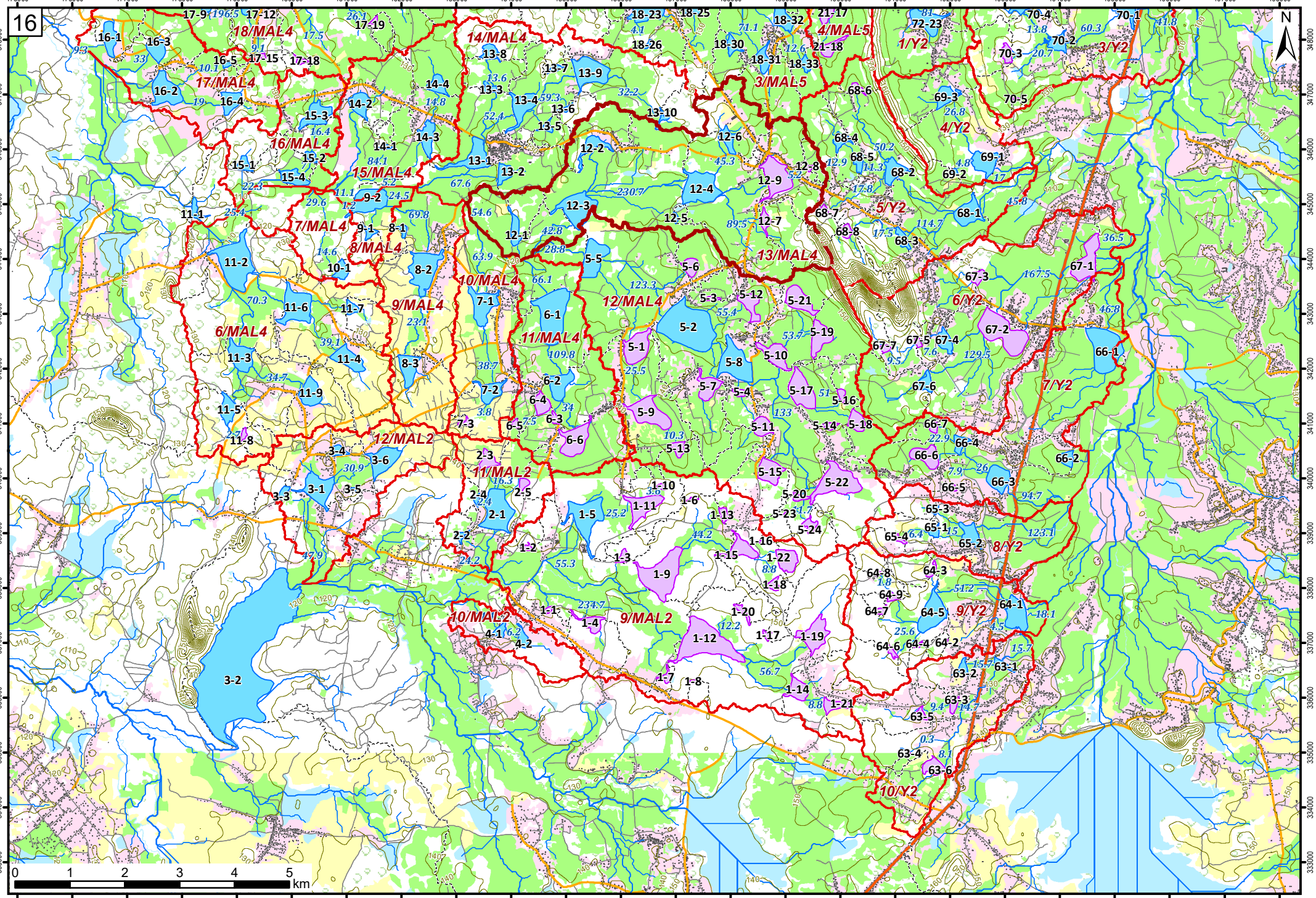


DATA SOURCE: - 1:10,000 LAND USE PLAN DEPARTMENT OF SURVEY SRI LANKA - 2014/2015

添付資料 5

プロジェクトシート

Title of Development Plan	Infrastructure Development		
Project Title	IF-1. Cascade System Facility Development Project		
Project Period	Seven years		
Related Ongoing/Past Programme	Mahaweli Upgrading Project (JICA), Mahaweli Restructuring and rehabilitation project (World Bank)		
Main Trust Areas of National Food Production Programme		Development of irrigation infrastructure facilities	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	-	
Implementing Organisation	PDOI (NCPC) and DAD Vauniya	**Related Organisation**	DOA, Private sector, DAD

Background / Activities

Background

With the allocation of the irrigation water from NCPC, the present farming became an intensive irrigated agriculture; and investment from farmers may increase aiming for high profit. To support the intensive farming, firm facilities to ensure irrigation water as well as to mitigate drought and flood risks are needed. Especially, the risk of flooding is considered to increase due to the augmentation of available water resources after NCPC construction. The Provincial Director of Irrigation (PDI) and the Department of Agrarian Development (DAD) attend some maintenance or rehabilitation works on tank bund and/or related structure every year with their available fund. However, since PDI and DAD cover a number of tanks in Anuradhapura and Vavuniya districts and available fund does not meet actual needs in many cases, the present irrigation and drainage facilities including farm road are still not in good condition. Comparing the two districts, the condition of the facilities is worse in Vavuniya District and land development with vegetation clearing is needed more in Vavuniya District.

To deliver the water from branch canal of NCPC to cascade system, the tertiary canal is needed. In addition, link canals to connect between upstream and downstream also necessary considering the effective, timely and fair distribution of the irrigation water from NCPC. The Project of "Cascade System Facility Development Project" includes tertiary canal and link canal construction other than rehabilitation of headworks and canal system of target minor irrigation system.

Activities

The rehabilitation works of the headworks cover tank bund reshaping, repair/reconstruction of sluices, improvement and expansion of spillways, provision of bathing steps. The irrigation canal works cover formation of canals with trapezoidal earthen canal and construction of related structures with concrete such as farm turnout and drop. Those facilities will enable to conduct proper and efficient water distribution at the field level. The type of tertiary canal is basically open canal with reinforced concrete flume type. The type of link canal is proposed for open canal with concrete flume for higher discharge and close canal with PVC for lower discharge. The Improvement of the farm road covers formation of road with gravel pavement and construction related structures such as culvert.

Considering the early implementation of the project, the plan proposes to divided civil work components into two. The 1st components are headworks, canal system and farm road construction and rehabilitation which can be started without considering progress of main system design and construction works of NCPCP. The 2nd components are tertiary canal and link canal construction with installation of water level monitoring system which specification are influent of main system of NCPCP. It is proposed that the project period will be seven years and the 2nd components will start after 3 years of commencement of 1st components. Considering the present implementing capacity of the PDI NCP and DAD Vauniya, stage-wise implementation with cascade basis is proposed. 128 cascade systems are divided into five batches and construction period of each batch is set as two years.

Sub Water Shed	No. of Cascade (nos.)	Work Volume				
		Target Tank (nos.)	Irrigation Area (ha)	Length of tertiary canal	Length of link canals	Installation of water level recorder
Malwathu Oya	62	493	14,275	178	492	18
Yan Oya	24	226	7,948	99	274	9
Ma Oya	24	164	4,911	61	168	5
Parangi Aru	16	122	3,324	41	114	4
Kanagarayanaru	2	19	958	12	33	1
Total	128	1,024	31,416	392	1,081	37

Overall Goal	Increase of agriculture production with increment of cropping intensity and yield
Project Purpose	Ensure irrigation water to the farm land and prevent flood damage
Outputs / Outcomes	Rehabilitation of irrigation facilities (headworks and canal system) Construction of tertiary and link canal Rehabilitation of rural road

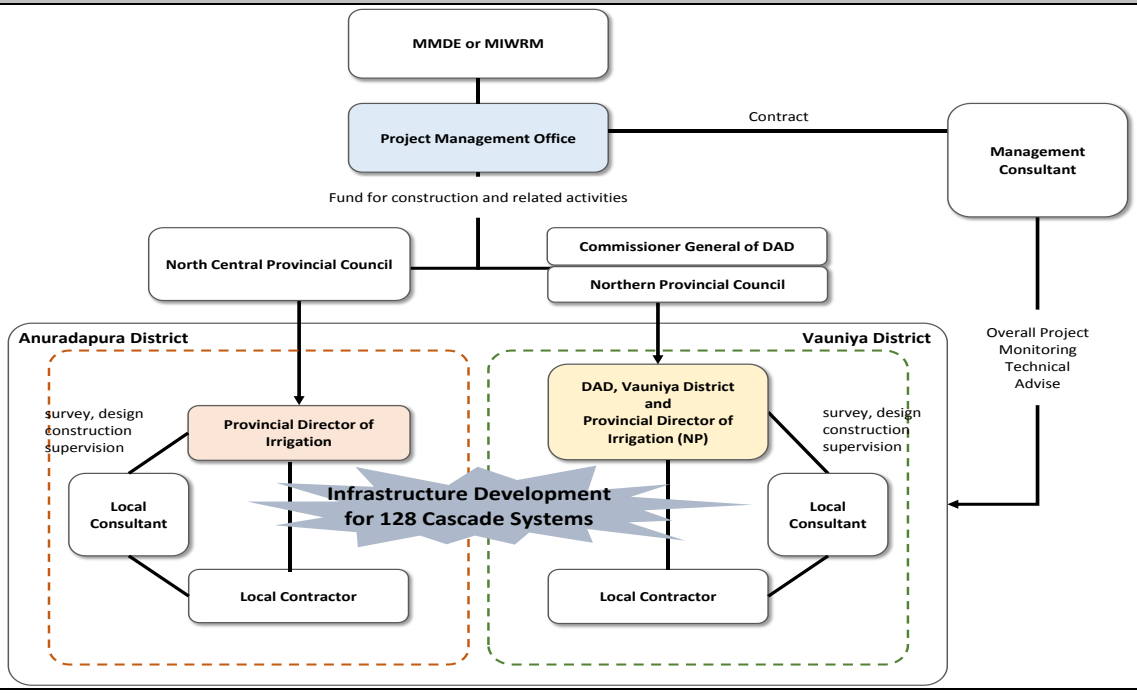
Schedule

			1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Preparatory works															Completion of NCPC main and branch system design															
1st Batch (27 cascades)	Headworks, canal, farm road & others	Survey and Design																												
		Tender																												
		Construction																												
	Tertiary & Link Canal	Survey and Design																												
		Tender																												
		Construction																												
2nd Batch (19 cascades)	Headworks, canal, farm road & others	Survey and Design																												
		Tender																												
		Construction																												
	Tertiary & Link Canal	Survey and Design																												
		Tender																												
		Construction																												
3rd Batch (31 cascades)	Headworks, canal, farm road & others	Survey and Design																												
		Tender																												
		Construction																												
	Tertiary & Link Canal	Survey and Design																												
		Tender																												
		Construction																												
4th Batch (23 cascades)	Headworks, canal, farm road & others	Survey and Design																												
		Tender																												
		Construction																												
	Tertiary & Link Canal	Survey and Design																												
		Tender																												
		Construction																												
5th Batch (28 cascades)	Headworks, canal, farm road & others	Survey and Design																												
		Tender																												
		Construction																												
	Tertiary & Link Canal	Survey and Design																												
		Tender																												
		Construction																												

Input

Human Resources, Materials, Etc.		**Budget**
Cost for civil work Cost for procurement of equipment Employment of Management consultant	Employment of survey, design and construction supervision Other administration cost	LKR. 34,000 million

Implementation Structure



Title of Development Plan	Infrastructure Development		
Project Title	IF-2. Promotion of Awareness Campaign of Tank Day		
Project Period	Three years		
Related Ongoing/Past Programme	Mahaweli upgrading project (JICA), Pro-poor Economic Advancement and community enhancement project (PEACE) (JICA)		
Main Trust Areas of National Food Production Programme		Natural resource management and adaptation to climate change	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	CMO	
Implementing Organisation	PDI and DAD	**Related Organisation**	DS, GN

Background / Activities

Background

Some tanks suffer serious damages due to flooding during the Maha season. When the major system or medium system tanks are damaged, repairs are started immediately as these tanks are the priority of the government. However, if the minor system tanks are damaged (this includes most of the tanks in the cascade), their turn for repair takes a long time to come around. Some tanks are still unrepaired when the next Maha season comes around, aggravating flood damage.

If the farmers' organisations are able to identify the risk and attend to the minor repairs of the tanks, O&M of the tanks will be greatly improved. In particular, early discovery and early repair of piping holes, which are directly linked to bund collapse, are also means of preventing tank collapse which leads to large-scale damage.

Through the verification programme, it was found that farmers play a significantly important role in tank disaster prevention. To maximise the abilities of the farmers in actual risk assessment and disaster prevention measures, the project of "Promotion of Awareness Campaign of Tank Day" to create the movement of encourage FO to be a tank doctor and conduct walkthrough survey and attend minor repair work every year.

Activities

Considering this situation, the project proposes to have awareness campaign to conduct walk though survey and repairing works of the damaged tank on specific one day in the year. The specific day will be promoted as a "Tank Day" in the target area. On Tank Day, respective officer will lecture or remind mechanism of tank collapse, importance of timely assessment and typical method of repair. After having the lecture, all the participant will walk on the tank bund and jointly inspect the condition of the tank. The participants also attend the minor repair works based on inspection result on the same day. The participants are mainly farmer but other village stakeholders such as school students, village leaders, religious leaders, youth organizations, women organizations are also expected.

The activity includes awareness training to member of FO or CMO with "Check Sheet for Inspection" which developed under verification programme, preparation of leaflets and posters, preparation of promotion movie, establishment of website and broad cast the information through radio, TV or other communication channel.

Expected list of activities are as follows.

(1) Discussion of basic concept for promotion of Tank Day with relevant stake holders
(2) Selection of model cascade systems, at least one for each DS or ASC, to implement pilot activities
(3) Awareness and training of government officers for conduct field activities
(4) Conduct walkthrough survey and minor repair works in the field
(5) Sharing the experience and modification of basic concept with relevant stakeholders
(6) Promote awareness campaign through media, website and school

Overall Goal	Increase of agriculture production with increment of cropping intensity and yield
Project Purpose	Create proper maintenance system for tank irrigation facilities
Outputs / Outcomes	Preparation of guideline of regular walkthrough and minor repair activities Development of tank irrigation system maintenance capacity of model cascade systems Making aware the public for importance of regular maintenance activities

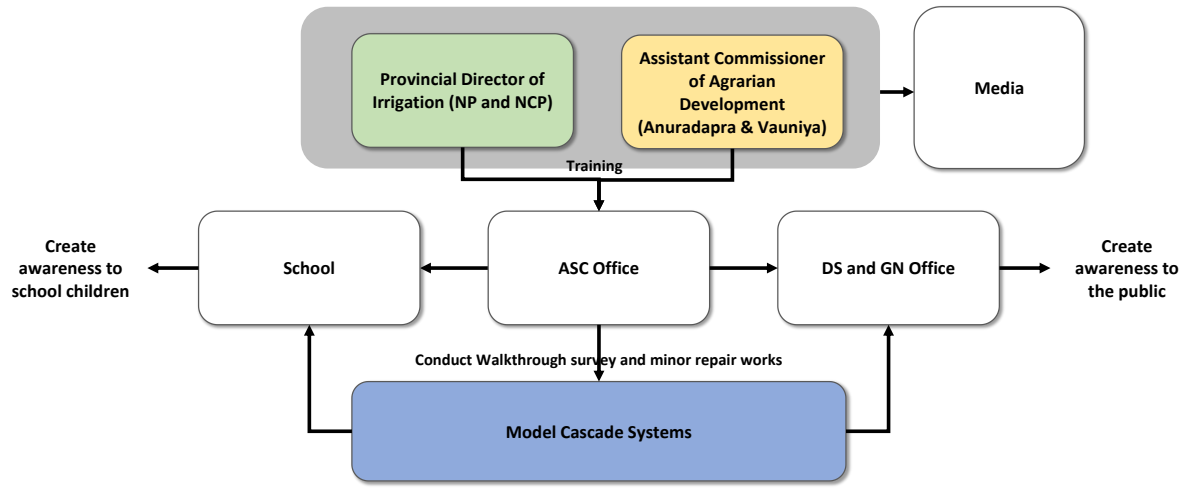
Schedule

	Activity	1st year			2nd year			3rd year		
		1	2	3	1	2	3	1	2	3
1	Discussion of basic concept for promotion of Tank Day with relevant stake holders	■								
2	Selection of model cascade systems, at least one for each DS or ASC, to implement pilot activities		■			■				
3	Awareness and training of government officers for conduct field activities			■			■			
4	Conduct walkthrough survey and minor repair works in the field				■			■		
5	Sharing the experience and modification of basic concept with relevant stakeholders					■				
6	Promote awareness campaign through media, website and school					■	■	■	■	■

Input

Human Resources, Materials, Etc.	**Budget**
Cost for training Consultant for web design Necessary cost for public awareness Other administration cost	LKR. 10 million

Implementation Structure



Title of Development Plan	Institutional Development Plan		
Project Title	IN-1. Establishment of management structure of NCPC system		
Project Period	Five years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Institutional Coordination, Legal and regulation framework	
Project Area / Target Group	**Project Site**	NCPC	
	Target Group	MMDE, MASL, MIWRM, PDI, DAD DoI, GA, SWMC	
Implementing Organisation	MMDE	**Related Organisation**	MASL, MIWRM, PDI, DAD DoI

Background / Activities

Background

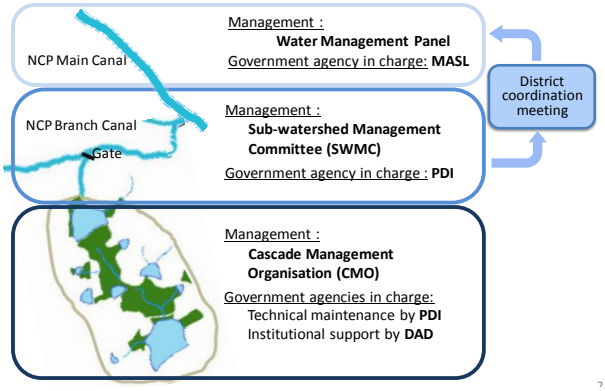
Management of NCPC system has complicated features as it involves several different stakeholders at different levels. Since the NCPC water will be diverted from the Mahaweli system, the whole project might be taken as a part of the Mahaweli system. Meanwhile, the competent authority of NCPC for its operation differs by the division of the canal system, as the system involve major tank of Mahaweli system, provincial medium schemes, as well as community-managed minor tanks, which are managed by different government authorities. Consequently, demarcation of the relevant authorities is critical for smooth operation of the NCPC system. As it is highly recommended to integrate the cascade system into the existing system, it is crucial to make effective coordination between the existing systems.

Activities

(1) Demarcation and coordination between relevant management system

In consideration of the possible division of authorities indicated in the figure, different irrigation management systems shall be applied at different levels of the NCPC. The following demarcation shall be discussed and finalised through stakeholders meeting and documented in an ordinance or relevant government regulation.

The main canal of NCPC shall be governed by the rules of the Mahaweli system. Branch canal and tertiary canal including water regulation at the gate from branch canal to cascades can be delegated to PDI. And the issues below tertiary canal shall be managed by applying the irrigation management system of minor schemes.



Level	Operation
NCP main canal:	Water distribution from Mahaweli system to NCPC shall be decided by the water management panel (WMP) of the Mahaweli system through their seasonal operation plan. The water management secretariat (WMS) of MASL prepares a seasonal operation plan (SOP) based on the results of its simulation studies for the coming irrigation season. The SOP will be presented to the WMP, for review and consent. After any necessary amendments are made, WMS will decide on the water allocation to the NCPC, as a component of the allocation plan for the entire Mahaweli-benefited area.
NCP branch canal to tertiary canal:	The decisions of WMP are informed to the sub-watershed level committee, and sub-watershed management committee (SWMC) shall allocate water to each cascade in proportionate bulk water issue basis.
Cascade and individual tank :	Cascade representatives to the SWMC will inform the Cascade Management Organisation (CMO) regarding water allocation to each cascade. The CMO will decide on water allocation to tanks at its meeting prior to the season taking consideration of water availability in the tanks at the beginning of the season. The tank level FOs will decide on cultivation extents and crops at their respective cultivation meetings prior to the start of each season

Decision of the higher-level management bodies are basically superior to the lower management bodies. And decision making at each level of the management are subject to the decision of other management bodies.

(2) Integration into district level coordination system

Applying this process of water distribution, what is crucial will be the coordination between relevant authorities managing different parts of the NCPC; from Mahaweli system to minor scheme. Possible coordination will be PMC or district coordination meeting of the major schemes. A particular coordination body should be identified and NCPC management shall be integrated in the existing coordination structure.

(3) Organisation of the meetings at each level

Meetings to be organised at the different levels of the NCPC are interrelated as the upper level decision shall influence the operation of the lower level water distribution and vice versa. Scheduling of meetings and coordination of the meetings at the different levels are important. A stakeholders' meeting involving representatives of all levels of the NCPC should be organised to decide procedures for scheduling and coordination of the different levels of meetings.

Overall Goal	Total water distribution system is established at whole NCPC system
Project Purpose	Government structure for coordination between management bodies at different levels of the NCPC is established for efficient water distribution
Outputs / Outcomes	Demarcation of the government agencies in-charge at each level of NCPC is confirmed Coordination structure of different level of NCPC is established Management body of each level of NCPC function and coordination between the management bodies work effectively

Activities	1st year				2nd year				3rd year				4th year				5th year			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(1) Demarcation and coordination between relevant management system	■	■																		
(2) Formation of District level coordination meeting			■																	
(3) Organisation of the meetings at each level					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Input

Human Resources, Materials, Etc.

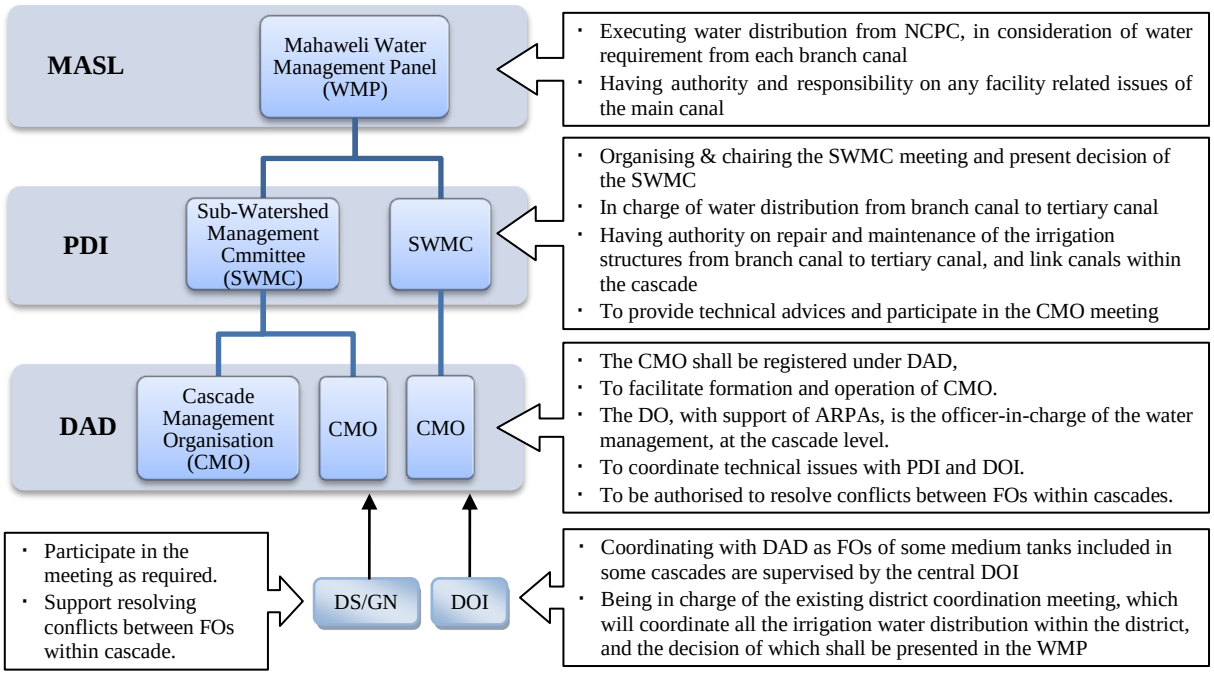
- Institutional Development Expert
- Meeting costs

Budget

LKR.4.3 million

Implementation Structure (

Roles of the relevant government agencies in NCPC operation are as stated below



Remarks

Title of Development Plan	Institutional Development Plan		
Project Title	IN-2. Establishment of Sub-watershed level management system		
Project Period	Three years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Institutional Coordination	
Project Area / Target Group	**Project Site**	Branch canals under the NCPC	
	Target Group	PDI, DAD DOI, DS officers in-charge	
Implementing Organisation	PDI	**Related Organisation**	DOI, DAD, DOA, DAPH, DS

Background / Activities

Background

Sub-watershed Management Committees (SWMCs) should be formed at the branch canals (sub-watershed), which takes responsibility and authority in deciding water allocation from the NCPC branch canal to tertiary canals under the area of their authority. The director of PDI has the authority and responsibility on management and supervision of SWMCs.

In the NCPC water management, decisions of Water Management Panel (WMP) of MASL are informed to SWMC, and SWMC distributes water to each cascade based on the proportionate bulk water allocation. Responsible officers of PDI will operate the gate from branch canal to the tertiary canal to deliver water to each cascade based on the decision of water distribution by the SWMC. Representatives from each cascade to the SWMC will inform the Cascade Management Organisation (CMO) regarding water allocation to each cascade, based on which the CMO of each cascade accordingly decides on water allocation to their tanks.

Activities

(1) Defining rules of SWMC

As a crucial part of the above mentioned NCPC water distribution, SWMC is to be formed in each sub-watershed of the NCPC, which is bounded by the command area of each branch canal. SWMC shall consist of representatives of each CMO under the concerned sub-watershed and officers of relevant government agencies. Each CMO is represented by the PDI Engineer and DO or his/her representative ARPA as their advisory members of the CMO. The government agencies to be involved as SWMC members are DAD, DOA, DOI, DAPH, and DS.

In order to finalise the structure and operational rules of the SWMC, a stakeholder meeting shall be organised through the PDI's initiative and responsibility. Higher level officers from relevant government agencies shall be involved in the stakeholders meeting to discuss and confirm the structure, government agencies to be involved, and operational rules of the SWMC.

(2) Training of PDI officers for SWMC operation and management

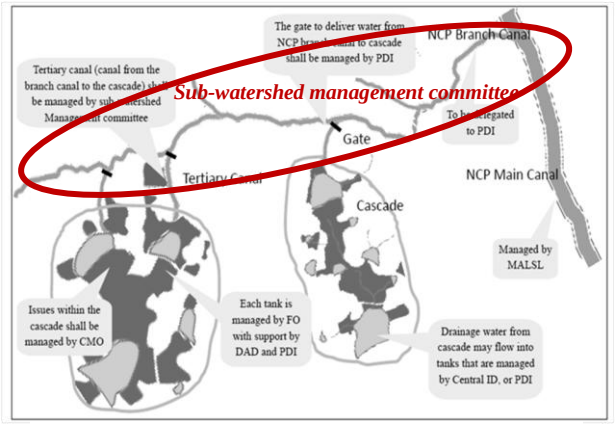
Based on the operational rules decided in the stakeholders meeting, PDI shall organise trainings for the concerned PDI officers who are supposed to manage SWMC and those who manage the sub-watershed water distribution.

PDI appoints officers in-charge of controlling water distribution from NCP branch canal to tertiary canal. The officer will be responsible on the duty regarding water management and maintenance of the irrigation facilities at NCP branch canal, tertiary canals, and their relevant structures. The officer in-charge of water management at the tertiary canal will participate in the SWMC and control the water delivery according to the SWMC's decision.

The training programmes shall consist of the following subjects.

1) Structure and roles of SWMC
2) Operation and management of SWMC
3) Calculation of water to be distributed through tertiary canals
4) Water distribution model for cascade water management to train and endorse cascade water master

For cascade water management, the PDI officers in-charge are trained to train and certify water masters of each cascade.



Source: JICA Study Team

Figure 1. Proposed Area of Responsibility of SWMC

(3) Establishment of SWMC at each sub-watershed

The following activities are executed to establish SWMC.

1) Workshop for SWMC members on roles and operational rules of SWMC, and water distribution system from the NCP branch canal to the tertiary canal
2) Technical training on water distribution to PDI field officers
3) Operation of the SWMC and periodical meetings
4) Coordination between relevant government offices

SWMC shall organize a meeting every season after decision of water allocation by WMP of Mahaweli Authority. The meeting shall decide water allocation to each cascade (tertiary canal) on supply basis, based on the water allocated from the NCP main canal. Water shall be divided to each cascade on equal proportional basis of the command area of the cascade. The SWMC confirm the seasonal allocation to each cascade and decide rotation of the water distribution. SWMC shall reflect cascade level needs and opinions in their decision and make representation of CMOs' needs to WMP.

(4) Experience sharing and learning between cascades among the SWMC

SWMC shall be used as an opportunity for the supporting members (concerned officers in charge of supporting CMOs) to share their experiences between officers. Since the supervision and support of cascade management is new to the most of the field officers, learning from other officers and cases of other CMOs are important to develop capacity of the field officers. Periodical learning opportunities are organised for the SWMC member officers.

