

IV. IRRIGATION AND FLOOD CONTROL

The outlay provided for Irrigation and Flood control during 2021-22 is ₹ 469.69 crore. Outlay consists of State share for CSS, EAP and RIDF. Breakup of the outlay provided for 2021-22 are as follows.

Sub sector wise outlay for 2021-22

Sl. No.	Sub Sector	Amount (₹ in crore)
1.	Major & Medium irrigation	220.25
2.	Minor Irrigation	168.04
	a. Ground Water Development	25.80
	b. Surface Water Development	142.24
3	Command Area Development	1.00
4.	Flood Control & Coastal Zone Management	80.40
	a. Flood Control	77.00
	b. Coastal Zone Management	3.40
	Total	469.69

13th Five Year Plan emphasize on the shift of focus from major and medium irrigation projects to minor irrigation projects. It is also aimed at expanding the agricultural productivity by expanding the irrigated area.

4.1 MAJOR AND MEDIUM IRRIGATION

Focus is on the implementation of the ongoing Major & Medium Irrigation projects for achieving their objectives envisaged in the original proposal by addressing the challenging issues in implementation. Considering the time lag, change in land use pattern, difficulties to acquire land and similar other problems, steps should be taken for having a phased closure of these projects.

Monitoring and Evaluation of Irrigation Projects including concurrent monitoring

It is observed that there has been undue delay in implementation of projects in the state, especially Irrigation projects. From 2021-22 onwards, monitoring (concurrent as well as final evaluation) of all ongoing and completed irrigation projects, major, medium and minor including micro irrigation implemented in the state will be undertaken through Third Party Mechanism.

1. Idamalayar Irrigation Project

(Outlay: ₹ 2000.00 lakh)

The Idamalayar Irrigation Project is a diversion scheme intended to irrigate an extend of 14394 ha. of wet and dry lands with the Cultivable Command Area (C.C.A) of 13209 ha. The source of water for irrigation is the tail race discharge of Idamalayar Hydro-Electric Project. The main component of the scheme is the construction of main canal from Periyar barrage towards right. This bifurcates into two, one is Low Level Canal (LLC) having a length of 27.25 km and the other is the link canal of length 7.582 km. The link canal is proposed to connect with the

Chalakkudy LB main canal at Poothenkutty. The project was commenced in 1981 with an estimated cost of ₹ 17.85 crore.

Full length of main canal (32.278 km) had been completed. The length of low level canal is limited up to 15th km. The works of MC road crossing was completed by adopting the push through mechanism, enabling water distribution till Ch.12540m in LLC. Works in the Railway crossing portion of LLC would be completed during 2021-22. By completing the works of flush escape in LLC, water distribution will reach till the tail end of LLC. The financial expenditure up to March 2020 is ₹ 493.00 crore which would irrigate an area of 4429 ha. An outlay of ₹ 2000.00 lakh is provided during 2021-22 for the following.

1. Land acquisition and construction works of Kanjoor Thekkumbhagam branch canal
2. Low Level Canal – Construction of flush escape at Ch. 14623m
3. Construction of LLC pressure siphon from Ch. 13818.5m to 13879 m
4. Approved spill over works
5. Rectification and maintenance works
6. Committed expenditure

Considering the exorbitant land value, the land acquisition for implementing the works of Kanjoor Thekkumbhagam branch canal, may be expedited through the “Right of way method”.

2. Muvattupuzha Valley Irrigation Project (MVIP)

(Outlay: ₹ 2000.00 lakh)

This project, through the utilization of tailrace water from Idukki hydro- electric project aims at providing irrigation to crops in Ernakulam, Kottayam and Idukki districts, power generation, providing water for industrial purposes and recharging the water table in the command area. The project was started in 1974 with an original estimate cost of ₹ 20.86 crore.

The Technical Committee of Kerala State Planning Board had suggested urgent measures for completion of the project. As per the plan, Muvattupuzha Valley Irrigation project was commissioned on 10.07.2020 . The envisaged ayacut of MVIP was 35619 ha (Gross) and 18173 ha (Net). As on date of commissioning, the total ayacut achieved from this project is 33670 ha (Gross) and 17179 ha (Net). The cumulative expenditure incurred for the project as on 10.07.2020 is ₹ 1083.64 crore.

An outlay of ₹ 2000.00 lakh is provided during 2021-22 for the following -

1. Completing the balance portion of Edayar Distributory
2. Rectification and maintenance works
3. Approved spillover expenditure

No new works would be taken up for the project during 2021-22.

3. Cauvery Basin Projects

The water allocation by the Cauvery Tribunal to the State was 30 TMC in 2007, out of 726 TMC of water of river Cauvery. Out of this, 21 TMC is in Kabini sub basin, 6 TMC in Bhavani sub basin and 3 TMC in Pambar basin. The Cauvery basin has a drainage area of around 81155 Km² spread over the States of Karnataka, Tamil Nadu, Kerala and Union Territory of

Pondichery. The catchment in Kerala is 2866 km². A comprehensive basin development strategy covering medium irrigation and minor irrigation projects will be implemented in the basin for the utilization of water resources.

A. Kabini sub basin

The two ongoing medium irrigation projects in the State are Karapuzha project and Banasurasagar project.

a. Karapuzha Irrigation Project

(Outlay: ₹ 1600.00 lakh)

Karapuzha project is the first project for irrigation taken up in the Wayanad District during the Fifth Five Year Plan. The scheme is to construct an earth dam across Karappuzha at Vazhavatta with a storage reservoir and canal system to irrigate an area of 5221 ha (net) in Wayanad district. The Administrative Sanction for the project was accorded in 1978. The aim of the project is to provide irrigation facilities for the second crop period and also during the period May-June.

The project was approved by Planning Commission in 1978 with an estimate cost of ₹ 7.60 crore with an ultimate irrigation potential of 8721 ha. Water is being stored after plugging the dam on 11.02.2005. The head works of the project had been completed and was partially commissioned on 20-06-2010. The revised estimate of the project is ₹ 560 crore. Cumulative expenditure incurred up to March 2020 is ₹ 334.20 crore. The total CCA created is 601 ha. As per the recommendations of the Technical Committee and further meetings in this regard, the project is expected to be commissioned in the year 2021.

