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EVOLVING INSTITUTIONAL SETUP FOR INTEGRATED RIVER BASIN MANAGEMENT IN KERALA

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ABSTRACT

Kerala had undergone devastating floods in August 2018 and August 2019. Though the repeated occurrences of extreme climatic events were primarily attributed to the climate change phenomenon, the Post Disaster Needs Assessment (PDNA) study has suggested alternate paradigms to be investigated while rebuilding a disaster resilient Kerala. Integrated Water Resources Management (IWRM) is one of the four pillars of recovery strategy suggested by the PDNA. Implementing IWRM for managing the river basins and the long belt of coastal zones in an integrated manner is the first step in rebuilding a disaster resilient Kerala. But at present Kerala lacks institutional set up for integrated river basin management. Water is managed by different line departments of the state without any overarching framework or institutional setup that can bring in IWRM. Establishing River Basin Conservation and Management Authority (RBCMA) by appropriate enactment is considered by the government to bridge this gap. This paper discusses the evolution of RBCMA and its proposed organizational structure. Powers and functions of the different tiers of proposed RBCMA are discussed together with their linkages to IWRM paradigm. Paper is concluded with major challenges in RBCMA enactment and their possible ways forward.

1. INTRODUCTION

Integrated Water Resources Management (IWRM) is defined as a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Rahaman & Varis 2005; Biswas et al. 2005). Social equity, Economic Efficiency and Environmental Sustainability are the three pillars on which IWRM has been built up. Social equity indicates equal access to power and resources. It ensures adequate quantity and quality of water necessary to sustain human wellbeing, particularly for the marginalised and poorer user groups. Economic Efficiency must bring in maximum benefit to the maximum number of users possible with the available financial and water resources. It is not just about the price of water; it must consider current and future social and environmental costs and benefits. Acknowledging aquatic ecosystems as users and allocating adequate water for their natural functioning is the primary objective of Environmental sustainability. Conceptually, IWRM is a development philosophy evolved through a series of systematic deliberations on water management paradigms.

IWRM is linked to key development issues (GWP 2017). Efficient production of food crops in irrigated agriculture delivering food security is the most important among these. Better management of water quality reducing health risks comes next. IWRM recognizes freshwater and coastal zones as a continuum to ensure its protection. Disaster Risk Reduction (DRR) by assisting its preparedness is an important feature of IWRM. Climate Change Adaptation (CCA) by appropriate planning of water use with better resilience is another important aspect of IWRM. Mainstreaming of DRR and CCA in the development plans is increasingly recognized by the IWRM (UNDP 2017). IWRM has several advantages particularly when the river basin is taken as the basic unit for its implementation. Apart from effectively delivering a triple bottom line of social equity, economic efficiency and environmental sustainability, IWRM when implemented at a basin scale, it enables appropriate inclusion of water-related disaster management and alleviation of environmental impacts. IWRM is increasingly recognized as the foundation for progressing adaptation to climate change.

But practically implementing this approach has several challenges and it requires satisfying many important conditions as enumerated in the World Water Development Report (WWAP 2012). Political will and commitment are the most important conditions for implementing IWRM. Public pressure for implementing IWRM can be generated only with political will. A comprehensive basin management plan prepared with a clear vision reflecting the individual sector

plans is required for IWRM. Participation and coordination mechanisms, fostering information-sharing and exchange is another prerequisite for the successful implementation of IWRM. Well-defined flexible and enforceable legal frameworks and regulation is another important condition that must be in place to accommodate sustainability and integration about water resources management. Water allocation plans, adequate investment, financial stability, sustainable cost recovery and good knowledge of the natural resources present in the basin are some other important requisites for rolling out IWRM.