(5) Monitoring and follow-up of the SWMC's activities

Periodical meetings of the SWMC and operation of the water distribution at the NCP branch canal should take place in line with the management at the NCP main canal as well as cascade level management. The responsible PDI officers shall monitor the SWMC's activities and coordinate with upper and lower systems of the NCPC.

Overall Goal	Water distribution at the NCP branch canal is operated effectively and efficiently through Sub-watershed Management Committee (SWMC) in line with the operation of NCP main canal and cascades.
Project Purpose	Sub-watershed Management Committees (SWMCs) are formed and their operation of water distribution at the NCP branch canals is established
Outputs / Outcomes	Roles of SWMC within the entire NCPC system are defined and disseminated SWMC is established at each branch canal of NCPC SWMCs are operated for efficient NCPC water distribution

Activities	1st year				2nd year				3rd year			
	1	2	3	4	5	6	7	8	9	10	11	12
(1) Defining rules of SWMC												
1) Documentation of the organisational structure and operational rules of SWMC		■										
2) Stakeholders meeting			■									
(2) Training of PDI officers for SWMC operation and management				■								
(3) Establishment of SWMC at each sub-watershed area												
1) Workshop for the prospective SWMC members on roles and operational rules of SWMC, and water distribution system from the NCP branch canal to the tertiary canal					■							
2) Technical training on water distribution to PDI field officers						■						
3) Operation of the SWMC and periodical meeting							■	■	■	■	■	■
(4) Experience sharing and learning between officers								■			■	
(5) Monitoring and follow-up of the SWMC's activities							■	■	■	■	■	■

Input

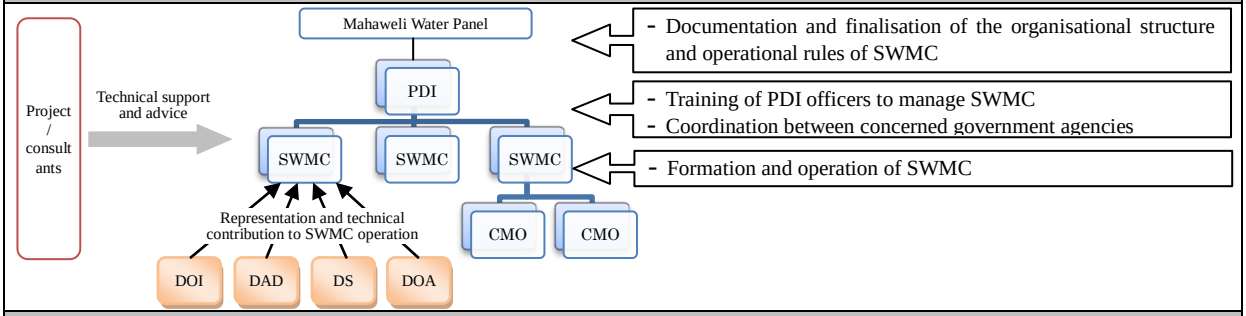
Human Resources, Materials, Etc.

- Institutional Development Expert
- Institutional Development / Training Specialist
- Meeting costs
- Training materials / expenses

Budget

LKR.14 million

Implementation Structure



Remarks

- FO representatives of CMOs can be involved in SWMC if required or preferable.
- Officers in-charge of SWMC should represent all the ethnic groups in the area to reflect voice of minority groups.
- Capacity building of PDI officers shall be implemented in collaboration with / in reference to the water distribution model of the infrastructure development project.

Title of Development Plan	Institutional Development Plan		
Project Title	IN-3. Establishment of Cascade Management Organisations		
Project Period	Five years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Institutional Coordination, Empowerment of farmers	
Project Area / Target Group	**Project Site**	128 cascades under the NCPC	
	Target Group	FOs under the target cascades, DAD field officers	
Implementing Organisation	DAD	**Related Organisation**	PDI, DOI, DOA, DS (GN)

Background / Activities

Background

A comprehensive and inclusive system to manage cascade systems is required for efficient use of irrigation systems with water from NCP canal. Establishment of an organisation at the cascade system level to manage cascade level irrigation-related matters is one of the priority issues in the development of cascade systems. Basic feature and situation of the NCPC project fundamentally differ from the past experiences of cascade management. The significant difference is the improvement of water availability through distribution of water from NCPC. This creates an inevitable task in cascade management of distributing NCPC water flowing into the upstream tanks then to the whole cascade. It was proved through the verification study that establishment of the cascade level organisation is possible with appropriate arrangement. The project propose establishment of cascade level management system through formation of Cascade Management Organisation (CMO)

Activities

(1) Establishment of legislation for Cascade level management body

Legal provision is crucial for sound and stable functions of cascade management as per observed in FOs' management system defined in the Agrarian Development Act and medium and major irrigation systems governed by the Irrigation Ordinance. Since the cascade is basically managed by concerned FOs, CMO as a federation of FOs shall be registered under DAD in the similar way as FOs. DAD has already started process of legalising the cascade level management organisation through amendment of Agrarian Development Act No.46 of 2000, in which establishment of cascade level management body with assigned authority is mentioned. Further details in operational rules of CMO should be documented and ratified. DAD will be responsible for legalising the operational rules of CMOs. Proposed operational rules of CMO is as per attached as *Attachment IN3-1*. In order to make the decisions of CMO legally valid, it is proposed to integrate authorisation of CMOs' decisions in the current legal procedure by making it compulsory to have approval of CMO in the process of legal endorsement of FOs' Kanna meeting. This means that decisions of FOs' Kanna meeting can be sent to the legal endorsement of GA only after approval of the concerned CMO. Once the minor tanks are connected with NCPC, the decision of FOs' Kanna meeting should comply the decisions of higher water management bodies such as water panel, SWMC, and CMO.

(2) Establishment of government support system for cascade management

DAD is the main organisation to support establishment and operation of CMOs. Field officers to support CMOs should be appropriately assigned according to the ethnic composition of the CMO to fairly deal with different ethnic groups. Additional officers with respective ethnic groups should be appointed in case the CMO includes different ethnic groups.

Based on the operational rules of CMO mentioned above, DAD field officers as well as authorised officers should be fully aware of the rules and be confident to support CMOs' activities. The following training programmes for DAD officers are to be conducted.

1) Awareness raising of concerned officers on legal frameworks of CMO and expected functions of the CMO.
2) Training of ARPAs on supporting establishment of CMO, registration, activity support, and conflict management.
3) Coordination between ARPAs, ASCs, and with other government agencies (esp. PDI for technical issues and DOI for medium tanks)

Contents of the training programmes are described in *Attachment IN3-2*. In the training of ARPA, it should be emphasised to take exceptional arrangements for the cascades that have risk factors in establishment and operation of CMOs. Coordination between different administrative offices is also critical for the cascades crossing over ASC divisions or other administrative boundaries.

(3) Formation of CMOs and strengthening of their functions

For the establishment of CMOs in each cascade, the following activities shall be implemented.

1) Identification of existing FOs for the tanks under each cascade.
2) Survey on the features of the cascade and existing FOs (identification of risk factors for CMO establishment)
3) Awareness programmes for the FOs (to make understanding of NCPC water delivery and necessity of cascade management)
4) Consensus making on the CMO establishment and election of representatives from each FO and tank for CMO
5) Training of CMO on basic organisational functions and conflict management (training programme in *Attachment IN3-2*)
6) Registration of CMO
7) Establishment of infrastructure for cascade management (provision of the system including PC, printer, internet facility)
8) Trainings on cascade management (water distribution and crop planning) (training programme in *Attachment IN3-2*)
9) Experience sharing and inter-learning programme between CMOs

Even though a standardised approach for establishment of CMOs can be fundamentally applied to all cascades, distinctive actions should be taken especially for the cascades that have risk factors. Therefore, the activity 2) for identification of risk factors in the concerned cascade is critical. Supplementary training programmes or distinctive approaches shall be adopted for those cascades with risk factors.

(4) Training of water masters on cascade water management

Water master(s) should be appointed in each cascade for water control within the cascade. Water master should be fully trained and equipped with skills on calculation for optimal water distribution between tanks and gate control for water delivery using water distribution model. The training shall be organised in collaboration with PDI officers. Whenever a new water master is appointed, he(she) should pass the training by PDI.

(5) Field support for CMO activities and periodical follow-up trainings

Above established functions of CMO will be rooted only through the on-site experiences. ARPAs and related officers in-charge shall follow up CMOs' activities with necessary advices. Additional trainings shall be conducted on the issues where needs are identified.

Overall Goal	Water from NCPC will be utilised effectively for agriculture development in the area through adequate cascade management
Project Purpose	CMOs are established and manage cascade systems and cascade level water distribution
Outputs / Outcomes	Legal framework for cascade management is established Government support system for cascade management is organised Cascade level management organisations are established and operated

Activities	1st year				2nd year				3rd year				4th year				5th year			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(1) Establishment of legislation for CMO	■	■	■																	
(2) Establishment of government support system for Cascade management																				
1) Awareness raising of concerned officers on legal frameworks on CMO and expected functions of the CMO		■																		
2) Training of ARPAs in charge of the cascades on supporting establishment of CMO, registration, and activity support			■																	
3) Coordination between ARPAs and between ASCs.				■																
(3) Formation of CMOs and strengthening of their functions																				
1) Identification of existing FOs for the tanks under the concerned cascade.				■	■															
2) Survey on the feature of the cascade for establishment of CMO (identification of risk factors for CMO establishment)				■	■															
3) Awareness programmes for the FOs under the cascade						■														
4) Consensus making on the CMO establishment and election of representatives from each FO and tank for CMO							■	■												
5) Training for CMO on basic organisational functions and conflict management										■	■									
6) Registration of CMO									■											
7) Trainings on cascade management												■	■							
8) Establishment of infrastructure for cascade management (provision																				
9) Inter-learning programme																■		■		
(4) Training of water master														■	■					
(5) Training on cascade level water management and maintenance of inter-tank facilities															■			■		
(6) Field support for CMO activities and periodical follow-up trainings														■	■	■	■	■	■	■

Input

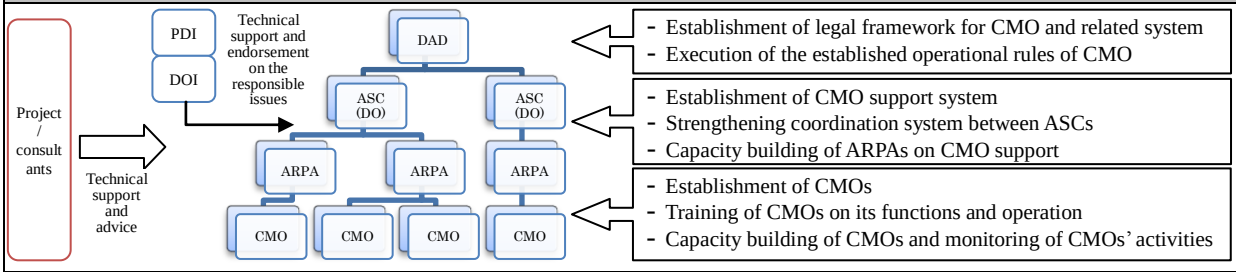
Human Resources, Materials, Etc.

- Institutional Development Expert
- Institutional Development / Training Specialist
- Water Management Expert
- Community Mobilisers
- Meeting costs
- Training materials / expenses
- Transportation for field support
- Infrastructure for water management (PC, printer, internet) for each CMO

Budget

LKR. 240 million

Implementation Structure



Remarks

- Legal status of the CMO should be confirmed through the amendment of Agrarian Development Act, and further operational rules are to be prepared and executed as an administrative ordinance. The operational rules of CMO shall be finalised in response to the overall operation of the NCP canal
- ARPAs should be fully assigned without vacancy. Demarcation of ARPA divisions and appointment of the ARPAs accordingly should be confirmed especially in Vavuniya District.
- ARPAs should be assigned with fair representation of ethnic groups and appropriate officers who can communicate with farmers in the accountable area with their languages.
- In case there are minority ethnic groups in the CMO, additional officers that can support the minority group shall be appointed.
- Capacity building of field officers as well as CMOs shall be organised in collaboration with Irrigation Departments.
- All the documents especially those to be distributed to farmers such as Operational rules of CMO and training materials should be prepared both in Sinhalese and Tamil language, and explained in the language of the respective farmers

Title of Development Plan	Institutional Development Plan		
Project Title	IN-4. Improving capacity of FOs in tank level water management		
Project Period	Four years (prior to the completion of NCPC)		
Related Ongoing/Past Programme	Mahaweli upgrading project (JICA), Pro-poor economic advancement and community enhancement project (PEACE) (JICA)		
Main Trust Areas of National Food Production Programme		Institutional Coordination, Empowerment of farmers	
Project Area / Target Group	**Project Site**	10-15 Pilot sites (FOs) under 2-3 cascades under NCPC	
	Target Group	ARPAs, FOs under the pilot sites of the target cascades	
Implementing Organisation	DAD	**Related Organisation**	PDI, DOI, DOA, GN

Background / Activities

Background

In advance to receiving NCPC water, it is important to improve tank level water management to maximise the benefit from NCPC. Although the FOs have been managing tank level water distribution fairly well to achieve present production, it is required to improve efficiency to get maximum benefit with limited water from NCPC. Moreover, recent change of rain pattern has been affecting cultivation practice of farmers in the area. The NCPC target area has received much less rainfall than normal years for consecutive 4 seasons in year 2016 to 2017. It became difficult to achieve expected yield with the present practice due to less amount of rain even during the Maha season. Therefore, it is necessary for farmers to change their practice of water management and cropping patterns to survive with less available rain and irrigation water. It is reasonable to improve tank level water management and cropping patterns before receiving NCPC water due to the abovementioned change of rain pattern. It will also enhance efficiency in use of NCPC water once they receive it as the techniques and practice of efficient water use can be applied to the management of NCPC water especially in Yala season when water supply is limited.

The programme shall enhance capacity of the field officers(ARPAs) to support FOs in improving tank level water management. The activities are be implemented in the selected pilot FOs under cascades of NCPC target area with full support as model sites, through which all the ARPAs develop their skills to support FOs.

Activities

(1) Selection of pilot cascades and identification of the target FOs

The programme shall be implemented with FOs under the pilot cascades. Pilot cascades are selected from different categories of cascade in consideration of area balance, soil pattern, water availability, ethnic balance etc. All the tanks and FOs under the selected pilot cascades are targeted for the pilot activities.

(2) Improvement of water management under the tank

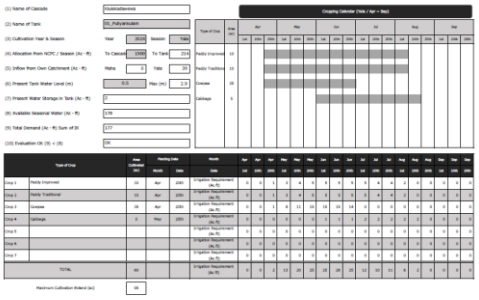
In order to improve water efficiency of NCPC water as well as current limited rainwater, it is crucial to improve water management system under the tank. The following activities shall be conducted to each target FOs of the pilot cascades to improve current practice of water management. This programme shall be implemented in line with rehabilitation and improvement of tank level irrigation facilities.

1) Awareness raising of available water for irrigation and need of efficient use of limited water
2) Lecture training on the efficient water use with establishment of management system and improved irrigation structures
3) Training of water master and relevant person on water control under the tank
4) Practical sessions and in-field practice of water management.

(3) Introduction of crop planning

Besides the importance of crop planning in water distribution at cascade level with NCPC water, tank level crop planning will be helpful to be introduced for better cultivation practice with current water supply. Crop planning with adequate cropping pattern for efficient use of limited water is necessary for the area where rainfall is decreasing. The following activities shall be organised to introduce crop planning practice at each tank in collaboration with agriculture project and DOA.

1) Training on crop planning and diversification of crops
2) On-field support on crop planning and cultivation practice



(4) Additional need based training for FO's capacity improvement

In addition to the above water management and crop planning, need based training shall be organised to enhance capacity of the FOs. Expected subjects of the trainings where capacity development was found necessary through the previous study are as follows.

1) Improvement of O&M activities (knowledge, skills and financial capacity).
2) Financial management and record keeping
3) Flood and disaster management
4) Conflict management
5) Collective agriculture related activities (in relation with and in collaboration with agriculture and marketing projects)

(5) Inter-learning programme between FOs

Mutual learning opportunities between FOs are organised to improve capacity of FOs through learning from successful and well-operated FOs. This opportunities can be especially organised within a cascade so that interaction between FOs under the same cascade can be enhanced, which will be one of the important factors for effective cascade management. Learning opportunities can strengthen ties between FOs under the cascade through mutual learning and interaction. Therefore, the opportunities shall be periodically organised for visits and interaction with different FOs.

(5) Training of ARPAs

Training of ARPAs shall be organised based on the experiences of the pilot activities on improvement of FO's functions and water management. Besides the training programmes, ARPA s are involved in all the activities on FOs as learning opportunities

Overall Goal	FOs became capable enough to maximise agricultural profit with limited water sources through effective support from ARPA
Project Purpose	ARPAs are fully equipped with the skills to support FOs on water managementthrough pilot activities
Outputs / Outcomes	ARPAs are equipped with knowledge and skills on supporting FOs on water management FO's capacities on water management are improved Crop plans are prepared by FOs with diversified cropping patterns and efficient water use Capacities of FOs on O&M, financial management, disaster management, conflict management, and other collective agriculture related activities are improved.

Activities	1st year				2nd year				3rd year				4th year			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
(1) Selction of pilot site																
(2) Improvement of water management under the tank																
1) Awareness raising of available water for irrigation and need of efficient use of the limited water																
2) Lecture training on the efficient water use with establishment of management system and improved irrigation structures																
3) Training of water master and relevant person of water control																
4) Practical sessions and in-field practice of water management.																
(3) Introduction of crop planning																
1) Training on crop planinng																
2) Practice of crop planning and monitoring																
(4) Additional capacity development trainings of Fos																
(5) Inter-learning programme between FOs																
(6) Training of ARPAs																

Input

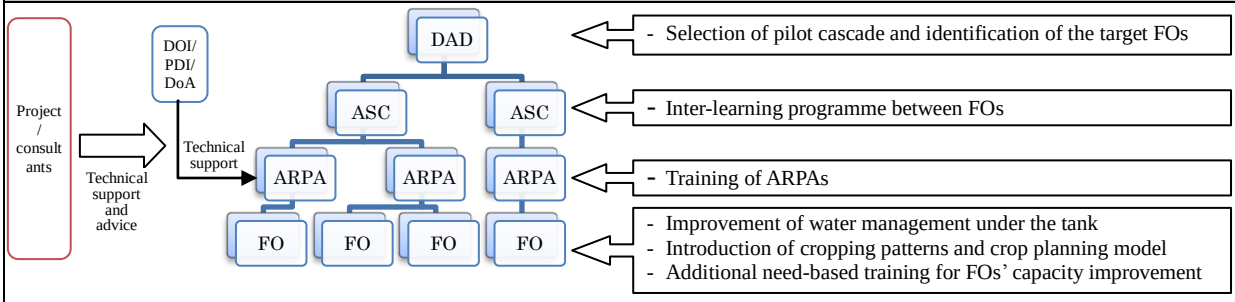
Human Resources, Materials, Etc.

- Institutional Development Expert
- Institutional Development / Training Specialist
- Water management Expert
- Community Mobilisers
- Meeting costs
- Training materials / expenses
- Transportation for community mobilisations and field support for CMO

Budget

LKR. 40 million

Implementation Structure



Remarks

- This programme shall be started early enough to be completed by the time NCPC starts operation.
- The programme aims to improve FO's capacity that can also contribute to effective operation and management of cascade
- All the training shall be structured in consideration of further applicability to cascade management and improvement of NCPC water management, in addition to the tank level FO's capacity development
- Water management training shall be organised in collaboration with infrastructure improvement programme and with support of PDI for technical advice.
- Crop planning training shall involve DOA officers.
- All the programmes are implemented in collaboration with the relevant government agencies and officers for the government to be able to replicate the pilot activities in other area of the NCPC

Title of Development Plan	Agriculture Development		
Project Title	AG-1. Cultivation Skills Development and Provision of Quality Inputs to Boost Crop Diversification		
Project Period	Five years		
Related Ongoing/Past Programme	Agriculture Modernization Project (World Bank)		
Main Trust Areas of National Food Production Programme		Food Security, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	CMO	
Implementing Organisation	Provincial DOA	**Related Organisation**	DOA, Agribusiness enterprises, RR&DI

Background / Activities

Background

Nominal and high-value crops are included in the cropping patterns for target area. Except for paddy, the other crops are cultivated under rain-fed conditions in the highland and most farmers have had no previous experience in growing them under irrigation in the command area. The productivity of the nominal crops remains less that those recorded in the major irrigation schemes in the district. With assured irrigation water supply and an effective extension delivery system, it is necessary to promote adoption of improved practices in crop production by farmers in order to reach the targeted productivity levels. There are a number of national level programs as well as provincial level programs based on training needs identified through pre-seasonal Provincial Technical Working Group (PTWG) conducted by the PDOA in collaboration of the DOA. Majority of the training programs of PDOA targets paddy since it is the main crop cultivated in the area. Contract farming based on buy-back agreement between farmers and major agribusiness entrepreneurs and processors of maize and soybean is already in operation in parts of the target area. These agreements often include provision of technology packages in the form of inputs such as seeds and advice to farmers. As regards the high value crops, condiments and vegetables proposed under the project there is little or no provision for technology transfer as they are either insignificant in terms of extents cultivated or are relatively new to the area. The situation exemplifies the need to develop production skills of the farmers for cultivation of the crops, OFCs and vegetables in particular, under irrigation in the tank command areas. The project provides technical advice and financial support to Rice Research and Development Institute and Agribusiness enterprise. Besides productivity, the next most important aspect in crop production is the product quality which relates to the appearance (shape, size, colour, etc.) and safety (free of harmful agrochemicals). It is also reported that the post-harvest handling loss of vegetables is about 35%, which is very high and need to be minimized. The farm inputs basically include seeds/planting materials, fertilizers and agrochemicals. Availability of high quality farm inputs at the correct time and in required quantities is crucial for successful crop production and to implement a sustainable crop diversification program. Registered seed paddy is issued to farmers by PDOA for demonstration, multiplication and for use in the next seasons while DAD and private traders supply about 60% of the certified seed paddy requirement secured from Government seed farms and private seed producers. The project underlines the need to introduce traditional paddy varieties and newly released high-value paddy varieties. Seeds of OFCs and vegetables as well as the fertilizers and agrochemicals (mainly herbicides and insecticides) are supplied by the private sector dealers operating from towns in the area.

Activities

(1) Promotion of traditional rice varieties and high-value new releases from RR&DI

The national level programs carried out by the PDOA includes the National Food Program: 2016 - 2018, Yaya 2 programs, seed multiplication programs and the crop clinics along with the provincial level programs based on training needs identified through pre-seasonal Provincial Technical Working Group (PTWG). Besides these, the project emphasize promotion of high value traditional paddy varieties and the new releases of the Rice Research Institute having special grain attributes, such as low glycaemic value and fragrancy, as they have high consumer demand and fetch higher market prices. A target of 10% of the total land area cropped with paddy in the target area is set for the traditional and new paddy varieties.

(2) Promotional seminars on introduction of crop diversification

In order to create awareness and deeper understanding of the concept of crop diversification, a series of meetings with the CMOs to inform and discuss basic issues relating to diversification including the purpose, benefits and profitability as well as the opportunities and limitations is proposed.

(3) Skills development programs

The targeted groups may consist of farmers in the cascade system opting to diversify their irrigated lands to non-paddy crops after ascertaining the areas for synchronization by the CMO to facilitate farm operations in individual farms. The areas of needed skills development are given below.

1) **General**: (a) Selection of crops to suit the soil conditions and available resources, (b) crop agronomy relating to Integrated Pest Management (IPM), Integrated Plant Nutrition Management (IPNM) including soil testing for fertilizer recommendations and Sri Lanka Good Agricultural Practice (GAP) and environmental issues.
2) **Specific**: (a) nursery management and (b) on-farm irrigation and drainage, and (c) post-harvest handling of produce to minimize losses.

(4) Provision of quality inputs

It is necessary to ensure that the recommended varieties of seeds/planting materials, fertilizers and agrochemicals are made available for the farmers through the suppliers, the local dealers and entrepreneurs under buy-back agreements with the farmers, at the required time and in adequate quantities. Training farmers on the input use is included in under the skills development program. The CMOs are encouraged to develop linkages with the input suppliers to ensure bulk purchases, quality assurance and price discounts.

Overall Goal	Sustain crop diversification
Project Purpose	Necessary cultivation skills for crop diversification of farmers are developed
Outputs / Outcomes	Development of training material for each crops Capacity development of extension officers and private extension person Develop the cultivation skills for pilot farmers Establishment of quality input distribution system

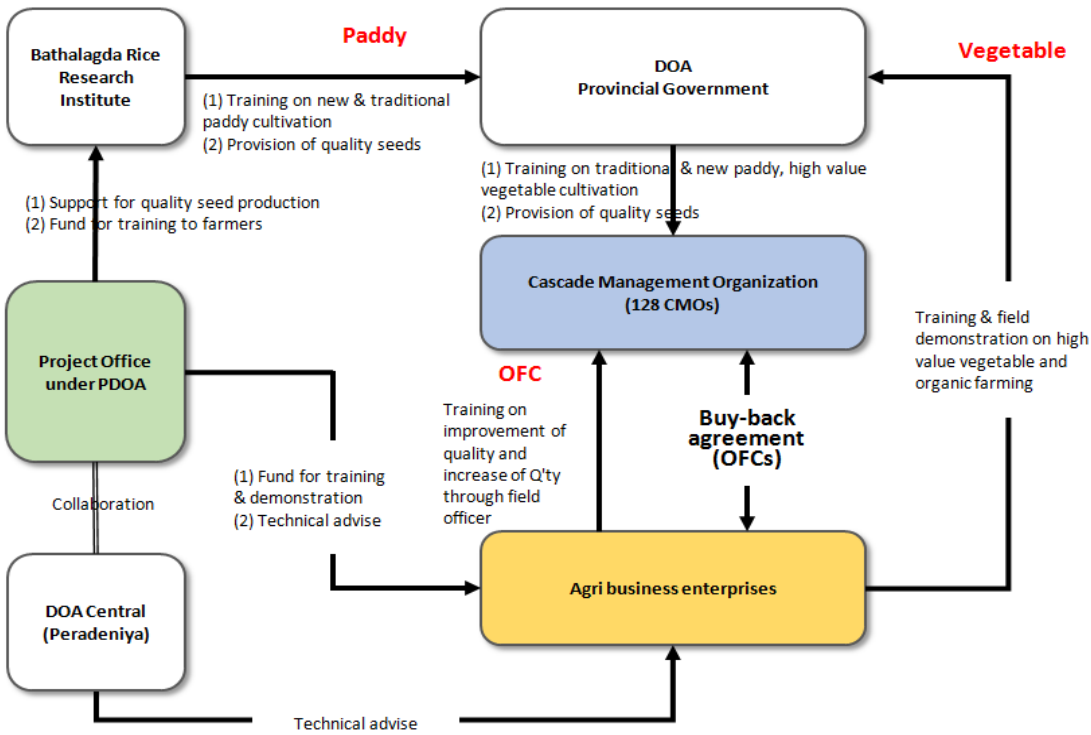
Schedule

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(1) Promotional seminars on crop diversification																				
1. Prepare training curriculum & schedule		■		■		■		■		■		■		■		■		■		
2. Select and inform participants			■		■		■		■		■		■		■		■		■	
3. Conduct promotional seminars			■		■		■		■		■		■		■		■		■	
4. Discuss issues and evaluation			■		■		■		■		■		■		■		■		■	
(2) Promotion of high value traditional & new paddy varieties																				
1. Prepare training curriculum & schedule		■				■				■				■						
2. Select participants			■				■				■				■					
3. Prepare training material			■				■				■				■					
4. Conduct training			■				■				■				■					
5. Monitor the progress and follow up activity			■	■			■	■			■	■			■	■				
(3) Skills development (General and Specific)																				
1. Prepare training curriculum & schedule		■				■				■				■				■		
2. Select participants		■				■				■				■				■		
3. Prepare training material		■				■				■				■				■		
4. Conduct training			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
5. Monitor the progress and follow up activity			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
(4) Provision of quality Inputs																				
1. Compute seasonal seed requirement			■		■		■		■		■		■		■		■			
2. Discuss with suppliers in state & private sectors			■		■		■		■		■		■		■		■			
3. Confirm availability in time and quantities			■		■		■		■		■		■		■		■			
4. Facilitate supplies through CMO				■		■		■		■		■		■		■		■		

Input

Human Resources, Materials, Etc.		**Budget**
Project Consultants	Support supply of quality inputs	LKR. 175 million
Field Coordinating Assistants	Direct cost for training and demonstration	

Implementation Structure



Title of Development Plan	Agriculture Development		
Project Title	AG-2. Promotion of farm mechanisation		
Project Period	Five years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Food Security, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	CMO and young farmers' group	
Implementing Organisation	Central DOA	**Related Organisation**	PDOA, Private sector, DAD

Background / Activities

Background

Labour requirement for paddy cultivation has come down during the past decades mainly as a result of mechanization. Yet, scarcity of labour for crop production is identified as a major problem by a majority of the farmers. Average 2 M/D per household per day of contribution to labour force is inadequate to meet the requirement at peak periods where completion of specific farm operation is often time-bound. Increased cropping intensity and cultivation of labour intensive high-value crops will aggravate the problem. The farm land allotments in minor irrigation schemes are small in size and not uniform in shape as in major schemes. Basically the irrigation and access to the particular farm plot is made through the other farm plot and any farming activities are subject to adjacent other farm plots activities. It will be a major constraint for farmers and service providers for promotion of effective farm mechanization in this area.

