

AGRICULTURAL WATER GOVERNANCE: SUSTAINABLE PRACTICES AND STRATEGIES

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PREFACE

Scarcity of water is chief amongst the several challenges faced on a global context, as inherently the said natural resource contributes to domestic usage, irrigation, agricultural productivity and is critical for ensuring food security. Irrigation techniques depend significantly on the availability of water, and there are diverse practices fostered, strengthened and promoted by local communities. As per a press release by the Press Information Bureau, Government of India in August 2021, the contribution of the Agricultural Sector to India's GDP has been pivotal, despite the outbreak of Covid-19, accounting to 20.2 percent of the Total Gross Value Added.

The federal structure of the Indian administration leaves the governance of Agriculture and Water subject-matters of its various regional provinces or States. Nevertheless, the Central Government has been on its toes to supplement the State Governments through various initiatives such as Micro Irrigation Fund, Long Term Irrigation Fund, besides several others. Water being a core component in all agricultural activities, it should be a focal point of legal and policy research. Given the extant regulatory structures, diverse topography across the country, coming up with a comprehensive law and policy framework is cumbersome, and as such this research is directed to fulfill such objectives.

The Agri-Consortia Research Platform on Water (Agri -CRPW) granted a five-year project to the Centre for Environmental Law, Education, Research and Advocacy, (CEERA), National Law School of India University (NLSIU) on 'Discussion on Water Governance and Policy' connected with areas of Institutional and Market Innovations Governing Sustainable Use of Agriculture Water. Under the aegis, CEERA has aimed at coming up with legal discourse on means in which water use efficiency in India can imbibe from various best models. By delving into the water laws that exist at the state level, a comparative analysis has been carried out to detail the existing legal regime. This book published as one of the deliverables under the project seeks to empower institutions to increase efficiency in service delivery; fostering effective management, distribution and sustainable use of water resources.

The project has multiple objectives which include evaluating regulations, laws, rules of State and Central Governments governing water resources with respect to institutional innovations for sustainable use of water resource. Under this project, CEERA, NLSIU has studied the Cauvery Dispute, the legal and policy framework at the Central level and in twelve states *viz.* Karnataka, Odisha, Madhya Pradesh, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Uttar Pradesh, Punjab, Uttarakhand, Kerala and West Bengal. The outcome of this was a comparative analysis, highlighting the commonalities, benefits and lacunae in the regulatory framework of water management.

CEERA hosted two in-person consultative workshops and owing to the COVID-19 pandemic, one online national seminar was organised. The two consultative workshops were hosted by CEERA, NLSIU in collaboration with Jagadguru Sri Shivarathreeshwara (JSS) Law College, Mysore on 24th March, 2021 and Vasudev Mahadeva (VM) Salgaocar Law College, Panaji on 31st March, 2021. The National Seminar was conducted online by CEERA-NLSIU in collaboration with ICAR-IIWM, Bhubaneswar, and UAS, GKVK, Bengaluru on 26th March, 2021. All the three events saw enthusiastic participation from various stakeholders and deliberations were made on various aspects of agricultural water use law and policies. This book includes various papers presented by resource persons in the aforesaid events.

As a pre-cursor to this book, CEERA, NLSIU had published a book titled “A Primer on Agricultural Water Use Law in India” in December 2020. And it gives us immense pleasure to publish another research outcome on the scantily researched area of Agricultural Water Use Law and Policy. This book is divided into five parts.

The first Part includes six research contributions on the theme *Analysis of Water Conservation Policies in Various Jurisdictions*. The authors of the articles under this section have presented an overview of the traditional irrigation systems in Dakshina Kannada, Udupi and Kasargod; an analysis of the Jammu & Kashmir Water Resources (Regulation and Management) Act, 2010; a Goan and Karnataka perspective along with surface water quality for irrigation and water use in peri-urban areas.

The second Part of the book comprising of two research contributions focuses on the theme *-Use of Technology in Water Conservation and Usage*. The authors in this section have analysed the Flexi-Check Dam technology for Water Conservation and Efficient Use for Agriculture and the Impact of Treated Sewage Water on Farm Economy in Kolar District, Karnataka.

The third Part of the book is on the theme - *Indian Legal Framework on Regulation of Water Conservation and Resolution of Disputes* and has eight research contributions. In this section the authors have examined the water quality in agriculture in terms of land use patterns

and have also analysed the policies related to the same. Furthermore, a constitutional perspective in terms of food security and the use of water has also been analysed. Role of panchayats in implementation of water policies and schemes in the agriculture sector along with an examination of the irrigations laws have been spoken about. The interstate water disputes in India have been looked at in terms of their recent developments; and, also from a conservationist point of view and management of ground water crisis in the country has also been explored.

The fourth Part of the book is on *Water Policy for the Agricultural Sector in Light of Climate Change* comprising of three research contributions focuses on climate change, sustainable water management and agricultural sector and policies in India related to the same are explored. A brief analysis of the policy related to rainwater harvesting is also addressed by the authors.

The last Part of the book has two research contributions on the areas of *Economic Evaluation of the Efficiency of Water Projects*, wherein the authors have specifically made an economic analysis of water productivity and efficiency and energy costs in Godavari command area and Ramthal Project in Karnataka.

Coming up with a book on these research areas involved an engaging discourse with various stakeholders and the outcome is owed to a concerted team effort. In this regard, we would profusely thank all the institutions involved in the project, viz., **Indian Council of Agricultural Research – Indian Institute of Water Management, Bhubaneswar** and the **Department of Agricultural Economics, University of Agricultural Sciences, Bengaluru**. In particular we would like to thank **Dr. Atmaram Mishra, Director, ICAR-IIWM, Dr. S. K. Jena, Principal Scientist, ICAR-IIWM** and **Dr. P. S. Srikantha Murthy, Professor, UAS, Bengaluru** for their collaborations.

We would also like to extend our sincere gratitude to the **University of Agricultural Sciences, GKVK, Bengaluru, JSS Law College, Mysore** and **V.M. Salgaocar College of Law, Goa** for their support and extensive co-operation in organising the consultative workshops on “**Agricultural Water Use Law, Policy and Management in India**”. We specially acknowledge the support and cooperation extended by **Dr. Nataraju S., Principal, JSS Law College, Mysore** and **Dr. Shaber Ali Gandaman, Officiating Principal, V.M. Salgaocar College of Law, Panaji**.