Applying the IWRM philosophy at basin scale is the most appropriate practise, as already discussed. More popularly this is known as Integrated River Basin Management (IRBM). Mainstreaming of DRR and CCA in the river basin master plan can be accomplished with IRBM. Climate variability and its impacts can be managed in a better manner with IRBM. But there must be robust institutional arrangements for successful implementation of IRBM. In this paper we are discussing the evolution of this institutional arrangement in the state of Kerala in India. In August 2018, a devastating flood struck Kerala, causing significant damage to life and property. The Post Disaster Needs Assessment (PDNA) study of Kerala Floods of 2018 has suggested IRBM as one of the important pillars of recovery strategy. This is the starting point of deliberations on IRBM and its required institutional arrangements by the administrative and technical think-tanks in the state of Kerala. Now it has progressed a lot in this front and the Government of Kerala is planning to enact the formation of institutional arrangements for IRBM known as River Basin Conservation and Management Authority (RBCMA) Act. This evolution of RBCMA and its organizational structure with powers and functions of different tiers are the major content of this paper. Rest of the paper is organized in four sections. In the first section, a brief description of Kerala Floods of 2018, which triggered the IRBM and RBCMA thoughts, is presented. The indicators of environmental sustainability portrayed in the RBCMA Act are discussed in the next section. This is followed by the organizational structure of RBCMA, powers and functions of its tiers and their IWRM linkages. Major challenges in the RBCMA enactment and their possible ways forward are discussed in the concluding section.

2. KERALA FLOODS OF 2018

Kerala, a very popular destination in the world tourism map and a state of high population density and several other unique features in the southern peninsular India, had undergone a devastating flood in August 2018. ‘Kerala Floods of 2018’, as it is known in the print and social media, was discussed across its breadth and depth. Recently, the UN Secretary General referred to the Kerala floods, among other natural disasters across the world, to highlight the urgency of the climate crisis and the need to step up efforts to reverse course on climate change. The extreme rainfall event and the very high population density of 860 persons per square kilometre, made the deluge significantly affecting a population of 1.2 million. About 400 persons lost their lives and the basic infrastructure facilities were seriously damaged. In the middle of August, Cochin International Airport, India’s fourth busiest in terms of international traffic, and the busiest in the state of Kerala had to suspend all operations for a fortnight, following runway flooding.

2.1 Extreme Rainfall Event

Though the extreme climatic event of unusual precipitation was mainly from 14 -19 of August 2018, Kerala had experienced an abnormally high rainfall from the very starting of southwest monsoon on 1st June 2018. As per IMD data, Kerala received 2346.6 mm of rainfall from 1 June 2018 to 19 August 2018 in contrast to an expected 1649.5 mm of rainfall. This rainfall was about 42% above the normal (CWC 2018). Further, the rainfall over Kerala during June, July and 1st to 19th of August was 15%, 18% and 164% respectively, above normal. Table 1 shows the rainfall departure from normal in this season.

Table 1 : Monthwise rainfall and its departure from normal (Source (CWC 2018))

Month	Normal Rainfall in mm	Actual rainfall in mm	% Departure from normal
June 2018	649.8	749.6	15
July 2018	726.1	857.4	18
1-19 Aug 2018	287.6	758.6	164
Total	1649.5	2346.6	42

Due to heavy rainfall, the first onset of flooding occurred towards the end of July. A severe spell of rainfall was experienced at several places on the 8th and 9th of August 2018. The 1day rainfall of 398 mm, 305 mm, 255 mm, 254 mm, 211 mm and 214 mm were recorded at Nilambur in Malappuram district, Mananthavadi in Wayanad district, Peerumed, Munnar and Myladumparai in Idukki district and Palakkad in Palakkad district respectively on 9 August 2018. This led to further flooding at several places in Mananthavadi and Vythiri in Wayanad district during 8-10, August 2018. Water was released from several dams due to heavy rainfall in their catchments. Out of 758.6 mm rainfall during 1-19 August 2018, 414mm occurred during the three days 15-17 August 2018. The previous instances of extreme rainfall in Kerala date back to 1961 and 1924. CWC (2018) has done extensive analysis of extreme rainfall event during August 2018 by comparing its intensity with the occurrences in 1924 and 1961. They have estimated the return period of 2-day maximum rainfall as about 200 years. At the same time, the estimated return period of extreme rainfall on the upstream catchments of large reservoirs were more than 500 years. Analysis of the extreme rainfall event has been carried out

by different researchers and different governmental agencies using different types of data sets available in the public domain. Irrespective of the data types and analysis methodologies it is generally concluded that the extreme rainfall event had a return period of 100 or more (Padikkal & Joshy 2019).