To overcome this condition, it is required to change the farming management to suit the mechanization. The farmers should synchronize the cropping pattern and type of crops in particular area to facilitate the mechanization without disturbing adjacent farmers. If the area is large, for example on a cascade basis, the scale of operation merits both farmers and the service providers to ensure optimal operational efficiency of mechanization. Some machinery and equipment are already available in the country though not used extensively by the farmers. They are designed for small scale operation to fit the small plot sizes in minor irrigation schemes often as attachments to 2/4 wheel tractors and include seeders, transplanters, bed making machines, inter-cultivators, harvesters, pod separators, de-coaters, etc. Further, there is the need to introduce new machinery and equipment, imported or locally manufactured, after their field testing and certification, supported by continuous upgrading for improving performance in specific field conditions.

The project supports to develop the technical and management capacity of Cascade Management Organization (CMO) on synchronisation of cultivation planning and monitoring. The project also support service providers and small and medium scale manufacturers for improvement of present machinery, if necessary, and field demonstration and training for farmers with cooperation of Farm Machinery Research Centre of DOA at Mahailluppallama, and Farm Machinery Training Centre at Puliyankulama.

Activities

(1) Exhibition and demonstration of farm machinery and equipment

The main objective of this activity is to create awareness and interest among the farmers as the preliminary stage leading to field adoption. DOA is the main organization for coordinating and conducting these events in collaboration with the DAD, FMTC, private sector suppliers of farm machinery and equipment. Locations for this activity should be made collectively in consultation of all concerned parties and the farmer organizations and may be conducted at FMTC, Provincial Seed Farms or suitable farm locations selected within the target area. The timing of the event may precede specific crop stage where the machine or equipment is used.

(2) Capacity development for synchronization of cultivation plan

Importance of synchronizing the cultivation plans is stressed for operational efficiency of farm mechanization activities. For this purpose, the CMOs need training and guidance to identify and demarcate the irrigated lands according to land suitability and crop selection.

(3) Training of selected young entrepreneurs.

There are in light engineering workshops run by young entrepreneurs in the target area. They are encouraged to undertake fabrication of selected low cost machinery and equipment to support the drive towards farm mechanization. For this purpose, the required training and advice along with engineering drawings for local fabrication are offered by FMRC to interested parties.

(4) Training of farm youth on operation and maintenance of Machinery and equipment

Training of selected farm youth on operation, repair and maintenance of farm machinery and equipment as a main or secondary source of income is promoted. FMTC offers training on operation and maintenance of machinery and equipment.

(5) Credit access to purchase farm machinery and equipment

Loan schemes for purchase of farm machinery and equipment are operated by the commercial banks. Further, cash grants have been made available by the government on cost sharing basis. Creating greater awareness of such facilities among farmers who could afford to purchase and the service providers renting out machinery to farmers is emphasized. Mass method of extension using print media can be applied.

Overall Goal	Farm mechanization is implemented
Project Purpose	Labour requirement for crop production is minimized
Outputs / Outcomes	Farm productivity is increased and crop diversification is adopted Farm profitability is enhanced Farm youth/entrepreneurs find new employment/opportunities

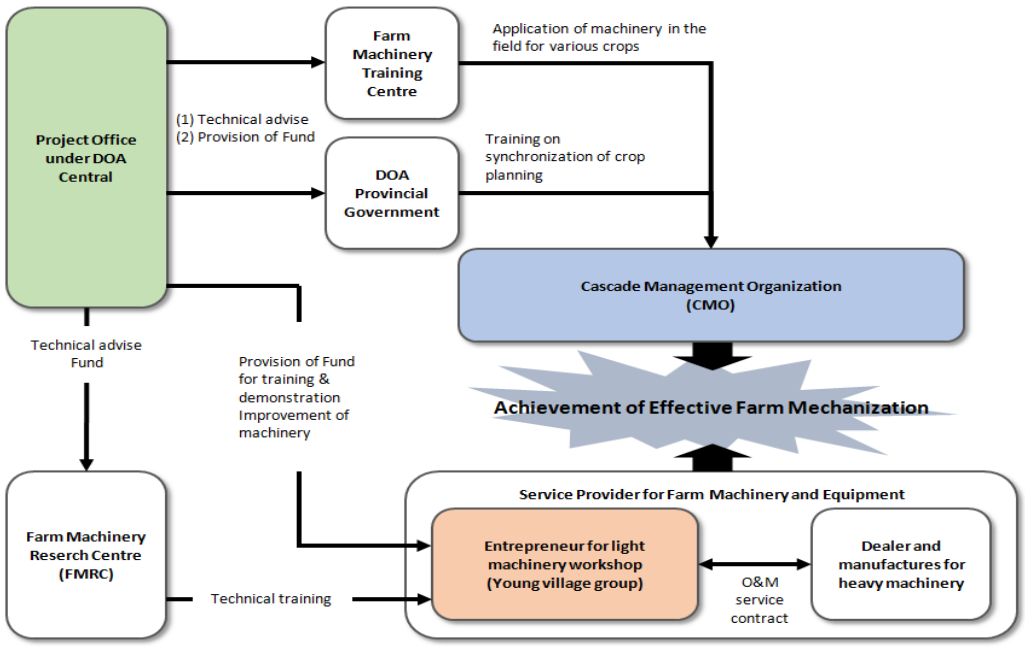
Schedule

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(1) Exhibition and Demonstration of farm machinery & equipment																				
1. Identify Participants and display items	■				■				■				■				■			
2. Site locations and site preparation work	■				■				■				■				■			
3. Prepare handouts, invitations & publicity	■				■				■				■				■			
4. Conduct Exhibition		■				■				■				■				■		
5. Select items for demonstrations		■				■				■				■				■		
6. Select farmers & farm sites for demos.		■		■		■		■		■		■		■		■		■		
7. Conduct field demonstrations		■	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	
(2) Capacity development for synchronization of plan																				
1. Prepare training outline, curriculum & schedule		■		■		■		■		■		■		■		■				
2. Select trainees participants in batches					■		■		■		■		■		■		■			
3. Conduct training before start of seasons			■																	
4. Identify land areas for diversification				■		■		■		■		■		■		■		■		
5. Select crops and cropping pattern/calendar				■		■		■		■		■		■		■		■		
6. Monitor the progress and follow up activities				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
(3) Training of selected young entrepreneurs																				
1. Prepare training outline, curriculum & schedule		■								■										
2. Select trainee participants		■								■										
3. Conduct training			■								■									
4. Monitor the progress and follow up activities				■								■								
(4) Training of selected farm youth on operation & maintenance																				
1. Prepare training outline, curriculum & schedule						■								■						
2. Select trainees						■								■						
3. Conduct training							■								■					
4. Monitor the progress and follow up activities								■								■				
(5) Credit access to purchase farm machinery & equipment																				
1. Discuss with lending agencies		■								■										
2 Select interested entrepreneurs & youth		■								■										
3. Promotional seminars			■								■									
4. Facilitate transactions with lending agencies			■								■									

Input

Human Resources, Materials, Etc.		**Budget**
Project Consultants	Direct cost for training and demonstration	LKR. 120 million
Field Coordinating Assistants		

Implementation Structure



Title of Development Plan	Agriculture Development		
Project Title	AG-3. Improvement of Accessibility to the Fund		
Project Period	Five years		
Related Ongoing/Past Programme	New Comprehensive Rural Credit Scheme (NCRCS) of Central Bank of Sri Lanka, Agriculture loan scheme of Govijana Bank under DAD		
Main Trust Areas of National Food Production Programme		Food Security, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	Famers in CMO	
Implementing Organisation	Central DAD	**Related Organisation**	PDOA, DAD (District)

Background / Activities

Background and Activities

The expansion of the cultivation with crop diversification requires additional capital for farmers with LKR 87,900 in Maha and LKR 227,700 in Yala. as described in the previous section. The central DAD will provide fund for agrarian banks in target area.

The Regional Development Department of the Central Bank of Sri Lanka (CBSL) delivers agricultural credit to increase food production and ensure food security through the New Comprehensive Rural Credit Scheme (NCRCS) or "Sarusara". The NCRCS is managed by the Participating Financial Institutions (PFIs) with their own funds. An interest subsidy of 6% for cultivation loans, 2% per annum for purchasing loans to PFIs and a credit guarantee up to 60% of the losses of the PFIs is payable by the CBSL. The scale of finance is determined in consultation with the Ministry of Agriculture on seasonal basis and the maximum limit per borrower is LKR 500,000. Excluding paddies, commercial scale crop production in the command area of the cascades under irrigation in the project is a new experience to farmers. In this situation, the position of the formal lending organisations with regard to granting of cultivation loans is not clear.

The Agrarian Banks under the DAD operates in accordance with the departmental circular No. 04/2112 at all the ASCs in the target area. The main objective of the Bank is poverty alleviation of the rural peasant community by assisting them to access required capital and to promote savings. A number of credit schemes are operated which include cultivation loans and project loans. Initial capital needs for the program is provided by the center, but many banks have already paid up the original capital and are now operating with their own funds accumulated from loan interest, deposits, shares and small groups. Under the agricultural loan scheme, loans area granted for paddy, soya bean, black gram, maize, cowpea and green gram (LKR 15,000/ac), Chilli (LKR 25,000/ac), Onion (LKR50,000/0.25ac) and vegetables (LKR 25,000/0.5ac).

Field supervision is entrusted to the ARPSs and assisted by the respective Agrarian Bank Officers and the DOs. Recovery rate has been very good and if repayment by few defaulters, after internal rescheduling failed, cases are filed in courts.

It is apparent that the operational system of Agrarian Banks is more appropriate and farmer friendly. It is therefore proposed to use to use Agrarian Banks as the principal lending agency of agricultural credit to farmers. Additional capital funds will be required for disbursement among a larger recipient farmer base after the intervention. This will be channeled through the steering committees at the national and district levels to the Govijana Bank Project operating at ASCs in the target area for disbursement among individual farmers. The PDOA will work in collaboration with the District DAD and ASCs on provision of extension services and determination of crop-wise credit limits. Overall supervision on the correct use of the funds dispersed to individual loan recipients is the responsibility of the respective Community Management Organizations. Operational details would be finalized after discussion with the DAD and the CMOs.

Overall Goal	Sustain crop diversification and achievement of profitable agriculture
Project Purpose	Enable the farmer who start crop diversification to access the fund
Outputs / Outcomes	Establishment of fund provision system between PFIs and farmers Provision of fund to farmers Development of financial management capacity of farmers Improvement of farm management skills of farmers

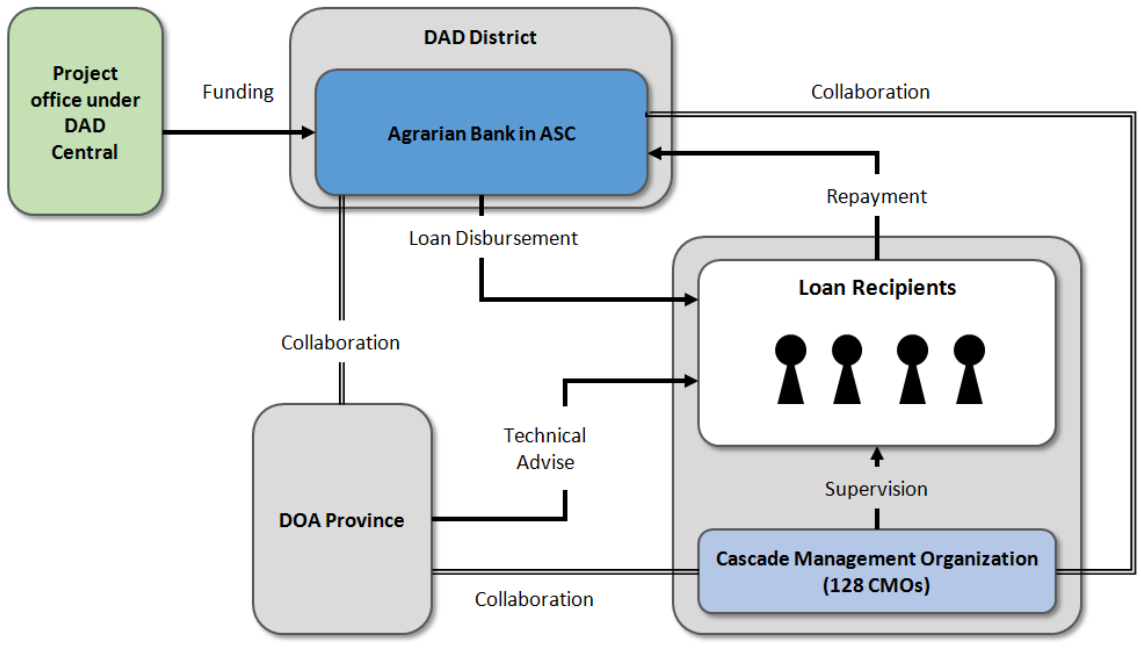
Schedule

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(1) Discussions with DAD to finalize the credit scheme																				
1. Discuss with District DAD	■				■				■				■				■			
2. Awareness session with all concerned parties		■				■				■				■				■		
3. Agreement on operational methodology.		■				■				■				■				■		
(2) Promotional seminars for farmer education																				
1. Preparatory work			■		■		■		■		■		■		■		■			
2. Prepare training outline, curriculum & schedule			■		■		■		■		■		■		■		■			
3. Select and inform participants			■		■		■		■		■		■		■		■			
4. Conduct promotional seminars			■		■		■		■		■		■		■		■			
5. Facilitate PFIs, CMo and recipients to disburse				■		■		■		■		■		■		■		■		

Input

Human Resources, Materials, Etc.		**Budget**
Project Consultants Field Coordinating Assistants	Loan component	LKR. 300 million

Implementation Structure



Title of Development Plan	Agriculture Development		
Project Title	AG-4. Enhancement of Agriculture Extension System Platform		
Project Period	Five years		
Related Ongoing/Past Programme	Agriculture modernization project (World Bank)		
Main Trust Areas of National Food Production Programme		Food Security, Institutional Coordination	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	Staff of PDOA	
Implementing Organisation	Provincial DOA	**Related Organisation**	-

Background / Activities

Background

Delivery of government extension services to the crop sector in the target area comes under the purview of the Provincial DOAs of the North Central and Northern provinces. Few exceptions are recognized where the services are provided by the Interprovincial DOAs. Existing extension structure and functions were presented in Chapters 3 and 6. The Provincial DOAs are vested with duties relating to national interest including implementation of National Food Program 2016 – 2018, Yaya (Tract 2) paddy program, seed paddy production and crop clinics. Provincial programs serve the training and other needs for the forthcoming season identified at the pre-seasonal Provincial Technical Working Group (PTWG).

To realize the expected transformation from a paddy based cropping system to diversified cropping patterns in the irrigated lands require a concerted effort and work commitment by the extension officers. Some of extension skills of government officers, especially cultivation skills for crop diversification, are strengthened through project of "Cultivation Skills Development and Provision of Quality Input to Booster Crop Diversification", this project focus on enhancement of basic extension system platform as follows.

Activities

(1) Mobility of the Extension officers

The service area or range of a field Agricultural Instructor (AI) averages to about 100 km2 in area with over 3000 farm households to serve. They operate from the Agrarian Service Centres (ASCs) as the frontline extensionists interacting directly with farmers. A target cascade area may constitute only a part of a much larger AI range. AIs use their own motorcycles, purchased through a government subsidy scheme, as mode of transportation for which a monthly allowance in the form of subsistence (5 days at LKR 400 per day). The range AIs complain that the payment is inadequate to provide an effective service to the farmers. In view of the increased workload of the concerned range AIs, it is necessary to examine ways and means to minimize their additional cost of travelling. This may refer to (1)Application of group and farmer to farmer (F2F) approaches in extension to reduce the frequency of farm visits, (2) Introducing a system of charging a nominal fee from farmers for the services rendered by AI on visit basis to cover his cost of travelling and (3) Supplementing the present rate of subsistence payment applicable to range AIs.

(2) Introducing an effective communication system

The administration hierarchy of the PDOA in the target area is arranged with the provincial or district head-offices at the top with segments headed by an Assistant Director with AIs placed in the ranges. Since segments, ranges and the farmers widely dispersed, communication among the offices and between farmers and AIs has been weak due to non-availability of an effective electronic network. This has caused the officers to physically gather at the segment or head-offices to exchange information at frequent intervals reducing the time available for field work. Most of the households and range AIs have smartphones and few have computers. An electronic linking up mechanism is required to facilitate rapid exchange of information and optimize time management.

(3) Establishment of a collaborative extension mechanism

A pluralistic approach for effective provision of extension service is deemed crucial for development of the sector. Besides the provincial ministries and departments, the PDOA collaborative work on extension is centred on the vested duties and services of the central MOA DOA and DAD. Training and capacity development on crop related subjects are handled by the PDOA in collaboration of DOA. Direct transactions with the non-state or private sector are rare. Agricultural development activities involve many actors, both from the state and the private sectors such as service providers (machinery and equipment and farm input suppliers), agribusiness enterprises, Paddy Marketing Board, collectors, dedicated economic centers, Activity also improve the cultivation meeting system.

Overall Goal	Sustain crop diversification and achievement of profitable agriculture
Project Purpose	Establish firm agriculture extension system platform to increase the agriculture productivity and production
Outputs / Outcomes	Improvement of mobility of the extension workers Establishment of an effective communication system Establishment of a collaborative extension mechanism

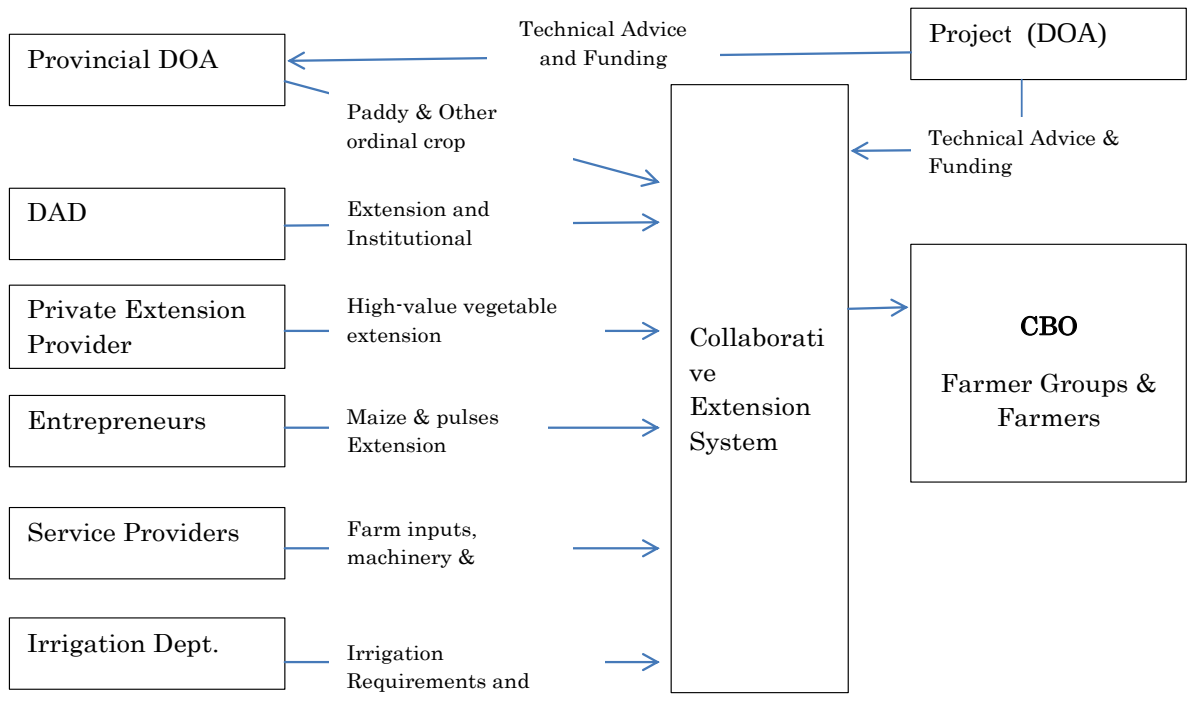
Schedule

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(1) Group & Farmer to Farmer Extension programms by PDOA																				
1. Group formation and leader farmer selections	■		■		■		■		■		■		■		■		■		■	
2. Preparation of visit schedules and training material		■		■		■		■		■		■		■		■		■		
3. Conducting the training		■		■		■		■		■		■		■		■		■		
4. Monitoring and evaluation			■		■		■		■		■		■		■		■		■	
(2) Formulation and activation of communication network																				
1. Initial data collection		■																		
2. Formulation of software programme			■																	
3. Training of stakeholders				■				■				■				■				■
4. Program activation				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(3) High value vegetable extension																				
1. Selection of service provider agency		■																		
2. Finalize working arrangements and reporting with PDOA			■			■				■				■				■		
3. Mobilization of extension service				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4. Progress monitoring				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
(4) Establishment of collaborative extension mechanism																				
1. Preparatory work by PDOA	■																			
2 Informative discussions and form the stakeholder groups		■				■				■				■				■		
3. Conduct pre-seasonal meetings in line with the kanna meetings			■		■		■		■		■		■		■		■		■	

Input

Human Resources, Materials, Etc.		**Budget**
Project Consultants	Training materials/expenses	LKR. 80 million
Field Coordinating Assistants	Advanced communication system	

Implementation Structure



Title of Development Plan	Post Harvest and Marketing Development		
Project Title	PM-1. Establishment of the Community Supported Agriculture Model of High Value Vegetables in Partnership with Hotel Industry		
Project Period	Five years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Marketing, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	FOs under the target cascades	
Implementing Organisation	PDOA	**Related Organisation**	DAD, GN

Background / Activities

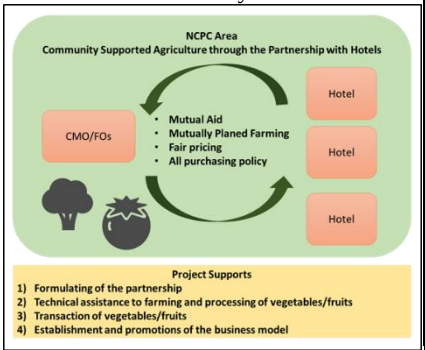
Background

High value vegetables/fruits are able to contribute to enhance crop diversification and agricultural profit for farmers at once.

The target area of NCPC, in particular, has a great potential for the high-valued crops. This is because the most target cascades are surrounded by, or closed to the "Cultural triangle of Sri Lanka", *Anuradhapura-Kandy-Polonnaruwa*, which annually invites over 700,000 tourists. In the triangle, the hotel industry is well developed, from middle range to high-end resorts. In other words, the targeted areas are not only production area but also a consumption area for high-value vegetables and fruits. Moreover, most middle or higher hotels seek for stable suppliers and they prefer to transact those crops directly from farmers. They are willing to pay 30-70% of premium price on the vegetables/fruits which meet required quality.

Based on the status quo, the project employs a concept of community supported agriculture (CSA). CSA is a food system that connects producer and consumers more closely by allowing both of producers and consumers to engage in farming and processing of a certain farm or group of farms. It is an alternative socioeconomic model of agriculture and food distribution where both parties share the risks of farming. CSA is rooted in *Sansyo-Teikei* (producers-consumers partnership) movement in 1970s in Japan, which producers and consumers directly connect in order to secure food quality and fair pricing. The NCPC area as one of the key tourist attractions in the country, is able to develop its own CSA model which CMO/FOs and hotels mutually engage in planning farming, producing, quality control, pricing and so on. The CAS model ultimately aims to enhance the locally supported food system which secure good quality of produce required by hotels, and better marketing for farmers.

To do so, the project coordinates the partnership, and supports the quality control of products and outbound logistics. In addition, the project provides technical assistance to farming and processing of vegetables and fruits. In the verification program of crop diversification, several high value crops, such as cauliflower and beets were identified, which are well adaptable in the target area. The project supports to design the most suitable cropping pattern in target areas, utilizing the result. At the end of the project, the NCPC version of CSA model will be promoted. Notably, farmers freely expand market channels such as through supermarkets or develop other value additions such as processing or off-season sales once they become familiar with the production and selling of those crops through the project.



Concept of Community Supported Agriculture

Activities

(1) Formulation of the Partnership (Preparation)

The project coordinates the farmers in the targeted CMO/FOs who are willing to start high-value vegetables and fruits and hotels. The participants will be also assisted to formulate an agreement which covers targeted produces, quality, pricing, and delivery methods. The agreement can be formed as a contract which is legally approved. The main activities are as follows;

1) Select the sites for pilot projects
2) Select hotels for the partnership
3) Identify the quality, quantity, delivery way of vegetables and fruits
4) Formulate an agreement (or contract) of the CMO/FOs and hotels

(2) Production of Vegetables/Fruits with the Required Quality (Production)

To achieve the quality and quantity agreed, the project provides a package of technical support to the pilot sites.

1) Identify suitable varieties of vegetables/fruits for the agreement
2) Provide trainings of cultivation of vegetables/fruits
3) Provide trainings of post-harvest processing and management of vegetables/fruits

(3) Transaction of Vegetables/Fruits (Transaction)

The project will support the transaction of the partnership as well. This activity includes the establishment of outbound logistics (quality control, order-delivery management, and traceability management). Main activities are as follows;

1) Identify and design an efficient outbound logistics such as quality control, and outbound logistics
2) Provide trainings of the transaction management to stakeholders
3) Operate the transaction and improve the system if necessary

(4) Establishment of the Business Model (Establishment and Extension)

1) Analysis achievements and challenges of the pilot projects
2) Improve the pilot projects, based on the above results
3) Establish the business model and held workshops to extend the model

Overall Goal	The business model of value added vegetables and fruits in partnership with hotel industry increases agricultural profits among the target farmers.
Project Purpose	Profitable business model of value added vegetables and fruits in partnership with hotel industry is established in the NCPC target area
Outputs / Outcomes	1. The partnership of CMO/FOs(or farmers groups) and hotels is formulated 2. Vegetables/fruits with the required quality are produced 3. Vegetables/fruits are smoothly transacted through the partnership 4. The business model is established and extended in the target area.

Activity	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(1) Formulation of the Partnership																				
1) Select the sites for pilot projects	■	■																		
1) Select hotels for the partnership		■	■																	
2) Identify the quality, quantity, delivery way of vegetables and fruits		■	■																	
3) Formulate an agreement (or contract) of the CMO/FOs and hotels			■	■																
(2) Production of Vegetables/Fruits with the Required Quality																				
1) Identify suitable varieties of vegetables/fruits for the agreement					■	■														
2) Provide trainings of cultivation of vegetables/fruits					■	■	■	■	■	■	■	■	■	■	■	■				
3) Provide trainings of post-harvest processing and management of vegetables/fruits					■	■	■	■	■	■	■	■	■	■	■	■				
(3) Transaction of Vegetables/Fruits																				
1) Identify and design an efficient outbound logistics			■	■	■	■														
2) Provide trainings of order-delivery management to farmers						■	■	■				■	■	■	■	■				
3) Operate the transaction and improve the system if necessary							■	■	■	■	■	■	■	■	■	■				
(3) Establishment of the Business Model																				
1) Analysis achievements and challenges of the pilot projects														■	■	■				
2) Improve the pilot projects, based on the above analysis																	■	■		
3) Establish the business model and held workshops to extend the model																		■	■	■

Input

Human Resources, Materials, Etc.

- Marketing Expert
- Vegetables/Fruits Farming Experts
- Postharvest Expert
- Social Mobilizers
- Meeting costs
- Training materials / expenses
- Equipment and tool for outband logistics

Budget

LKR. 740 million

Implementation Structure

Activity	Roles			
	Project Office of the PDOA	PDOA	CMO/FO	Anuradhapura Tourism and Hoteliers Association
(1) Formulation of the Partnership	:Assign a marketing expert and social mobilizers :Select the sites for pilot project with DAD :Support to held the partnership meetings	:Assign C/P personnel for the project :Identify and select the target CMO/FO : Hold partnership meetings and support to formulate an agreement/contract	: Organize the willing farmers for the business model : Participate in the partnership meetings and formulate an agreement/contract	: Organize the willing hotels for the CSA model : Participate in the partnership meetings and formulate an agreement/contract
(2) Production of Vegetables and Fruits with the required quality	:Assign rice a farming expert and post harvest expert : Provide trainings of farming and postharvest processing to CMO/FO with the C/P personnel of DAD	:Assign C/P personnel of farming and postharvest processing : Provide trainings of farming and postharvest processing to CMO/FO with the project's expert	: Plan cropping with the hotels : Cultivate and process the vegetables/fruits with assistance of the project' expert and DAD officers	: Plan cropping with CMO/FO : Participate in the process of cultivation and processing
(3) Transaction of vegetables/fruits	: Identify and design an efficient outbound logistics with DAD : Provide trainings of order-delivery management to CMO/FO with DAD	: Identify and design an efficient outbound logistics with the project : Provide trainings of order-delivery management to CMO/FO with the project	: Receive the trainings of order-delivery management : Transact vegetables and fruits with hotels	: Transact vegetables and fruits with hotels : Provide feedback of the quality and quantity to CMO/FO
(4) Establishment of the business model	: Analyze achievement and challenges of the business model :Share the findings to all stakeholders and improve the pilot project, if any	: Hold extension workshops of the business model	: Participate in the extension workshops of the business model	: Participate in the extension workshops of the business model

Remarks

*For the implementation of this plan, the Ministry of Tourism may be considered as a partner organization.