Head works of the project and works of Right Bank (8.805 km) and Left Bank (16.59 km) canals are completed. Rectification of two main bottlenecks are completed – (1) Breach in RB main canal at Edakkaravayal Ch. 7673m -7888m (2) Rock portion in Padinjaraveedu branch canal near Ch.330m. From February 2017 onwards, water distribution through Left Bank Main Canal is carried up to 15.30 km on trial basis. By rectifying the breach in RBMC between Ch.7673 m and 7888m, water distribution would be possible upto the tail end ie Ch.8805 m, which benefits an ayacut of 44.47 ha. By the end of 2020-21, the entire main canal – Left & Right would be made functional which would benefit an ayacut of 636.48 ha (including 60.31 ha ayacut of Arimunda distributory)

The following activities are proposed to be undertaken during 2021-22.

1. Acquiring 8.12 ha of land in Karapuzha reservoir belt area so as to expand it to the Full Reservoir Capacity.
2. Construction of Padinjaraveedu Branch Canal from Ch. 710 m to 1410 m (including the breached portion from Ch.1110m to 1210m)
3. Construction of four distributory canals off taking from Right Bank Canal –Arimula distributory, Ponginithodi distributory, Vallipetta distributory and Chikkalloor distributory
4. Approved spill over works

5. Rectification and maintenance works
6. Approved spillover expenditure.

An outlay of ₹ 1600.00 lakh is provided during 2021-22 for the above activities. Out of the total outlay ₹ 682.00 lakh is provided for Land Acquisition for Reservoir and ₹ 400.00 lakh for the construction of four distributories – Arimula, Ponginithodi, Vallipetta and Chikkalloor.

b. BanasuraSagar Irrigation Project

(Outlay: ₹1200.00 lakh)

BanasuraSagar Irrigation Project consists of a dam, constructed by KSEB, across Karamanthodu, a tributary of Panamaram river. The project, commenced with an estimated cost of ₹ 8.00 crore, aims to irrigate 2800 ha (net) of agricultural land for the second and third crops. The revised estimate of the project as per 2016 DSR is ₹ 165.98 crore. The main canal is 2.73 km long and there are two branch canals – Padinjarathara branch canal having a length of 9.030 km and Venniyode branch canal with a length of 5.390 km. Of the main canal, 2360 m canal works were completed. Works of both branch canals – Padinjarathara and Venniyode are in progress. Cumulative expenditure of the project as on March 2020 is ₹ 64.17 crore.

The following activities are proposed for 2021-22, for which ₹ 1200.00 lakh is provided.

1. Main Canal – Construction of land barrel and aqueduct from Ch. 1130 m to Ch.1500 m including CD works
2. Balance works of Kappumkunnu distributory
3. Works of Peral distributory
4. Approved spill over works
5. Rectification and maintenance works
6. Approved spillover expenditure

c. MI Projects in Cauvery basin

(Outlay: ₹300.00 lakh)

Class II Minor irrigation including restoration of ponds in Cauvery basin will be taken up under this provision.

Revival of rivers through construction of check dams and other measures is a priority area. A number of small streams are mapped in the hill areas for development. The topography of Wayanad is suitable for implementation of minor irrigation projects which can sustain ground water recharge, provide drinking water and irrigation facilities. Comprehensive development of small streams, construction of check dams, rehabilitation of ponds etc. in Kabani & Pambar basin can be taken up. Focus would be given for the rain shadow regions in Idukki, Wayanad and Palakkad districts. Construction of water storage structures, construction and rehabilitation of ponds etc. can be taken up. During 2021-22, an amount of ₹ 300.00 lakh is set apart for minor irrigation projects in Cauvery basin. Out of the total outlay, ₹ 100.00 lakh is provided for focusing on rain shadow regions in Idukki, Wayanad and Palakkad districts.

B. Bhavani Basin

(Outlay: ₹ 200.00 lakh)

Under Bhavani basin, construction of check dams in Attappady valley, an under developed tribal area, in Palakkad district is envisaged. The topography of Bhavani sub basin is suitable for

implementation of MI projects such as check dams and LI schemes which can sustain ground water recharge, drinking water supply and irrigation facilities in Attapady. During 2021-22, an outlay of ₹ 200.00 lakh is set apart for implementing minor irrigation projects in Bhavani basin. The amount provided is for construction of ponds, small water storage structures, check dams and lift irrigation schemes benefiting the tribal areas. The physical targets would be clearly spelt out at the time of administrative sanction.

C. Inter State Water Hub

(Outlay: ₹ 50.00 lakh)

A new building complex named ISW HUB was sanctioned to accommodate JWR Division and other interstate water support mechanisms. It also offer facilities like co- ordination and monitoring of all interstate water issues pertaining to Kerala. Government vide GO (Rt) No: 532/2015/WRD dated 26.6.2015 had accorded Administrative Sanction for the construction of ISW Hub at Palakkad for an amount of ₹ 150.00 lakh. The construction work of the Inter State Water Hub at Palakkad had been completed. An amount of ₹ 50.00 lakh is provided during 2021-22 for the settlement of bills. The entire work in this regard will be completed in the year 2021.

D. Pambar Basin Projects

(i) Pattissery Project

(Outlay: ₹ 1500.00 lakh)

The water allocation by the Cauvery Tribunal to the State was 30 TMC in 2007, out of this 3 TMC is in Pambar basin. By constructing the Pattissery dam, 0.075 TMC water can be utilized. Comprehensive water resource development is envisaged in the Pambar basin. During March 2013, Administrative sanction was given for ₹ 2600.00 lakh for the reconstruction of Pattissery dam and canal system under Chengalar scheme in Pambar basin. Revised Administrative Sanction obtained for civil, mechanical, electrical and instrumentation works amounting to ₹ 46.81 crore and Technical Sanction obtained for civil works amounting to ₹ 42.90 crore.