2.2 PDNA

As the damages caused by Kerala Floods of 2018 was significant, PDNA study was commissioned on September 18, 2018. The study was for a period of three weeks with the engagement of over 100 people from government, international agencies and civil society. Ten UN agencies have supported the PDNA: FAO, ILO, UNDP, UNEP, UNESCO, UNFPA, UNICEF, UNWOMEN, WFP and WHO. The Swiss Development Cooperation and the European Commission have also participated in the exercise. The PDNA founded on the Joint Rapid Needs Assessment conducted by the World Bank and Asian Development Bank. Major focus of PDNA was to deliver a report after the comprehensive analysis of the damage, loss, impact and recovery needs. IWRM based on principles of “room for river” and “living with water” has been identified in the PDNA as one of the four pillars of recovery strategy. As the damages due to floods were mainly reported from major river basins in the state, PDNA emphasized the need for integrated basin management. Lack of institutional arrangements for integrated basin management was also pointed out in the PDNA. The institutional arrangements for the integrated river basin management, as suggested in the PDNA, thus became an important point of discussion. The ‘River Basin Authority of Kerala’ (RBAK) was originally mooted in this context. Stakeholder consultations at various levels about RBAK highlighted the importance of conservation and management which ultimately rechristened the institutional arrangement as RBCMA.

3. ENVIRONMENTAL SUSTAINABILITY INDICATORS OF RBCMA

IWRM emphasizes cross-disciplinary coordination of water, land, and related resources in a river basin, watershed or catchment to achieve long-term sustainability. It highlights the importance of ecosystem function and highlights the need for integration of policies and costs across sectors. IWRM aims to break inter-sectoral barriers to establish a holistic framework for coordination. It brings together all stakeholders to develop an agreed set of policies and strategies to achieve a balanced approach to land, water, and natural resource management. It helps identify best practices from community use, safeguarding the environment, economics, urban planning and business management to achieve healthy river ecosystems beneficial for communities, economies and biological processes.

Repeated occurrences of extreme climatic events like droughts and floods in Kerala pinpoints the need to look at river basins holistically as one entity from its origin to the sea. To protect rivers from further deterioration and restore a healthy ecosystem, basin plans with appropriate multi-dimensional strategies fitting within the sustainability framework needs to be evolved. This will need the joint and consistent efforts and participation of all those who depend and use the rivers for diverse purposes. The institutional arrangement to catalysing the evolution of these basin plans and dynamically correlating these plans with the climate variability and other stochastic parameters is particularly important. Strategic basin plans must follow some of the basic principles of sustainability. Integrated Management, Eco-DRR (Ecosystem based Disaster Risk Reduction), Participation, Equitable Utilisation, Conjunctive Management etc are some of these important principles to be upheld in the basin plans. Undoubtedly, allocating enough water for the environment must be an overarching theme of these plans. Though basin planning must be decentralized, incorporating all the above principles at basin level can be accomplished only if there is a central agency.

A River Basin does not imply flowing river alone. It implies the entire river basin inclusive of the catchment and the different land uses within the basin boundary which in turn impacts upon the availability and recharge of surface and ground water in the river basin. Hence the scope and functions of a central agency shall extend to the entire river basin requiring the concerted and integrated efforts of all the stakeholder departments, agencies, institutions including local self-governments within a river basin. The multiple uses of and demands on a river basin mean that an integrated approach to managing river basins is required. Reconciling and coordinating competing demands relies on appropriate planning mechanisms, and basin planning can now be the starting point of sustainable management of the river basin and the associated social and economic systems. RBCMA needs to be founded on these gross principles and strategies.

4. ORGANIZATIONAL STRUCTURE OF RBCMA

A Governing Council with an executive arm specifically known as the Executive Committee is the essential framework of RBCMA. It is schematically presented in figure 1. The Chairperson of the Governing Council shall be the Chief Secretary of the State of Kerala. The Members of the Governing Council shall be senior most officials from the departments in the State as recommended by the Government and appointed by the Governor of Kerala. Table 2 lists the permanent Members of the Governing Council. The Governing Council may invite head of departments of other sectors as “Special invitee”, as required based on the subject matter tabled for the consideration and approval of the Governing Council. The Professional Members shall be nominated by the Government, who shall have the rank and status of Secretary to the Government. The Professional Member shall have adequate knowledge, experience or proved capacity in dealing with the problems related to engineering, agricultural, drinking water, industry, law, economics, commerce, finance, or management to support the Authority with technical inputs towards achieving the envisaged results. Before appointment of a Professional Member of the Authority, the Governing Council and or the Government shall satisfy itself that such

person does not have any financial or other interest which is likely to affect prejudicially his/her functions as a Member of the Authority The Governing Council may, discharge of its functions, constitute such sub-committees with members, specialists and or representatives from other departments, on a case to case basis, as it may consider necessary to assist and or provide expert advice to the Governing Council and or Chief Executive Officer- as required