Title of Development Plan	Post Harvest and Marketing Development		
Project Title	PM-2. Promotion of Contract Farming of Other Field Crops		
Project Period	Three years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Marketing, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	FOs under the target cascades	
Implementing Organisation	PDOA and private sector	**Related Organisation**	DAD, GN

Background / Activities

Background

Other Field Crops, or OFCs (grain legume, condiments, and oil seeds) is one of the option for farmers, to explore a new market channel, with contributing to crop diversification and food security. Sri Lanka imports a huge amount of OFCs despite the fact that the majority of those crops are essential food items in the country and can be locally produced. It is urgent to increase the domestic production of OFCs in order to reduce the expense of foreign currency and to enhance the food security.

Responding to the demand in the domestic production, some major agribusiness enterprises practice a contract farming of maize and soya in the target area. Those contract faming mostly benefit the participant farmers, providing a higher prices and a package of technical assistances. However, there is a risk of non-fulfilments or breach of a contract. Mainly those troubles are mainly caused by the failure to meet the contracted quality/quantity of produces, or by the lack of a authorized regulator.

This project, therefore, aims at promoting the production of OFCs in the target area through coordinating and supporting the contract farming. In particular the project highlights to establish one stop, governmental body which provides 1) match-making service of producers and entrepreneurs, 2) coordination of financial loan and agricultural insurance, 3) consultation of contract related troubles, and 4) technical transformation to agribusiness enterprises. Particularly, 4) technical transformation attempts to encourage agribusiness enterprises to play a role in agricultural extension.

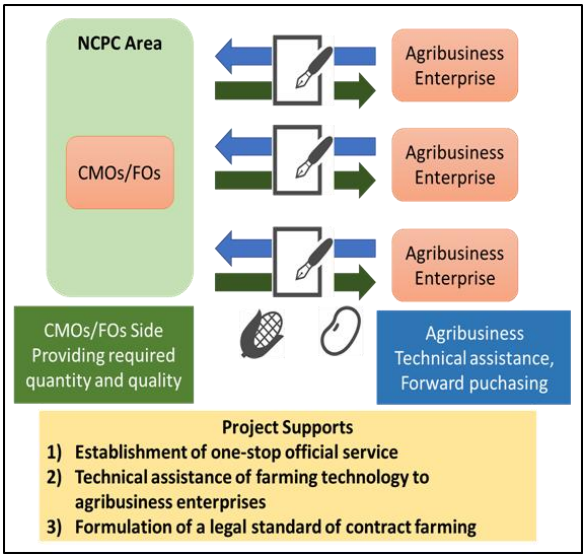


Figure: Concept of Contract Farming

In addition, the project plans to formulate an authorized standard of a contract farming. It includes a warranty of violation and non-fulfilments of a contract.

Activities

(1) Establishment of One-stop, Specialized Body for Contract Farming

1) Organize a task force group in the DAD to establish the once-stop body for contract farming
2) Survey key challenges and needs to promote a contract farming
3) Clarify the roles and responsible of the governmental one-stop body
4) Hold a coordinating workshop of stakeholders such as financial agencies, seed, input companies, agricultural machinery services and collect the data of services
5) Hold a workshop for opening the one stop body and making a linkage between farmers and agribusiness enterprises
6) Operate the service of one-stop body

(2) Technical Transformation to Agribusiness Enterprises

1) Clarify current status and challenges of technical assistance of agribusiness enterprises
2) Provide a training of farming technology and others to the target agribusiness enterprises
3) Follow up and monitor agricultural extension activities of the target agribusiness enterprises

(3) Formulate a Legal Standard of Contract Farming

1) Organize a legal unit in the above task force group
2) Study contracts of agricultural contract farming in Sri Lanka and other countries
3) Draft a standard for contract farming in Sri Lanka
4) Hold a conference/workshop to announce the standard and legal regulation

Overall Goal	The promotion of contract farming of OFCs increases agricultural profits among the target farmers
Project Purpose	The contract farming of OFCs is promoted in the target area through the establishment of the official service
Outputs / Outcomes	1. One-stop, specialized body for contract farming is established and operated 2. Appropriate farming technology is transformed to agribusiness enterprises. 3. Legal standard of a contract farming is formulated

Activity	1st Year				2nd Year				3rd Year			
	1	2	3	4	1	2	3	4	1	2	3	4
(1) Establishment of One-stop, Specialized Body for Contract Farming												
1) Organize a task force group in the DAD to establish the once-stop body	■											
2) Survey the key challenges and needs to promote a contract farming		■	■									
3) Clarify the roles and responsible governmental body of the one-stop body			■	■								
4) Hold a coordinating workshop of stakeholders				■		■						
5) Hold a workshop for opening the one stop body							■	■				
6) Follow up and monitor agricultural extension activities of the target agribusiness									■	■	■	■
(2) Technical Transformation to Agribusiness Enterprises												
1) Clarify current status and challenges of technical assistance of agribusiness enterprises			■									
2) Provide a training of farming technology and others to the target agribusiness enterprises				■	■	■						
3) Draft an contract standard for contract farming in Sri Lanka							■	■				
(3) Formulate a Legal Standard of Contract Farming												
1) Organize a legal unit in the task force of DAD			■									
2) Study contracts of agricultural contracts in Sri Lanka and other countries				■	■	■						
3) Draft an contract standard for contract farming in Sri Lanka							■	■				
4) Hold a conference/workshop to announce the standard and legal regulation									■	■		

Input

Human Resources, Materials, Etc.

- Agricultural Finance/Contract Expert
- Farming Expert
- Legal Expert
- Social Mobilizers
- Meeting costs
- Training materials / expenses

Budget

410 million LKR

Implementation Structure

Activity	Roles			
	Implementing Agency	DAD	CMO/FO	Agribusiness enterprises
(1) Establishment of One-stop, Specialized Body for Contract Farming	:Dispatch an agricultural finance/contract expert :Survey key challenges and needs to promote a contract faming of OFCs with the task force group of DAD	:Organize a task force group in the DAD :Survey key challenges and needs to promote a contract faming of OFCs with the project :Clarify the roles of responsible of the one-stop body : Hold a workshop for opening the one stop body and making a linkage between farmers and agribusiness enterprises :Operate the service of one-stop body	: Beneficiaries of the one-stop body	: Beneficiaries of the one-stop body
(2) Technical Transformation to Agribusiness Enterprises	:Dispatch rice farming experts and post harvest expert : Provide trainings of farming to agribusiness enterprises with the C/P personnel of DAD	:Assign C/P personnel of rice farming : Provide trainings of farming to agribusiness enterprises with the project's expert		: Receive the trainings of farming from the project and DAD and formulate the agricultural extension manuals
(3) Formulate a Legal Standard of Contract Farming	: Support CMO/FO to transact traditional rice varieties with DAD : Study contracts of agricultural contract farming in Sri Lanka and other countries with the legal unit of DAD : Support the legal unit to draft a standard for contract farming in Sri Lanka with the legal :Support DAD to hold the workshop to announce the standard and legal regulation	: Organize a legal unit in the task force group : Study contracts of agricultural contract farming in Sri Lanka and other countries with the project : Draft a standard for contract faming in Sri Lanka : Hold the workshop to announce the standard and legal regulation	: Participate in the workshop and utilize the standard	: Participate in the workshop and utilize the standard

Remarks

Title of Development Plan	Post Harvest and Marketing Development		
Project Title	PM-3. Creation of the Value Chain of Traditional Rice Varieties		
Project Period	Three years		
Related Ongoing/Past Programme	Nil		
Main Trust Areas of National Food Production Programme		Marketing, State-Private sector Partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	FOs under the target cascades	
Implementing Organisation	PDOA	**Related Organisation**	DOC (Department of Commerce), DAD, GN

Background / Activities

Background

The paddy/rice sector of Sri Lanka has arrived at the stage of the creating new value, having passed the stage of self-sufficiency. High value, traditional rice varieties are one of the options to create a new value chain of rice, which enhances farmers' agricultural income, without increasing both production and farmland.

The demand in traditional rice varieties such as *Suwandel* and *Pachchaperumal* has notably increased amongst health conscious consumers in the urban area and the excessive demand is observed particularly in the Colombo market. The survey of JICA Project Team analysed the supply of the top five varieties covers only 25.6 % of the demand and most downstream players are willing to pay 2-3 times higher price than modern varieties. Moreover, the study showed that a significant number of wholesalers and retailers prefer to transact traditional rice varieties directly with farmers.

As such, this project aims to promote the high value, traditional rice varieties which the conventional rice farmers can apply relatively easily. In particular, the project introduces the direct selling and encourage the target groups to digitalize their transaction with an electronic commerce (E-commerce) that connects producers in the target area to the downstream stakeholders in Colombo. E-commerce is able to reduce transaction cost by shortening the supply chain and digitalise each process from inventory management to delivery. Through the website or by a simple tablet/smartphone application of the E-commerce, CMOs/FOs is able to manage the inventory of paddy/rice, orders, and deliveries. Consumers, on the other hand, can easily place their orders for traditional rice varieties by accessing different interfaces of the same website or application.

The project supports to design and develop the most applicable direct selling for the target groups. At the initial stage, the target groups establish a direct selling network with supermarkets or retailers and transact traditional rice to them by phone or other simple methods. Once they secure a sufficient number of direct customers, they are able to choose the most suitable and feasible systems, from various types of E-commerce, from low cost, simple one such as short message service, to sophisticated, high-technological system .

Moreover, the project assists to promote the business model that sells traditional rice varieties directly to consumption areas, utilizing the frontline information and communication technology, both for producers and consumers.

Activities

The project consists of three main activities; (1) introduction of E-commerce, (2) cultivation and processing of traditional rice varieties, and (3) promotion of the traditional rice varieties.

(1) Introduction of E-commerce system

This project attempts to encourage CMO/FOs to manage the transaction of traditional rice varieties, but taking transactional cost into consideration, some processes such as milling or transporting can be cooperated with other stakeholders. The main activities follow as

1) Identify the targeted CMO/FOs and nominate a marketing leader(s) in the targeted CMO/FOs.

2) Design and develop the most suitable method or steps to apply E-commerce, of direct selling, which link the target CMO/FOs and the consumption sides in Colombo

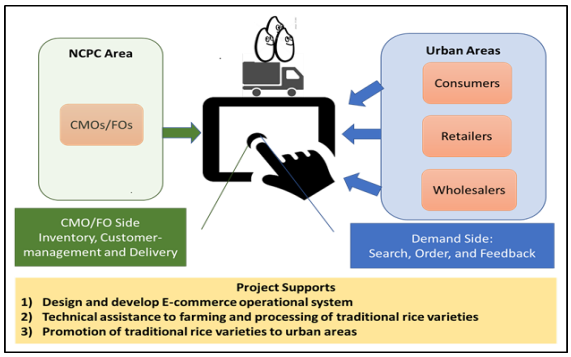


Figure: The Concept of the transaction with E-commerce system

3) Coordinate related stakeholders (millers, transportation agency, and others) and organize a business alliance

4) Provide trainings of the operation and maintenance of the E-commerce to the targeted CMO/FOs and other stakeholders.

(2) Cultivation and Processing of Selected Traditional Rice Varieties

1) Select the traditional rice varieties suitable both for the target market and agroecological conditions in the target farmland

2) Provide training of cultivation of the traditional rice varieties to the target CMO/FOs

3) Provide training of post-harvest processing of the traditional rice varieties to the target CMO/FOs

(3) Promotion of the Traditional Rice Varieties with the E-commerce system

1) Design promotion methods, including branding, packaging and advertising

2) Operate the transaction of the traditional rice varieties with the E-commerce system

3) Organize a workshop of the traditional rice varieties with E-commerce, for producers in other cascades, downstream stakeholders

Overall Goal	The promotion of traditional rice varieties increases the agricultural profit among the target farmers.
Project Purpose	The cultivation and selling of high value, traditional rice varieties are increased in the target area.
Outputs / Outcomes	1. E-commerce system is introduced both in the targeted areas and Colombo 2. High valued traditional rice varieties are cultivated in the targeted areas 3. Traditional rice varieties are promoted both in the targeted area and consumption areas.

Schedule

Activity	1st Year				2nd Year				3rd Year			
	1	2	3	4	1	2	3	4	1	2	3	4
(1) Introduction of E-commerce system												
1) Identify the targeted FOs and nominate a marketing leader(s).	■											
2) Design and develop the E-commerce system		■	■			■				■		
3) Coordinate related stakeholders and organize a business alliance		■	■			■				■		
4) Provide trainings of the operation and maintenance of the E-commerce			■	■		■		■		■		
(2) Cultivation and Processing of Selected Traditional Rice Varieties												
1) Select the traditional rice varieties suitable	■											
2) Provide training of cultivation of the traditional rice varieties to the targeted FOs		■	■	■	■	■	■	■				
3) Provide training of post-harvest processing of the traditional rice varieties to the targeted Fos			■		■		■		■			
(3) Promote the Traditional Rice Varieties with the E-commerce system												
1) Promote of the traditional rice varieties, produced in the targeted area in Colombo							■	■	■			
2) Operate the transaction of the traditional rice varieties with the E-commerce system			■	■	■	■	■	■	■			
3) Organize a workshop of the traditional rice varieties for producers in other cascades											■	

Input

Human Resources, Materials, Etc.

- Marketing/Promotion Expert
- System Engineer
- Rice Farming Expert
- Postharvest Expert
- Meeting costs
- Training materials / expenses
- Digital equipment for E-commerce (PC, Tablet, Software etc)

Budget

LKR. 486 million

Implementation Structure

	Roles		
Activity	Implementing Agency	DAD	CMO/FO
(1) Introduction of E-Commerce system	:Dispatch system an engineer and marketing expert :Design and develop the E-commerce web/application :Provide trainings of the operation and maintenance of the E-commerce to C/P and representatives of CMO/FO	:Assign C/P personnel to be in charge of E-commerce operation and maintenance :Identify and select the target CMO/FO(s) for the traditional rice varieties project : Receive the training of the operation and maintenance of the E-commerce : Support the operation and maintenance of the E-commerce	: Nominate representatives of E-commerce operation (market leaders) : Receive the training of the operation and maintenance of the E-commerce
(2) Cultivation / processing of selected traditional rice varieties	:Dispatch rice farming experts and post harvest expert : Provide trainings of rice farming and postharvest processing to CMO/FO with the C/P personnel of DAD	:Assign C/P personnel of rice farming and : Provide trainings of rice farming and postharvest processing to CMO/FO with the project's expert	: Organize the willing farmers : Cultivate and process the traditional rice varieties with assistance of the project' expert and DAD officers
(3) Promotion of the traditional rice varieties	: Support CMO/FO to transact traditional rice varieties with DAD :Support DAD to hold the workshop of the traditional rice varieties	: Support CMO/FO to transact traditional rice varieties with the Project : Hold promotion the workshop of the traditional rice varieties with E-commerce	: Manage paddy/rice inventory through the E-commerce system : Operate the transaction of traditional rice varieties

Remarks

- For the implementation of this plan, the Department of Commerce may be considered as a partner organization.
- One CMO/FO is not necessary a business body of the traditional rice business, but several CMO/FOs are able to organize an association or other appropriate entity.

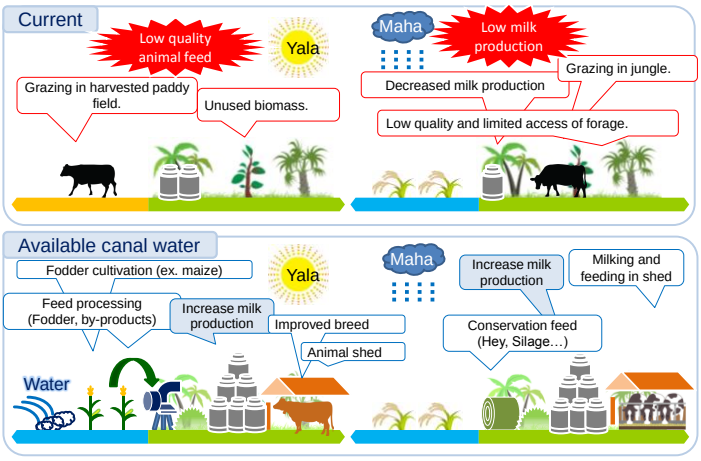
Title of Development Plan	Livestock Development		
Project Title	LS-1. Stable Feed Production and Delivery through Entrepreneur Development		
Project Period	Five years		
Related Ongoing/Past Programmes	Project on Promotion of Appropriate Feeding Technique to exploit productivity in dairy cattle (2014-17, FAO), Small Scale Dairy Farming Improvement through Genetic and Feeding Management Improvement Project (GFMI) (2009-2014, JICA)		
Main Trust Areas of National Food Production Programme		Food Security, Empowerment of farmers	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	Young livestock farmers group in FMS	
Implementing Organisation	PDAPH and Private Sector	**Related Organisation**	School of animal husbandry

Background / Activities

Background

After arrival of NCPC water to the target area, the present grazing land will be limited specially in Yala season. It is therefore that this project will establish the proper feed production with crop residue and distribution to livestock farmers.

This Project expects to establish system of entrepreneur development of motivated young livestock farmers group in Farmer Milk Societies (FMS) to collect and process the maize crop residue and sale of those as a cattle feed to the member of FMS. The FMS are basically strong organisation functioning with a basic accounting and management procedure in milk related services activities. The sale channels are easily created in FMS and present accounting systems are also used for transaction of the money on this business activities.



Since the cascade managed organisation (CMO) is expected to have the contract farming agreement with agribusiness enterprises on the large scale cultivation of maize or other field crops as proposed in the crop marketing plan, the project will facilitate to make the contract with young livestock farmers' group with CMO for purchasing maize or other crop residues at first. Then project will support for young livestock farmers' group with three channels for his technical, management and financial capacity development.

Activities

The first supporting channel is through Provincial Department of Animal Production and Health (PDAPH) providing the technical training for silage making and maintenance. The PDAPH officers are trained through field demonstration and those trained officers will conduct necessary training programmes to young livestock farmers' group. The main training components are (1) economic value of crop residue, (2) basic processing of crop residue including equipment and machinery utilization and storage and packaging and (3) improving nutritive quality of crop residue and those are necessary skills for silage production and maintenance. The second partner is the private sectors such as development banks, major milk industrial company or agribusiness enterprises which expected to give the initial fund or equipment to young livestock farmers' group. The Project will provide seed money to private sector with agreement then the private company will provide initial fund or equipment such as choppers or barrels for loan or rental basis. The condition to provide those facilities to young livestock farmers' group is decided based on the terms and conditions agreed between project and private sector.

The training on management skills development to young livestock farmers' group is provided the consultant or resources person hired by the Project. The first training program namely "Introduction to Entrepreneurship Development" will provide necessary knowledge and skills on how to establish, manage, and oversee a small scale business successfully. The content of the program will cover understanding of entrepreneurship, successful business ventures, resource analysis and management, production cycle, costing pricing and profit, market analysis and preparation of a business plan. The second training program namely "Management skill development "will provide necessary knowledge and skills to improve management capacity. The program will cover the area of Record Keeping, Financial management, Time management, Manpower management, and quality management. Third training program namely "Business promotion and Productivity Improvement "will provide required knowledge and skills to promote existing business and improve productivity. The content of the program will cover Customer relations, Value addition, Marketing, and Production Cycle management. In addition to the three main training programs, on the job training will be provided depending on the need.
The Project will target nearly 100 young livestock farmers groups for five years and will be implemented with three batches targeting 30, 30 and 40 groups respectively.

Overall Goal	Increase the production and sale amount of milk
Project Purpose	Produce and delivery necessary amount of feed to livestock farmers
Outputs / Outcomes	Development of technical and business management capacity of young livestock farmers' group Production of feed Establishment of production and delivery system for feed

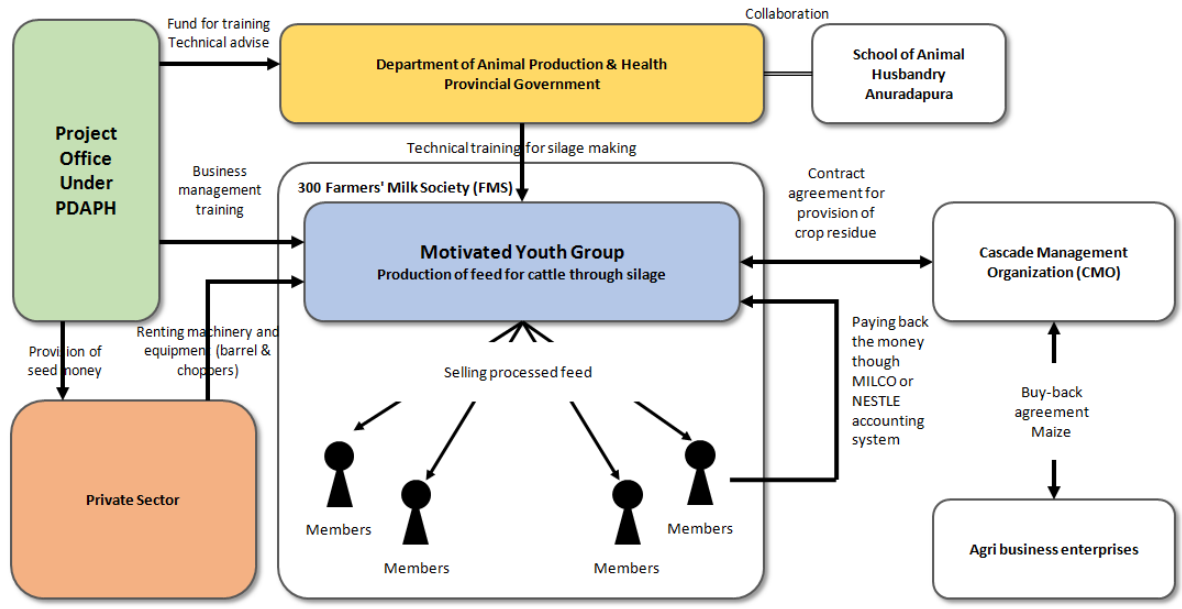
Schedule

Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Project Preparation																				
2. Selection of private partner																				
3.Training on PDAPH																				
4.1st Batch (30)																				
Selection of groups																				
Training on skills dev.																				
Business implementation																				
Monitoring																				
5.2nd Batch (30)																				
Selection of groups																				
Training on skills dev.																				
Business implementation																				
Monitoring																				
6.3rd Batch (40)																				
Selection of groups																				
Training on skills dev.																				
Business implementation																				
Monitoring																				
7.Financial Audit																				

Input

Human Resources, Materials, Etc.		**Budget**
Livestock Production Specialist	Other direct cost	LKR. 100 million
Seed money for provision of equipment		
Training expenses		

Implementation Structure



Title of Development Plan	Livestock Development		
Project Title	LS-2. Enhancement of Livestock Management Extension System		
Project Period	Five years		
Related Ongoing/Past Programmes	Dairy cattle and buffalo improvement project (2010-2011, FAO)		
Main Trust Areas of National Food Production Programme		Food Security, State-Private sector partnership	
Project Area / Target Group	**Project Site**	128 cascade systems	
	Target Group	Livestock farmers under FMS	
Implementing Organisation	PDAPH and private sector	**Related Organisation**	DAPH and school of animal husbandry

Background / Activities

Background

The availability of feed by the supply of silage to the farmers of the FMS will encourage the adoption of labour-intensive technology of stall-feeding. However, there are other factors to be considered such as improved management, efficient breeding system, mechanization and proper health management. These factors will further encourage farmers to adopt stall-feeding as they will increase the production and the productivity of dairy farming. The farmer ultimately decides on the farming systems on whether or not to adopt technologies and how to assign resources to support it. The decision of use of technologies is dependent on how farmers perceive of technology. Project activities should provide positive signals to convince the farmer making this decision to adopt new technology. Hence, the following activities are carried out to establish the Stall-Feeding system in the cascade system dairy management.

Activities

The Department of Animal Production and Health, Peradeniya will undertake the capacity building activity for extension staff of the PDAPH, MILCO and Nestlé's. The extension staff of these three organizations then will take on farmer training programs at the provincial level. Farmer training activities can be conducted at the School of Animal Husbandry at Sippukulama (SAHS). The major public sector operators supporting this sector, Provincial Department of Animal Production and Health (PDAPH) and MILCO, together with the Nestlé's should work together in providing services, training and marketing activities. The training modules should include all aspects of dairy management, clean milk production, animal health, record keeping and business management.

Stall-feeding can be based on zero grazing and semi zero grazing. In the first situation animals are fed silage and concentrates but confined in cattle sheds. In the second aspect when grazing land is available especially during the Yala season farmers can allow free grazing or tethered grazing. Hence, a very well constructed cattle shed should be available to keep the full herd within this facility. This will protect calves from rain and allow them to grow faster than in the open system. This will increase the supply of replacement stock to meet the current demand. Seed money for this facility will have to be provided by the Project. This activity will have to be handled by MILCO and Nestlé's under the supervision and monitoring of PDAPH. Keeping cattle indoors prevent the natural breeding and there will be a high demand for artificial insemination (AI) but the service providers may not be able to cope up with this situation. Hence, whilst strengthening the Artificial Insemination (AI) activity by training and providing equipment to a set of new artificial inseminators. In addition to AI, the Project should support natural mating facilities within the FMSs. Both MILCO and Nestlé's should handle this activity under the supervision and monitoring of PDAPH. The PDAPH and MILCO both should develop stud bull-rearing facility. Good quality stud bulls could be obtained from the National Livestock Development Board farms. The Faculty of Veterinary Medicine and Animal Science, Peradeniya can undertake training of VSs in this aspect. The early diagnosis of pregnancy and sex determination of the foetus is another aspect supported by the project to increase the number of female calves born. This will increase the numbers of replacement stock and will reduce the price per calf allowing new farmers to take up dairy farming. In farmer focus group meetings with crop farmers this issue was discussed. These farmers are maize growers and were interested in keeping cattle confined in the stall-feeding system.

The project emphasise capacity building of extension officers such as veterinary surgeon and livestock development officer in the government and private sector to uplift their service level for better management of the livestock in this area. The project will be carried out for five years. The project will improve the extension manuals which is available at present based on the pilot activities in the field.

Overall Goal	Sustain the production and sale amount of milk
Project Purpose	Increase the increment of milk production though livestock management improvement such as breeding and pest and diseases control
Outputs / Outcomes	Improvement of quality of breeding services provided by private sector or PDAPH Increase crossbred cows Improvement of milk yield Increase of lactation length

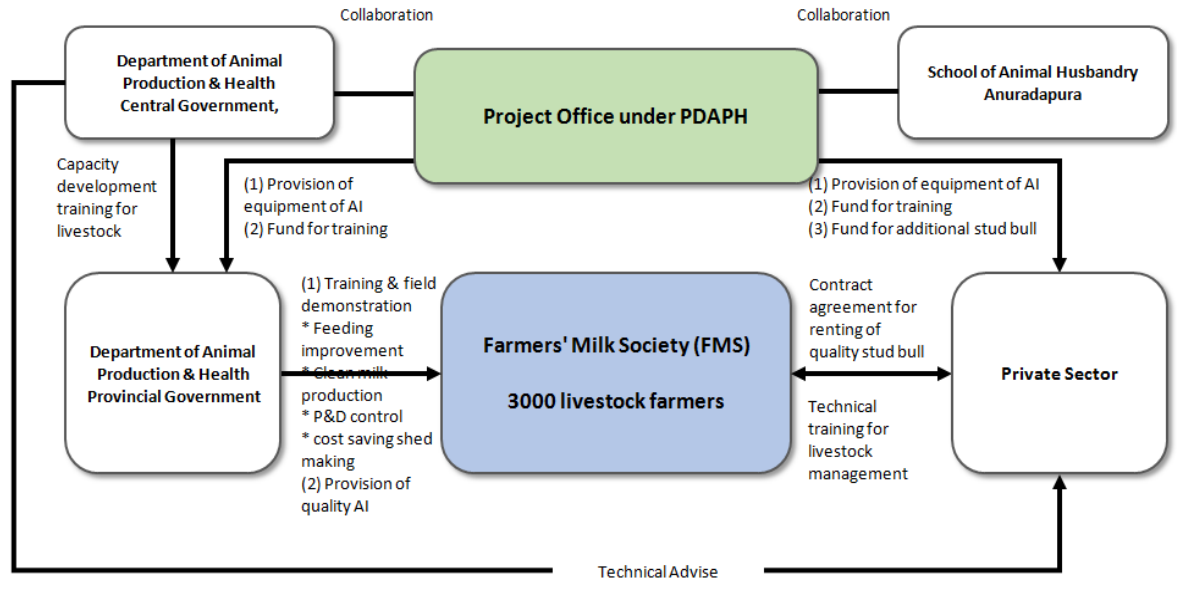
Schedule

Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Project Preparation																				
2. Preparation of draft training material																				
3. Selection of 1st pilot FMSs for training																				
4. Provision of equipment																				
5. Conduct extension activities in 1st pilot FMSs																				
6. Follow up activities																				
7. Revision of draft training material																				
8. Selection of 2nd pilot FMSs for training																				
9. Provision of equipment																				
10. Conduct extension activities in 2nd pilot FMSs																				
11. Follow up activities																				
12. Finalisation of training material																				

Input

Human Resources, Materials, Etc.		**Budget**
Livestock Expert Equipment of AI and stud bulls Training expenses	Other direct cost	LKR. 100 million

Implementation Structure



Operational Rules
for
Cascade Management Organisation (CMO)

(DRAFT)

This is a rule set by the government of Sri Lanka to provide for matters relating to cascade management, for the organisation to manage cascade, for government authority and system to support the cascade management, for the operation of cascade management system

The documents of this rule are prepared in English with translation in Sinhalese and Tamil. The English shall be the ruling language in case of different interpretation between the languages.