We acknowledge the rich insights of all the Resource Persons and stakeholders for their active participation and their contributions to the deliberations under the Project and

for their invaluable contributions towards this publication, who include **Dr. P. Ishwara Bhat, Akhila Basalalli, Nayashree Bhosge, Dr. Arvind Jasrotia, Kartika Bakshi, Dr. G. Shaber Ali, Dr. Kim Couto, Dr. Shilpa M.L., Seemakowsar. N., Dr. Priyanka Jamwal, Dr. Sharachandra Lele, Dr. Susanta Kumar Jena, Dr. P. S. Brahmanand, N. Ramesh, Dr. Jagannath Olekar, Dr. Vani Kesari, Dr. C.N. Manjappa, Dr. Manjunatha C.S., Dr. Nataraju S., Dr. N. Sathish Gowda, Dr. Uday Shankar, Dr. G.B. Reddy, Dr. S.B. Md. Irfan Ali Abbas, Dr. Misha Bahmani, Yashdeep Lakra, Aditi Tripathi, Omkareshwar Pathak, Dr. Yogendra Kumar Srivastava, Vidya Ann Jacob, Ishita Das, Banda Sainath and M. Shivashankar Hugar.**

We would like to acknowledge the efforts of the research team at CEERA - **Madhubanti Sadhya, Rohith Kamath, Raghav Parthasarathy, Vikas Gahlot, Geethanjali K.V. and Lianne D'Souza**, who have supported in organizing the workshops and also in putting together this book.

October, 2021

Prof. (Dr.) M. K. Ramesh
Prof. (Dr.) Sairam Bhat

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PART I

Analysis of Water Conservation Policies in Various Jurisdictions

Chapter 1

A Study of Kattas as Traditional Irrigation Systems in the Districts of Dakshina Kannada, Udupi and Kasaragod

Dr. P. Ishwara Bhat* Akhila Basalalli** Nayashree Bhosge***

Abstract

The paper in emphasizing the need for revival of traditional irrigation systems, studies the efficacy of Kattas (temporary check dam) as a reliable means of irrigation in the districts of Dakshina Kannada, Udupi of Karnataka and Kasaragod of Kerala. Kattas being temporary structures with barricade/bunds across the rivers or streams not only store water for community irrigation during summer season but also play a pivotal role in sustenance and maintenance of ecological balance by retaining moisture and increasing ground and surface water level. The empirical data indicates a few challenges associated with the traditional Kattas for which there has been a

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Sri H.P. Jayaprakash et. al., Ground Water Year Book of Karnataka, 2016-17, Govt. of India, Ministry of Water Resources, River Development & Ganga Rejuvenation, Central Ground Water Board, Bangalore, October 2017, Also See P. Ishwara Bhat, et. al., 'Karnataka', in Groundwater Law and Management in India From an Elitist to an Egalitarian Paradigm, Khan Sarfaraz, Puthucherril Tony, Paul Sanu (Eds.), Springer, 2021

great demand by farmers for government support in terms of finance and technical aid. The paper examines the response by the Governments of Kerala and Karnataka through several schemes and programs, prominent of which is the construction of Vented Dams (VDs). Highlighting the disadvantages of the VDs, the paper makes a comparative analysis between Kattas and VDs on parameters of being eco-friendly, disaster resistant, community led and fairly accountable. It further suggests that the regulated use of Kattas with the Government intervention and community participation increases their efficacy making them a reliant irrigation system in the districts of Dakshina Kannada, Udupi and Kasargod.

Keywords: *Katta, Vented Dams, Traditional Irrigation Systems, Water Conservation, Community Participation.*

The emphasis on traditional and alternative forms of irrigation and their revival is of great importance given the rampant water crisis in the country. The need for the revival of traditional forms of irrigation is strongly felt across Karnataka as it appears to be the viable solution to the alarming crisis. The Ground Water Year Book of Karnataka has recorded a fall in water levels in 70 percent of wells in the decade 2006- 2015 and agricultural use of the groundwater largely attributes to such depletion. There have been persistent efforts at all levels to conserve water for instance, the Ministry of Jal Shakti has stressed on the importance of rainwater harvesting, renovation of traditional water bodies and tanks, reuse and recharge structures and afforestation;¹ Prime Minister in the recent Mann Ki Baat has initiated a new 100 days campaign ‘catch the rain’.² The National Water Policies,³ and Karnataka State Water Policy, 2019⁴ further encourage the revival of traditional water harvesting systems to solve the problem of water crisis. Such water conservation drives have provided impetus for the reversion to traditional forms of irrigation as a viable and alternative model. The paper explores the Kattas (temporary check dam) as reliable traditional irrigation model of Coastal Karnataka and vouches for their efficacy. These are classical irrigation structure predominately found in the districts of Dakshina Kannada, Udupi and Uttara Kannada of Karnataka and Kasaragod of Kerala.

1 http://164.100.68.78/gwh/GWH_Home.aspx accessed on 8/3/2021

2 https://www.pmindia.gov.in/en/news_updates/pms-address-in-the-21st-episode-of-mann-ki-baat-2-0/ accessed on 8/3/2021

3 National Water Policy, 2002, National Water Policy, 2012 & Section 7 Draft National Water Framework Bill, 2016.

4 KJA Task Group, Government of Karnataka, Karnataka State Water Policy, 2019, p. 187

Traditional Kattas

Kattas (temporary check dam) are temporary structures in the form of bunds constructed across the rivers, tributaries of the rivers and streams. The Kattas/ seasonal bunds or barricades are designed to store running water from streams or rivers for community irrigation during Rabi and summer season. They are significant means of water conservation as they hold back flowing water and let excess water flow. Traditional Kattas are mostly community irrigation system where their construction, maintenance and repair are managed by the community.

The construction of these structures requires enormous amounts of traditional skill and knowledge as the task of building a Katta begins from identification of a suitable location, processing the raw material into construction materials and ends with building barricade without breaches or leakages. Generally, the site selected for construction of Katta would be in a bottle-neck shape landform.⁵ Usually, the construction takes place at the end of November or beginning of December to avoid flood and water scarcity. The traditional Kattas are mostly constructed with locally available materials like stone, mud, wild creepers, wooden poles and soil. A foundation is first constructed using locally available soil or if granite rock exists then it serves as the foundation. The barricade/bund to obstruct the water flow is constructed using stones and sticky mud. A small outlet called 'Maadu'⁶(diversion channel) is left open in barricade/bund to allow the water to flow until construction of Katta is complete. After the construction is complete, 'Maadu' is closed for the water to collect. One of the remarkable features of construction is the preparation of sticky mud to bind stones in the barricade. The preparation of the sticky mud takes about a week's time as it involves kneading of the muddy mixture by feet until it gets sticky and letting it to ferment for about 3-4 days so that it acts as an adhesive to the stones while constructing the barricade/bund. To protect the slimy texture of the mud from getting evaporated, banana or areca dried leaves are used as coating agents.⁷ The process of applying such mixture to the stones is a skill whereby the continuous kneading of mud by feet fills the gaps between the stones. Hence, the construction of a Katta requires enormous skill and indigenous knowledge of appropriate place, time, process and materials. However, a few innovations to the traditional design have been brought about to increase the longevity of the structures and reduce manual labour like construction using concrete