Table 2 : Permanent members of Governing Council

No	Members	Designation
(1)	Chief Secretary	Chairperson
(2)	Secretary, Water Resources Department	Vice Chairperson
(3)	Secretary, Finance Department	Member
(4)	Secretary, Local Self Government Department	Member
(5)	Secretary, Department of Agriculture	Member
(6)	Secretary, Department of Environment	Member
(7)	Secretary, Forest and Wildlife	Member
(8)	Executive Vice President of Kerala State Science, Technology and Environment Council	Member
(9)	Two sector Professional nominated by the Government	Member
(10)	Chief Executive Officer	Member Secretary

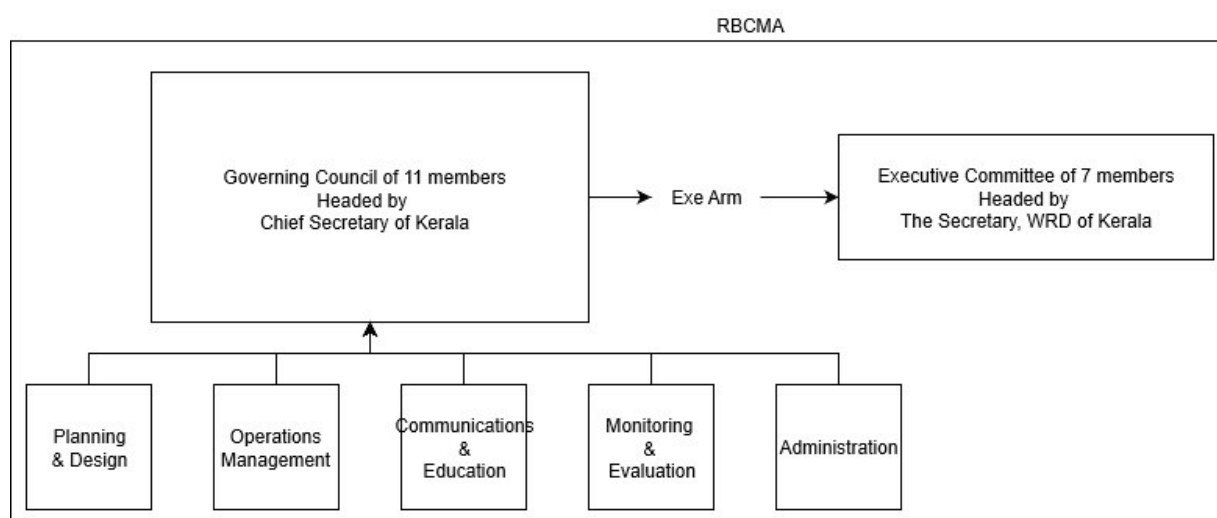


Figure 1 : Schematic representation of RBCMA

4.1 Executive Committee

The Governing Council shall constitute an Executive Committee with the members listed in Table 3 to support the Authority in its overall administration and management.

Table 3 : Executive committee members

No	Member	Designation
(i)	Secretary Water Resources Department	Chairperson
(ii)	Secretary, Finance Department	Vice Chairperson
(iii)	Secretary, Local Self Government Department	Member
(iv)	Secretary, Revenue and Disaster Management	Member
(v)	Secretary, Agriculture Department	Member
(vi)	Secretary, Environment	Member
(vii)	Chief Executive Officer	Member Secretary

The Executive Committee will be established to cause overall coordination among various implementing and collaborating agencies, to approve programs, projects and provide guidance to the Chief Executive Officer, for administration and monitoring monitor the progress of implementation of policies, programs, projects and schemes, in addition to discharging management responsibilities under overall guidance of the Governing Council. The Executive Committee

will exercise all executive and financial powers of the Authority as bestowed by the Governing Council. Some of the specific functions of the Executive Committee are enumerated below.