Civil works are in progress - concreting of dam body for Block No. I &II and leveling course concreting in Block No. 3 are in progress. Instrumentation works at foundation level for Block No. I & II are completed. Mechanical works would be executed after completing the concreting of dam body at the level of river sluice level.

An amount of ₹ 1500.00 lakh is provided during 2021-22 for the completion of the reconstruction works of Pattissery dam and canal system under Chengalar scheme. The entire amount is allocated for project measures and no administrative expense will be allowed from this amount.

(ii) Construction of Lower Chattamunnar dam

(Outlay: ₹ 100.00 lakh)

The construction of Lower Chattamunnar Dam is envisaged under Thalayar scheme. Detailed contour survey and soil testing have been done for the construction works of the dam. Design works are entrusted with IDRIB.

By constructing the dam, 0.12 TMC water can be utilized. The scheme will benefit 220 ha of agricultural land. An amount of ₹ 100.00 lakh is set apart for the construction works. The

entire amount is allocated for project measures and no administrative expense will be allowed from this amount.

4. RCB at Chamravattom

(Outlay: ₹ 400.00 lakh)

“Regulator cum bridge at Chamravattom across Bharathapuzha” is a multi purpose medium irrigation project. It provides water required for irrigation in two taluks of Ponnani and Tirur and stabilizes 4344 hectares of gross ayacut area under 9 LI schemes. Administrative Sanction was accorded for ₹ 113 crore on 30.6.2008 and revised estimate was sanctioned for ₹ 134.27 crore on 31.01.2013. Water storage in Chamravattom RCB reservoir is interrupted due to the piping effect noticed at the downstream of RCB. For rectifying the defects, investigation works were carried out by IIT, Delhi.

During 2021-22, ₹ 400.00 lakh is provided under State plan for RCB at Chamravattom. Amount is provided for rectification works and also for bank protection works for preventing the flooding up of low lying areas. It is proposed to do the side protection works of both sides, upstream 1 km each side and downstream ½ km each side. The entire amount is allocated for project measures and no administrative expense will be allowed from this amount.

5. Modernisation of field channels and drains of CADA canals of major projects

(Outlay: ₹ 600.00 lakh)

Projects such as Chitturpuzha, Malampuzha, Mangalam, Pothundy and Cheramangalam are included in the scheme Modernisation of field channels and drains of CADA canals of major projects. By rectifying the damages and arresting the leakages of selected channels, water distribution to the entire ayacut of these channels can be made and issues of water logging can be controlled to a greater extent.

During 2021-22, it is proposed to stabilise and achieve more ayacut by carrying out the modernization of field channels of the projects viz. Mangalam, Malampuzha, Pothundy, Chitturpuzha and Cheramangalam. An outlay of ₹ 600.00 lakh is provided during 2021-22 for carrying out the modernisation activities. The physical targets of ayacut would be submitted at the time of Administrative Sanction.

Other Programmes

6. Investigation of Irrigation Schemes

(Outlay: ₹ 250.00 lakh)

The scheme envisages investigation of new irrigation projects, preparation of project reports and also for revision of project reports. Major activities include soil investigation works, desiltation study of dams, sedimentation study of various reservoirs etc.

An amount of ₹ 250.00 lakh is set apart for investigation of irrigation schemes during 2021-22.

7. Human Resource Development and Modernisation of Department

i) Specialized Training Programmes and modernization of the Department

(Outlay: ₹ 130.00 lakh)

The objective of the scheme is to impart training for the technical personnel of the department in planning and monitoring, preparation of designs and execution in institutions like

IITs, Management Institutes etc. An outlay of ₹ 40.00 lakh is for imparting training related to various projects to the technical personnel of the department.

The Kerala State Wide Area Network (KSWAN) has been envisaged for common networking of e-Governance applications in the state. In order to implement the e-governance initiatives in Irrigation Department, an amount of ₹ 30.00 lakh is provided.

For undertaking activities pertaining to modernization of the department, ₹ 60.00 lakh is provided. The amount is provided for tracking and keeping the assets of the department electronically, up keeping the electronic assets and for imparting right to services under the department. A Project Formulation, Management and Monitoring Cell (PFMMC) for looking into various aspects of department projects and also for inter- departmental co-ordination will be set up. An amount of ₹ 10.00 lakh is allocated within the amount earmarked for modernization of department.

8. Post Facto Evaluation (Third party evaluation of irrigation projects)

(Outlay: ₹ 105.00 lakh)

Monitoring and Evaluation of Irrigation Projects including concurrent monitoring: It is observed that there has been undue delay in implementation of projects in the state, especially Irrigation projects. From 2021-22 onwards, monitoring (concurrent as well as final evaluation) of all ongoing and completed irrigation projects, major, medium and minor including micro irrigation implemented in the state will be undertaken through Third Party Mechanism. An independent and highly competent accredited agency, preferably in the government sector (other than Kerala Government) or Public Sector Undertaking outside Government of Kerala, which has substantial experience in the field will be selected through competitive bidding. This agency will do the concurrent evaluation of all irrigation projects, and will undertake the final evaluation of completed projects. The indicative areas to be covered in the M&E procedure include adherence to time and cost, project appraisal and quality of DPR, different processes involved in formulation and implementation, and the accrued/accruable benefits of the projects may be evaluated vis-a-vis the initial objectives of each project. An amount of ₹ 105.00 lakh is earmarked for this purpose during 2021-22. Out of this, an amount of ₹ 5.00 lakh will be utilized for ancillary expenses and ₹ 100.00 lakh is earmarked for payment to the Third Party Monitoring Agency.

9. Modernisation of investigation and design wing

(Outlay: ₹ 500.00 lakh)

Modernisation of investigation and design wing of the department is proposed for implementation with technology up gradation considering the requirement of water resource management at river basin level. The Design Wing, KERI Peechi and Field Studies Circle, Thrissur will be modernized with latest technological applications. A full-fledged GIS laboratory will be established along with development of design software and digital document filing system. The components are shown below.