Objective and Roles of CMO

Objective of CMO

1. The main objective of the Cascade Management Organisation (CMO) is to ensure efficient operation and maintenance of the cascade irrigation system to provide water for agriculture development.

2. CMO is expected to achieve the above objective by liaising and collaborating with relevant government departments and other concerned agencies, facilitating efficient communication among the members, and by mediating disputes amongst members and other stakeholders regarding any issues affecting the cascade system management.

Roles and responsibilities of CMO

3. CMO should fulfil the following roles and responsibilities, with guidance of the Authorities defined in section 3;

   - Making rules on cascade water distribution and management of cascade level irrigation facilities,

   - Planning water allocation to each tank based on the water requirement calculated from the crop plan prepared by each FO and in consideration of fair distribution,

   - Monitoring water distribution based on the water allocation plan,

   - Maintenance and periodical monitoring of inter-tank facilities,

   - Maintaining compliance to the rules and agreed issues regarding cascade,

   - Supporting the relevant authorities in cascade level flood management, watershed management, reservation of the area around irrigation facilities including tank catchment area and canals, maintaining ecosystem of cascade area by regulating unnecessary encroaching and deforestation, and reconciling land dispute by reporting to the relevant government agent.

   - Monitor compliance of relevant laws and acts regarding cascade related activities and report any violation to the concerned government authority

Authorities and Roles of the Authorities

Authority

4. Cascade Management Organisation shall be registered under the Department of Agrarian Development DAD. Commissioner General of Agrarian Development shall have the authority to endorse decision of the CMO. The representative of Commissioner General of Agrarian Development shall have the authority to supervise activities and financial transaction of the CMO at their respective area.

Delegation of power and administrative rules of the authority

5. DO of the ASC that the CMO belongs to is authorized by the Commissioner General for operation and administration of the CMOs.

6. In case the cascade covers an area that belongs to more than one ASC division, the cascade shall be registered under the ASC, to which the majority of tanks under the cascade belongs. DO of the ASC centre where CMO is registered has authority to supervise and endorse activities of CMO. However, the responsible DO of the ASC where CMO is registered should coordinate with the DO of ASC where the minority of the tanks belongs to for the following issues.

   - To facilitate communication with FOs belonging to different ASC divisions
   - Organising meetings and coordination between FOs
   - Assuring fair representation to the cascade from the minority FOs belonging to the other ASC
   - Collection of contribution from FOs to CMO
   - Reconciliation of dispute between FOs
   - Operation and maintenance of inter-tank facilities located between ASC divisions
   - Intervene decision of CMO when the decision is made in unfair manner that may favour limited members or cause disadvantages to particular groups of members

7. Field officers who support CMOs should be assigned according to the ethnic composition of the CMO. Additional officers with respective ethnic groups should be appointed to the CMO that are composed of different ethnic groups.

Area of authority of CMO

8. CMO has the authority to manage total cascade irrigation system and related natural resources in the area under the cascade, with guidance and approval from the relevant government authorities. However, management of each tank and related resources remain under each FO as defined as the area of authority of FO in the Agrarian

Development Act. CMO can intervene management of each FO in case of an issue affecting the management of the cascade system.

9. A CMO shall be a legal representative of the member FOs during contacts with the bank, and government and non-government institutions, and serve as the communication link in dissemination of information and representing the views and requests of the members.

10. CMO is responsible to assure fair participation and treatment of all members regardless of their ethnicity, sex, religion and their social status.

Establishment of CMO

Formulation of CMO

11. There shall be established CMO for any cascade system area determined by the relevant authority.

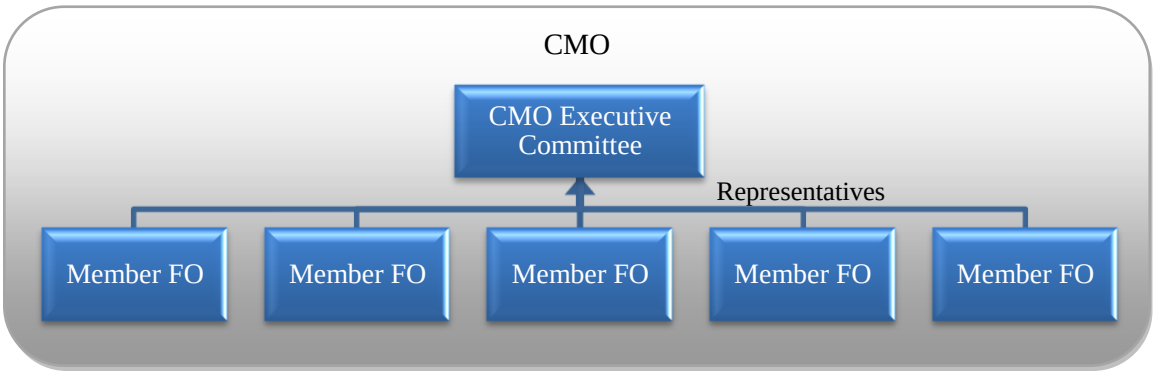
12. The Commissioner General of Agrarian Development where an application on that behalf is made to him/her by a CMO, shall register such CMO. Upon registration the relevant authorized person shall assign a number to such CMO.

13. Every registered CMO shall be a body corporate having perpetual succession and a common seal and may sue and be sued in its corporate name.

Structure and membership of CMO

Structure of the CMO

14. CMO is an organization as a federation of member FOs that manage tanks under the concerned cascade. CMO executive committee consists of the representatives of the member FOs



Membership

15. All FOs managing tanks under the cascade are member FOs of a CMO of the concerned cascade. FOs can hold memberships of more than one cascade if the tanks that they manage belong to several cascades. Member FOs should be enrolled under the concerned CMO.

16. Each member FO has equal representation, power and right within the CMO regardless its size, capacity, and social and economic status.

17. Each member FO is responsible to assist the CMO that the FO belongs to with contribution as per decided in the CMO's general meetings.

CMO Executive Committee

18. Executive Committee of the CMO shall consist of;

    - One representative from each tank under the cascade. One person can represent only one tank.

    - Three office bearers from each FO. If a FO belongs to more than one CMO, members other than office bearers can represent the FO.

19. CMO Executive Committee members shall be selected from each FO in every two years. The FO that consists of different social groups must select its representative fairly from all the social groups. At least one should represent minority group if there is any in the FO.

20. More than one third of the executive committee members should be women.

21. In case a CMO Executive Committee member is not able to fulfil his/her duty, replacement can be decided by the FO that the concerned CMO Executive Committee member belongs to and be reported to the CMO.

22. Every executive committee of CMO can exercise the power and shall accept the duties laid down in this regulation. The executive committee has the responsibility to execute such duties and are entrusted to do them by the members. The executive committee is always accountable to the general body of the CMO consisting of all the rightful cascade system irrigation water users.

23. The executive committee is responsible for the management of the organization and its functions are as follows;

    - To call and hold committee meetings,

    - To make decision on issues related to the cascade, representing opinions of the member FOs for decision of the CMO,

- To formulate plans and procedures in managing water distribution and rules in executing them,
- Monitor water use according to the crop plan and supervise the cascade water master for water control,
- To ensure true and accurate management of finance of CMO and maintenance of records of all transactions kept by the Treasurer and audited annually,
- To liaise with relevant authorities and the CMO,
- To ensure unity of member FOs in the cascade management, through close communication between FOs.

24. Executive Committee members have the following rights. And all executive committee members have equal rights.

- To exercise the right to vote on all matters affecting and related to the cascade.
- To be eligible to any elective position in the CMO for which the executive committee member is qualified.
- To participate in all deliberations during meetings and to freely express opinions or ideas on any matters under discussion on behalf of the FO that the executive committee member belongs to.
- To know about the financial transactions by the CMO.
- To call for a meeting for immerging issues.

25. Executive Committee members have the following obligations.

- To represent the FO and the tank, to which they belongs
- To reflect the opinions of the member FOs in the CMO's decision making and to disseminate the decision of the CMO to the concerned FO members
- To liaise the respective tank with the CMO
- To facilitate crop planning in the respective tank based on the water allocation from cascade and to report it to the CMO
- To monitor water use of the respective tank following the approved crop plan
- To willingly contribute personal services for the CMO's functions and maintenance of the cascade system.
- To faithfully obey and comply with the rules and regulations and such other duties as may be decided in the CMO.

- To promptly transfer the member contribution from the FO and any other agreed contributions as specified in the general meeting.

- To participate in all meetings and other common works called by the executive committee or to send his/her representative.

Office bearers

26. Every Cascade Management Organisation shall elect its own office bearers including; President, Vice President, Secretary, Vice Secretary, and Treasurer within its executive committee.

27. Maximum period that one member can continuously hold a seat of office bearer shall be two years. Office bearers should be selected in turn from all member FOs.

28. Regulations shall be made and documented in the CMO constitution prepared thorough CMO General meeting, setting out the manner of election, the terms of the position, removal or resignation, filling up vacancies, and the procedures to be followed at such meetings. The regulation agreed in the CMO should be endorsed by the respective DO.

29. Office bearers should be elected in consideration of fair representation from member FOs, ASC area, gender, ethnicities, and any other social groups.

30. The President shall have the following powers and duties;

    - To exercise general supervision and direction of the organisation's affairs and to oversee the proper implementation of resolutions and instructions of the executive committee.

    - To call and preside overall meetings of the organisation and the executive committee

    - To represent the organisation at higher level meetings and other activities.

    - To sign any relevant documents of the CMO on behalf of the members.

    - To act as one of the signatory of the organization's bank account, unless the Secretary take that responsibility.

    - To be accountable to the members for any information and decision regarding the organisation.

    - To exercise such other powers and to perform such duties as the executive committee may delegate.

31. The Secretary shall be responsible on the followings,

    - To record and maintain minutes of all meetings of the executive committee and the organisation.

- To serve as custodian for all records, correspondence, assets and other files of the organisation.
- To maintain all non-financial records of the organization including the list of members of the organization.
- To conduct an inventory of assets of the organization.
- To act as one of the signatory of the organization's bank account, unless the President take that responsibility.

32. The Treasurer is responsible on the following;

- To collect and deposit all revenue of the organization.
- To settle any payment owed by the organization from the organisation's account and to obtain receipts for such payment.
- To maintain all financial records of the organization.
- To prepare annual accounts showing income and expenditure of the organization
- To have responsibility to present and explain the financial status of the organization to the members during executive committee meetings or at any other time when required.
- To reconcile actual receipts and expenditures of the organization and render monthly report to the executive committee.
- To act as the custodian of all petty cash belonging to the organization, which should be kept separately from any other monies.
- To act as one of the signatory of the organization's bank account.
- To provide all required information concerning the financial status of the organization whenever required from any eligible person and responsible government authority.

Advisory member of the CMO

33. The CMO shall have the following government officers as advisory members.

- DO of DAD or his/her representing ARPA(s),
- An engineer of PDI or his/her representative,
- AI of DoA in charge of the concerned area,
- LDI of the Department of livestock, and

- GN(s) of the concerned area

34. Advisory member shall be appointed in consideration of ethnic and gender balance to support different groups of people in CMO.

35. Status and responsibilities of the advisory members are as follows.

    - to participate in executive committee meetings of the CMO,
    - to support CMO and its executive committee with adequate advice
    - not to be entitled to any remuneration for participating in the CMO,
    - not to have right of voting ,
    - not to be a signatory to any cheque or any bank transaction of the CMO, and
    - not to be included in any transaction or enter into any agreement with any organization on behalf of the CMO.
    - can intervene and make advice on decisions of CMO when the decision is made in unfair manner that may favour a limited members or cause disadvantages to a particular group of members

Meetings

Meetings to be organised

36. Every CMO shall call annual general meeting represented by executive committee members. Seasonal cultivation meeting by the executive committee members are conducted before every cultivation season to formulate cultivation plan and water distribution plan including operation and maintenance of the cascade system.

37. Meeting of CMO should be conducted with (a) language(s) that all the members are comfortable to use and understand. In the meeting where participants speak different languages, interpretation should be made by the supporting members, officers in charge, or one of the CMO members.

Executive Committee Meeting

38. The executive committee organises Annual General Meeting yearly at the agreed time of the year to discuss the following issues

    - Election of office bearers are conducted and replacement of members representing FO and tanks are approved and registered,

- Activity and financial report shall be disclosed and shared with members.

39. The executive committee shall conduct seasonal general meetings at the beginning of every cultivation season to decide the following issues;

    - Water allocation from NCP canal shall be shared and water distribution plan within cascade shall be prepared,

    - Cultivation plan of each tank shall be combined, examined in comparison with the water allocation and approved with any necessary amendment,

    - Periodical maintenance works shall be discussed and work shall be allocated to member FOs,

    - Any further issues related to the cultivation and water allocation shall be discussed.

40. Additional executive committee meetings of its executive committee members shall be held at least quarterly to monitor and review progress of the activities and response to any emerging issues. Any issue raised regarding cascade management shall be discussed and decided in the executive committee meetings. Member FOs can raise issues to be discussed in the executive committee meetings and decision of the executive committee meeting shall be conveyed to FO members through their CMO representatives.

Organising Executive Committee Meetings

41. Executive committee meetings shall be called on the order of the president or by a majority of the committee members.

42. The President shall preside at the meeting or the members of executive committee may elect a chairperson if the president is absent.

43. Members shall be allowed to send a representative from his/her FO or tank if he/she is unable to attend and this representative shall not have the right to vote.

44. Any committee members who fail to attend three consecutive meetings without satisfying the committee of reasonable causes for absence shall cease to be a member. The dismissal of any member of the executive committee should be approved in an executive committee meeting.

45. Every committee member has the right to attend, participate and vote on issues arising in the meeting.

46. Each committee member has the same weight of vote in the decision making of CMO regardless the size of the FO they represent, to assure voice of small FOs are to be taken into consideration.

47. President can call any ad-hoc executive meetings to discuss emerging issues, based on the request and needs raised from the members.

Records to be kept

48. The following records shall maintain by every CMO. Meeting minutes

    - Membership register
    - Financial Records
    - Facilities operation and maintenance records
    - Water distribution plan and implementation record (including weekly water level record of each tank, distribution practice against plan.

49. All documents should be prepared in the language(s) that all the members understand. In the CMO that include members who use different languages, all the documents should be presented in both languages.

50. Minutes of the meetings, financial document and any decision made by the CMO should be duplicated and distributed to all member FOs and displayed in a common notice board. Copies of the documents should be submitted to ASC and be disclosed when requested by any relevant person.

Financial Management

Account of CMO

51. CMO shall maintain an account in a prescribed bank and to operate such account in accordance with instructions issued from time to time by the authorized person.

52. The treasurer of the CMO is responsible to maintain accounts of the income and expenditure.

53. The DO shall examine the books and accounts of a CMO as annual auditing and anytime required. For the purpose of examination, the CMO shall submit all the necessary books, documents, and accounts and shall give all such assistance as may be necessary.

54. Funds shall be utilized for repair, maintain and develop irrigation works in related with authorized cascade system area. Use of CMO fund and savings should be discussed and approved by the executive committee, and endorsed by the responsible DO of the DAD, in consultation with the engineer of DAD or PDI on technical aspects.

Financial contribution from FO to CMO

55. CMO shall collect contribution from each member FOs as defined below.

    - Every CMO shall collect contribution from all member FOs for its activities such as for the payment of water master, minor repairing of inter-tank facilities, and covering administration cost.

    - Contribution from member FOs shall be decided in Annual General Meetings. Based on the needs of the CMO, it can be revised time to time as per the approval of the executive committee and the concerned authority.

    - Rates of the membership fee allocated for each FO shall be decided based on either the proportional ration of command area that each FO manages under the cascade, or the proportional ration of the number of FO members cultivating under the tanks in the cascade.

    - Contribution for payment for water master is collected from each FO and deposited to Agrarian Development Council (ADC)'s account, for which DO has responsibility to supervise and authorize the use of the saving.

Other revenue of CMO

56. With development of capacity of CMO, the CMO may take initiative to execute any business related to agriculture production and use of cascade, which should be approved by the relevant authorities. Any profit gained from the business should be deposited to CMO account.

Rules on NCP Water Management

Water distribution from NCP canal

57. Water to be distributed from the NCP main canal is allocated by Water Management Panel of Mahaweli Authority.

58. Water allocation to each cascade from the NCP branch canal to tertiary canal is managed by Sub-watershed management committee represented by the concerned advisory member officers of CMO, especially ARPA(s) and the Engineer of PDI. Decision on the water allocation at sub-watershed level shall be conveyed by the advisory officers to CMOs.

59. The gate between the NCP branch canal and tertiary canal is handled by the appointed officer of Provincial Department of Irrigation.

Water distribution within Cascade

60. Water allocated through tertiary canal to each cascade shall be divided to each tank principally based on the proportion of command area of each tank.

61. Once the amount of water to be allocated to each tank is calculated on proportionate basis, each FO plans cropping pattern under the tank, based on the allocated water to each tank.

62. Cropping pattern planed in each tank shall be reported to CMO for approval. CMO has right to adjust in case it is required from view point of equity between tanks, water efficiency and crop efficiency. Kanna meeting decision of each FO will be endorsed by GA only after approval from CMO.

63. Cropping pattern approved by the CMO should be complied. CMO monitor the execution of crop plan in each tank. CMO has right to charge penalty in case any tank violate the approved crop plan and use more water.

64. Water shall be delivered in turn to each sub-cascade. Water distribution plan should be prepared by CMO including distribution order, interval, the amount of water to be released. Water master will collect water level every week for calculation of weekly water distribution based on the water allocation model. Water amount and distribution plan is prepared by the cascade water master under supervision of the executive committee. Weekly water allocation plan is followed by the water master for daily gate operation.

65. Water use of each tank shall be monitored and evaluated at the end of the season, with which water distribution shall be adjusted according to the performance level of each tank. Tanks with better water use performance shall get priority of water use in the following season.

66. In case there is any necessary adjustment for better allocation among tanks raised by members, the CMO committee can discuss and agree to make further rules. The newly proposed rules should be agreed in the executive committee meetings with consent of general meeting of all member FOs, the minutes of which should be submitted to the respective DO for approval.

Rules in Disputes between FOs

67. CMO has power to make people comply the rules agreed among the CMO meeting and approved by the relevant authority. In case any member FOs or any individuals violate the agreed ruled, CMO has power to charge penalty to the FO or the person. In case a FO or any individuals refuse to follow the water distribution plan, the CMO can directly instruct the water master to execute the agreed water distribution. In the cases

of dispute between FOs regarding cascade management, CMO has authority to reconcile the issue with help of the relevant authority as necessary.

Water control

68. One or two cascade water master(s) is(are) appointed in each cascade, who is(are) to calculate weekly water amount and to prepare distribution plan based on the remaining water level of each tank. The number of the cascade water masters shall be decided by each CMO depending on the number of tanks it manages.

69. Water master should have numerical capacity and understanding on the water balance of irrigation system. The candidates selected for the water master should go through the training on water distribution by PDI and pass the exam.

70. The water master is selected by CMO and officially and legally appointed by Agrarian Development Council (ADC) of each ASC

71. Water master should not favour or represent any particular FO or group of members and be neutral to all FOs and social groups. In case it is difficult to select such neutral person, the number of water master can be adjusted or the water master can be appointed by the government authority from an independent disinterested party.

72. Cascade water master is responsible to control water distribution, under supervision of CMO. Cascade water master shall calculate the water amount to be allocated to each tank based on the water level of each tank reported every week, and control gates based on the weekly water distribution plan prepared through the water distribution model. Water level of each tank is measured weekly by the water master.

73. The gate of the inter-tank canals can be operated only by the appointed cascade water master, based on the water distribution plan and instruction given by the CMO.

74. Cascade water master should keep record of the gate operation and water level of the tank and report to the CMO. FO representative(s) or tank representative(s) of the concerned tank shall observe(s) and confirm(s) the gate operation by the water master.

75. Cascade water master shall be paid in cash by the CMO, the amount of which shall be decided in each CMO.

76. Payment for the water master shall be collected from each member FO and deposited to ADC account, from which water master shall be paid.

77. CMO can dismiss the cascade water master with votes of more than two-third of the executive committee members in case the person does not comply the rules and his duty.

O&M of Cascade Facilities

Maintenance of inter-tank facilities

78. CMO has responsibility to maintain the inter-tank facilities within the cascade with support of the concerned government authorities. The facilities are maintained through the periodical monitoring and necessary maintenance works by CMO and prompt reporting to the concerned authorities.

79. Maintenance works on the facilities such as link canals, gates, reservation areas are divided among the member FOs, and CMO has power to charge penalty for incompliance of the rules and allocated works decided by the CMO.

Repair and rehabilitation of the facilities

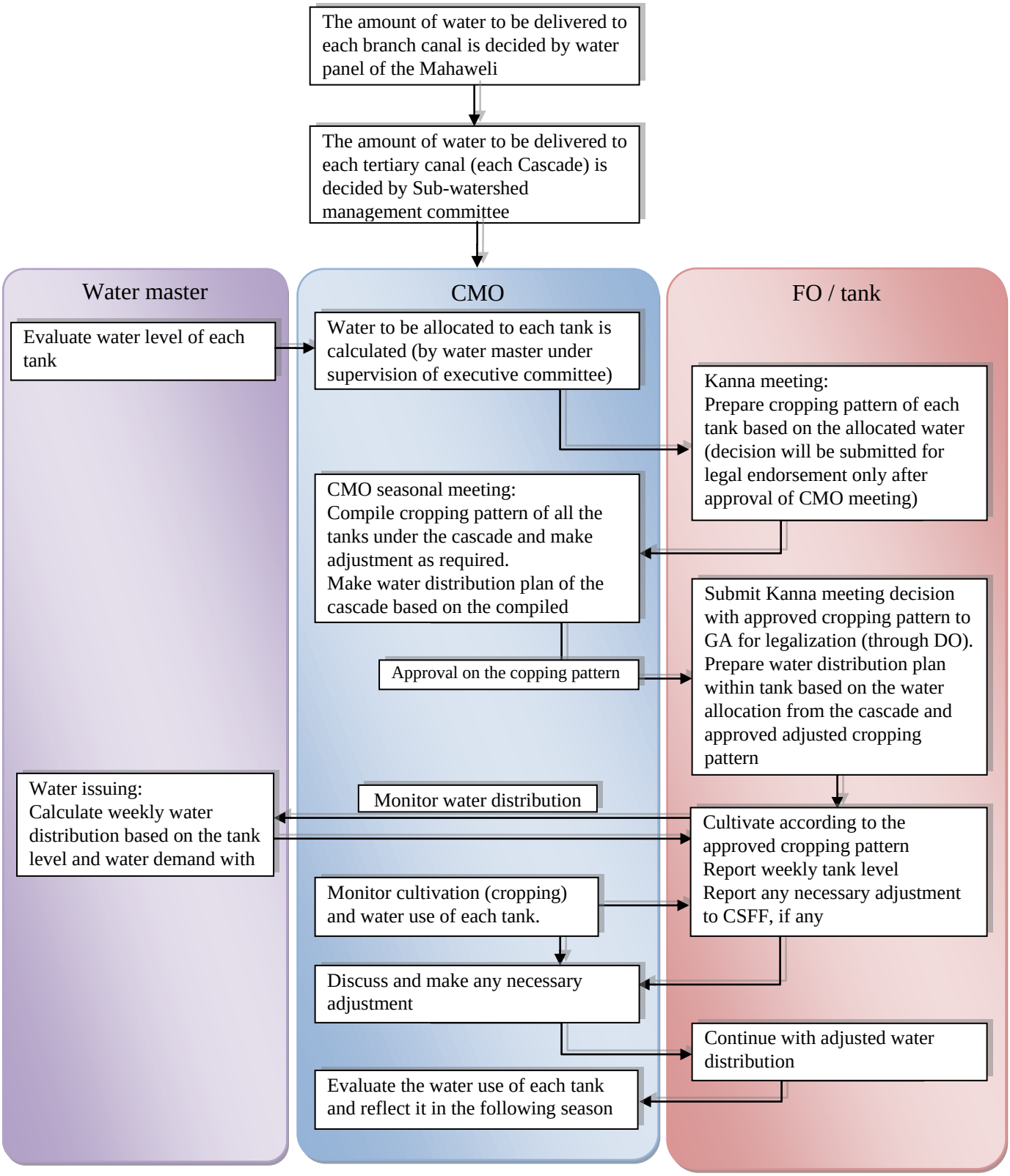
80. CMO has responsibility of maintaining inter-tank facilities.

81. Repairing works of inter-tank facilities costing less than Rs.50,000 is under responsibility of CMO. Repair and rehabilitation under the capacity of the CMO shall be executed with their savings through the procedure to be taken for use of the CMO fund. The works to be done by CMO should be authorised by PDI with support of technical officer of PDI or DAD.

82. PDI shall provide technical and financial support for major rehabilitation of the inter-tank facilities.

83. Maintenance of the facilities of each tanks remain under responsibility of each concerned FO. However, any repair that can affect water distribution among cascade and interfere other tanks should be consulted to CMO, and CMO has power to interfere the work that affects water distribution within the cascade.