1. Manage funds of the Authority, submitting annual budget and all reports to the Governing Council for its approval, according approval of subprojects' tender evaluations for contract award, approve financial sanctions, and monitoring financial expenditures and fund flows.
2. Frame by-laws inconsistent with Rules of Business of the Government and Operation Manual of the Authority as advised by the Governing Council;
3. Enter into agreement with any legal entity in meeting the objectives of the Authority;
4. Monitor physical and financial progress of the Authority;
5. Submit annual/quarterly financial statements, and cause action for obtaining reimbursement of fund for Authority;
6. Supervise and closely monitor the activities of the programs, projects, schemes etc. executed by relevant state departments and provide recommendations for course corrective actions and status report to the Government;
7. Take all actions necessary for fulfillment of Authority's objectives. This will include suggesting to the Governing Council, State Departments and or its implementing agencies of new initiatives for improving water conservation and management in the State;
8. Executive Committee shall communicate Govt. staff requirement to respective Departments with intimation to personnel and Finance Departments.
9. The Executive Committee shall be the Appellate Authority for all officers / officer Subordinate to it.
10. The Executive Committee shall provide overall supervision on matters having legal dimension/arbitration to be dealt with by the Chief Executive Officer.

4.2 Administrative Structure of RBCMA

1. The Authority will be administered on the directions of the Governing council which will be supported by the Office of the Chief Executive Officer.
2. The Authority will consist of five divisions each headed by an Officer assigned by the Government on deputation or from on fixed term contract basis, with powers and responsibilities not lesser than the rank and status of a Joint Secretary or a Chief Engineer in the State Government;
3. The five divisions include Planning and Design, Operations Management, Communications and Education, Monitoring and Evaluation, and Administration;
4. A Committee of four eminent technical persons from the field of water resources and related natural resources shall provide technical inputs to the Chief Executive Officer as peer reviewers of technical designs and documentation prepared by the various divisions. Appointment of these peer reviewers will be approved by the Governing Council at the recommendation of the Chief executive Officer.
5. The Executive Committee and or the Chief Executive Officer may draw the services of additional national and or international experts to provide peer reviewer services to draw upon lessons and or technical inputs from best global practices;
6. The functions, roles and responsibilities of each division shall be executed in accordance with the Operational Manual of the Authority approved and or amended from time to time by the Governing Council.

4.3 Powers, Functions and Duties of RBCMA

The RBCMA shall exercise the following powers and perform the following functions:

1. to determine the criteria for the distribution of Entitlements by the Water Resources Department, and its agencies, within each Category of Use, on such terms and conditions as may be prescribed, after sectoral allocation is made.
2. to enforce the decisions or orders issued under this RBCMA Act;
3. to determine the priority of equitable distribution of water available at each water source, sub-basin and river basin levels during periods of scarcity;
4. to establish a water tariff system, and to fix the criteria for water charges at sub-basin, river basin and State level after ascertaining the views of the beneficiary public, based on the principle that the water charges shall reflect the full recovery of the cost of agriculture and irrigation management, drinking water supply, industrial and commercial uses, and other such uses not detailed here, administration, operation and maintenance of water resources;
5. to administer and manage inter-state water resources apportionment on river systems, of the State;