(i) Development of Kerala Engineering Research Institute (KERI), Peechi- Stage II

Kerala Engineering Research Institute (KERI), Peechi is the only research institute under Water Resources Department for undertaking research activities on project design and irrigation

systems. The outlay provided is for the development of the institute which includes procurement of modern equipments, up gradation of equipments, purchase of software and active utilisation of its available potential. Many sophisticated equipments have been procured as part of modernisation of KERI. The overall objective is to improve the infrastructure of labs. It is also envisaged to increase revenue generation through testing of materials. During 2021-22, it is proposed to carry out routine activities of KERI, Peechi and to upgrade the infrastructure of labs. An amount of ₹ 150.00 lakh is provided for the modernisation of KERI Thrissur. Out of this, ₹ 100.00 lakh is for the ongoing schemes and ₹ 50.00 lakh for the upgradation of labs.

(ii) Modernisation of design wing

As part of modernization, conduct of training programmes, software development, up gradation of technical library, provision for electronic gadgets and internet connectivity, effective automation in online monitoring of dams, online design indent submission, modernization of quality control wing, digitization of drainage systems of each basin, online facility for submission of design proposal and development of software etc. are planned. Formation of Quality Control Data Manual, Modernisation of Quality control wing, setting up of labs, purchase of modern equipments for material testing labs, mobile quality control units etc are envisaged during 2021-22. An amount of ₹ 150.00 lakh is set apart for modernisation of design wing. Purchase of vehicle is not allowed under the scheme. Existing vehicles may be modified for mobile units.

(iii) Modernisation of hydrology information system

In order to have a realistic assessment of water resources in our State, IDRIB is in the process of modernising existing Hydrology Information System with Real Time Data Acquisition System (RTDAS). During 2021-22, an amount of ₹ 100.00 lakh is set apart for the modernisation of hydrology information system. The scheme envisages hydro meteorological data collection from gauging stations established across kerala river basins, maintenance of exiting gauging stations and establishing new stations, if necessary, procurement of equipments for data collection, maintenance of infrastructure facilities for data validation, dissemination and publication of documents, studies for integrated river basin management, capacity building programmes etc. Purchase will be done through GeM, Government of India or through suitable competitive bidding.

Establishing Flood Early Warning System (FEWS):- Under the World Bank funded National Hydrology Project, IDRIB is developing “Real Time Operation of Reservoirs integrated with flood forecasting and warning system for Periyar basin”. The accuracy of the forecasts depends on the real time hydro met data received and the quality of topographical features. During 2021-22, it is proposed to establish more number of Real Time Hydro-Met stations and availability of high resolution (1m to 5m) DEMs. An amount of ₹ 100.00 lakh is provided during 2021-22 for establishing Flood Early Warning System (FEWS).

10. Formation of River Basin Organisation

(Outlay: ₹ 150.00 lakh)

The basin wise development of all the rivers of the State shall be taken up in a phased manner which includes survey and demarcation of rivers, river side afforestation, works related

to pollution abatement in rivers, riverside protection works, assessing carrying capacity etc. A river basin approach has to be followed in assessing the availability of water resources and their optimal utilization integrating it with the various needs in the command area. It will address the issues of soil conservation, pollution control, flood control, optimum usage of water resources in the river and long term conservation of river. To have a holistic approach for the rejuvenation of a river basin, the impact of sea erosion/ accretion needs to be assessed. To analyse the behavior of coastal area and its impact on the river basin, data collection of coastal areas and its connected activities are proposed under the scheme. Data collection includes conducting field studies and collection of data on coastal erosion for the year 2021-22. An outlay of ₹ 150.00 lakh is provided during 2021-22.

11. Dam Safety Organisation and Executing Dam safety Measures

(Outlay: ₹ 240.00 lakh)

Inspection of dams, technical visit, attending training programmes, rectification of urgent emergency works and other dam safety works of dams under Irrigation Department are envisaged under this project. As per Government of India norms, a Dam Safety Organisation has been created in Kerala. The outlay is for meeting the expenses in connection with conducting state level trainings/workshops, inspection of dams, preparation of inundation maps, dam break analysis, conducting repeated sedimentation study in reservoirs and for works connected with the safety of dams of the completed projects.

The outlay is provided to execute dam safety works of dams viz Chimoni Dam, Kuttiyadi Dam, Pazhassi Dam, Peechi Dam, Periyar Valley Barrage, Kanjirapuzha Dam, Kallada Dam, Malampuzha Dam, Neyyar Dam, Pothundy Dam, Vazhani Dam, Pamba Barrage, Meenkara Dam, Chulliyar Dam, Walayar Dam, Mangalam Dam, Karapuzha, Malankara and other emergency works. It is also proposed to use the funds for the rectification works in minor dams like Poomala dam, Asurakund dam etc. Timely rectification works of dams, rectification of damages due to the floods etc. would be carried out. An outlay of ₹ 240.00 lakh is provided during 2021-22.

12. Benchmarking of Irrigation system in Kerala for Effective Irrigation Management

(Outlay: ₹ 50.00 lakh)

Benchmarking is a management tool which helps in the evaluation of an individual irrigation system and suggest methods to improve the system. It is used to compare the processes with the best practices and to adopt suitable ones. In the irrigation system, this would improve the efficiency of the system and result in savings in water usage. Bench marking for effective irrigation management is introduced with the objective of identifying the best management practices, prioritizing and evaluating rehabilitation and remodeling of projects with an objective to improve irrigation efficiency. For benchmarking exercise, key performance indicators would be derived. Benchmarking the irrigation systems in Kerala would go a long way in increasing the efficiency of the system. Interventions for repairs, rectifications and improvements would be prioritized based on the report of the benchmarking exercise. All the completed irrigation projects would be brought under benchmarking process in a phased manner.

During 2021-22, it is proposed to take up benchmarking of Chitturpuzha Irrigation Project along with a decision support system for effective distribution of water for irrigation. An outlay of ₹ 50.00 lakh is provided during 2021-22.