5 Chandrashekhar Yethadka, Sarani Katta Ulisikonda Yethadka, ed. by Shree Padre & Dr. Varanashi Krishnamurthy, *Kattagalu Anushodhane Mattu Varanashi Madari*, Varanashi Research Foundation & Arghyam Trust, May 2008, pp.44-50

6 *Ibid* p. 45

7 *Ibid* p. 46

planks, fibre plastic planks, sandbags,⁸ lining plastic sheet to the tank, micro ring to check dam⁹ in place of stones and mud to prevent washing away of barrages.¹⁰ There have been innovations by farmers to the traditional Kattas with the use of HDPE sheet, iron sheet¹¹, Silpaulin sheet,¹² concwood, bison-sheet, convex sheets, and micro-ring check dams. Once the Katta is formed, the 'water spread' lasting for several months over the long basin of the stream which has rocky fissures facilitate the percolation of water into the soil effectively rejuvenating the groundwater.

The Kattas have multiple benefits not just for farmers but they are also the most effective means of rain water conservation in the Coastal Karnataka. The water from the Kattas is used for the purpose of irrigating the agricultural lands, it also provides water for the cattle and other domestic needs. The Kattas recharge water-bodies like tanks (hondas) and open wells in the surrounding areas. Another remarkable benefit of Kattas is that it recharges the water source that is located in an elevated place. Water flows from downward Katta to water sources at higher altitude due to 'capillary action.'¹³ The unique construction of Kattas facilitates the percolation of water sideways and to surface thereby enhancing the retention of moisture in the surrounding areas. The birds, animals and aquatic species also benefit from Kattas adding to their ecological significance. Since these structures are of great importance due to their multiple and varied benefits, the emphasis for their revival becomes all the more relevant.

Despite Kattas being remarkable structures, they are not without challenges. The desirability of Kattas has reduced over the years due to some of the problems that grapple them. Firstly, the breach in the walls or embankments poses threat to the stability of the Katta. The very purpose of constructing Kattas gets compromised if there is any leakage because of breach. The construction has to be re-started if the problem has to be addressed.¹⁴ The second challenge arises in the event of multiple beneficiaries of Katta when a few of them are reluctant to share the cost arising out of its construction and maintenance. The empirical data collected after interviewing one of the beneficiaries of Nereppady stream Katta reveals

8 Apa Balaga, *Hosa Aase Chigurisida Sudharita Katta*, Adike Patrike, June 2019, pp. 15 & 16.

9 Raviprasad Kamila, *Old 'Kattas' make a comeback as mini check dam*, The Hindu, Mar. 20, 2017 <https://www.thehindu.com/news/cities/Mangalore/old-kattas-make-a-comeback-as-mini-check-dams/article17533135.ece>

10 Karant, *Neer Nemmadige Katta Kattona*, Adike Patrike, August 2017, pp. 18 & 19.

11 Karant, *Marike Tagadina Katta*, Adike Patrike, January 2018, pp. 18-20.

12 *Supra* note 6, p. 46

13 Shree Padre, *Rain Water Harvesting*, Alter Media, pp. 34 & 35.

14 Ravishankar Doddamani, *Katta : Samasyegalu, Parihaargalu*, ed. by Shree Padre & Dr. Varanashi Krishnamurthy, *Kattagalu Anushodhane Mattu Varanashi Madari*, Varanashi Research Foundation & Arghyam Trust, May 2008, pp.91-99.

the reluctance of few among the seven beneficiaries to share the cost of the expenses.¹⁵ It is basic tenet that the law does not support unjust enrichment of one at the cost of another. Hence the beneficiaries using Katta water are obligated to share the cost of the expenses arising out of construction and maintenance. Thirdly, the Kattas are often under the threat of crab attack, i.e. the crabs gnaw mud from the barricades/bunds thereby loosening the structures. In order to prevent such attacks from the crabs Copper Sulphate is mixed with the mud while constructing Kattas.¹⁶ Fourthly, the construction of Kattas requires skilled labour and there has been a decrease in the availability of skilled labour over the years.¹⁷ There have been instances where only with the intention of providing employment, a few of the women labourers were assigned for the construction of Kattas under the MGNREGA. This proved to be futile since the women labourers had neither any training to construct Kattas nor did they have any knowledge of the same.¹⁸ Fifthly, the other set of problem faced during the construction of Kattas is the insufficiency of local construction material. The local material is to be transported from different places making the construction process far more tedious than it already is. Finally, there is excess reliance on groundwater as an alternative to the Kattas appears to the local communities as an easier means of irrigation. With the insufficiency of material, skilled labour, construction material and the reduced community participation, the shift from the use of water from traditional Kattas towards groundwater is evident.

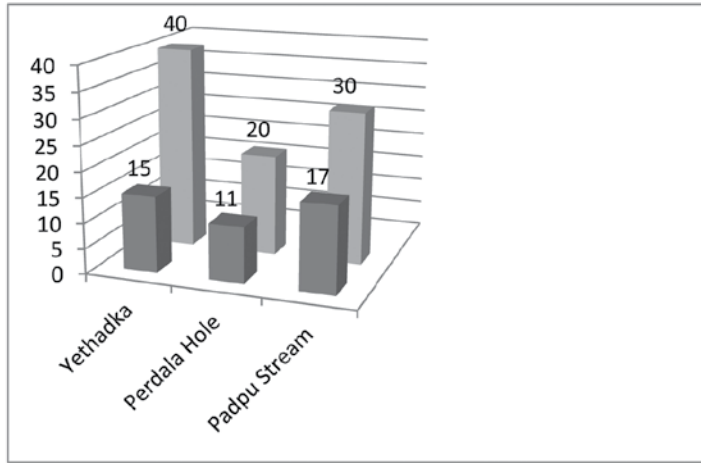
There has been a significant decline in the number of Kattas for reasons such as shifting trends of cultivation from paddy to commercial crops, use of ground water and construction of Vented Dams in the place of traditional Kattas. For instance, in Udupi especially the talukas of Karkala, Byndoor, Kundapur and Kapu have a marked decline of traditional Kattas. The charts below further the argument.