6. to prepare river basin master plans for each river system in the State in conjunction and collaboration with all departments and or their agencies in the State;
7. Prepare an integrated State Water Resources Management Plan based on river basin and sub-basin wise water plans and submit it to Government;
8. The Governing Council shall approve the draft of the Integrated State Water Resources Management Plan, with such modifications as deemed necessary, within a period of three months from the date of submission of draft Integrated State Water Plan to facilitate removal of regional imbalances in availability of water. The water plan so approved by the RBCMA shall become “Integrated State Water Resources Management Plan”.
9. The Integrated State Water Resources Management Plan may be reviewed every five years or earlier, as deemed appropriate, from the date of approval by the Governing Council
10. to plan, design and prepare detailed project reports for sequencing investments for management of water resources and allocations for various users and or user entities;
11. to conduct technical review and approve water resources projects and other sector plans involving or utilizing waters from sub-basins and or at river basin level to ensure that the plans and proposals are in conformity with integrated State Water Resources Management Plan and also with regard to the economic, hydrologic and environmental viability and where relevant, on the State’s obligations under Tribunals, Agreements, or Decrees involving inter-state Entitlements:
12. to lay down the criteria and monitor the issuance of Entitlements. These criteria among others shall also include the following,-
 - (a) the Entitlements shall be issued by the RBCMA based on the Category of Use and subject to the priority assigned to such use under the State Water Policy;
 - (b) Bulk Water Entitlements shall be issued by the RBCMA for agriculture, irrigation water supply, rural water supply, municipal water supply or industrial water supply to the relevant Water User Entities including Municipalities, Water User’s Associations, Industrial Users and State agencies responsible for delivery to the respective sector or to a sub-surface Water User’s Association or entity that operates a well field of multiple sub-surface water, tube wells, bore wells and or other wells on behalf of multiple users;
 - (c) Bulk Water Entitlements for irrigation, shall be issued by RBCMA, to the Water User’s Associations at the primary unit level, Distributary level and Canal or Project levels. River Basin Committees shall not receive Entitlements but shall act as conveyance entities for the Entitlements issued to the Water User’s Associations;
13. Water User Entities including Water User’s Associations managing the aggregate of Entitlements on behalf of a group of Entitlement holders may be issued an Aggregate Bulk Entitlements;
14. Individual Water Entitlements may be issued by the Chief Engineer of the respective cluster of river basins in consensus with the local bodies or other authorized agencies only for the construction and operation of individual lift irrigation schemes drawing water from surface water sources, bore wells, tube wells or other facilities for extraction of sub-surface water. Such Entitlements shall be administered, registered, measured and monitored by the Chief Engineer of the respective cluster of river basins in close co-ordination with relevant Government agencies. Where such facilities extract water from alluvial aquifers that are conjunctive with the surface water of a basin, the issuance and operation of such Entitlements shall be conjunctively coordinated with the use and yield of surface water resources of the basin and shall be compatible with the overall water-resource plan of the local area and the respective river basin and- the sustainable use of the subsurface water resources;
15. Bulk Water Entitlements shall be for a specific proportion of flow, storage or other determination of the annual yield of a water resource or facility and the Entitlement shall be measured volumetrically and with respect to time of delivery and flow rate of delivery;
16. the allocation of a percentage of the water available under the Entitlements of each facility, in the drainage basin or river basin shall be determined jointly by the respective Chief Engineer, Basin Management Committees and Water User Entities based upon the hydrology and other relevant parameters with regard to the specific basin. This allocation shall be utilized for the determination of the amount of water to be made available under each Entitlement for that specific year or runoff season;
 - (a) to lay down the criteria for modification in Entitlements for the diversion, storage and use of the surface and sub-surface waters of the State. These criteria shall among others, include the following:
 - (b) Aggregate Bulk Water Entitlements will be considered as Bulk Water Entitlements under the provisions of this Act except that they shall not be a usufructuary right and will only be adjusted by the RBCMA if there is a compensating change, under the provisions of this Act, to any component Bulk Water Entitlement that comprise part of the Aggregate Bulk Water Entitlement;
 - (c) in the event that any Water User Entity wishes to use its category priority to mandate a change in the use or volume of any Entitlement, that entity shall demonstrate in a public hearing before the Authority, that it has