13. Dam Rehabilitation and Improvement Project (EAP)

(Outlay: ₹ 6500.00 lakh)

A large number of dams have been built over the years for the development of water resources for irrigation, water supply, power generation and other benefits. Many of these dams are in urgent need of strengthening and rehabilitation to ensure their safety and to improve their performance. Government of India has approved the World Bank aided Dam Rehabilitation and Improvement Project (DRIP) for implementation in five States covering Chattisgarh, Kerala, Madhya Pradesh, Orissa and Tamil Nadu. Phase I of the project was launched in Kerala in April 2012 to improve the safety and operational performance of selected dams, associated appurtenances and for the institutional strengthening under World Bank aid for sixteen dams/ barrages/ regulators of Irrigation Department. The components of the project are institutional strengthening of dam safety organization, improvement of basic dam facilities and rehabilitation works. The funding pattern for the initial sanction of the project was 80:20 (80% World Bank loan & 20% State share) and was later revised to 70:30. Rehabilitation of 16 dams have been undertaken under DRIP Phase I (Malampuzha, Neyyar, Peechi, Walayar, Kuttiyadi, Kanjirapuzha, Chimoni, Malankara, Kallada, Pothundy, Vazhani, Meenkara, Chulliyar, Pazhassi barrage, Bhoothahankettu barrage and Moolathara regulator)

The project has an initial cost of ₹ 36000 lakh, which was later revised to ₹ 32700 lakh. DRIP Phase I is extended upto March 2021. The funding pattern for the initial sanction of the project was 80:20 (80% World Bank loan & 20% State share), which was later revised to 70:30 for additional financing. An outlay of ₹ 2500.00 lakh is provided during 2021-22 for the balance work of ongoing schemes under Phase I.

DRIP Phase II:-DRIP Phase II, launched during 2019-20, received in principal approval from Central Water Commission. 16 dams are selected for Phase II - (Malampuzha, Neyyar, Walayar, Kuttiyadi, Kanjirapuzha, Chimoni, Malankara, Kallada, Pothundy, Meenkara, Chulliyar, Pazhassi barrage, Bhoothahankettu barrage, Mangalam, Karapuzha and Pamba). The funding pattern is 70:30 (70% World Bank loan and 30% state share) Government of Kerala has accorded Administrative Sanction for ₹ 24000 lakh. Concrete backing work of Kuttiyadi dam has been tendered. Rehabilitation works of Karapuzha, Malankara, Kanjirapuzha and Pampa are envisaged for 2021-22. For the activities under DRIP Phase II, ₹ 4000.00 lakh is provided during 2021-22.

14. Mullaperiyar Project

(Outlay: ₹100.00 lakh)

Government of Kerala has decided to construct a new dam in the place of the century old Mullaperiyar dam based on a detailed study conducted about the security of the existing dam. A special task force has prepared a DPR for constructing the new dam. The other studies/works included are model studies, dam break analysis, investigation for road way etc. Ministry of

Environment Forest and Climate Change has approved Terms of Reference for Environment Impact Assessment study for the new Mullapperiyar Dam on 14.11.2018. EIA study is under progress. Dam construction would be started only after obtaining all statutory clearances. An amount of ₹ 100.00 lakh is provided for the project during 2021-22. The amount would be enhanced as per requirement.

15. Renovation of Kuttiyadi Irrigation Project

(Outlay: ₹ 200.00 lakh)

Kuttiyadi Irrigation Project started functioning in full swing since 1993 when it was declared as completed. The left bank main canal is having a length of 40.22 kms and right bank main canal is 34.27 kms in length. There are 10 numbers of branch canals having a total length of 136.325 kms, and distributaries & sub distributaries with a total length of 330 kms. Most of the portions of the canals are unlined leading to heavy seepage of water in many places. During 2021-22, ₹ 200.00 lakh is provided for the renovation and modernization works of the main canal, branch canal and distributaries of Kuttiyadi Irrigation Project. Canal renovation works should be prioritized and implemented in need based manner.

16. Renovation of Main Canal, Branch Canal and Distribution System in Pazhassi Irrigation Project

(Outlay: ₹ 500.00 lakh)

Pazhassi Barrage has 46 km of main canal and the total length of the canal system comes to 400 km. For the renovation and modernization of main canal, branch canal and distribution system of Pazhassi Irrigation Project, an amount of ₹ 500.00 lakh is provided during 2021-22. Canal renovation works should be prioritized and implemented in need based manner.

17. Cheramangalam Project- Improvement of Anicut and allied structures

(Outlay: ₹ 250.00 lakh)

Cheramangalam is a diversion scheme in Palakkad district with a weir in Gayatri river, which irrigates an ayacut area of 1180 ha. An amount of ₹ 250.00 lakh is provided during 2021-22 for the improvement of Cheramangalam anicut and its allied structures and for the improvement of the main canal from Ch.0 to 15 km.

18. Extension of Moolathara Right Bank canal from Varattayar to Velanthavalam

(Outlay: ₹ 500.00 lakh)

Right Bank canal system from Moolathara regulator is completed up to Korayar and the ayacut under this canal system is at present being irrigated. This area is situated in the rain shadow region of Palakkad gap. Korayar, Varattayar and Velanthavalam are the three major rivulets in this region. By rejuvenating these rivulets, the agricultural productivity of this belt can be significantly improved. During 2021-22, ₹ 500.00 lakh is provided for taking up the extension of MRBC from 22147m to 32625m (Varattayar to Velanthavalam).

19. Attappady Valley Irrigation Project

(Outlay: ₹ 100.00 lakh)

Attappady Valley Irrigation , a medium irrigation project, envisages the construction of a concrete gravity dam across Siruvani river, a tributary of Bhavani river. The dam will impound

65 Mm³ (2.29 TMC) of the awarded share of water from Bhavani river basin out of the Cauvery Water Dispute Tribunal Award of 2.87 TMC for Attappady Valley Irrigation Project (AVIP).

The canal distribution system is proposed to irrigate a command area of 4900 hectares of land in Sholayar, Agali villages of Attappady region. An amount of ₹ 100.00 lakh is provided during 2021-22 for the initiation of the project works including detailed investigation, soil test, preliminary head works etc. The entire amount is allocated for project measures and no administrative expense will be allowed from this amount.