15 Also see Shree Padre, *Kattas and Madakas: Decline of traditional water conservation methods*, Down to Earth, 27 Feb 2020

16 Also see Jadadeeshchandra K., *Katta Katti Nodi*, Adike Patrike, November 2019, pp. 36 & 37.

17 Anitha Pailoor, *Water Conservation: Kattas in the coast*, Deccan Herald, 28 Nov. 2020

18 Interview with farmers at Yethadka



Decline in Traditional Kattas

Figure 1 Katta in Kasaragod District

x-axis indicates name of streams; y-axis indicates no. of Kattas constructed in 2020-2021, and no. of traditional Kattas constructed 50 + years ago.

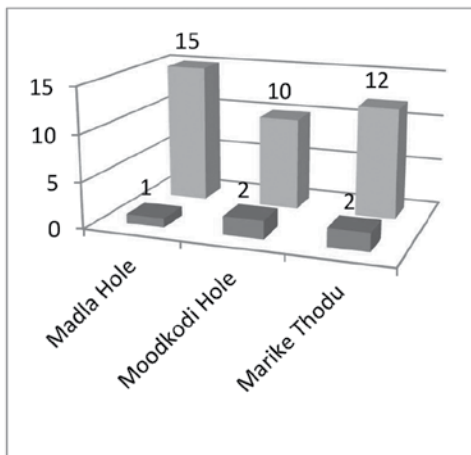


Figure 2 Kattas in DK Dist.

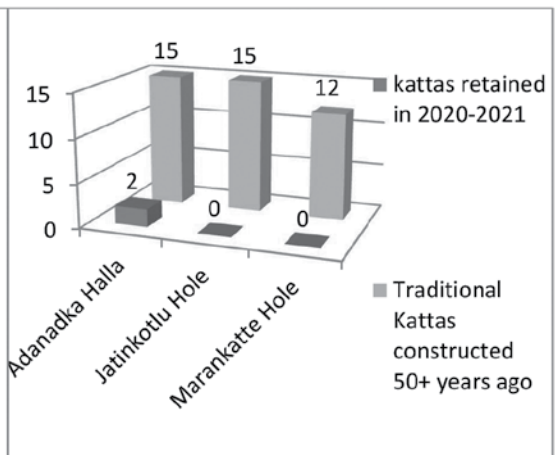


Figure 3 Kattas in Udupi District

1. Yethadka has retained 35-40% of Kattas.
2. Dakshina Kannada District has seen increased number of farmer innovated Kattas¹⁹ as compared to Kasargod and Udupi.

¹⁹ For ex. two Kattas retained in Marike thodu (stream), both are farmer innovated Kattas i.e., one

3. With increase in VDs, there has been decrease in Traditional kattas in Udupi & DK Districts.
4. VD are not constructed in small streams, farmers irrigating from these streams constructed Katta²⁰ which are tiny check dams across the drainage channel. These are inexpensive and can be constructed in a day using areca trunk, soil and plastic sheet.

While exploring the ways to meet the challenges associated with Kattas, the interviews from the framers suggested that support by the Governments and their departments in terms of financial and technical assistance would be the way forward. Since the study is focused on the districts of Dakshina Kannada and Udupi of Karnataka and Kasargod of Kerala, the responses from the two State Governments are evaluated and a comparative assessment is made on the basis of incentives provided in support of traditional Kattas.

Responses from Governments of Kerala and Karnataka

Kerala

Kerala Government has launched several schemes for the retention of traditional Kattas and construction of new Vented Dams (VDs). The VDs are the modernized concrete structures with similar function and roles as Katta. Few of the efforts by Kerala Government are as follows:

1. Minor Irrigation (MI), Kasaragod

The MI department has constructed 263 Vented Cross Bars (VCBs) in 6 divisions of Kasaragod under the Haritha Keralam Mission²¹ VCBs are generally designed in discharge areas where direct irrigation is not feasible from the streams. Vented Cross Bars are constructed across the streams with reinforced cement concrete on an average height of 2.5 m above bed level, a minimum of 2 vents and provision of wooden shutters to discharge the flood water and silt load carried during the monsoon seasons.²² The Haritha Keralam Mission has also ensured cleanliness of streams/ rivers to curb water pollution, cleanliness drives have been initiated

micro-ring check dam & another steel sheets Kattas, which are far more sustainable than traditional Kattas, sandbag Kattas and VDs. See <https://www.civilsocietyonline.com/rural-reporter/the-new-check-dams-of-puttur/>

20 Shree Padre, *Put in the Water, Take out the Guarantee*, India Together, 02 Dec. 2008 <http://www.indiatogether.org/photo/2002/rwhpadre.htm>

21 As per data available till 2014, collected from MI Department, Kerala.

22 <http://www.irrigation.kerala.gov.in/index.php/infrastructure/other-mi-structures>

with the help of the local self-government institutions.²³ The Irrigation Department has undertaken construction of seven check dams from 2010-2020.²⁴

2. Kasargod Development Package (KDP)

The Government launched a special developmental programme for the district, known as 'Kasaragod Development Package' which was started in the year 2013-14²⁵. About five rubber check dams (RCD) have been sanctioned by Kasaragod Development Package in 2019-20 and Rupees 2.43 crores has been granted for the same.²⁶ Rubber check dam or flexible check dam is an inflatable structure built across a stream used for water conservation, flood control and regulating flow of water in the stream. When RCD is inflated, it serves as a check dam/ weir. When RCD is deflated, it functions as a flood mitigation device and sediment flushing. The head or height of RCD is variable. According to the requirement, its height can be increased or decreased²⁷. The components of a rubber dam include a concrete base and side walls. Its dimension varies from a width of 1 meter to 100 m, and height of 0.5 m to 5m. KDP's water conservation project has launched construction of 900 micro ring check dams.²⁸ It has also initiated projects for construction of 16 check dams, 72 VCBs and renovation of 18 VCBs since 2014-2021 costing Rs. 11247.21 lakhs²⁹.

3. Local Bodies

Kerala Government has also initiated schemes to promote construction of traditional Kattas, for example, a few gram panchayats had sanctioned 50% of construction costs for ten years between 2005- 2015³⁰; Rs. 8000/- was sanctioned under 9th Five Year Plan,³¹ Rs. 4000/- was sanctioned to Karimbila panchayat from 2008 to 2016; and 120 MGNREGA women laborers were assisting in construction of Kattas (MGNREGA scheme for construction of Kattas was discontinued three years ago as the scheme was implemented for construction work which was permanent in nature, construction of Kattas being of temporary in nature, MGNREGA scheme was discontinued)³².

