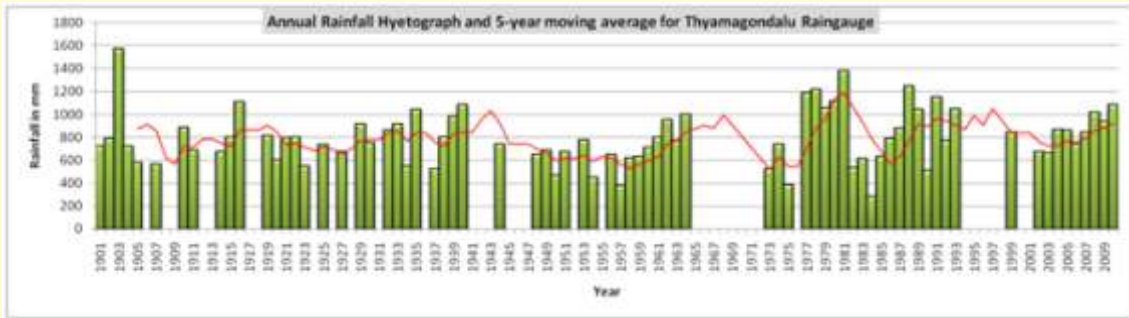
Revival of dried up natural water resources is the key objective of this initiative. Natural stream is revived by reducing the soil erosion, increasing soil moisture, artificially accelerating the process of ground water recharge, and increasing the natural vegetation. These put together result in enhancing the water absorbing and water with-holding capacity of the soil.

## Area of Implementation

The area covered by Tavarekere watershed is geographically between Mankanakuppe and Tymagondlu. Hydrologically the area is one of the 18 mini watersheds of entire Kumudvathi basin. The watershed code is 4B3B8Q as per watershed of Karnataka prepared by Karnataka Remote Sensing Application Centre. Administratively this area covers 11 complete villages (19.67 SqKm), 14 partial villages(23.62 SqKm) coming under Manne, Kodigehalli, Doddabele and Tymagondlu Grama Panchayats. This is expected to benefit a population of approx. 11,000 at a cost of INR 120.84 Lacs. This does not include costs of feasibility study, technical design, project management and training that have been absorbed by IAHV.

## Availability of rain water

Analysis of rainfall in a long term and the average availability of rainfall through runoff has been estimated. It is indicated that for 840 mm of rain fall, water availability is 147.58 Mcft.



Minimum Rainfall 277mm

Maximum Rainfall : -1570mm

100 year average (From 1901 to 2010) :- 795 mm

50 year average (From 1951 to 2010) :- 807 mm

30 year average (From 1981 to 2010) :- 840.7mm

## Methodology

The action plan prepared for rejuvenation is based on topography, soils, geomorphology, natural drainage etc. derived by the analysis of Remote Sensing Satellite data.

The action plan report has been reviewed by the national level experts. They have considered it as the best methodology and recommended it for implementation all across. These review reports have been published in Journal of Geological Society of India and Current Science.

Reference: JGSI Nov 2013, Current Science 25 Jan 2014.

## Project Details & Timeline

The following works were taken for implementation.

Sl. No.	Name of work	Nos	Unit cost in Rs.	Amount in Rs. Lakhs
1	Recharge wells	34	56871.11	19.34
2	Boulder checks	34	18347.01	6.24
3	Recharge Bore-wells	7	114549.86	8.02
4	Water Pools	10	437542.48	43.75
5	Planting of Saplings	5000	650.17	32.51
			Total	109.86
	Administrative, Overhead, Supervision etc., charges @ 10%			10.99
	<b>Total in Lakhs</b>			<b>120.84</b>

The MOU with HAL was signed on 8th January 2015. The works were commenced in the 3rd week of January 2015 and completed in full by the 3rd week of March 2015.