Procedure for water distribution



Training programme of ARPA on CMO management

Training outline

Training objective	To develop capacity of field officers who are in-charge of supporting CMO formation and activities	
Target trainee	ARPAs in-charge of CMO support in 128 target cascade under NCPC	
Organiser	DAD / Project	
Timing / period	Timing	After completion of legal framework of CMO
	Period	2day training
	Section	1 training per ASC (26 trainings/26 ASCs)
Expected outputs	1) Awareness raising of concerned officers on legal frameworks of CMO and expected functions of the CMO. 2) Training of ARPAs in charge of the cascades on supporting establishment of CMO, registration, activity support, and conflict management. 3) Coordination between ARPAs and between ASCs. Coordination with other government agency (esp. DoI for medium tanks)	

Training contents

Subject	Contents	Contents / Reference
1. Outline and management structure of NCPC	- Outline of NCPCP - Objective and target area of NCPC - Structure of NCPC management	Final Report main report - Chapter 4.2 Proposed North Central Province Canal Project Under the Feasibility Study - Chapter 5.3.1 Water Distribution and Management - Chapter 5.7.2 Position and Area of Function of Cascade Management Within the NCPC System
2. Basic concept and importance of cascade management	- Basic concept of cascade development	Final Report main report - Chapter 5.1 Cascade System Development Concept Under North Central Province Canal - Chapter 5.2 Overall Concept to Make Cascade Agriculture an Economic Entity
	- Importance of cascade management	Final Report main report - Chapter 5.7 Basic Concept for Cascade Based Institutional Development
3. Formation and operational rules of CMO	- Basic feature of CMO	Final Report main report - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (1) Proposed CMO Final Report Project Sheet IN-3 Attachment3-1 - ***"Operational Rules of CMO"***
	- Formation of CMO	Final Report Project Sheet IN-3 "Establishment of Cascade Management Organisation"
4. Cascade water management	- Concept of cascade water distribution	Final Report main report - Chapter 5.3.1 Water Distribution and Management
	- Cascade water distribution model	Final Report main report - Chapter 7.5.4 Verification of Water Distribution Model (1) Proposed Cascade Water Distribution Model Final Report Project sheet IN-3 Attachment 2-1 ***"Operational Rules of CMO"***

5. Role of ARPA in CMO support (constraints and counteractions)	Roles of ARPA in CMO establishment	- Awareness raising of FOs on NCPC and importance of cascade management - Support in formation and registration of CMO - Training of FOs on basic organizational functions of CMO - Maintain CMO's registry - Periodical monitoring of CMOs' activities - Support DO on supervision of CMO including financial audit - Coordinate with relevant government officers regarding cascade management
	Constraints and counteractions	Final Report main report - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (2) Results of the Study and Verification on Possibility of Establishment of CMO (b) Evaluation of Potential of Cascade Management through Study with Relevant Officers
	Conflict resolution	- Conflict between FOs under cascade - Conflict between different social groups (ethnic group, caste group, etc) - Conflict management regarding water distribution
6. Management of cascade with risk factors	Identified risks and necessary actions to be taken	Final Report main report - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (3) Recommendation and Feedback to Finalisation of Development Plan
7. Coordination between ARPAs, between ASCs and with other government agencies (PDI, DOI)	Coordination between ARPAs Coordination between ASCs Coordination with other government agencies	Final Report main report - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (3) Recommendation and Feedback to Finalisation of Development Plan (b) Further Needs to be Considered in the Development Plan 2) Need in Administrative Structure

Training programme of CMO on Basic Organisational Functions

Training outline

Training objective	To develop capacity of CMO executive committee to manage basic organisational functions of CMO	
Target trainee	CMO executive committee	
Organiser	DAD / Project	
Timing / period	Timing	After completion of consensus making on CMO formation
	Period	2day training
	Section	1 training per cascade/CMO (128 trainings/128cascades)
Training contents	1) Awareness raising of CMO executive committee on legal frameworks on CMO and expected functions of the CMO. 2) Training of CMO executive committee focusing on basic organisational functions of CMO (the training on water management and crop planning shall be organised separately)	

Training contents

Subject	Contents	Remarks / issues to be emphasised
1. Basic concept and importance of cascade management	Basic concept of cascade development	Final Report main report - Chapter 5.1 Cascade System Development Concept Under North Central Province Canal - Chapter 5.2 Overall Concept to Make Cascade Agriculture an Economic Entity - Chapter 5.3.1 Water Distribution and Management - Chapter 5.7.2 Position and Area of Function of Cascade Management Within the NCPC System
	Importance of cascade management	Final Report main report - Chapter 5.7 Basic Concept for Cascade Based Institutional Development
2. Structure of CMO and roles of executive committee	Objective of CMO	Final Report main report - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (1) Proposed CMO - Chapter 7.5.3 Verification on Possibility of Establishment of Cascade Management Organisation (CMO) (3) Recommendation and Feedback to Finalisation of Development Plan Final Report Project Sheet IN-3 Attachment 3-1 - ***"Operational Rules of CMO"***
	Basic feature of CMO	
	Structure of CMO	
	Roles of executive committee	
3. Election of office bearers	Fair election from member FOs and tanks	
4. Meeting and coordination between FOs	Organising meetings	
	Preparation of meeting	
	Conducting meeting	
5. Record keeping	Registry, meeting minutes, financial document, water management record, inventory, etc	
6. Financial management		
7. Conflict management		- Conflict management within organization - Conflict between FOs under cascade - Conflict between different social groups (ethnic group, caste group, etc) - Conflict management regarding water distribution

Training programme of Water Master on Cascade Water Distribution

Training outline

Training objective	To develop capacity of water master to manage cascade water distribution	
Target trainee	Cascade water masters of 128 target cascade under NCPC	
Organiser	DAD / PDI / Project	
Timing / period	Timing	After formation of CMO, during construction of cascade irrigation facilities
	Period	3day training
	Section	1 training per sub-watershed (12 trainings/ 12 ASCs)
Expected outputs	1) Making understanding on water management of cascade. 2) Technical skill development of water master on calculation of water requirement and discharge 3) Technical skill development on use of water distribution model	

Training contents:

1. Outline and water distribution from NCPC to cascade
2. Concept of water distribution within cascade
3. Cascade water distribution model and calculation of water requirement and discharge
4. Gate control for water distribution and monitoring

Reference material :

- "Water Balance Model" developed by JIRCAS named "CASCADE" and its users' manual (the programme was handed over to PDI Anuradhapura and DAD Vavuniya)
- "Water Level Information Management System" developed by the JICA project team (through GENIUS Associates Pvt. Ltd.) named "Aqua Sense"

Training Material and contents of the Training of ARPA

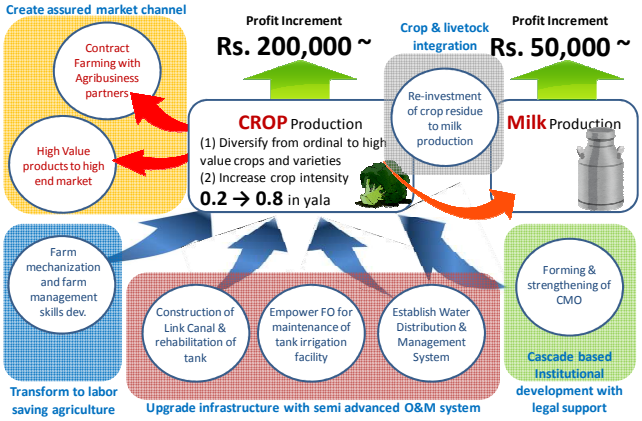
SESSION 1. OUTLINE AND MANAGEMENT STRUCTURE OF NCPC

1-1 Outline of NCPC

As a part of Mahaweli Development Programme with the aim of developing Mahaweli river basin and adjacent other river basins of North Central Province (NCP), Northern Province (NP), and Eastern Province (EP), GoSL assigned high priority on NCPCP to address water scaresity in NCP, NP, EP and North Western Province (NWP).

The project especially targets 128 cascade irrigation systems including 33,600 ha of land and over 50,000 farmers (estimated) in Anuradhapura and Vavuniya District.

By developing cascade system under NCPCP with envisages irrigation development, flood and draught management, to improve livelihood of cascade communities of the target area by promoting agriculture activities.

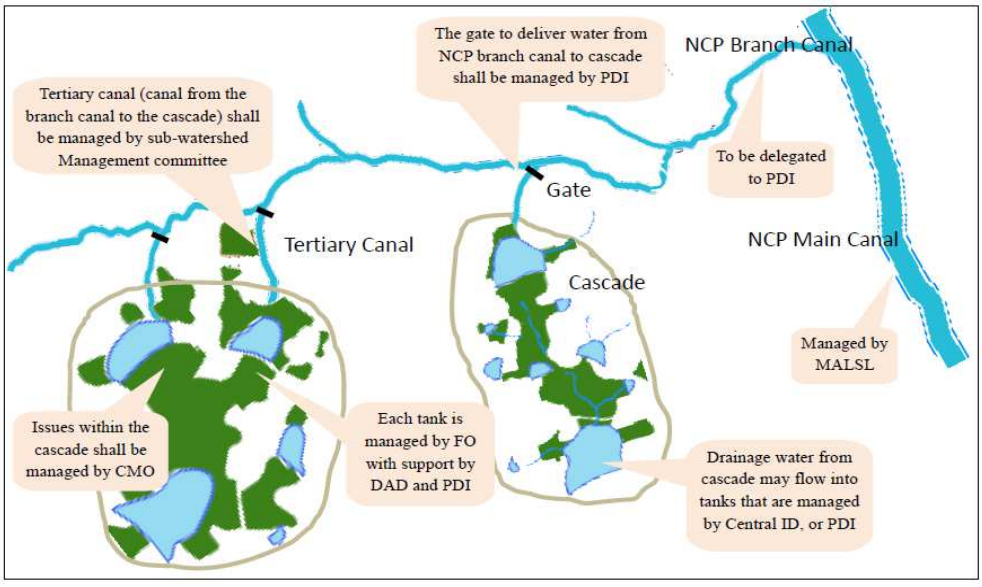


1-2 NCPC management structure

Management of NCPC system has complicated features, as it involves several different stakeholders at different levels. Since the NCPC water will be diverted from the Mahaweli system, the whole project might be taken as a part of the Mahaweli system. Meanwhile, the competent authority of NCPC for its operation differ by the division of the canal system, as the system involve major tank of Mahaweli system to community-managed minor tanks, which are managed by different government authorities.

In consideration of the possible division of authority indicated in the below figure, different irrigation management systems shall be applied at different levels of the system. the following demarcation is discussed and finalised through a stakeholders meeting and documented in an ordinance or relevant government regulation.

The main canal of NCPC shall be governed by the rules of the Mahaweli system. Branch canal and tertiary canal including water regulation at the gate from branch canal to cascades can be delegated to PDI. And the issues below tertiary canal shall be managed by applying the irrigation management system of minor schemes.



NCP main canal:

Water distribution from Mahaweli system to NCPC shall be decided by the water management panel (WMP) of the Mahaweli system through their seasonal operation plan. The water management secretariat (WMS) of MASL prepares a seasonal operation plan (SOP) based on the results of its simulation studies for the coming irrigation season. The SOP will be presented to the WMP, for review and consent. After any necessary amendments are made, WMS will decide on the water allocation to the NCPC, as a component of the allocation plan for the entire Mahaweli-benefited area.

NCP branch canal to tertiary canal:

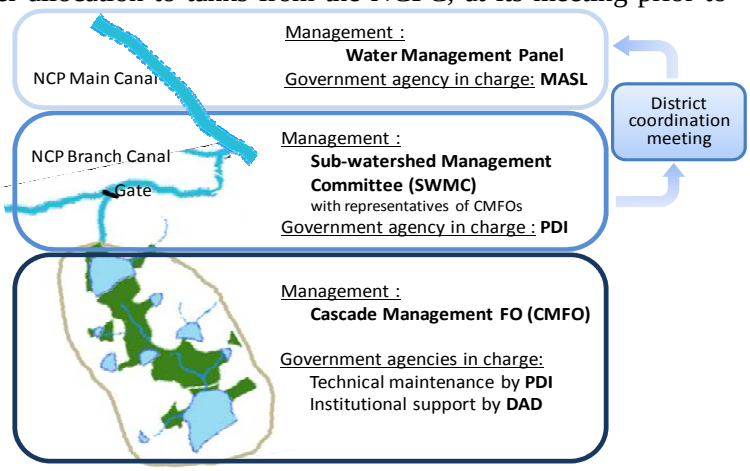
The decisions of WMP are informed to the sub-watershed level committee and sub-watershed management committee (SWMC) shall allocate water to each cascade in proportionate bulk water issue basis.

Cascade and individual tank:

The cascade representatives to the sub-watershed management committee will inform the cascade management organisation regarding the water allocation to each cascade. The cascade management organisation (CMO) will decide on water allocation to tanks from the NCPC, at its meeting prior to the season, giving consideration to the water available in the tank at the beginning of the season.

The tank level FOs will decide on cultivation extents and crops at their respective cultivation meetings, prior to the start of the season

Management system applied and responsible government agencies at each level of NCPC are as shown in the figure.



Based on the application of the different system at the different level of the NCPC, expected roles of each government agencies is as follows.

Expected Roles of the Government Agencies

Agency	Role/Authority
MASL	・ Authority on any facility related issues of the main canal ・ Authority on water distribution from NCPC, in consideration of water requirement from each branch canal ・ Controlling the gate from NCPC to branch canal.
Central DOI	・ Coordinating with DAD as FOs of some medium tanks that are included in some cascades are supervised by the central DoI ・ Being in charge of the existing district coordination meeting, which will coordinate all the irrigation water distribution within the district, and the decision of which shall be presented in the WMP
PDI	・ Being in charge of water distribution from branch canal to tertiary canal ・ Having authority on repair and maintenance of the irrigation structures from branch canal to tertiary canal, system from the NCPC to cascade and link canals within the cascade ・ Engineers or his representatives will provide technical advices and participate in the CMO meeting ・ Organising and chairing the SWMC meeting and present the decision of the SWMC
DAD	・ The CMO shall be registered under DAD, as FOs under cascade system are. ・ Facilitate formation of CMO and encourage FOs in functionalising the CMO. ・ The DO, with support from ARPA, is the officer-in-charge of the water management and crop related decision, at the cascade level. ・ Coordinate technical issues with PDI and ID/MASL. ・ To be authorised to resolve conflicts between FOs within the cascades.
DS/GN	・ Participate in the meeting as required. ・ Support resolving conflicts between FOs within the cascade.

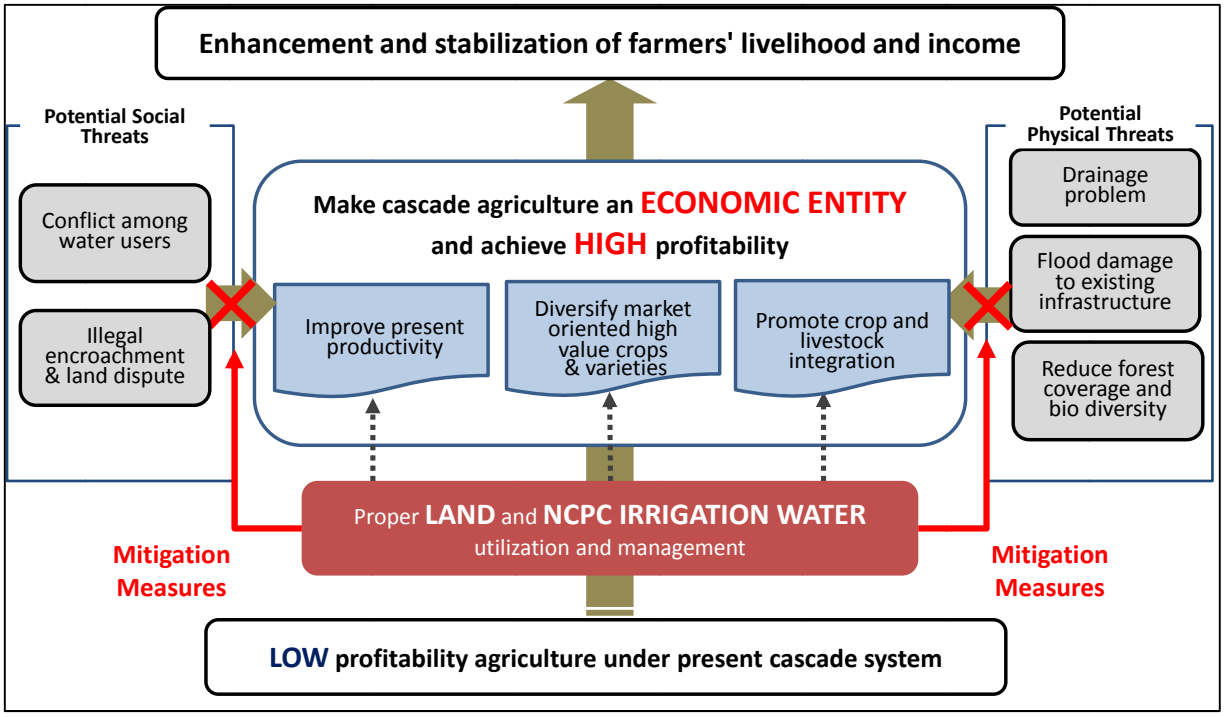
SESSION 2. BASIC CONCEPT AND IMPORTANCE OF CASCADE MANAGEMENT

2-1 Basic concept of cascade development

Present cascade agriculture does not bring attractive profit to farmers to encourage further investment

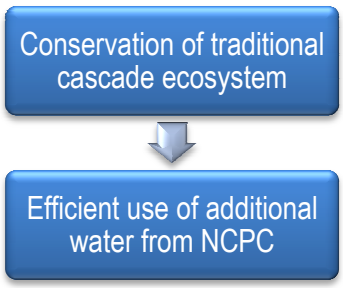
Due to this situation, farmers in this area lose interest in farming and become more dependent on non-farming income. Technologies may not be updated; agriculture productivity may decline; and agriculture, which is the key sector of local economy, may deteriorate.

In order to improve village economy in the target area, it is feasible to make cascade agriculture ECONOMIC ENTITY with utilization of NCPC water



2-2 Importance of cascade management

A comprehensive and inclusive operational structure to manage the whole cascade system is required for efficient use of the irrigation system with water from the NCP canal. Establishment of an organisation at the cascade system level to manage cascade level irrigation-related matters is one of the priority issues in the development of cascade systems.



Even though there have been several attempts to establish cascade level organisation in the past, they have not shown sustainable consequence. The possible reason of the unexpected results would be mainly because basic feature and situation of the NCPC project fundamentally differ from the past experiences of cascade management. The significant difference is the improvement of water availability through distribution of water from NCPC. This creates inevitable task in cascade management of distributing water flowing into the upstream tanks then to the whole cascade.

SESSION 3. FORMATION AND OPERATION OF CMO

3-1 Objective of CMO

A comprehensive and inclusive operational structure to manage the whole cascade system is required for efficient use of the irrigation system with water from the NCP canal. Establishment of an organisation at the cascade system level to manage cascade level irrigation-related matters is one of the priority issues in the development of cascade systems.

3-2 Basic feature of CMO

Even though the structure of the CMO shall be a federation of FOs with representatives of each FO instead of an organisation that has fixed membership, CMOs can adopt their basic function and operation from the FOs' experiences. The following are the essential aspects of the CMOs' structure, function, and operation.

Organisational Structure	· Members of FOs are all FOs managing the tanks under the concerned cascade · A committee consists of representatives of each FO and tank under the cascade · Relevant government officers are involved as supporting members
Legal Authorisation	· CMO to be registered under DAD and governed by the Agrarian Development Act
Area of Authority of CMO	· CMO to be responsible only for cascade-related issues and issues of each tank remain under each FO
Government Agencies In-charge	· DAD: Supervision and authorisation of CMO · Central Irrigation Department: Authorisation of FOs of medium irrigation to participate in CMO · PDI: operation of tertiary canal and technical maintenance of cascade level facilities
Water Management	· CMO shall decide water distribution to each tank and each FO should prepare crop plan and allocate water complying the decision of the CMO · A cascade level water master (water controller) is appointed for water distribution and gate control · The water master is selected by CMO and officially and legally appointed by Agrarian Development Council at each ASC · Contribution is collected from each FO and deposited to ADC account, from which water master shall be paid.
O&M	· CMO is responsible for inter-tank facilities whilst each FO shall manage facilities of each tank · Minor maintenance works are under the responsibility of CMO and major rehabilitation is done with support of the government · Contribution from member FO managed by CMO shall be utilised for minor maintenance under supervision of DO

Details of the CMO functions are described in the ***"Operational Rules of CMO"***

3-3 Formation of CMO

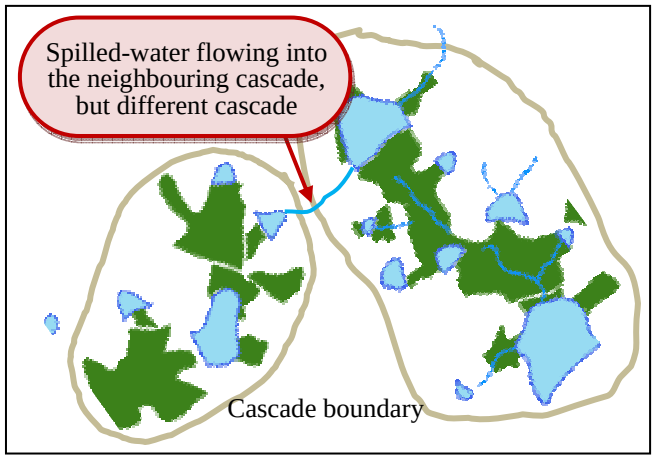
Based on the structure of the CMO described in the "Operational Rules of CMO", ARPA shall play the fundamental roles in formation of CMO.

The following steps are to be taken for formation of CMO

1) Identification of existing FOs for the tanks under the concerned cascade.
2) Survey on the feature of the cascade for establishment of CMO (identification of risk factors for CMO establishment)
3) Awareness programmes for the FOs (to make understanding of NCPC water delivery and necessity of cascade management)
4) Consensus making on the CMO establishment and election of representatives from each FO and tank for CMO
5) Training of CMO on basic organisational functions and conflict management
6) Registration of CMO

2) Identification of existing FOs for the tanks under the concerned cascade.

Since the cascade boundaries have not been identified practically in field, there seems to be confusion in lining boundaries of cascades. Since water flow in several different directions, tanks with water flow between them do not necessarily mean the belongingness to the same cascade. In some cases, there is spilled-water flow from the tank belonging to a neighbouring cascade.

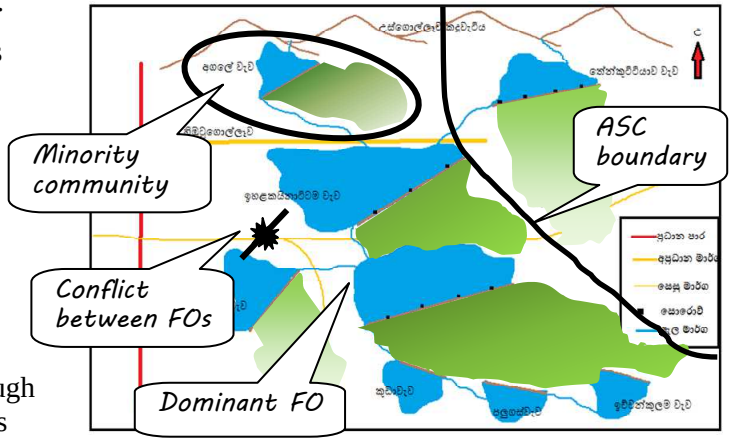


It shall take time to clarify the cascade boundaries with clear water flow between tanks within the cascade and through neighbouring cascade. Identification of the tanks under the concerned cascade is crucial as the FOs shall be involved in CMO based on the tanks they manage. Currently many FOs are managing several tanks that belong to different cascades. Therefore, the FOs managing tanks that belong to different cascades need to participate in both CMOs.

3) Survey on the feature of the cascade for establishment of CMO

Each cascade shall have different feature in its composition and situation of members. Understanding critical feature of the cascade will ease facilitation of the CMO establishment. There are some cascades with difficulties in formation of CMO. Common risk factors in formation and operation of CMO were identified as mentioned below. Detection of those risk factors is important to avoid or overcome the difficulties. Critical risks are as listed below.

- Cascade crossing over ASC divisions
- Existence of minority population
- Cascade with a large number of FOs
- No. of FOs covering more than one cascade
- Lower Bethma practice
- Observed problem/dispute between FOs
- Existence of inactive FOs

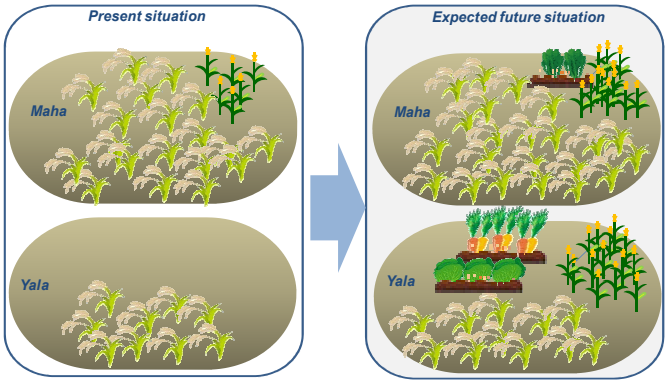


These situation shall be identified through meeting with FOs, simple household surveys

Details of are explained in the Session 6.

4) Awareness programmes for the FOs

Organise an awareness programme in general gathering of the FOs to inspire benefit of NCPC and necessity of cascade management .



It was proved that thorough explanation about expected situation with the NCP canals and discussion on necessity of cascade level management enhanced needs on establishing cascade level management bodies as a whole. Clear understanding on the necessity of the CMO is crucial for effective formation and operation of the CMO. Therefore, intensive awareness programme on necessity of cascade level organisation is inevitable to create foundation for CMO in advance to the formation of the CMO.

5) Consensus making on the CMO establishment and election of representatives from each FO and tank for CMO

Conduct a cascade level meeting with representatives of all the FOs and tanks under the cascade. Consensus on establishing CMO should be made through deep discussion with representatives from all the FOs under the cascade.

- Confirm necessity of establishing CMO for efficient use of NCPC
- Clarify objective of the CMO
- Agree on the basic structure and roles of member FOs
- Seek for possibility of forming CMO as cascade level federation to manage cascade
- Discuss possible constraints in forming and establishing CMO

It is important to discuss possible constraints by making the participants to come up with the actual situation possibly occur in cascade management and seek for prevention and solution for the possible difficulties.

Based on the consensus made through the cascade level meeting with FO representatives, each FO elect their representatives as CMO executive committee members. Representation of the membership is as defined in the "Operational Rules of CMO"

6) Training of CMO on basic organisational functions and conflict management

Elected CMO executive committee members are to be trained on the basic organisational functions of CMO, that include;

- Structure of CMO and roles of executive committee
- Election of office bearers (fair election from member FOs and tanks)
- Organisation of meeting and coordination between FOs
- Record keeping (registry, meeting minutes, financial document, water management record, inventory, etc)
- Financial management
- Conflict management

Office bearers shall be elected at the end of the training based on the criteria and roles of the office bearers learned through the training.

7) Registration of CMO

CMO shall be registered under DAD based on the Amendment of Agrarian Development Act 2017.

An inauguration meeting shall be conducted with the elected CMO executive committee members to prepare for registration of the CMO. Constitution is drafted and approved by the executive committee.

Prepare a registration form of CMO and registration criteria to be fulfilled by the CMO, which include;

- Name of CMO
- Names of member FOs and their members,
- Names of tanks under the cascade,
- The number of beneficiaries under each tank.
- Names of office bearers
- Constitution of the CMO

DO shall create registry of CMO under his/her area of authority.
CMO shall create bank account after the registration.

SESSION 4. CASCADE WATER MANAGEMENT

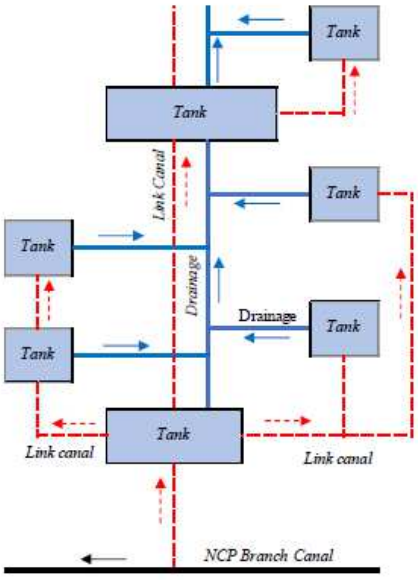
4-1 Concept of cascade water distribution

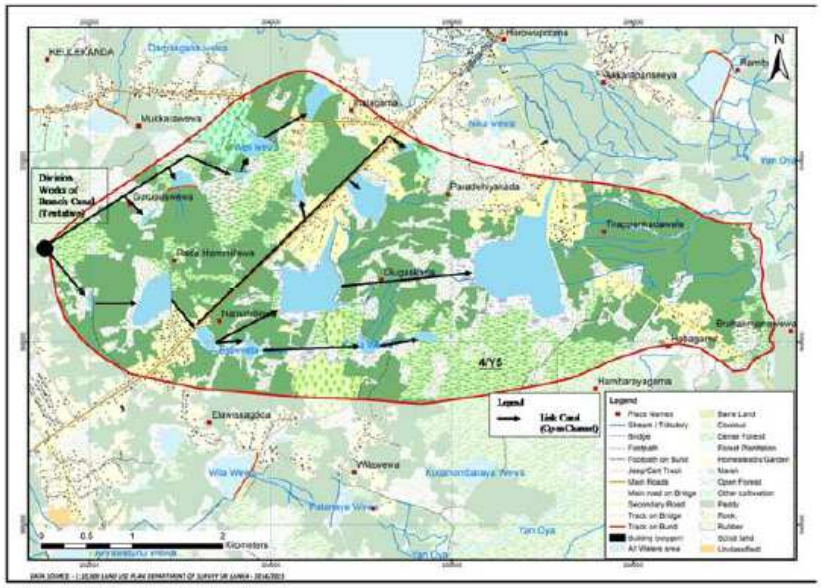
North Central Province Canal Project (NCPCP) under the Mahaweli Water Security Investment Programme is a national project with large government investment. The newly developed water resources should be distributed in an equitable manner among target beneficiaries. Then, the project assumes the following water distribution concepts

- As “equitable share” concept is simple and can be accepted in Sri Lanka, this concept is employed as the distribution policy of NCPC.
- According to the equitable share, water is simply distributed proportionally to the irrigable area held by each cascade.
- Equitable share does not consider inflow within the cascade catchment area, nor the effective rainfall in a cascade.

There are two considerable types of water distribution system, namely, supply-oriented and demand-oriented water allocation. Since there is not enough regulating capacity/facilities before NCPC or between Moragahacanda and the cascade system, the proposed distribution from upstream to the cascade system is supply-oriented water allocation. The project proposed the irrigable area based on the equitable water allocation to the cascade system. The water conveyance from NCPC to cascade system will be through a branch canal. The branch canal distributes water to the tertiary canal at the division work.

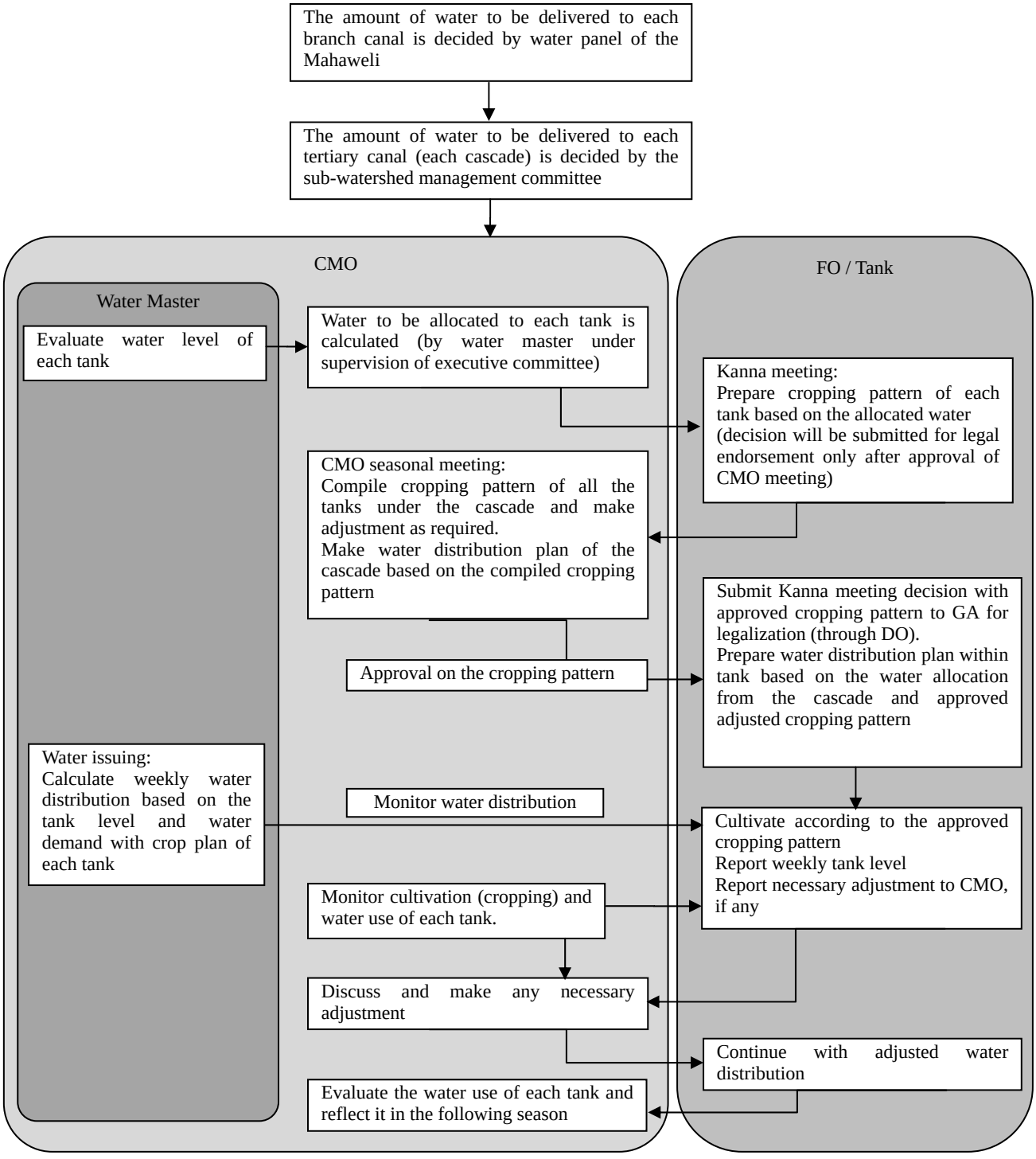
After distribution of irrigation water from the branch canal to the cascade system, the irrigation water diverted from the division works of the branch canal is distributed to the upper most tanks (there are in case of multiple tanks as the upper most tank). The irrigation water flows from an upper tank to a lower tank by using head difference between tanks. Pipeline and open channel are considered as distribution types. The distribution type will be selected based on the conditions (topographic, land acquisition, design flow quantity etc.).