20. Renovation of Kanjirapuzha project (NABARD RIDF) (NEW SCHEME)

(Outlay: ₹ 1200.00 lakh)

Kanjirapuzha Irrigation Project, a Medium Irrigation project in Palakkad district is having a canal network of left bank canal (61.71 km) and right bank canal (9.35 km). The efficiency of the canal system has declined due to seepage and leak. For the renovation and maintenance activities of canals including canal lining, ₹ 1200.00 lakh is provided under NABARD RIDF during 2021-22. Canal renovation works should be prioritized and implemented in need based manner.

21. Renovation & Modernisation of Canals under Chitturpuzha Project (NABARD RIDF) (NEW SCHEME)

(Outlay: ₹ 1300.00 lakh)

The Chitturpuzha irrigation project in Bharathapuzha basin is organized by improving and extending some old irrigation systems. The lack of proper maintenance and repairs affected the water distribution system and this resulted in heavy conveyance loss. For renovation and modernization of canals, including canal lining works, under Chitturpuzha project, ₹ 1300.00 lakh is provided under NABARD RIDF during 2021-22. Canal renovation works should be prioritized and implemented in need based manner.

4.2 MINOR IRRIGATION

A. Groundwater Development

1. Investigation and Development of Groundwater Resources

(Outlay: ₹ 1150.00 lakh)

The scheme aims at the realistic evaluation of the ground water resources and also for providing infrastructural facilities for the development of groundwater resources in the State. This scheme envisages ground water resource estimation, ground water investigation by hydrogeological, geophysical and remote sensing studies and construction of water extraction structures such as borewell, tube well and filter point well. Preparation of hydro geological reports including pumping test studies, groundwater data collection, data analysis, geological and geophysical logging, developing drilled wells, monitoring the water quality and water quality studies will also be carried out. Procurement of machineries and accessories and materials for well construction, maintenance of machineries and vehicles, procurement of IT hardware and software, equipments for hydrogeological investigation, purchase of digital toposheets, geophysical equipments and other field related instruments, chemicals for labs etc. are also included. During 2021-22, it is proposed to carry out 15000 ground water investigation, 1500 drilling

(deposit) works, 100 well logging, 500 pumping test analysis, 350 bore well developing and 3500 water sample analysis. An amount of ₹ 1150.00 lakh is provided during 2021-22. The procurement of equipments will be carried out through GeM, GoI.

2. Conservation of Ground Water and Artificial Recharge

(Outlay: ₹ 1000.00 lakh)

The scheme envisages conservation and recharge of ground water through artificial recharge techniques. The basic purpose of artificial recharge of groundwater is to restore supplies from aquifers depleted due to excessive draft or to improve supplies from aquifers lacking adequate natural recharge. This also helps to conserve excess ground water underground and improves quality of ground water. Implementation of artificial recharge structures helps to enhance the ground water table. Construction of sub surface dykes, VCBs, small check dams across 1st order streams, bore well recharge, dug well recharge, rejuvenation of small open ponds etc. are envisaged under this scheme. Priority would be given to recharge open wells in the State and also to establish recharge structures in the notified blocks of the State.

During 2021-22, it is proposed to give priority to implement suitable recharge structures in all feasible Government owned institutions/land and aided institutions across the state. Recharge pit schemes, dug well recharge schemes, borewell recharge schemes, rejuvenation of open ponds (< 0.1ha), small check dams and sub surface dykes are proposed for over exploited, critical, semi critical and safe blocks in the state. An outlay of ₹ 1000.00 lakh is provided during 2021-22.

3. Training of Personnel

(Outlay: ₹ 5.00 lakh)

The objective of the scheme is to provide training to the technical, scientific and administrative personnel of the department in the relevant fields to upgrade/improve knowledge, skill and abilities by exposing them to the latest advancements in groundwater investigation, water well construction, groundwater conservation and management practices, modern computer application studies etc. An outlay of ₹ 5.00 lakh is provided during 2021-22.

4. Scheme for Control and Regulation of Ground Water Exploitation

(Outlay: ₹ 25.00 lakh)

The objective of the scheme is to control and regulate groundwater development through the implementation of Kerala Groundwater (control & regulation) Act 2002 to prevent adverse environmental impacts of groundwater exploitation and to ensure equitable distribution of resources. Special attention will be given to over exploited, critical and semi critical blocks in the State. Issuance of permits, granting NOCs to drinking water bottling plants and other industries which use ground water as raw material, addressing complaints of over exploitation of groundwater, addressing different disputes of groundwater use, registration of drilling rigs and firms/ agencies engaged in construction of Groundwater abstraction structures, conducting mass awareness programmes to public, students, people's representatives and other officials on groundwater conservation and management etc are envisaged under the scheme. An outlay of ₹ 25.00 lakh is provided during 2021-22.

5. Ground Water based Drinking Water Scheme

(Outlay: ₹ 400.00 lakh)

The main objective of the scheme is to provide drinking water supply to non- covered/ partially covered habitats throughout the State. 25 to 100 families will be benefitted by one scheme. Mini water supply schemes will be implemented where the bore wells drilled are of high yield and hand pump schemes will be implemented where the bore wells drilled are of low yield. During 2021-22, it is proposed to implement 38 numbers of mini water supply schemes, 155 numbers of bore well, 15 numbers of tubewell construction and 90 numbers of hand pump schemes. It is also envisaged to renovate 53 numbers of damaged drinking water supply scheme and to repair 450 numbers of hand pump schemes. An outlay of ₹ 400.00 lakh is provided during 2021-22.

Surface water Development

1. Lift Irrigation

(Outlay: ₹ 2573.00 lakh)

Works involving lifting of water by mechanical means with a command area not less than 40 hectares come under this category. At present there are 450 Lift Irrigation Schemes with a total ayacut of 43170 ha. During 2021-22, ₹ 2573.00 lakh is provided for Lift Irrigation schemes. The outlay provided is to meet the expenditure required for new Lift Irrigation works and also for rehabilitating the defunct LI schemes. Out of the total outlay, ₹ 763.00 lakh is provided for new Lift Irrigation schemes, of which ₹ 200.00 lakh is provided for the lift irrigation works in Idukki and Wayanad districts.