## Activities

### Construction of Boulder Checks

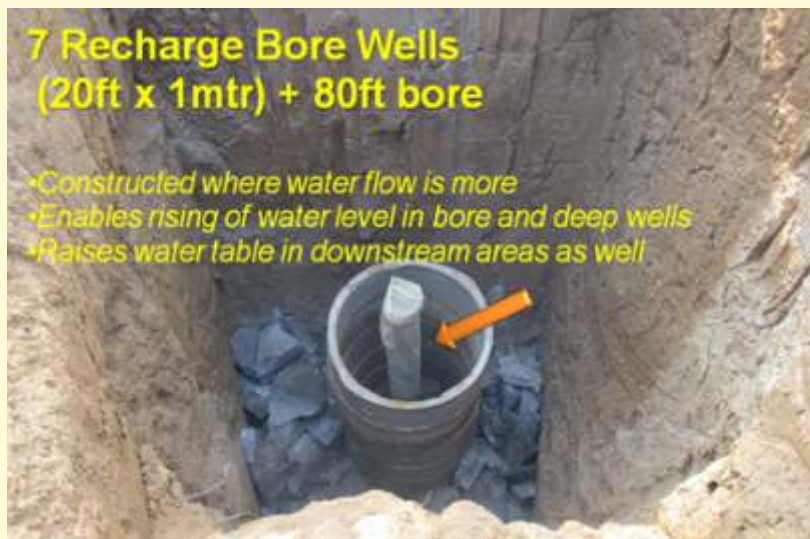
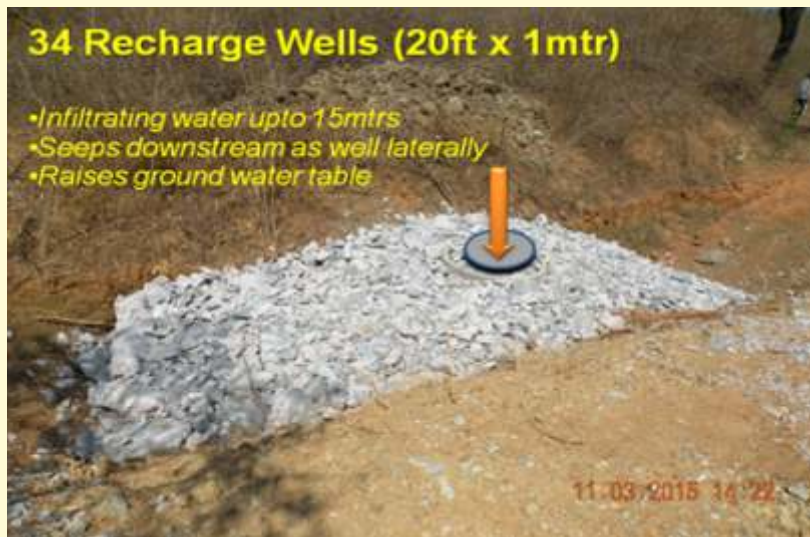


To harvest rain water and reduce the rate of erosion boulder checks have been constructed across the natural streams. Rainfall varies in intensity and surface flows also vary during the rains. It could be turbulent, semi turbulent or lamellar flow along the natural streams. Each such flow, carry soil particles or sediments and deposit in the water bodies as layers of silt. Such silt layers have been reducing the storage capacities of the existing tanks. Further the rate of percolation to enrich the ground water is also reduced due to less permeable silt layer.

Construction of boulder checks will reduce erosion, siltation and increase the soil moisture and make runoff water available for artificial recharge of ground water. Sites for boulder checks have been selected all along the stream network.

In Tavarekere mini watershed 34 boulder checks have been constructed.

## Construction of Recharge wells and Recharge Bore wells



The natural arrangement that existed to recharge ground water is distorted because of the destruction of natural vegetation and the soil erosion factors. To bring back the natural water balance in a short period artificial recharge techniques have been evolved and relevant structures designed and constructed.

These structures are planned in appropriate geo-morphological and geo-hydrological sites. These sites are effective in transforming surface water into the ground water and make it available for wells and bore wells and also create a base flow to sustain the surface water availability.

The recharge wells are capable of filling the shallow aquifers which act as a source for open wells. Increased base flow in the higher order streams sustains the surface water.

In Tavarekere mini watershed 34 Recharge wells and 7 Recharge bore wells have been constructed.

## Creation of Water Pools inside tanks

### 10 Water Pools inside tanks

28m x 28m x 4m

- Water storage in a column with minimum spread area
- Reduce evaporation
- Source of water for human, cattle and birds



Water pools are constructed at the junction points of the natural streams and the surface water bodies (Tank). Irrigation tanks were constructed by our ancestors to harvest rainwater and make it available for irrigation and drinking needs. However over the years the tanks are silted and have lost their storage capacity. The water is spread in the tanks appearing as thin sheet. Therefore, the rate of evaporation is greater than surface water storage and infiltration.

The creation of water pools helps to harvest rainwater and sustain availability of surface water due to increase in base flow of recharged ground water.

10 Water pools have been created in this mini watershed.



## Afforestation



It is necessary to plant trees of native species to revive the geo hydrological situation. Each tree has its own root system which is capable of attracting the water molecules. Major part of the attracted water will percolate to vadose(gravity) zone through capillary fringe and reach the water table.