- exhausted all attempts to conserve, increase efficiency and manage its demand of water within its, Entitlement and has exhausted all opportunities to increase its Entitlement through a transfer within the voluntary, market based economy. If, after such a public hearing, the Authority deems such a mandated transfer, on either an annual or permanent basis, to be legal and necessary in the interest of the people of the State, the RBCMA shall then determine a fair and just compensation as determined by the market value of the water resource, to be paid to the Entitlement holder by the entity exercising the mandated user category preference;
- (d) to fix the criteria for trading of water Entitlements or Quotas on the annual or seasonal basis by a water Entitlement holder. These criteria shall among others, include the following-
 - (i) Entitlements, except Aggregate Bulk Water Entitlements are deemed to be usufructuary rights which may be transferred, bartered, bought or sold on annual or seasonal basis within a market system and as regulated and controlled by the Authority as established in the rules of the RBCMA;
 - (ii) Quotas of water determined by the seasonal or annual allocation assigned to an Entitlement shall be volumetric usufructuary rights which may be transferred, bartered, bought or sold on an annual or seasonal basis within a market system as established and controlled by the rules of the RBCMA;
 - (iii) Bulk Water Entitlements or Quotas shall be transferable within the respective category of use if, such transfers are compatible with the operation of the specific water resource facilities involved. Such annual transfers shall be managed and registered with the Office of the respective Chief Engineer which shall have the power to approve or deny such proposed transfers if they are incompatible with the operation of the facility or would damage the Entitlements or rights of other users within the system. The Office of the Chief Engineer may charge a nominal fee for the processing and registering such transfers but shall not participate in any compensation between Entitlement holders as a part of such transfers;
 - (e) Entitlements may be subject to review at intervals of not less than three years and then, only if warranted by concerns about, the sustainability of the level of allocation;
 - (f) Bulk Water Entitlements shall be registered by the River Basin Agency and shall be monitored by the Authority or its duly delegated competent representative;
 - (g) Permanent transfer of Entitlements shall be made with the approval of the Office of the respective Chief Engineer and the Authority, and in compliance with the rules of the Authority promulgated for this purpose. All approved transfers shall be entered into the registry of Entitlements of the Authority;
 - (h) In the event of water scarcity, the Authority, in compliance with its policy and rules for allocating such scarcity, shall adjust the quantities of water to be made available to all Entitlements and shall permit the temporary transfer of Water Entitlements between users and Categories of Users in accordance with the approval of the Office of the Chief Engineers;
 - (i) To establish regulatory system for the water resources of the State, including surface and sub-surface waters, to regulate the use of these waters, apportion of the Entitlement to the use of the water of the State between water using Categories;
 - (j) To establish a system of enforcement of the Entitlements issued by the concerned Chief Engineer and or the Authority to various Categories of Use and its regulation, through measurement and monitoring, with a view to ensure that the actual use of water both in quantity and type of use, are in compliance with the Entitlements issued;]
 - (k) To administer the use and Entitlement of water resources within the State in a manner consistent with the State Water Policy 2008 and amendments if any, thereof, to ensure the compliance of the obligation of State with regard to the apportionment of inter-state waters between the State and other States;
 - (l) To promote efficient use of water and to minimize the wastage of water and to fix reasonable use criteria for each Category of Use;
 - (m) To determine and ensure that cross-subsidies between Categories of Use, if any, being given by the Government are totally offset by stable funding from such cross-subsidies or Government payments to assure that the operation and maintenance of the water management and delivery systems within the State are not jeopardized in any way;
 - (n) To develop the State Water Entitlement data base that shall clearly record all Entitlements issued for the use of water within the State, any transfers of Entitlements and a record of deliveries and uses made as a result of those Entitlements;
 - (o) To develop new storage, flood protection and other measures to address climate change in accordance with the State Action Plan for Climate Change;
 - (p) To facilitate and ensure development, maintenance and dissemination, of a comprehensive hydro-meteorological information data base in co-operation with the Office of the Chief Engineers, Indian Metrological Department,

Kerala State Disaster management Authority, and other such agencies which are linked to the water resources sector;

- (q) The RBCMA shall ensure that the Water Resources Status Report is published by it by the end of third quarter every year for the preceding twelve months. Such report shall contain all statistical data relating to water usage and availability including details in respect of district wise water resource potential created and its actual utilization;
- (r) The knowledge and information collected or generated from the activities undertaken shall be disseminated to all stakeholders by the RBCMA

5. CONCLUSION

The PDNA study has recommended IWRM as a key recovery strategy for Kerala. The extreme climatic event and the PDNA followed this disaster, triggered the origin of thoughts on institutional arrangements for IWRM, which is finally being evolved now as RBCMA. Even though the Government of Kerala is yet to enact RBCMA, lot of brain storming has already taken place now and this paper has illumined its findings together with the grey areas which deserve special attention. RBCMA, proposed in this study, needs to be refined by clearly defining its powers, functions and responsibilities. The overall objective of IWRM by integration of policies and costs across sectors can be accomplished only by concerted coordination of the different tiers of RBCMA. This would result in overlapping domain of powers and responsibilities across different tiers of RBCMA. Even then, at what level each tier should respond to those overlapping domains of responsibilities needs to be fine-tuned. Feedback from MSEP (Multi Stakeholder Engagement Process) specifically for this purpose can shape up the RBCMA before it is rolled out for legal consultations and legislative procedures. Restructuring the existing water related Departments of Government of Kerala, mainly the Irrigation Department, to fit within the framework of RBCMA is another challenge that should be addressed forthwith. Enabling the coordination of all other water related agencies in the Government sector by this restructured Irrigation Department (which will be known as Water Resources Department of Government of Kerala) is yet another task to be detailed.

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