23 <http://haritham.kerala.gov.in/ininjan-ozhukatte/>

24 Data collected from Irrigation Department

25 <http://www.kasaragodpackage.com/index.php#about>

26 <http://www.kasaragodpackage.com/projects.php>

27 Jena, Design and Development of Rubber Dams for Watersheds

28 SP, *Kasaragodina Ananya 'Ring Thadegottu'*, Adike Patrike, July 2020 pp 26 & 27.

29 Data collected from Kasargod Development Package, Kasargod, *Also see Shree Padre, Rubber Anekattua*, Adike Patrike, March 2020, pp 5 -10

30 Field interview with farmers at Perdala Kattas

31 Five Year Plan from 1997 to 2002, Field interview with farmers at Perdala Kattas

32 Field interview with farmers at Yethadka, Kasaragod

The P. Prabhakaran Commission³³ was appointed to study the scope for development needs of Kasaragod especially in the light of its overall backwardness. The Commission was set up 25 years after the formation of Kasaragod. Addressing the over-extraction of groundwater, the Commission made the following observation as “problems faced due to over exploitation of groundwater can be resolved by striking a balance between drawal of ground water and its recharge. Water requirement for drinking, irrigation, etc. can be met to a large extent by adopting new approaches for optimum conservation of surface water. Over utilization of ground water and under- utilization of surface water potential are problems that call for immediate attention. Surface water which wastefully drains in to the sea is enough to take care of our drinking water and irrigation needs. Check dams should be constructed in major rivers at regular intervals to facilitate recharging of ground water.”³⁴ The approach of Kerala Government is inclined towards revival of Kattas and construction of new VDs. Several incentives have been provided for construction of Kattas and Gram Panchayats have played an active role in disbursing the sanctioned amount. Kerala has also experimented with different designs and structures of VCB’s.³⁵ However, viewed from the angle of the cost-benefit analysis, inclusive of construction, monitoring, maintenance, repair and renovation of VCBs, it was observed during field study at Kasaragod that despite the large number of schemes they were not implemented in letter and spirit.³⁶ The Report attributes these reasons for such predicament: (i) a lack of co-ordination in the functioning of Agriculture and Irrigation Departments which reduces the effectiveness of irrigation schemes; (2) low level of participation of farmers in the implementation of schemes for the development of irrigation facilities, and; (3) lack of arrangements to involve local people in the maintenance of the assets created as part of irrigation development on a sustainable basis resulting in poor efficiency.³⁷

33 P. Prabhakaran Commission Report available at <http://www.kasaragodpackage.com/index.php>
<https://cdn.s3waas.gov.in/s38dd48d6a2e2cad213179a3992c0be53c/uploads/2018/05/2018050942.pdf>

34 *Ibid*, p. 297

35 The Government bodies have also recognized the efforts of local farmers. For instance, Mini ring check dams was innovated by farmer from Dakshina Kannada District., this has been studied & is being scaled by KDP, Raviprasad Kamila, *Old ‘Kattas’ makea comeback as mini check dam*, The Hindu, Mar. 20, 2017 <https://www.thehindu.com/news/cities/Mangalore/old-kattas-make-a-comeback-as-mini-check-dams/article17533135.ece>

36 Field interview with farmers at Yethadka

37 Dr. P. Prabhakaran Commission Report, Report on the development of Kasargod District, October 2012, p. 51.

Karnataka

The Government of Karnataka has mostly constructed Vented Dams (VDs) in the districts of Dakshina Kannada and Udupi. The Dakshina Kannada district has seven major rivers³⁸ while Udupi has six.³⁹ Several departments and ministries, such as Minor Irrigation Department, Panchayat Raj Engineering Department and Agriculture Department have launched schemes such as Paschim Vahini⁴⁰, PMKSY-WD,⁴¹ PMKSY-OI,⁴² WDDP⁴³ and MGNREGA⁴⁴ for the construction of VDs. Some of the department-wise figures are as follows:

a) Minor Irrigation Department

Under Paschimvahini Scheme, 212 VDs from 2010-2020 have been completed by Minor Irrigation Department in DK District. The total funds allocated during the period of 2009-2021 to Dakshina Kannada is Rs. 54,035.31 lakhs of which A&P NABARD has funded Rs. 2659.5 lakhs, A&P has allocated Rs. 29905.75 lakhs and Pashimvahini has allocated Rs. 18811.06 lakhs.⁴⁵ The expenditure incurred for the construction of VD varies from Rs. 15 lakhs to Rs. 4670 lakhs depending on the size.⁴⁶ Minor Irrigation Department also provides storage sheds to store planks and looks after regular maintenance of the Vented Dam⁴⁷.

b) Agriculture Department

The PMKSY and Watershed Development (PMKSY-WD) is a Central Government Scheme which is implemented at State Level. Under this scheme, 60% funds were sanctioned by Central Government and 40% funds from State Government. Integrated Watershed Management Programme (IWMP) is another such scheme for soil and water conservation implemented by Department of Land Resources. In the year 2009-2010, VI batches of projects were sanctioned by Central Government. In the year 2017-18, Watershed Development for Drought Proofing (WDDP) consisting of ridge-to-valley scheme was

38 Major Rivers are-Netravathi, Kumardhara and Gowri, Gurupura, Nandini, Shambhavi, and Phalguni, as per Data collected from Minor Irrigation Department, Dakshina Kannada District.

39 Major Rivers are-Seetanadi, Swarnanadi, Shambhavi, Chakra, Varahi & Gangolli See PMKSY, Udupi District, District Irrigation Project, 2016, p. 22.

40 Data collected from Minor Irrigation Department, Dakshina Kannada District

41 Data collected from Agriculture Department, Dakshina Kannada District.

42 *Ibid.*

43 *Ibid.*

44 Data collected from Zilla Panchayat Office, Dakshina Kannada District.

45 Data collected from Minor Irrigation Department, Dakshina Kannada District.

46 Data collected from Zilla Panchayat Office, Dakshina Kannada District.

47 Data collected from MI Department, Dakshina Kannada District.

introduced by Agriculture Department, DK District. Important components of these programmes are- construction of Vented Dams, nala bunds, gowkatte, and krishi Honda. About 806 VDs have been completed by Agriculture Dept., DK Dist. and amount allocated for construction of VD is Rs. 39062 lakhs.⁴⁸ The capacity building training programmes are conducted where the user group, self- help groups and watershed committee members led by Assistant Agricultural Officer and President of Gram Panchayat are trained. About 638 VDs have been constructed by the Agriculture Department, Udupi District under PMKSY-WD, PMKSY-IO and WDDP Schemes and Rs. 1,969.81 lakhs were sanctioned for the same.⁴⁹

c) Zilla Panchayat

The DK District under MGNREGA has constructed 125 VD in the past three years and Rs. 3.53 Crores has been expended. The VDs constructed under this scheme have width between 2m to 5m, and store water between 1200m³ to 2900m³. The Panchayat Raj Engineering Department (PRED), Udupi Dist. has constructed 548 VD.⁵⁰

From the evaluation of the data, it may be evidently observed that the response by the Karnataka Government has been the construction of VDs through several schemes and enormous funds. Whereas, the Kerala Government though has launched many projects for the construction of VDs, it has nevertheless taken efforts to sustain traditional Kattas and has experimented with new innovation to Kattas.