5000 Saplings have been planted in two tank beds. Native Species planted include Torematti, Mahagani, Jambunerala, Tamarind, Ala, Arali, Neem, Akashmallige, etc. All these plants are eco-friendly and helpful in long term soil restoration and enhancing the water absorbing and with-holding capacity.





## Expected Project Benefits

Following benefits will be visible, post 3 rain cycles, after the rejuvenation of entire Kumudvathi River Basin

- Overall groundwater development
- Revival of defunct borewells and open wells
- Protect drinking water sources
- Rejuvenation of irrigation tanks leading to Agro-horticultural developments
- Increase of Natural Vegetation
- Increase in Food, Fuel and Fodder
- Environmental development leading to eco-hydrological conservation
- Eco-restoration

## Way forward

The full benefits of the project will be visible only after the completion of the works in the entire Kumudavathi Basin. Two more rain cycles is the target envisaged by the team. Efforts are on to rope in a few more corporates and also Government of Karnataka for this purpose. We request HAL to take up a few more mini watersheds under CSR for the year 2015-16 also.

## About Hindustan Aeronautics Limited

Hindustan Aeronautics Limited is a navaratna status public sector undertaking under the Ministry of Defense operating in the aerospace manufacturing domain & manufactures aircrafts and associated systems for customers within and outside India. The company traces its roots to the pioneering efforts of an industrialist with extra ordinary vision, Late Seth Walchand Hira Chand, who set up Hindustan Aircraft Limited at Bangalore in December 1940. In march 1941 the Government of India became its share holder and subsequently took over its management 1942. HAL was formed by merger of Hindustan Air crafts Limited, Aeronautics India Limited & Aircraft Manufacturing Depot, Kanpur on 1st October, 1964.

HAL is recognised as the Flag Bearer of Indian Aviation and is ranked 33rd as per the Flight International Top 100 Survey of Aerospace manufacturing companies published in 2013.

(Source : Sustainable Development Report of HAL 2013-14.)



Art of Living International Campus, Bengaluru

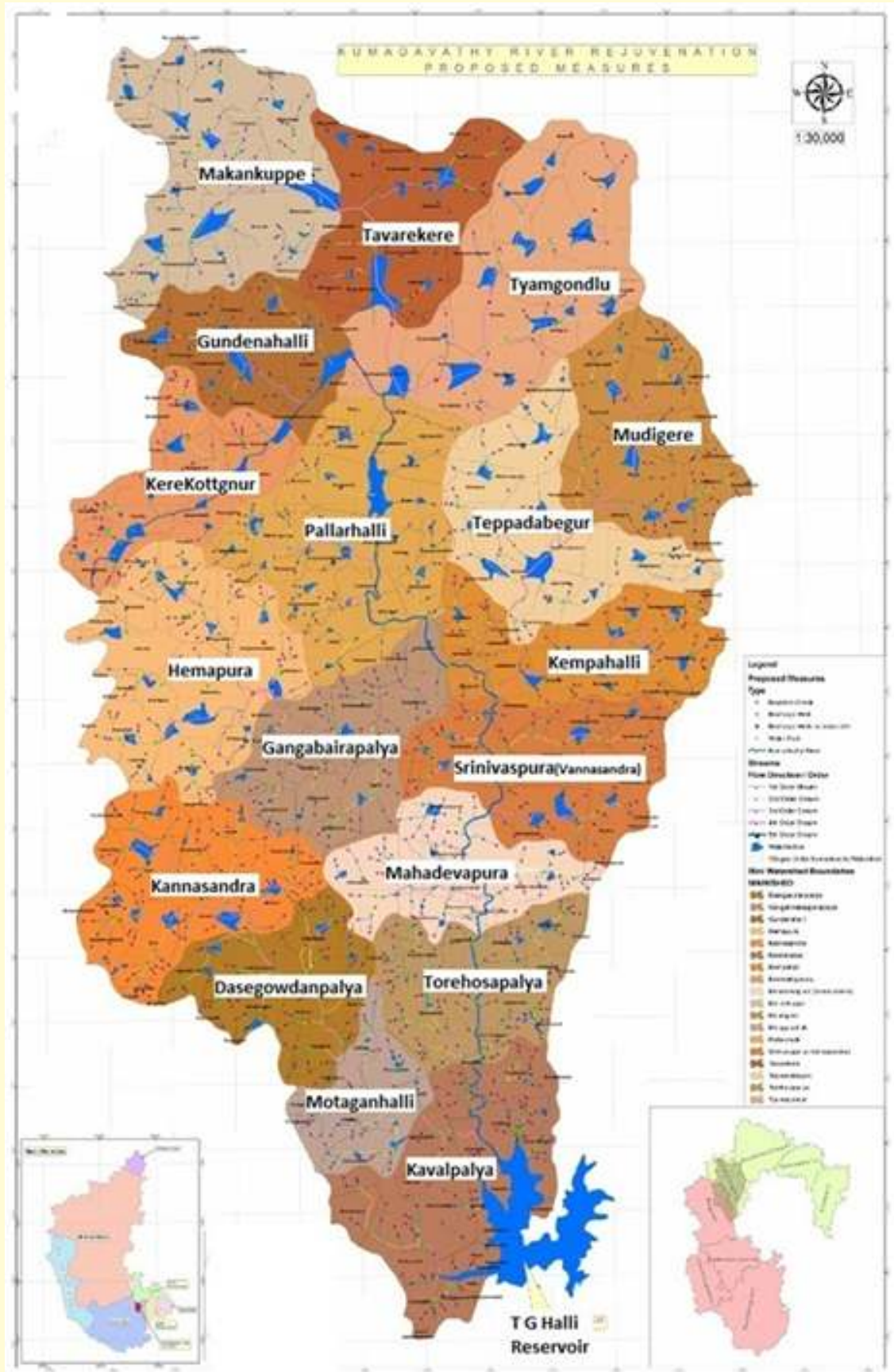
## About International Association for Human Values