The implementation of Lift Irrigation schemes help in irrigating areas at higher level. The changes occurred in cropping pattern highlights the need to irrigate crops, specifically cash crops/plantation crops. An amount of ₹ 1210.00 lakh is provided during 2021-22, out of the total outlay, for the purpose. Schemes would be identified and prioritized in need based manner.

Main activities proposed under the scheme are repairs/ replacement of pumps, electrical installations, repairs to pump houses, pipe system and the maintenance of fixtures for the upkeep of LI scheme. The floods of August 2018 & 2019 had caused severe damages to the pumps. Pumphouses and transformers that supply power for lifting the water were also damaged due to flooding. The floods also resulted in siltation of canals that leads to the farms. In addition to these, it is also proposed to renovate Lift Irrigation schemes taken up under Malabar Irrigation Package (MIRPA). Out of the total outlay, ₹ 600.00 lakh is provided for the balance rehabilitation works of Lift Irrigation schemes under MIRPA and also for renovating and repairing defunct Lift Irrigation schemes.

2. Minor Irrigation Class – I

(Outlay: ₹ 7200.00 lakh)

Minor works like improvements to tanks and rivulets, construction of check dams, sluices, regulators, bunds, vented cross bars, salt water barriers, layout of channels and drainage structures etc. that serve an area more than 50 ha up to 2000 ha come under this category. Under MI class I scheme, a total outlay of ₹ 7200.00 lakh is provided during 2021-22.

For undertaking Minor Irrigation Class I works during 2021-22, an amount of ₹ 1500.00 lakh is provided. This amount is for meeting the expenditure towards completing the ongoing works and for taking up new works such as construction of check dams, sluices, bunds, vented cross bars, salt water barriers etc. Out of this, ₹ 300.00 lakh is provided for undertaking Lift Irrigation schemes in Wayanad district.

An amount of ₹ 2000.00 lakh is provided under Minor Irrigation Class I- HarithaKeralam. Out of this, ₹ 1700.00 lakh is provided for implementing Community Micro Irrigation schemes. The importance of Micro Irrigation is increasing considering its benefits on improved water efficiency and increased productivity of crops. It is intended to undertake community based micro irrigation clusters in the State during 2021-22. At least one micro irrigation scheme in each district would be taken up with the coordination of line departments. A detailed project report would be prepared by the Department of Water Resources in coordination with the Department of Agriculture, Local Self Governments and HarithaKeralam Mission. The DPR should incorporate source development, conveyance and last mile delivery aspects for adopting community micro irrigation. The process of implementation to be adopted, the crops that would be benefitted etc. would also be included. Private partnership wherever necessary may be brought in as per the decision of the implementing departments and as per the DPR. For implementing Micro Irrigation in Wayanad and Idukki districts, ₹ 100.00 lakh each is provided out of the outlay.

Under HarithaKeralam, new water retaining/conservation structures would be constructed for which ₹ 300.00 lakh is provided out of the total outlay provided under Minor Irrigation Class I- HarithaKeralam.

NABARD has been providing loan assistance for Minor Irrigation works under RIDF. Minor Irrigation works assisted by NABARD includes construction of RCBs, SWECBs, ponds, VCBs, check dams, storage weirs, cross bars and protection works etc. For Minor Irrigation Class I schemes under NABARD RIDF, ₹ 3700.00 lakh is provided for 2021-22.

3. Minor Irrigation Class – II

(Outlay: ₹ 2150.00 lakh)

Minor Irrigation works which can serve below 50 ha come under the scheme. The outlay provided is to meet the expenses connected with the completion of the ongoing Minor Irrigation Class – II schemes and for taking up new works after meeting the spillover commitments. An outlay of ₹ 2150.00 lakh is provided for Minor Irrigation Class –II works during 2021-22.

Out of the total outlay, ₹ 1550.00 lakh is provided for the execution of new minor irrigation schemes and also for the completion of ongoing Class II works. Amount is also provided for construction of check dams/ small storage structures, renovation of ponds in all districts and in rain shadow areas in Palakkad, Idukki and Wayanad districts.

Under HarithaKeralam, it is intended to have an Integrated Watershed approach to enhance water availability of both surface and ground water. For implementing the activities under HarithaKeralam, including rejuvenation of water bodies/ponds, ₹ 600.00 lakh is provided.

4. Repairs and Maintenance of Minor Irrigation Structures

(Outlay: ₹ 300.00 lakh)

Periodical maintenance of Lift Irrigation schemes is essential to realize the potential of the projects. This investment is proposed for the special repairs of head works and canal structures wherever necessary. Amount is also provided to meet the expenses for completing the ongoing works and for taking up new works, after meeting the spillover commitments. An outlay of ₹ 300.00 lakh is provided for the repair and maintenance of minor irrigation structures during 2021-22.

5. Detailed Investigation of Minor irrigation works and Preparation of Projects for NABARD Assisted MI works

(Outlay: ₹ 50.00 lakh)

The project preparation capability as well as the quality of projects has to be improved to tap maximum possible amount from Government of India and NABARD. The amount allotted by NABARD has to be spent within the assigned period. In order to propose the projects for sanction, a comprehensive project report of the scheme has to be prepared. The outlay provided is for the same. DPRs need to be prepared for the projects identified by the Department on priority basis.

An amount of ₹ 50.00 lakh is provided for detailed investigation of minor irrigation works and preparation of projects for NABARD assisted MI works during 2021-22.