Critical Evaluation of the Vented Dams

The VDs are seen more as a solution to the problem that traditional Kattas face. The concrete-based checked dam/ vented cross bars are projected as way out of the traditional Kattas. However, when the VDs were critically evaluated for their efficiency in water conservation and retention, channelization of stored water, longevity of the structures, cost efficacy and desirability among the users, the following inferences were made after examining the data gathered from the government authorities and interviews of the users.

1. Vented dams are constructed using concrete structures, the retaining walls and the vents are permanent structures which obstructs the flow of water permanently unlike traditional Kattas that are dismantled post-monsoon. The semi- permanent

48 Data collected from Agriculture Department, Dakshina Kannada District.

49 Data collected from Agriculture Department, Udupi District.

50 Data collected from Zilla Panchayat Office, Dakshina Kannada District.

concrete structures block 30% natural flow over the year.⁵¹ The general norm is that the obstruction has to be reasonable and must not hinder the natural flow.

2. VDs lacked structures/channels that facilitate the flow of excess water, thereby resulting in artificial floods. A few instances of which are during August 2019 floods, the embankments of 87 vented dams were damaged causing a loss of Rs 35.77 crore.⁵² There had been blockage due to fallen tree branches and garbage.⁵³ During September-October 2020 floods, at Kukkuje Village, Karkala Taluka, a VD was damaged as a result of which the surrounding agricultural plantations were damaged because of artificial flooding.⁵⁴ Many bridges in Udupi and DK Districts also were damaged during 2020 floods. A VD constructed at Palimar, Kapu Taluk, Udupi District has created huge agricultural loss upto 100 acres due to standing waters stored in this VD, and lack of channels to drain excess water.⁵⁵ The work of this VD was completed on 17th June, 2020 with the budget of Rs. 650.00 lakhs and consists of 30 Vents. There is another VD located just 50 m ahead that was built earlier and is defunct now. Further, there is another bridge 50 m ahead of these two VDs making three concrete structures in a row. As a response to flood, an inter-Ministerial Central Team was appointed to assess the damages caused by flood.⁵⁶ However, repair work is in progress and the emergency support came from the local people. The Udupi District Disaster Management Plan 2019-2020 provides for-Inspection of damage prone roads, bridges, check dams, causeways,⁵⁷ preparedness by alerting officers on the dam site,⁵⁸ forewarning settlements in the downstream, evacuation, coordination with other dam authorities.⁵⁹ However, Disaster Management Plans with respect to VDs specifically require detailed guidelines and better planning for the dam safety, keeping in view the havoc caused by the artificial floods.
3. A few of the Government constructed VDs have been inefficient to store water. The planks that are to be used in summer to stop flowing water are dysfunctional, and

51 Shivanand Kalave, Neernyamadige Shatmanad Mannina Vidya, in Kattagalu-Anushodha-negalu mattu Varanashi maadari, Varanashi Research Foundation and Arghyam Trust, May 2008, p. 24.

52 <https://www.deccanchronicle.com/nation/current-affairs/260819/mangaluru-vented-dams-gone-farmers-worried.html> accessed on 10/11/2020.

53 *Ibid.*

54 Data Collected from Disaster Management Department, Udupi.

55 Field Visit to Palimar VD and farmers interview.

56 <https://timesofindia.indiatimes.com/city/mangaluru/karnataka-3-member-central-team-visits-flood-hit-udupi-dakshina-kannada/articleshow/65786996.cms> accessed on 10/03/2021.

57 8.1.12 Udupi District Disaster Management Plan 2019-2020.

58 8.2.6 Udupi District Disaster Management Plan 2019-2020.

59 8.2.6 Udupi District Disaster Management Plan 2019-2020.

has resulted in the growth of weeds obstructing the flow of the stream in the rainy season.⁶⁰ The rainwater flooding to the adjacent agricultural lands has wrecked the crops. Due to fear of crop loss, the farmers have destroyed VDs in Yellapur, Sirsi⁶¹.

4. Flawed site selection is a significant cause for breach in the structures and leakages. Leakages in the foundation of the structure or vents or VDs which have become defunct due to other reasons, such structures are being simply abandoned and not used for anything. Shree Padre strongly opines that the Authorities have to repair such abandoned structures and make them useful rather than constructing the new ones.⁶² The interviews of the local farmers at Moodkodi village,⁶³ suggested that VD was constructed in that location simply because it was easy to approach and transport the construction materials. However, that VD had failed to store water due to leakage in foundation and the site selection was based on ease of transportation. The farmer had to incur expenses and repair VD and had to use iron shutters to prevent leakages⁶⁴. Bengav Bandhara, Sirsi, which was constructed in 1993 is another example for failed VD due to selection of site based on transportation of stones and cement trucks⁶⁵.
5. There has been heavy reliance on the Government's expert knowledge base resulting in reduced community participation and disregard to the traditional knowledge. The Government sponsored projects lack local farmer's participation for instance initially, watershed programmes had no component of Kattas.⁶⁶ Shivanand Kalave argues that lack of building trust during site selection, construction and execution of project has made these concrete structures mere museum pieces and crores of rupees spent on construction of these structures have become unusable.⁶⁷ He further draws attention to water bodies such as bunds, tanks, wells built by farmers are flourishing because of elders' wisdom in terms of water conservation and culture of societal co-operation. The villages in Bhatkal are cited as examples for achieving water conservation in agriculture based solely on the understanding of the nature of water.⁶⁸ Shree Padre proposes that the watershed projects should take into confidence all the stakeholders

60 *Supra* note 52.

61 *Supra* note 52, p. 23.

62 Interview conducted during field visit.

63 Venooru Gram Panchayat, Belthangady Taluk, DK District.

64 *Ibid.*

65 Shivanand Kalave, Halligalige 'Bandhara'gala koduge entahdu?, ed. by Shree Padre & Dr. Varanashi Krishnamurthy, *Kattagalu Anushodhane Mattu Varanashi Madari*, Varanashi Research Foundation & Arghyam Trust, May 2008, p. 35.