The International Association for Human Values was created in Geneva in 1997 by His Holiness Sri Sri Ravi Shankar as a global platform for humanitarian initiatives that solve problems by uplifting human values.

Through its country organizations and partners, IAHV conducts service projects and raises funds for humanitarian initiatives throughout the world. Over the past decade, IAHV India has successfully transformed distressed communities, and spread human values in the daily lives of millions through our numerous service initiatives. IAHV also work under Corporate Social Responsibility program in partnership with Corporates looking to contribute towards building a more sustainable future.

## Kumudvathi River Rejuvenation Project – Taverekere Miniwatershed Summary of Works sponsored by H A L in four Grama Panchayat Areas

SI No	Name of Grama Panchayat	Name of Village	Recharge Well	Boulder Check	Recharge Bore Well	Water Pool
1	Manne	Adi Hosa Halli	SI Nos 2, 32 [2]	SI No 2, 3 [2]	--	SI No 8 [1]
		Hallu Rampura	SI No 8, 19 [2]	SI No 7, 17 [2]	SI No 6 [1]	SI No 3 [1]
		Taverekere	SI No 18, 20, 21, 22 [4]	SI No 16, 18, 19 & 20 [4]	SI No 7 [1]	SI No 6 [1]
		Appa Gondana Halli	SI No 6, [1]	SI No 6 [1]	SI No 2 [1]	SI No 2 [1]
		Manne	SI No 7 [1]	SI No 28 [1]		SI No 9 [1]
		<b>Sub Total - GP</b>	<b>10</b>	<b>10</b>	<b>3</b>	<b>5</b>
2	Dodda Bele	Kare Halli	L No 17, 30 [2]	SI No 15, 24, 27, 34 [4]	SI No 4, 5 [2]	SI No 4 [1]
		Mavina Kammana Halli	SI No 28, 29 [2]	SI No 25, 26 [2]		SI No 7 [1]
		Dodda Chenna Halli		SI No 33 [1]		
		<b>Sub Total -GP</b>	<b>4</b>	<b>7</b>	<b>2</b>	<b>2</b>
3	Kodige Halli	Obalapura	SI No 5, 9, 10, 11, 12, 16, 23, 24 25 [9]	SI No 5, 8, 9, 10, 11, 21, 22,32 [8]	SI No 3 [1]	SI No 10 [1]
		Krishnaraja Pura	SI No 1, 3, 4, 13, 14, 15, 31, 33, 34 [9]	SI No 1, 4, 12, 13, 14,29, 30, 31 [8]	--	SI No 1 [1]
		Sub Total- GP	<b>18</b>	<b>16</b>	<b>1</b>	<b>2</b>
4	Thyamagondalu	Thyamagondlu	SI No 26,27 [2]	SI No 23 [1]	SI No 1 [1]	SI No 5 [1]
		<b>Sub Total - GP</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>
		<b>Grand Total</b>	<b>34</b>	<b>34</b>	<b>7</b>	<b>10</b>



## Visit of HAL Officials to the Project Site



**Kumudvathi River Rejuvenation Project  
Tavarekere Mini Watershed.**



Hindustan Aeronautics Limited



International Association for Human Values