4-2 Cascade Water Distribution Model

The overall feature of the procedures of water distribution is indicated below.

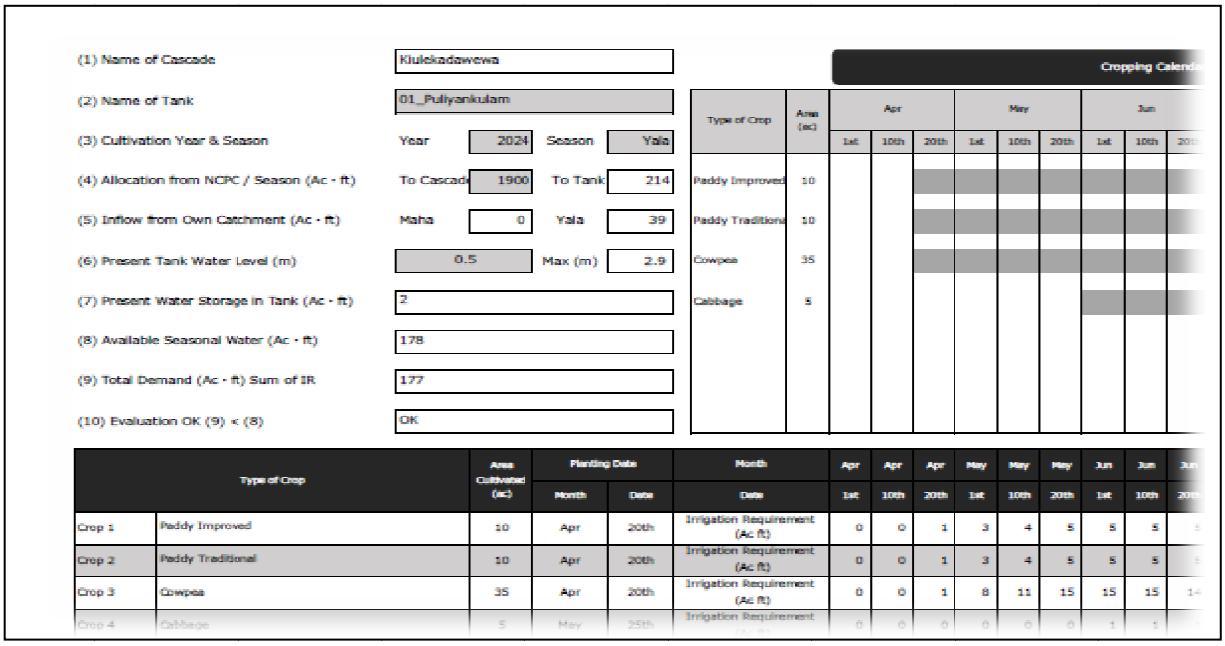


Details of the water management is also described in the "Operational Rules of CMO, Section 9 Rules on NCP Water Management".

The available water amount to the cascade for a season is decided by the Irrigation Department that manages the branch canals of NCP, based on which the amount of water to be allocated to each tank within the cascade is principally calculated on proportional basis according to the command area of each tank. Each FO under the cascade prepares a crop plan based on the allocated water amount to the tank using the developed crop planning model. The crop plan prepared by each FO is examined and compiled

by the CMO to balance the water requirement and supply. For the water distribution, the water master will measure the water level every ten days and calculate water discharge of each link canal with the developed model for link canal operation based on the water requirement of each tank calculated from the crop plan.

The developed model for crop planning and water distribution within cascade is indicated as follows



(1) Name of Cascade	Kulukadawewa
(2) Name of Tank	01_Puliyankulam
(3) Cultivation Year & Season	Year 2024 Season Yala
(4) Allocation from NCPC / Season (Ac - ft)	To Cascade 1900 To Tank 214
(5) Inflow from Own Catchment (Ac - ft)	Maha 0 Yala 39
(6) Present Tank Water Level (m)	0.5 Max (m) 2.9
(7) Present Water Storage in Tank (Ac - ft)	2
(8) Available Seasonal Water (Ac - ft)	178
(9) Total Demand (Ac - ft) Sum of IR	177
(10) Evaluation OK (9) < (8)	OK

Cropping Calendar

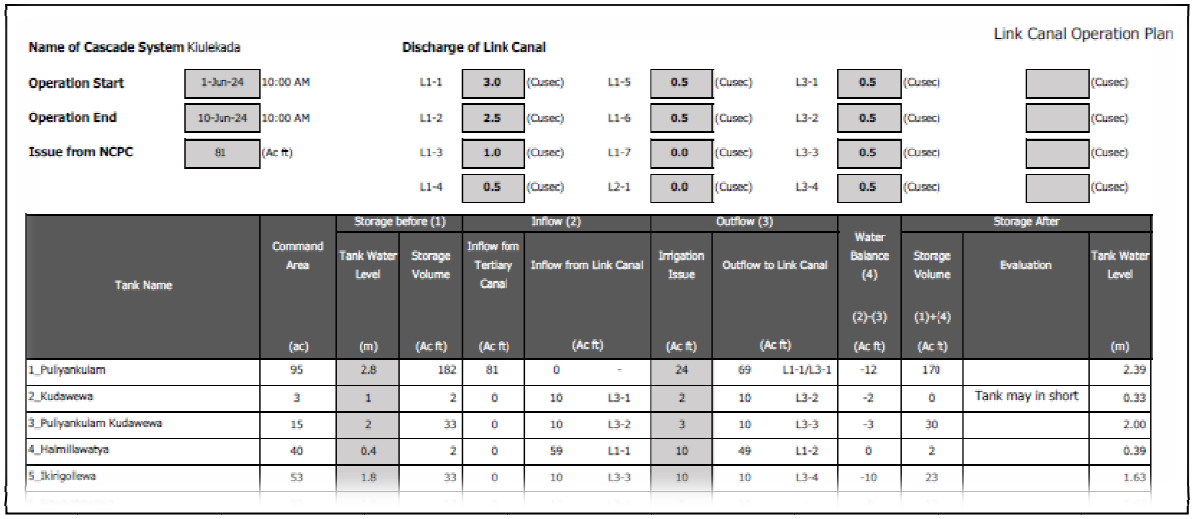
Type of Crop	Area (ac)	Apr 1st	Apr 10th	Apr 20th	May 1st	May 10th	May 20th	Jun 1st	Jun 10th	Jun 20th
Paddy Improved	10									
Paddy Traditional	10									
Cowpea	35									
Cabbage	5									

Type of Crop		Area Cultivated (ac)	Planting Date Month	Planting Date Date	Month	Apr 1st	Apr 10th	Apr 20th	May 1st	May 10th	May 20th	Jun 1st	Jun 10th	Jun 20th
Crop 1	Paddy Improved	10	Apr	20th	Irrigation Requirement (Ac ft)	0	0	1	3	4	5	5	5	5
Crop 2	Paddy Traditional	10	Apr	20th	Irrigation Requirement (Ac ft)	0	0	1	3	4	5	5	5	5
Crop 3	Cowpea	35	Apr	20th	Irrigation Requirement (Ac ft)	0	0	1	8	11	15	15	15	14
Crop 4	Cabbage	5	May	25th	Irrigation Requirement	0	0	0	0	0	0	1	1	1

Crop Planning Model

The required amount of water for the planned crops is calculated with the variables of varieties of crops, cultivation extents, and planting time, which the FO members can decide in consideration of their preference and other factors. Through the calculation by the system, the FOs can judge the sufficiency of water for the planned cultivation in comparison with the allocated water, thus, they can select their cultivation with maximum use of water.

Water distribution is calculated every ten days with the tank water level and water requirement of each tank in the particular operation period. The system indicates shortage and excess of water in each tank calculated from the variables of water level and requirement during the specified operation period. The water master shall adjust water discharge of each link canal to avoid shortage and overflow of the tanks. The following shows the developed model of water distribution.



Link Canal Operation Plan

Name of Cascade System Kulukada

Operation Start 1-Jun-24 10:00 AM

Operation End 10-Jun-24 10:00 AM

Issue from NCPC 81 (Ac ft)

Discharge of Link Canal

L1-1	3.0	(Cusec)	L1-5	0.5	(Cusec)	L3-1	0.5	(Cusec)			(Cusec)
L1-2	2.5	(Cusec)	L1-6	0.5	(Cusec)	L3-2	0.5	(Cusec)			(Cusec)
L1-3	1.0	(Cusec)	L1-7	0.0	(Cusec)	L3-3	0.5	(Cusec)			(Cusec)
L1-4	0.5	(Cusec)	L2-1	0.0	(Cusec)	L3-4	0.5	(Cusec)			(Cusec)

Tank Name	Command Area (ac)	Storage before (1) Tank Water Level (m)	Storage before (1) Storage Volume (Ac ft)	Inflow (2) Inflow fom Tertiary Canal (Ac ft)	Inflow (2) Inflow from Link Canal (Ac ft)		Outflow (3) Irrigation Issue (Ac ft)	Outflow (3) Outflow to Link Canal (Ac ft)		Water Balance (4) (2)-(3) (Ac ft)	Storage After Storage Volume (1)+(4) (Ac ft)	Storage After Evaluation	Storage After Tank Water Level (m)
1_Puliyankulam	95	2.8	182	81	0	-	24	69	L1-1/L3-1	-12	170		2.39
2_Kudawewa	3	1	2	0	10	L3-1	2	10	L3-2	-2	0	Tank may in short	0.33
3_Puliyankulam Kudawewa	15	2	33	0	10	L3-2	3	10	L3-3	-3	30		2.00
4_Halmillawatya	40	0.4	2	0	59	L1-1	10	49	L1-2	0	2		0.39
5_Ikirigollewa	53	1.8	33	0	10	L3-3	10	10	L3-4	-10	23		1.63

SESSION 5. ROLE OF ARPA IN CMO SUPPORT

5-1 Roles of ARPA in SMO establishment

Basically the roles ARPAs are expected to play in CMO formation and support are similar to that of FOs. However, more intense support is required as the cascade management is new to existing FOs. Basic roles of ARPAs are as listed below.

Awareness raising of FOs on NCPC and importance of cascade management

Support formation and registration of CMO

Training FOs on basic organizational functions of CMO (with support of experts)

Maintain CMO's registry

Periodical monitoring of CMO activities

Support DO on supervision of CMO including financial audit

Coordinate with relevant government officers regarding cascade management

5-2 Conflict resolution

5-2-1 Importance of conflict management in cascade management

Since cascade management involve several FOs with different group of people that might have different interests, it is more complicated to manage conflict between FOs and groups

A small conflict in a certain part of the cascade will disturb all the tanks and area under the cascade system is interconnected and function as a whole. For example, conflict between two tanks may disturb water flow between the tanks that will block water to the downstream. Conflict between two of the FOs shall create disagreement on the issue to be decided as a cascade such as work sharing, contribution, water control.

5-2-2 Controlling conflict

Conflict can be controlled by either by preventing it in advance or resolving when it happens.

Prevention:

Enhancing acknowledgement between FOs and people through communal activities, and social activities.

Establishing mutual trust between FOs and groups under the cascade through periodical discussion, compliance to the decision made by the CMO.

Make discussion whenever a small issue is raised to seek for a mutual agreement between the parties.

Resolution:

Discuss matters in the executive committee meeting as a issue of the whole cascade, even if the issue is between the parties of only a part of the cascade

Seek for the resolution from the point of managing cascade instead of attributing to personal interests, cultural difference, social groups, etc

Consult relevant officers or authority when they cannot solve within the members

Impose penalty if necessary for those who cannot follow fair decision of resolution

SESSION 6. MANAGEMENT OF CASCADE WITH RISK FACTORS

6-1 Identified risks and necessary actions to be taken

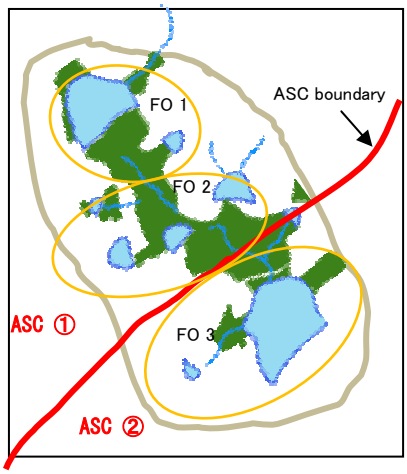
Sound functions of the CMO are highly influenced by some important factors. There have been observed some difficulties in forming and operating CMO in particular area and situation. Therefore, it is very important to identify such risk factors before formation of the CMOs and take necessary actions to mitigate the risk. The following are the risk factors in formation of CMOs to be identified through pre-survey during demarcation of FOs under cascade boundaries.

- Cascade crossing over ASC divisions;
- Existence of minority population;
- Cascade with a large number of FOs;
- FOs covering more than one cascade;
- Lower Bethma practice;
- Observed problem/dispute between FOs; and
- Existence of inactive FOs.

In order to identify the risk factors, simple survey of each FO under the cascade should be conducted to assess the abovementioned situation.

6-1-1 Cascade crossing over ASC divisions

Cascades crossing-over more than one ASC division may face difficulties in management due to the following reasons: Firstly, it was observed that unity of people from different ASCs might be weak as relation between people from different ASC divisions is much less than those from the same ASC. Secondly, the proposed cascade management is integrated in the existing system of ASC such as the Agrarian Development Committee at ASC level. Since there are probable constraints in the proposed option of establishing CMO crossing over the ASC divisions, it is strongly proposed to make appropriate intervention with the mentioned countermeasures to reconcile the constraints.



Proposed Management	Risks	Necessary Action to Overcome the Disadvantages
One CMO to be formed by current cascade boundary involving FOs from different ASCs and manage as a whole	・ Weak unity between different communities or under different ASCs ・ Difficulties in management amongst FOs under different ASCs e.g., ➢ where the contribution shall be deposited ➢ which DO of the concerned ASCs has final authority	・ Train officers in-charge on conflict resolution and fair treatment ・ System of collaboration between two ASCs should be established especially in deposit of contribution

Current relationship between FOs is one of the crucial factors to establish an effective management at the cascade level. Whilst FOs under the same ASC know each other, FOs in the neighbouring ASCs hardly communicated with each other. Although the FO in the neighbouring ASC agreed to work with other FOs in the cascade, coordination seems to be difficult, as some CMO functions and procedures are associated with the existing ASC structures.

6-1-2 Existence of minority population

Possibility of internal conflict cannot be denied in the cascade with mixed community, especially in water distribution and appointment of a cascade level water master. Management amongst Sinhalese communities and Muslim community of Sri Lankan Moor shall not face much problem as their current relations are fair and people are socially coexisting. Their expected conflict seems to be originated by water availability regardless the ethnic differences. On the other hand, careful intervention will be

necessary in the cascades co-managed by the Sinhalese and Tamil communities as some disputes were observed during the meetings.

Separate water flow through different tertiary canals for different ethnic groups seems to reduce risk of conflict and make the management easier. On the other hand, it may remind them of separation of ethnicities and bring negative impacts on ethnic coexistence. Therefore, it shall be recommended to encourage them to manage the cascade system by the mixed community with fair distribution of water. In order to avoid occurrence of conflict, a fundamental step to be taken is behavioural change of farmers through collaboration in the CMOs' activities as well as awareness programmes and social interaction, which shall be initiated far prior to the formation of the CMOs.

Proposed Management	Rational	Risks	Necessary Action to Overcome the Disadvantages
One CMO to be formed by current cascade boundary involving FOs from different communities and manage as a whole	・ It is in line with the government policy of social integration and coexistence of the different ethnic groups	・ Possibility of triggering conflicts between the communities	・ Fair regulation shall be set to avoid conflict ・ Train officers in-charge on conflict resolution and fair treatment

More systematic conflict management training shall also be organised to enhance capacity of conflict resolution of the organisation. In addition, the officers in-charge shall take important roles in handling the communities. Meticulous trainings on conflict management and inclusion of minority and socially underprivileged people should be organised for the field officers who are expected to be consulted by the communities in case of any conflict amongst cascades. It is also crucial to create a system to assure fair relation between different groups and legal provision to comply the system. Moreover, different languages that different communities use shall be equally applied in the documentation, information delivery, and discussion, in which Sinhalese language is, in most of current cases, dominant as many Tamil and Muslim people understand Sinhalese.

6-1-3 Cascade with a large number of FOs

A larger number of FOs involved in a CMO increase the risk of conflicts, as more parties are involved the more issues will be raised due to differences in their interests. Moreover, disparity in the size of FOs may cause power relations between FOs and some dominant groups. A fair decision-making system with fair representation from each FO should be proposed in the establishment of CMO.

Reference :

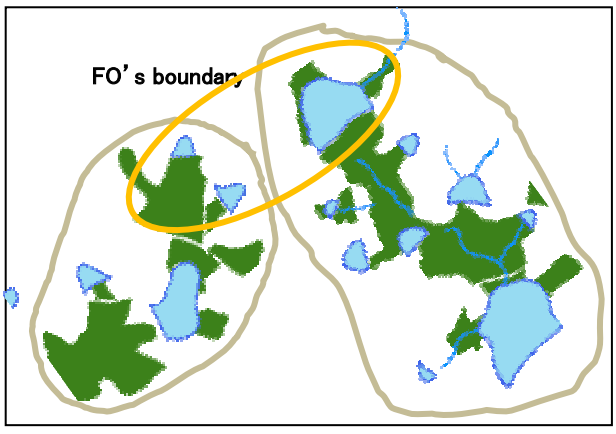
- Fair representation to CMO: "Operational Rules of CMO"
- Fair decision-making system : "Operational Rules of CMO"
- Training

Necessary facilitation:

- Rule for resolving dispute between FOs shall be discussed among all the member FOs and documented as Memorandum of Understanding (MoU) or meeting minutes at the formation of CMO.

6-1-4 FOs covering more than one cascade

There are several FOs that manage several tanks under different cascades as shown in the figure. Some FOs with several tanks in different cascades mentioned that since the tank in the concerned cascade is connected to the other tank in the neighbouring cascade through its spillway, they prefer to send water to the other tank under the same FO. Even if the FO does not have any problem in sending water to the tank under



different FO, management of the FO shall be difficult as they need to participate in two different CMO. In some cases, there are farmers who have several section of land under different tank. Such farmers are involved and influenced by both CMOs.

Therefore, management of an FO that belongs to more than one cascade might require special arrangement for smooth management especially in the case where the area cultivated by the same farmers are divided by the cascade boundaries. ARPAs support division of roles within the cascade, management of representation to different cascades, communication between the cascades

6-1-5 Lower Bethma practice

The cascades with lower Bethma practice showed higher preference in direct water delivery from NCP with a fixed amount, meaning that willingness for water sharing with other tanks is low. This may be because people in such tank are accustomed to the situation that upper land owners take water without sharing with others, and they may feel that the fixed allocation through direct canal is the only way they can receive water regardless of power relation and location of their field.

Idea of fair distribution of water from NCPC should be carefully explained in such cascade for the benefit of the whole cascade. Some rules and penalty can be decided within the cascade in case there is some violation of rules in water distribution.

6-1-6 Observed problem/dispute between FOs

Relation between FOs in the situation before they receive NCP water will highly influence the unity of CMO. If there is some conflict between FOs or tanks under the cascade, it will create dispute in cascade management. Existing problems between tanks and FOs should be solved before establishment of the CMO. Furthermore, cause of the conflict should be analysed to prevent recurrence of the conflict during formation of CMO and its operation.

Existing conflict should be resolved before formation of cascade. Benefit from NCPC shared within cascade can also contribute to resolving the conflict for both parties to get benefit. Resolution shall be assessed depending on the cause of the problem. In the cases where ARPA cannot solve the problems, higher officer, administrators, of village leaders shall be involved in the discussion.

6-1-7 Existence of inactive FOs

Sound and effective operation of CMO requires full participation of the member FO. Presently inactive FO may tend to ignore their responsibility, which discourage other FOs and disturb operation of the CMO. Constraints that inactive FOs face should be solved and empower them for active operation of their own FO. Special consultation and capacity building programme should be organised for such FOs according to their needs.

添付資料 6

施設開発計画に係る関連情報

Items			Type		Civil Unit Cost (4 verification tanks)		Work Volume of Model Cascades							Total Cost (M. LKR)	Unit Cost (128 Cascade Development)	Remarks
							Alagalla	Ichchankulama	Kiulekada	Navelikulam	Rathmalawewa	yabalangaswev	Total			
Survey and Investigation			Inventory		30,000	LKR/tank	5	10	12	15	15	10	67 tank	2.010	2.466 M. LKR/tank	
			Levelling and Route		560,000	LKR/tank	5	10	12	15	15	10	67 tank	37.520		
			Tank H-V Survey		400,000	LKR/tank	1	1	1	1	1	1	6 tank	2.400		
			Desgin, Cost Estimate, Tender		950,000	LKR/tank	5	10	12	15	15	10	67 tank	63.650		
			Supervision		890,000	LKR/tank	5	10	12	15	15	10	67 tank	59.630		
Preliminary			Average		4.0%	of Total Civil									4.0% of Total Civil	(1)
Headworks	Tank bund		Reshaping		4,698	LKR/m	2,880	7,360	7,555	8,976	8,950	6,810	42,531 m	199.811	7.986 M. LKR/km	
	Spillway	Drop wall	Repair		23,494	LKR/m	0	202	28	37	0	58	325 m	7.636		
			Reconstruction		80,335	LKR/m	99	169	209	69	227	34	807 m	64.830		
		Natsural (Channel)	Repair		1,137	LKR/m	0	0	0	39	193	59	291 m	0.331		
			Reconstruction		11,365	LKR/m	53	64	102	192	232	230	873 m	9.922		
	Sluice	Gate	Repair		22,500	LKR/nos.	0	7	6	3	2	10	28 nos.	0.630		
			Replacement		150,703	LKR/nos.	12	9	20	17	15	8	81 nos.	12.207		
		Structure	Repair		75,263	LKR/nos.	6	9	18	6	8	10	57 nos.	4.290		
			Reconstruction		525,321	LKR/nos.	6	5	8	15	6	8	48 nos.	25.215		
	Bathing Step		Reconstruction		182,601	LKR/nos.	5	15	16	16	17	12	81 nos.	14.791		
Canal Works	Canal System		Earth		3,280	LKR/m	4,710	16,230	20,650	19,690	24,880	12,210	98,370 m	322.654	3.280 M. LKR/km	
Link and Tertiary		Open Channel	Concrete	0.015 < Q < 0.033 m^3/s	7.273	M.LKR/km	1.1	3.2	4.1	2.7	1.9	6.0	19.0 km	138.187	8.056 M. LKR/km	
				0.033 < Q < 0.048 m^3/s	7.942	M.LKR/km		1.4	3.1	1.3	4.9	1.6	12.3 km	97.687		
				0.048 < Q < 0.064 m^3/s	8.610	M.LKR/km	1.3	2.0	1.1	1.8	0.8		7.0 km	60.270		
				0.064 < Q < 0.155 m^3/s	10.615	M.LKR/km		2.6	2.7	7.2	3.4	2.0	17.9 km	190.009		
				0.155 < Q < 0.200 m^3/s	11.286	M.LKR/km			1.5		1.0		2.5 km	28.215		
				0.200 < Q < 0.237 m^3/s	11.958	M.LKR/km		1.0			1.8		2.8 km	33.482		
				0.237 < Q < 0.378 m^3/s	13.224	M.LKR/km		2.3					2.3 km	30.415		
				0.378 < Q < 0.441 m^3/s	14.439	M.LKR/km							0.0 km	0.000		
		Pipeline	PVC	Q = 0.003 m^3/s	1.447	M.LKR/km					0.8		0.8 km	1.157		
				Q = 0.004 m^3/s	1.929	M.LKR/km				0.8			0.8 km	1.543		
				Q = 0.005 m^3/s	2.411	M.LKR/km							0.0 km	0.000		
				Q = 0.006 m^3/s	2.894	M.LKR/km						1.7	1.7 km	4.919		
				Q = 0.007 m^3/s	3.376	M.LKR/km				1.4	1.0		2.4 km	8.102		
				Q = 0.008 m^3/s	3.858	M.LKR/km	0.5						0.5 km	1.929		
				Q = 0.009 m^3/s	4.340	M.LKR/km			0.4		0.7	1.4	2.5 km	10.851		
				Q = 0.010 m^3/s	4.823	M.LKR/km					1.5		1.5 km	7.234		
				Q = 0.0011 m^3/s	5.305	M.LKR/km			1.1	1.7			2.8 km	14.854		
				Q = 0.0012 m^3/s	5.787	M.LKR/km	2.3						2.3 km	13.311		
				Q = 0.0013 m^3/s	6.270	M.LKR/km	1.1						1.1 km	6.897		
				Q = 0.0014 m^3/s	6.752	M.LKR/km					2.3		2.3 km	15.529		
				Q = 0.0015 m^3/s	7.234	M.LKR/km							0.0 km	0.000		
Farm Road					1,598	LKR/m	750	6,640	12,350	7,200	4,000	4,000	34,940 m	55.834	1.598 M. LKR/km	
Miscellaneous			Average		2.5%	of Total Civil									2.5% of Total Civil	(1)
Water Level Monitoring System					3,420,000	LKR/set									3.420 M. LKR/set	(1)

Remarks:

(1): Based on the verification Program

List of 128 cascades

Summary

Water shed	No. of Cascade	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
				Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
				Rehabilitation			New Construction								
				Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
		(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Malwathu Oya river basin	62	493	14,275	345.45	799.39	284.07	670.91	18	631.12	584.62	6,213.98	5,756.18	2,070.84	61.56	15,318.30
Yan oya river basin	24	226	7,948	192.35	445.09	158.17	373.56	9	289.32	268.00	3,459.94	3,205.02	1,153.04	30.78	8,406.10
Ma oya river basin	24	162	4,857	117.55	272.01	96.66	228.29	5	207.39	192.11	2,114.49	1,958.66	704.65	17.10	5,194.40
Parangi aru	16	120	3,295	79.75	184.54	65.58	154.89	4	153.62	142.30	1,434.55	1,328.91	478.08	13.68	3,551.14
Kanagarayanaru	2	19	958	23.18	53.63	19.06	45.01	1	24.35	22.55	417.19	386.31	139.01	3.50	992.91
Total	128	1,020	31,333	758.28	1754.66	623.54	1472.66	37	1,305.80	1,209.58	13,640.16	12,635.07	4,545.61	126.62	33,462.84