66 As pointed out by Shree Padre during the Interview

67 *Supra* note 52, pp.20 & 21.

68 *Supra* note 52, p.29.

since the local farmers have wisdom and experience in water conservation practices and their knowledge and expertise has to be utilized from the initial stages of project.⁶⁹




6. There have been noted procedural delays in laying and removing barricades since the tenders have to be floated for laying and removing the planks. During data gathering, the farmers at the Udupi District expressed that they cannot lay/remove the planks themselves because one FRP sheet weighs around 50 kg and have to be laid/removed using earth movers. They have also revealed that the delay in laying planks has defeated the purpose of VD altogether, and at times the planks are not laid at all.⁷⁰ Additionally, the insufficiency of planks has also posed a problem to the farmers of Udupi District. Due to a smaller number of planks, there is a marked decrease in storage of flowing water. In one of VDs of Palimar Village, Kapu Taluka, Udupi District planks have not been laid in the last ten years. Wooden planks last only for two years whereas FRP sheets have long span but they are not affordable by local farmers making them dependent on MI Department for shuttering materials.
7. Difficulties persist while attempting to address these challenges because of scattered jurisdictions. The authorities claiming that the VDs not falling within their jurisdiction for the repair and maintenance has left most of the VDs futile. The jurisdiction is often disputed regarding undertaking the obligations of the VDs by the Gram Panchayats, Public Works Department, Minor Irrigation Department and Agriculture Department. Scattered jurisdiction, fragmented responsibilities and lack of co-ordination between concerned agencies poses a serious problem that remains unaddressed.

Questioning the cost effectiveness of VDs, the paper compares the VD with Katta and farmer innovated micro-ring check dam.⁷¹ Though the VD (in the following table) irrigates larger area, the cost of construction is 30 times more than that of a traditional Katta and 20 times than that of a farmer innovated Micro-ring Check Dam. The observation is tabulated as follows:

69 Interview with Shree Padre.

70 Interview with farmers at Kervashe, Karkala Taluq, Udupi.

71 Four beneficiaries at Kodungai river, DK Dist., voluntarily joined together to design concrete VD with galvanized iron sheets as shutters on an abandoned bridge. Shuttering is carried out through Cranes. KDP Special Officer has remarked that this model is very effective and that the difference in government estimates & the costs incurred by locals for the same structure is huge. See Shree Padre, *With dream dam farmers show what is possible*, Civil Society, Feb 28, 2020 <https://www.civilsocietyonline.com/rural-reporter/with-dream-dam-farmers-show-what-is-possible/>

	<p>Traditional Katta</p> <ul style="list-style-type: none"> • 20 ft width * 4ft height* • Rs. 15,000/- • Irrigates 3-5 acres
	<p>Farmer innovated micro-ring check</p> <ul style="list-style-type: none"> • 24 ft width * 4 ft height • Rs. 25,000/- • Irrigates 25 acres
	<p>Vented Dam (IWMP)</p> <ul style="list-style-type: none"> • 20 ft width * 4 ft height. • Rs. 5,00,000/- • Irrigates 84 acres

Legal Dimensions of Riparian Rights and Kattas

The Indian Constitution, pursuant to Article 21 has expanded dimensions of right to life to include ‘right to wholesome environment’ i.e., the right to have access to pollution-free water and air for the enjoyment of life. The Judiciary has played a pro-active role in providing varied and vast interpretations to the right. For instance, the Court in *Subhash Kumar v. State of Bihar*⁷² highlighting the requirement of clean and pure water and air for a healthy and quality existence, entitles the recourse under Article 32 for furtherance of such right. The Court reiterating the importance of quality of water in *Narmada Bachao Andolan v. Union of India*⁷³ resorted to the United Nations Water Conference 1977⁷⁴ and held that “water is the basic need for the survival of human beings and is part of the right to life and human rights as enshrined in Article 21 and can be served only by providing source of water where there is none.”⁷⁵ Further, Supreme Court in the recent decision of *suo moto* petition ‘Remediation of Polluted Rivers’ and subsequent *Delhi Jal Board v. State of Haryana*⁷⁶ looking into the consequence on increasing ammonia in the river water because of pollution, held that ‘the right to clean environment and further, pollution free water has been protected under the broad rubric of the right to life guaranteed under Article 21.’⁷⁷ It further explained the importance of Articles 47, 48A and 243W towards the realization of right to clean water.

72 AIR 1991 SC 420.

73 (2000) 10 SCC 664.

74 All people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantum and of a quality equal to their basic needs. See United Nations Water Conference 1977.

75 *Supra* note 74 para 274.

76 Writ Petition (Civil) No. 8/2021. Para 15 of the case directs the registration of *suo moto* writ petition (civil) with regard to ‘Remediation of Polluted River’.

77 *Ibid.* para 5.

These articulations of Article 21 by the Supreme Court extend to Kattas and has two-fold manifestations (a) it vests the users of Kattas/stream with a positive right to have access to clean water; (b) imposes an obligation not to pollute the water of the stream/Kattas or cause obstruction to others from having access to water.

Article 39 (b) provides that the State shall direct its policy towards securing the ownership and control of the material resources of the community and distributed in manner best to subserve the common good. With the inclusive interpretation of 'material resources' to cover water resources, there arises a duty on the state to ensure that water is equitably distributed among the beneficiaries. The right to flowing water of rivers/streams is described as a right '*publici juris*' a right of public.⁷⁸ This idea of distributive justice resonates with the rights of riparian owners. The riparian owners both upper and lower are entitled to equitable share of water. This unveils the dilemma of the lower riparian owner, their access to water when Kattas are constructed across the stream by upper riparian owners. When the Court encountered with such situations, for instance in *Ram Bhatta and others v. Krishna Bhatta and others*,⁷⁹ it held that the riparian proprietor has no right to interrupt the regular flow of the stream, if he thereby interferes with the lawful use of the water by other proprietors and inflicts upon them a sensible injury.⁸⁰ Similarly, in *State of Bombay v. Laxman Sakharan Pimpakar and others*⁸¹ the Court laid down guidelines protecting the rights of the lower riparian owners by holding that upper riparian owners cannot obstruct water *ad libitum* for it is conditioned by the right of similar riparian owners who have co-extensive rights to the water of the stream.⁸² But for a few decisions on riparian rights associated with Kattas,

78 *Re: Cauvery Water Dispute Tribunal*, AIR1992 SC 522.