6. Pradhan Mantri Krishi Sinchayee Yojana (40% SS)

(Outlay: ₹ 1000.00 lakh)

Government of India had introduced a new scheme Pradhan Mantri Krishi Sinchayee Yojana during 2015-16. AIBP, Flood Management, CADA, Repair Renovation and Restoration of Water Bodies etc come under the purview of the scheme. The funding of this “Core Scheme” will be shared in the ratio 60:40 between the Centre and the State. The scheme envisions to increase the gross irrigated area by bridging the gap between irrigation potential and utilization by means of strengthening the water distribution network and enhancing water use efficiency and management. An amount of ₹ 1000.00 lakh is provided to meet 40% state share of CSS. Efforts will be taken to maximize the utilization under this scheme.

7. Renovation of Tanks and Ponds

(Outlay: ₹ 800.00 lakh)

In order to attain self-sufficiency in food security and for augmenting food production, focus should be given for revival, conservation and up gradation of local water resources and traditional system of water management. Tanks have been the main source of irrigation in several parts of the State and the objective of the scheme is to undertake renovation and revamping of major existing public/ community ponds in the State, river basin wise. The main activities proposed to be taken under the scheme are renovation of ponds, linking of ponds with irrigation canals etc. During 2021-22, an outlay of ₹ 800.00 lakh is provided for implementing the activities under Haritha Keralam.

8. NABARD RIDF assisted Micro Irrigation schemes (RIDF) (NEW SCHEME)

(Outlay: ₹ 151.00 lakh)

Community Micro Irrigation aims at maximum yield from the crops by optimum usage of Irrigation water. A Detailed Project Report would be prepared after examining the feasibility and viability of implementing the micro irrigation projects in co-ordination with the Department of Agriculture, Local Self Governments and Haritha Keralam Mission. During 2021-22, ₹ 151.00 lakh is provided under NABARD RIDF for implementing Micro Irrigation schemes.

4.3 COMMAND AREA DEVELOPMENT

1. CADA works for Muvattupuzha Valley Irrigation Project (MVIP) (50% SS)

(Outlay: ₹ 100.00 lakh)

An amount of ₹ 100.00 lakh is provided during 2021-22 as 50 % state share for CADA works of MVIP. The amount is provided for constructing field channels, field drains and for system corrections.

4.4. FLOOD CONTROL (INCLUDING ANTI-SEA EROSION)

Flood Management – (Part of PMKSY)

1. Pradhan Mantri Krishi Sinchayee Yojana (Kuttanad Flood Management Component)

(50% SS)

(Outlay: ₹ 550.00 lakh)

M.S. Swaminathan Research Foundation has prepared a study report for the development of Kuttanad wetland ecosystem. The Kerala State Planning Board also prepared a package during 2019 for the revival of flood affected Kuttanad region. The major intervention suggested in these reports is the strengthening of infrastructure support to paddy cultivation. The outer bund construction and strengthening around padasekharams is critical to prevent frequent distress from flood related crop loss.

During 2021-22, an amount of ₹ 550.00 lakh is provided as 50% State share of the Centrally Sponsored Scheme. The amount is provided for clearing the pending bills of KEL II, KEL III, KEL IV schemes, and also for settling the bills of Thanneermukkom barrage. No new works would be taken up under this during 2021-22. For continuing works, issuance of Administrative Sanction/new tenders for new components should not be taken up.

The outlay is to avail assistance from Government of India under flood management programme. The cost escalation not approved by Government of India would not be supported from this provision including widening the width of bunds.

2. NABARD RIDF assistance for Kuttanad

(Outlay: ₹ 2900.00 lakh)

The amount is budgeted for undertaking NABARD RIDF assistance for carrying out infrastructure activities in Kuttanad. An amount of ₹ 2900.00 lakh is provided as RIDF assistance during 2021-22. The scheme is intended to develop infrastructure facilities in Kuttanad which helps in reducing crop loss and increase paddy production. This scheme

envisages development of outer bunds of padasekharams in most vulnerable portions of Kuttanad.

3.Flood Management Programmes in Kuttanad

(Outlay: ₹ 3000.00 lakh)

The scheme intends to mitigate floods in various padasekharams of Alappuzha and Kottayam districts. Various flood management activities could be undertaken in Kuttanad under the scheme during 2021-22. The activities envisaged are:-

- cleaning / desilting of canals and improving the drainage facilities
- protection of outer bunds of padasekharams
- compartmentalization of padasekharams

An amount of ₹ 3000.00 lakh is provided during 2021-22 for carrying out the above activities. Out of the total outlay, ₹ 1000.00 lakh is for the activities related to compartmentalization of padasekharams.

4.Flood Management and Border Area Programme 2020-2025 (25%SS)

(Outlay: ₹ 1250.00 lakh)

Government of India announced a new scheme “Flood Management and Border Area Programme 2020-25” for which the expected central assistance is in the ratio 75:25. For the first phase of Flood Management works, an amount of ₹ 1250.00 lakh is provided during 2021-22 as 25 % state share for this scheme.

Coastal Zone Management

(1) Coastal Zone Management

(Outlay: ₹ 240.00 lakh)

Kerala coast is having a coastline of 576 km. As per National Centre for Coastal Research, 45 % of the Kerala coast is eroding. Out of 576 km, 370 km is protected by seawall and groynes. In the protected stretches, around 160 km length of sea walls are severely damaged. Several stretches in the unprotected reaches have been identified as vulnerable to wave attack and subjected to continuous erosion.

An amount of ₹ 240.00 lakh is provided during 2021-22 for Coastal Zone Management. The amount is provided for the construction of new sea wall and reformation of old sea wall. Moreover, the stabilization of the structure requires proper and timely maintenance and repair. It is proposed to utilize modern technologies like geo-textiles, polyethylene fabrics/sheets, and nourishment of foreshore with bio materials for coastal protection. Sea walls already constructed under the State Plan, 12th and 13th Finance Commission also requires constant reformation. These works have to be arranged on a priority basis.

(2) Study on coastal protection measures (NEW SCHEME)

(Outlay: ₹ 100.00 lakh)

Proper construction and maintenance of coastal protection structures require scientific study and site specific design. Coastal protection treatments may vary depending on the wave climate, coastal topography, bathymetry, sediment transport etc. For undertaking a study on coastal protection measures, ₹ 100.00 lakh is provided during 2021-22.