79 1962 KLJ 45.

80 Every riparian proprietor has a right to the use of stream for any purpose what may be deemed the extraordinary use of it, provided he does not thereby interfere with the rights of other proprietors, either above or below him. Subject to this condition, he may dam up the stream for the purpose of a mill, or divert the water for the purpose of irrigation. But he has no right to interrupt the regular flow of the stream, if he thereby interferes with the lawful use of the water by other proprietors and inflicts upon them a sensible injury. *Ibid* para 10 p 5-6.

81 AIR 1960 Bom 490.

82 The Court laid down the following principles (1)A riparian owner, in the exercise of his right to use the water of the stream for or extra-ordinary purposes, such as agriculture, can impound and divert water to irrigate his land adjacent to the stream.(2)The right is not an absolute or exclusive right. He cannot abstract water *ad libitum* for his right is conditioned buy the similar right of other riparian owners who have coextensive the water of the stream. It is limited but only by rights of persons in similar position having lands abutting both sides of the stream. The crucial condition is that the user of the stream by him must be a reasonable use and not capricious or such as wood inflict sensible injury on others similarly situated.(3)This standard or reasonableness applies to the volume of water that he can divert, to the purpose for which he can utilise it as also to the mode or method that he may adopt for impounding and channeling such water.(4)There is no rule exclusive or inclusive

the area is largely left unattended and requires a regulatory mechanism.

The Way Forward

In conclusion the paper addresses the challenges that the users of the Traditional Kattas and VDs are facing with a few recommendations. Firstly, there has to be a well-structured post intervention map that lays down the responsibilities and obligations of the stakeholders. The rationale is that the project should not be abandoned by the government once the construction is completed. There has to be a well-defined framework of the work, repair, monitoring and maintenance that has to be included within the project so as to avoid the conflict of scattered jurisdiction. This also ensures the timely laying/removing the planks thereby increasing the utility of the Katta/VDs.

Secondly, the Water Users Associations have to be strengthened to (a) obtain a better collective bargaining capacity against the authorities to enhance the maintenance of VDs; (b) to ensure that there is efficient and equitable supply and distribution of water from the VDs/Kattas; and (c) to amicably resolve disputes.

Thirdly, the paper stresses on the strict contractual arrangements between the users of Kattas to ensure the proportionate cost and benefit sharing. The strict terms of contract checks the unjust enrichment of those beneficiaries who use the water of Kattas but are unwilling to share the annual maintenance cost.

Fourthly, the general absence of contract spelling out the rights and obligation of stream users has given rise to the violation of riparian rights. The solution is two-folded action, one by the users of streams to have specific contract ensuring that there is no overstepping of the condition laid down by the precedents, thereby protecting riparian rights of lower

which defines the mode or specific methods or manner of diverting that water for that must depend on a variety of factors including for instance geographical and natural features of the lands of the riparian owners upstream and downstream, the Terrain and the magnitude of the stream.⁽⁵⁾A normal and usual mode or method of diverting water adopted in many parts of the country and more so in rocky or hilly Terence is that of putting up in the stream Kaccha or Pakka Bandharas (dams). In case of such terrains principally in higher reaches of a small river or rivulet this is the most practicable and economical method and it is too late in the day Nau to throw doubt on the reasonableness of this ancient system. It is incidental to the right itself. But the Bandharas must be such that they permit the flow of the water down stream and without diverting the natural course of the stream.⁽⁶⁾The riparian rights of lower owners is to have the water of the stream transmitted to them continuously and in a manner which does not materially affect their enjoyment on the right. An upper riparian who puts up Bandhara must, therefore, take care to see that the stream continues to flow without interruption and without any substantial diminution in volume. Ibid, para 11 pp.7-8.

regions and the intervention by authorities through monitoring the use. There might also be pragmatic solutions like enabling the lower riparian owners to construct a check dam/Katta prior to the construction by the upper riparian owner so that sufficient water is stored before the water flow diminishes. In cases of conflict, the contracts must specify the dispute resolution clause specifying conciliation or arbitration as efficient and speedy means of disposal.

Fifthly, there has to be revival of the role of Neeruganti,⁸³ by nominating a person who will be in-charge of distributing and allocating equal shares of water among the beneficiaries. This arrangement is the step towards distributive justice.

Sixthly, the paper recommends that the projects concerning VDs have to be placed in the public domain to necessitate proper impact assessment and public hearing. This provides the required platform for the public to deliberate upon the consequences of the project. This also provides for an opportunity to include the local communities to participate in the projects.

Finally, the paper emphasis on the importance of community led participation in making these irrigation systems successful. There have been a few mass movement led by youth groups⁸⁴, NGOs, journalists and activists to sustain the practice of Kattas. The initiative by Varanashi Development and Research Foundation⁸⁵, campaign led by Zilla Panchayat Member Dharnendra Kumar⁸⁶, *shramadan* activities by NSS Volunteers, activism by journalists like Shree Padre, Chandrashekar Yethadka, and Shivanand Kalave are examples that illustrate the importance of traditional Kattas to the local communities. Though these movements are not against the construction of VDs, they nevertheless symbolize the importance of community participation and sentiment in making the structures successful. The VDs devoid of these elements make them elitist and less popular among masses.

83 *Neeruganti* is a person appointed by the community to manage water in a just and equitable manner. The key functions of the *neeruganti* were to- ensure uniform supply of water to all fields in the command area; determine the type of crop to be grown based upon the water available; decide on the dates and times for supply of water; maintenance and repair of waterbodies, etc. See Dr. S.T. Somashekara Reddy, *Water Management- the neeruganti way*, ed. By Sandhya Iyengar, 'Waternama', Communication for Development and Learning, Bangalore, 2007, p.15.

84 Bhashya Laxmi P et. al., Improvement of Groundwater by replacement of earthen Kattas by Bison Panel Sheet Katta System, International Journal of Advances in Mechanical and Civil Engineering, Vol-5, Issue 2, Apr. 2018.

85 Varanashi Foundation experimented and developed an innovative cost saving and less labour intensive method. VF conducts field visits, technology demonstrations and workshops to disseminate this practice. See Krishna Moorthy and Ashwini K. M, 'Water Harvesting The Varanashi Story' www.varanashi.com accessed on 30/10/2020.

86 Sri. Dharnendra Kumar, Zilla Panchayat Member is on a Mission to revive Kattas. He led the construction of 50 Kattas across Falguni river with the help of NSS volunteers. See Shree Padre, Holethodugale Nilli! Dharnendra Katta Chalaka, Adike Patrike, April 2020, p.5-12.