Malwathu Oya river basin

Sub water shed	Cascade	Symbol	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
					Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
					Rehabilitation			New Construction								
					Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
			(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Maminiya oya	Siwala kulam	9/MAL2	1	55.3	1.34	3.10	1.11	2.60	0	1.28	1.19	24.14	22.32	8.04	0.00	56.97
	Bora Wewa	11/MAL2	3	26.6	0.65	1.50	0.54	1.26	0	3.85	3.55	11.71	10.82	3.90	0.00	33.83
	Pairimaduwa Wewa	12/MAL2	6	78.9	1.91	4.42	1.57	3.71	0	7.68	7.12	34.37	31.84	11.45	0.00	92.46
	Galwaduwagama	10/MAL2	2	20.6	0.50	1.16	0.41	0.97	0	2.57	2.37	9.03	8.33	3.00	0.00	25.30
	Sub Total	4	12	181.4	4.39	10.16	3.61	8.53	0	15.36	14.24	78.99	73.19	26.33	0.00	208.11
Upper Kanadara oya	Abagaha wewa	12/MAL4	3	108.3	2.63	6.07	2.16	5.09	0	3.85	3.55	47.27	43.68	15.73	0.00	114.08
	Periya kulam	11/MAL4	2	175.9	4.26	9.86	3.51	8.27	0	2.57	2.37	76.67	70.97	25.54	0.00	178.12
	Kon wewa	10/MAL4	2	102.7	2.49	5.76	2.05	4.83	0	2.57	2.37	44.81	41.45	14.92	0.00	106.12
	Pahala halmillewa	9/MAL4	3	92.9	2.25	5.21	1.85	4.37	0	3.84	3.56	40.50	37.50	13.49	0.00	98.89
	Tharanogolllawa	8/MAL4	2	25.6	0.63	1.44	0.52	1.21	0	2.57	2.37	11.30	10.39	3.75	0.00	30.38
	Siyabalabedigaswewa	7/MAL4	1	44.1	1.07	2.48	0.88	2.08	0	1.28	1.19	19.28	17.86	6.43	0.00	46.04
	Mahagal kulam	6/MAL4	8	169.5	4.11	9.50	3.38	7.97	0	10.25	9.48	73.92	68.39	24.62	0.00	186.66
	Ichchan kulam	13/MAL4	10	355.0	8.60	19.88	7.07	16.69	1	12.80	11.86	154.63	143.21	51.53	3.42	377.45
	Katukaliyawa	14/MAL4	10	225.5	5.46	12.63	4.49	10.60	1	12.80	11.86	98.22	90.96	32.73	3.42	249.99
	Kasamaduwa	15/MAL4	4	115.3	2.80	6.46	2.30	5.42	0	5.13	4.74	50.32	46.51	16.75	0.00	123.45
	Ittiktiya	16/MAL4	4	45.9	1.12	2.58	0.92	2.16	0	5.14	4.73	20.13	18.55	6.69	0.00	55.24
	Galmaduwa	17/MAL4	5	71.5	1.73	4.01	1.43	3.36	0	6.41	5.92	31.18	28.83	10.38	0.00	82.72
	Palugas wewa	18/MAL4	17	404.8	9.80	22.68	8.06	19.03	1	21.77	20.16	176.32	163.28	58.75	3.42	443.70
	Sub Total	13	71	1,937.2	46.88	108.49	38.55	91.05	3	90.89	84.20	843.33	781.18	281.04	10.26	2,090.90
Upper weli oya	Mekechchawa	3/MAL5	29	800.2	19.37	44.82	15.93	37.62	1	37.13	34.39	348.43	322.77	116.12	3.42	862.26
	Abagahawela	2/MAL5	7	164.5	3.99	9.22	3.28	7.74	0	8.97	8.30	71.75	66.42	23.90	0.00	179.34
	Ethawetuna wewa	1MAL5	2	18.1	0.44	1.02	0.37	0.86	0	2.56	2.38	7.96	7.38	2.65	0.00	22.93
	Ella wewa	4/MAL5	13	671.6	16.26	37.62	13.37	31.57	1	16.65	15.41	292.48	270.87	97.46	3.42	696.29
	Ranpathwila wewa	5/MAL5	26	826.0	19.99	46.26	16.44	38.83	1	33.28	30.84	359.62	333.16	119.85	3.42	880.17
	Kukulawa wewa	6/MAL5	3	49.1	1.19	2.76	0.98	2.31	0	3.85	3.55	21.45	19.82	7.14	0.00	55.81
	Konketupothana	7/MAL5	8	120.0	2.91	6.72	2.39	5.64	0	10.25	9.48	52.31	48.40	17.42	0.00	137.86
	Gekarawa wewa	8/MAL5	4	79.9	1.94	4.48	1.59	3.76	0	5.13	4.74	34.88	32.28	11.62	0.00	88.65
	Sub Total	8	92	2,729.4	66.06	152.85	54.32	128.29	3	117.78	109.10	1,188.25	1,100.69	395.99	10.26	2,922.07
Lower weli oya	Kongollawewa	8/MAL12	6	112.7	2.73	6.32	2.25	5.30	0	7.69	7.11	49.15	45.48	16.37	0.00	125.80
	Nika wewa	10/MAL12	3	132.7	3.22	7.44	2.65	6.24	0	3.84	3.56	57.91	53.54	19.28	0.00	138.13
	Hammillewa	9/MAL12	2	49.2	1.20	2.76	0.98	2.32	0	2.57	2.37	21.54	19.91	7.17	0.00	53.56
	Kuda wewa_1	11/MAL12	3	257.2	6.23	14.41	5.12	12.09	0	3.84	3.56	112.06	103.74	37.33	0.00	260.53
	Rathmalgaha wewa	12/MAL12	4	215.3	5.22	12.06	4.29	10.12	0	5.13	4.74	93.84	86.84	31.26	0.00	221.81
	Kudagama wewa_1	13/MAL12	2	41.7	1.02	2.34	0.84	1.97	0	2.57	2.37	18.30	16.92	6.09	0.00	46.25
	Sub Total	6	20	808.8	19.58	45.30	16.10	38.02	0	25.60	23.72	352.19	326.20	117.36	0.00	845.07
Kudahathu oya	Tibiri wewa	3/MAL6	21	390.7	9.46	21.88	7.78	18.37	1	26.89	24.90	170.15	157.61	56.70	3.42	439.67
	Gonawa lhala wewa	2/MAL6	3	88.5	2.15	4.96	1.77	4.16	0	3.85	3.55	38.63	35.71	12.86	0.00	94.60
	Gonawa wewa	1/MAL6	3	61.7	1.50	3.46	1.23	2.90	0	3.85	3.55	26.95	24.89	8.97	0.00	68.21
	Kapirilgama wewa	4/MAL6	21	536.5	12.99	30.05	10.68	25.22	1	26.89	24.90	233.65	216.39	77.86	3.42	583.11
	Siyabalagaswewa	5/MAL6	10	245.0	5.93	13.72	4.88	11.52	1	12.80	11.86	106.68	98.85	35.56	3.42	269.17
	Thalgaha	6/MAL6	6	236.6	5.73	13.25	4.71	11.12	0	7.68	7.12	103.04	95.42	34.33	0.00	247.59
	Walketu wewa	7/MAL6	4	50.4	1.23	2.83	1.01	2.37	0	5.14	4.73	22.09	20.35	7.34	0.00	59.65
	Dumminnegama	8/MAL6	2	91.0	2.21	5.10	1.82	4.28	0	2.57	2.37	39.72	36.73	13.23	0.00	94.62
	Lidawewa	2/MAL7	3	85.7	2.08	4.80	1.71	4.03	0	3.84	3.56	37.40	34.58	12.45	0.00	91.83
	Sub Total	9	73	1,786.0	43.23	100.02	35.55	83.95	3	93.45	86.57	777.58	720.28	259.13	10.26	1,947.27
Sangili kanadara oya	Pihibiyagollawa	7/MAL7	24	724.6	17.54	40.58	14.42	34.06	1	30.73	28.46	315.50	292.23	105.14	3.42	775.48
	Kirimetiyawa	6/MAL7	6	110.7	2.68	6.21	2.21	5.21	0	7.68	7.12	48.27	44.72	16.09	0.00	123.88
	Ralapanawa	5/MAL7	8	160.7	3.89	9.01	3.20	7.56	0	10.24	9.49	70.03	64.87	23.34	0.00	177.97
	Kardan kulam	4/MAL7	2	72.6	1.76	4.07	1.45	3.42	0	2.56	2.38	31.67	29.36	10.56	0.00	76.53
	Diulgas Wewa	3/MAL7	2	20.7	0.51	1.16	0.42	0.98	0	2.57	2.37	9.13	8.42	3.04	0.00	25.53
	Galwiragollewa	8/MAL7	9	476.7	11.54	26.70	9.49	22.41	0	11.52	10.68	207.58	192.28	69.18	0.00	491.24
	Kirigollewa	9/MAL7	17	691.0	16.73	38.70	13.75	32.48	1	21.77	20.16	300.90	278.67	100.27	3.42	725.19
	Kudagama wewa_2	10/MAL7	15	658.9	15.95	36.91	13.12	30.98	1	19.20	17.79	286.93	265.81	95.62	3.42	688.77
	Kuda wewa_2	11/MAL7	4	109.2	2.65	6.12	2.18	5.14	0	5.13	4.74	47.65	44.11	15.87	0.00	117.50
	Madawachchiya Wewa	12/MAL7	30	946.1	22.90	52.99	18.83	44.47	1	38.41	35.57	411.94	381.55	137.27	3.42	1,008.16
	Sub Total	10	117	3,971.2	96.11	222.39	79.03	186.65	4	149.78	138.75	1,728.79	1,601.40	576.12	13.68	4,208.52
Boo oya	Parana halmillewa	4/MAL8	21	504.8	12.22	28.27	10.05	23.73	1	26.89	24.90	219.80	203.60	73.25	3.42	551.86
	Kidewaran kulam	5/MAL9	20	680.6	16.48	38.12	13.55	32.00	1	25.60	23.72	296.41	274.56	98.78	3.42	722.49
	Thibiri wewa	3/MAL8	2	39.6	0.96	2.22	0.79	1.87	0	2.56	2.38	17.29	16.06	5.77	0.00	44.06
	Tammnennakanda	6/MAL8	1	40.3	0.98	2.26	0.81	1.90	0	1.28	1.19	17.63	16.31	5.87	0.00	42.28
	Alagalla	7/MAL8	5	80.0	1.94	4.48	1.60	3.76	0	6.41	5.92	34.90	32.27	11.62	0.00	91.12
	Nochchikulam	8/MAL8	14	338.5	8.20	18.96	6.74	15.92	1	17.93	16.60	147.46	136.60	49.14	3.42	371.15
	Aluth halmillewa	5/MAL8	12	472.9	11.45	26.49	9.42	22.23	1	15.37	14.23	205.96	190.74	68.63	3.42	498.35
	Irataperiya Kulam	9/MAL8	18	396.2	9.59	22.19	7.89	18.63	1	23.04	21.35	172.53	159.85	57.50	3.42	437.69
	Kurundan kulam	10/MAL8	3	22.9	0.56	1.29	0.46	1.08	0	3.85	3.55	10.08	9.28	3.35	0.00	30.11
	Kandapuran kulam	11/MAL8	3	91.2	2.21	5.11	1.82	4.29	0	3.84	3.56	39.76	36.82	13.25	0.00	97.23
	Karuweppan kulam	12/MAL8	7	132.2	3.20	7.41	2.64	6.22	0	8.96	8.31	57.61	53.37	19.20	0.00	147.45
	Suduventapulavu	13/MAL8	2	61.4	1.49	3.44	1.23	2.89	0	2.57	2.37	26.80	24.81	8.93	0.00	65.48
	Sub Total	12	108	2,860.7	69.23	160.20	56.93	134.46	5	138.26	128.07	1,245.33	1,153.63	415.02	17.10	3,097.41
	Total	62	493	14,274.6	345.45	799.39	284.07	670.91	18	631.12	584.62	6,213.98	5,756.18	2,070.84	61.56	15,318.30

Yan oya river basin

Sub water shed	Cascade	Symbol	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
					Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
					Rehabilitation			New Construction								
					Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
			(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Upper yan oya	Ihalagal kulam	10Y/2	2	31.4	0.76	1.76	0.63	1.48	0	2.56	2.38	13.70	12.71	4.57	0.00	35.92
	Eluwan kulama	9/Y2	2	65.2	1.58	3.66	1.30	3.07	0	2.56	2.38	28.45	26.35	9.48	0.00	69.22
	Meegaswewa	8/Y2	3	138.1	3.35	7.74	2.75	6.50	0	3.84	3.56	60.23	55.78	20.07	0.00	143.48
	Kannimaduwa wewa	7/Y2	4	167.7	4.06	9.40	3.34	7.89	0	5.12	4.75	73.07	67.71	24.35	0.00	175.00
	Pahala nittawa	6/Y2	2	133.0	3.22	7.45	2.65	6.25	0	2.57	2.37	57.94	53.62	19.30	0.00	135.80
	Puliyan kulam	5/Y2	5	184.8	4.48	10.36	3.68	8.69	0	6.40	5.93	80.58	74.57	26.84	0.00	194.32
	Ella wewa	4/Y2	3	48.6	1.18	2.73	0.97	2.29	0	3.84	3.56	21.25	19.65	7.08	0.00	55.38
	Olukolagala wewa	3/Y2	3	116.0	2.81	6.50	2.31	5.46	0	3.84	3.56	50.56	46.85	16.85	0.00	121.66
	Punchihammillawa	2/Y2	2	79.6	1.93	4.46	1.59	3.75	0	2.56	2.38	34.73	32.18	11.58	0.00	83.43
	Mahakirimetiyawa	1/Y2	21	463.5	11.22	25.96	9.23	21.79	1	26.89	24.90	201.83	186.97	67.26	3.42	511.27
	Sub Total	10	47	1,427.7	34.56	79.96	28.42	67.11	1	60.17	55.74	621.63	575.79	207.15	3.42	1,523.90
Upper middle yan oya	Hettuwewa	7/Y4	5	199.0	4.82	11.15	3.96	9.36	0	6.40	5.93	86.71	80.32	28.90	0.00	208.26
	Kon wewa	6/Y4	3	189.7	4.60	10.63	3.78	8.92	0	3.84	3.56	82.71	76.54	27.55	0.00	194.20
	Ithalwatuna wewa	5/Y4	11	438.9	10.63	24.58	8.74	20.63	1	14.09	13.04	191.17	177.01	63.70	3.42	462.43
	Maha hammillewa	4/Y4	28	750.8	18.17	42.05	14.95	35.29	1	35.85	33.20	326.90	302.78	108.93	3.42	811.08
	Moragahadigilliya	3/Y4	12	591.2	14.31	33.11	11.77	27.79	1	15.37	14.23	257.41	238.44	85.78	3.42	614.65
	Pemorakewa	2/Y4	20	615.2	14.89	34.46	12.25	28.92	1	25.60	23.72	267.89	248.13	89.27	3.42	658.03
	Patanaya	1/Y4	4	119.3	2.89	6.68	2.38	5.61	0	5.12	4.75	51.99	48.15	17.32	0.00	127.33
	Sub Total	7	83	2,904.0	70.28	162.63	57.79	136.49	4	106.25	98.43	1,264.20	1,171.05	421.30	13.68	3,074.91
Middle yan oya	Nilla wewa	2/Y5	39	1,219.2	29.51	68.28	24.27	57.31	1	49.93	46.25	530.82	491.71	176.90	3.42	1,299.03
	Rathmala wewa	4/Y5	15	469.0	11.35	26.27	9.34	22.05	1	19.20	17.79	204.22	189.19	68.06	3.42	501.88
	Ralapanawa	1/Y5	14	358.0	8.67	20.05	7.13	16.83	1	17.93	16.60	155.93	144.40	51.96	3.42	390.24
	Sub Total	3	68	2,046.2	49.52	114.59	40.72	96.18	3	87.05	80.64	890.78	825.20	296.86	10.26	2,190.79
Lower middle yan oya	Hammillawa	1/Y6	14	648.8	15.71	36.34	12.92	30.50	1	17.93	16.60	282.57	261.69	94.16	3.42	676.37
	Dutu wewa	5/Y6	3	221.2	5.36	12.39	4.41	10.40	0	3.84	3.56	96.39	89.24	32.11	0.00	225.14
	Kapugollewa ela	2/Y6	8	600.7	14.54	33.64	11.96	28.24	0	10.24	9.49	261.55	242.30	87.17	0.00	610.75
	Wagollakada	3/Y6	3	99.3	2.41	5.57	1.98	4.67	0	3.84	3.56	43.34	40.08	14.43	0.00	105.25
	Sub Total	4	28	1,570.1	38.00	87.93	31.25	73.80	1	35.85	33.20	683.55	633.19	227.80	3.42	1,617.01
Total		24	226	7,948.0	192.35	445.09	158.17	373.56	9	289.32	268.00	3,459.94	3,205.02	1,153.04	30.78	8,406.10

Ma oya river basin

Sub water shed	Cascade	Symbol	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
					Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
					Rehabilitation			New Construction								
					Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
			(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Mora oya	Maha wewalkadawala	9/MA1	30	697.3	16.88	39.05	13.88	32.78	1	38.41	35.57	303.62	281.25	101.18	3.42	763.45
	Walahawidda wewa	10/MA1	6	185.3	4.49	10.38	3.69	8.71	0	7.69	7.11	80.74	74.73	26.90	0.00	197.17
	Ulpathagama wewa	11/MA1	2	58.0	1.41	3.25	1.16	2.73	0	2.57	2.37	25.34	23.44	8.44	0.00	62.16
	Ulpotha	12/MA1	1	21.2	0.52	1.19	0.43	1.00	0	1.29	1.18	9.34	8.59	3.10	0.00	23.50
	Kiriketu wewa	13/MA1	2	78.4	1.90	4.39	1.56	3.69	0	2.56	2.38	34.17	31.67	11.39	0.00	82.17
	Mahatikka wewa	15/MA1	9	338.6	8.20	18.97	6.74	15.92	0	11.53	10.67	147.51	136.60	49.15	0.00	355.46
	Elapattewa	14/MA1	7	239.7	5.81	13.43	4.78	11.27	0	8.97	8.30	104.48	96.71	34.81	0.00	253.27
	Gallewa wewa	16/MA1	4	295.2	7.15	16.54	5.88	13.88	0	5.12	4.75	128.62	119.09	42.85	0.00	300.43
	Ihala thammennawa	8/MA1	13	308.9	7.48	17.30	6.15	14.52	1	16.65	15.41	134.54	124.59	44.83	3.42	339.44
	Kiulekada wewa	7/MA1	10	259.0	6.27	14.51	5.16	14.72	0	11.63	13.03	112.82	126.31	41.37	0.00	305.16
	Ayiyatige wewa	6/MA1	22	929.7	22.50	52.07	18.51	43.70	1	28.17	26.09	404.77	374.94	134.89	3.42	972.28
	Palupuliyam kulama	5/MA1	7	130.1	3.15	7.29	2.59	6.12	0	8.96	8.31	56.69	52.52	18.89	0.00	145.37
	Ithalwiddawa wewa	4/MA1	11	293.3	7.10	16.43	5.84	13.79	1	14.08	13.05	127.75	118.33	42.57	3.42	319.20
	Mahanettiyawa	3/MA1	4	113.3	2.75	6.35	2.26	5.33	0	5.13	4.74	49.44	45.74	16.47	0.00	121.52
	Olugaskada	2/MA1	10	283.8	6.87	15.90	5.65	13.34	1	12.80	11.86	123.61	114.46	41.19	3.42	307.34
	Sinhaya ulpotha	10/MA2	1	4.0	0.10	0.23	0.09	0.20	0	1.27	1.20	1.83	1.73	0.62	0.00	6.65
	Pahala herath mamillew	1/MA1	2	40.5	0.98	2.27	0.81	1.91	0	2.56	2.38	17.66	16.39	5.89	0.00	44.88
	Sub Total	17	141	4,276.2	103.49	239.47	85.10	200.99	5	180.50	167.21	1,861.56	1,724.43	620.38	17.10	4,571.18
Mukunu oya	Medagama wewa	9/MA2	1	10.9	0.27	0.61	0.22	0.52	0	1.28	1.19	4.83	4.46	1.61	0.00	13.37
	Kunchuttuwa	7/MA2	3	165.7	4.01	9.28	3.30	7.79	0	3.84	3.56	72.16	66.85	24.05	0.00	170.46
	Puliyan kulama	8/MA2	7	116.6	2.83	6.53	2.32	5.48	0	8.97	8.30	50.85	47.02	16.93	0.00	132.07
	Maha ralapanawa	6/MA2	5	131.4	3.18	7.36	2.62	6.18	0	6.40	5.93	57.24	53.03	19.08	0.00	141.68
	Migakada wewa	5/MA2	2	98.0	2.38	5.49	1.96	4.61	0	2.57	2.37	42.78	39.56	14.24	0.00	101.52
	Viharahalmillawa	2/MA2	2	38.7	0.94	2.17	0.78	1.82	0	2.57	2.37	16.92	15.63	5.63	0.00	43.12
	Nikawewa	1/MA2	1	19.8	0.48	1.11	0.40	0.94	0	1.28	1.19	8.66	8.08	2.90	0.00	22.11
	Sub Total	7	21	581.0	14.06	32.54	11.57	27.31	0	26.89	24.90	252.96	234.32	84.30	0.00	623.37
Total		24	162	4,857.2	117.55	272.01	96.66	228.29	5	207.39	192.11	2,114.49	1,958.66	704.65	17.10	5,194.40

Parangi aru

Sub water shed	Cascade	Symbol	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
					Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
					Rehabilitation			New Construction								
					Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
			(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Upper parangi aru / peru aru	Puthuk kulam	5/PAR1	18	769.2	18.62	43.08	15.31	36.16	1	23.04	21.35	334.93	310.25	111.62	3.42	804.61
	Putuk kulam	4/PAR1	5	115.2	2.79	6.46	2.30	5.42	0	6.40	5.93	50.23	46.52	16.74	0.00	125.82
	Periya kulam	3/PAR1	2	77.8	1.89	4.36	1.55	3.66	0	2.57	2.37	33.97	31.41	11.31	0.00	81.63
	Kollamutamadu kulam	2/PAR1	5	116.2	2.82	6.51	2.32	5.46	0	6.41	5.92	50.70	46.85	16.88	0.00	126.76
	Chinna kulam	1/PAR1	6	102.3	2.48	5.74	2.04	4.82	0	7.68	7.12	44.62	41.36	14.87	0.00	115.65
	parandikallu	6/PAR1	24	434.2	10.51	24.32	8.65	20.41	1	30.73	28.46	189.08	175.12	63.01	3.42	489.82
	Sub Total	6	60	1,615.0	39.09	90.44	32.14	75.91	2	76.81	71.15	703.11	651.29	234.31	6.84	1,743.51
Periyakattu aru	Periyakada	6/PAR4	13	538.1	13.03	30.14	10.71	25.29	1	16.65	15.41	234.35	216.99	78.08	3.42	564.90
	Kidachchuri	7/PAR4	4	70.1	1.70	3.93	1.40	3.30	0	5.13	4.74	30.59	28.33	10.19	0.00	78.98
	Mullaik kulam	8/PAR4	2	26.5	0.65	1.49	0.53	1.25	0	2.57	2.37	11.66	10.73	3.87	0.00	31.20
	Sub Total	3	19.0	634.6	15.36	35.54	12.63	29.83	1	24.33	22.53	276.31	255.95	92.08	3.42	674.62
Thurumpamddi aru	Karunkalisinna kulam	7/PAR1	9	428.8	10.38	24.02	8.54	20.16	0	11.52	10.68	186.74	172.97	62.23	0.00	444.14
	Marutan kulam	3/PAR2	9	220.2	5.33	12.34	4.39	10.36	0	11.52	10.68	95.93	88.90	31.98	0.00	239.01
	Naveli Kulam	4/PAR2	13	218.0	5.28	12.21	4.34	11.61	1	15.65	16.41	94.96	99.62	33.66	3.42	263.72
	Kasawapulaiyan kulam	5/PAR2	2	34.8	0.85	1.96	0.70	1.64	0	2.57	2.37	15.28	14.08	5.08	0.00	39.38
	Alankulam	6/PAR2	3	43.6	1.06	2.45	0.87	2.05	0	3.85	3.55	19.08	17.60	6.35	0.00	50.43
	Podun kulam	7/PAR2	4	56.8	1.38	3.18	1.13	2.67	0	5.13	4.74	24.80	22.91	8.25	0.00	65.83
	Palaimoddalk kulam	8/PAR2	1	43.5	1.06	2.44	0.87	2.05	0	1.28	1.19	19.04	17.60	6.34	0.00	45.45
	Sub Total	7	41	1,045.7	25.31	58.57	20.82	49.16	1	52.49	48.62	455.31	421.79	151.74	3.42	1,133.37
Total		16	120.0	3,295.3	79.75	184.54	65.58	154.89	4	153.62	142.30	1,434.55	1,328.91	478.08	13.68	3,551.14

Kanagarayanaru

Sub water shed	Cascade	Symbol	Benefit tanks	Irrigable area	Quantity					Cost (Million LKR)						
					Civil Work Volume				Monitoring System	Survey		Civil Work Total		NBT VAT	Monitoring System	Total
					Rehabilitation			New Construction								
					Headworks	Canal	Farm Rord	Link and Tertiary Canal		R	N	R	N			
			(nos.)	(ha)	(km)	(km)	(km)	(km)	(set)							
Upper kanakarayan aru	Chamalan kulam	7/MGA1	9	557.6	13.50	31.23	11.10	26.21	0	11.53	10.67	242.82	224.88	80.91	0.00	570.81
	Periyapuliyan kulam	6/MGA1	10	400.1	9.69	22.41	7.97	18.81	1	12.80	11.86	174.28	161.39	58.07	3.42	421.82
Total		2	19	957.6	23.18	53.63	19.06	45.01	1	24.35	22.55	417.19	386.31	139.01	3.50	992.91

Required water level

Watershed	Sub-watershed	Cascade				
		No.	Name	Symbol	FSL MSL (m)	Required Water Level MSL (m)
Malwathu Oya river basin	Maminiya Oya	1	Siwala Kulam	9/MAL2	136	138
		2	Bora Wewa	11/MAL2	135	137
		3	Pairimaduwa Wewa	12/MAL2	136	138
		4	Galwaduwagama	10/MAL2	134	136
	Upper Weli Oya (Maha Kanadara Oya)	5	Abagaha Wewa	12/MAL4	137	139
		6	Periya Kulam	11/MAL4	132	134
		7	Kon Wewa	10/MAL4	134	136
		8	Galwaduwagama	10/MAL2	134	136
		9	Tharanogollawa	8/MAL4	125	127
		10	Siyabalabedigaswew	7/MAL4	122	124
		11	Mahagal kulam	6/MAL4	129	131
		12	Ichchan Kulam	13/MAL4	135	137
		13	Katukaliyawa	14/MAL4	140	142
		14	Kasamaduwa	15/MAL4	128	130
		15	Itthiktiya	16/MAL4	121	123
		16	Galmaduwa	17/MAL4	121	123
		17	Palugas Wewa	18/MAL4	126	128
	Upper Weli Oya (Maha Kanadara Oya)	18	Mekechchawa	3/MAL5	140	142
		19	Abagahawela	2/MAL5	116	118
		20	Ethawetuna Wewa	1/MAL5	112	114
		21	Ella Wewa	4/MAL5	129	131
		22	Ranpathwila Wewa	5/MAL5	132	134
		23	Kukulawa Wewa	6/MAL5	115	117
		24	Konketupothana	7/MAL5	114	116
		25	Gekarawa Wewa	8/MAL5	113	115
	Weli Oya	26	Kongollawewa	8/MAL12	110	112
		27	Nika Wewa	10/MAL12	98	100
		28	Mekicha Wewa	9/MAL12	103	105
		29	Kuda Wewa	11/MAL12	99	101
		30	Rathmalgaha Wewa	12/MAL12	95	97
		31	Kudagama Wewa	13/MAL12	87	89
	Kudahathu Oya	32	Tibiri Wewa	3/MAL6	134	136
		33	Gonawa Thala Wewa	2/MAL6	110	112
		34	Gonawa Wewa	1/MAL6	106	108
		35	Kapirilgama Wewa	4/MAL6	135	137
		36	Siyabalagaswewa	5/MAL6	110	112
		37	Thalgaha	6/MAL6	112	114
		38	Walketu Wewa	7/MAL6	102	104
		39	Dummin negama	8/MAL6	98	100
	Sangilikandara Oya	40	Lidawewa	2/MAL7	98	100
		41	Pihibiyagollawa	7/MAL7	129	131
		42	Kirimetiyawa	6/MAL7	114	116
		43	Ralapanawa	5/MAL7	112	114
		44	Kardan Kulam	4/MAL7	102	104
		45	Diulgas Wewa	3/MAL7	98	100
		46	Gagurane Pathaha	8/MAL7	125	127
		47	Kirigollewa	9/MAL7	135	137
		48	Kudagama Wewa	10/MAL7	115	117
		49	Kuda Wewa	11/MAL7	107	109
		50	Madawachchiya Wew	12/MAL7	114	116
	Upper Kalara	51	Parana Halmillewa	4/MAL8	134	136
		52	Kideweran Kulam	5/MAL9	108	110
		53	Thibiri Wewa	3/MAL8	100	102
		54	Dutuwewa	6/MAL8	101	103
		55	Puliyan Kulam	7/MAL8	105	107
		56	Nochchikulam	8/MAL8	114	116
		57	Aluth Halmillewa	5/MAL8	125	127
		58	Irataperiya Kulam	9/MAL8	124	126
		59	Kurundan Kulam	10/MAL8	87	89
		60	Kandapuran Kulam	11/MAL8	90	92
		61	Karuweppan Kulam	12/MAL8	90	92
		62	Suduventapulavu	13/MAL8	89	91

Watershed	Sub-watershed	Cascade				
		No.	Name	Symbol	FSL MSL (m)	Required Water Level MSL (m)
Yan Oya river basin	Huruluwewa	63	Thalagal Kulam	10/Y2	133	135
		64	Eluwan Kulama	9/Y2	140	142
		65	Meegaswewa	8/Y2	138	140
		66	Kannimaduwa Wewa	7/Y2	129	131
		67	Pahala Nittawa	6/Y2	135	137
		68	Puliyan Kulam	5/Y2	138	140
		69	Ella Wewa	4/Y2	123	125
		70	Olukolagala Wewa	3/Y2	120	122
		71	Punchihammillawa	2/Y2	105	107
		72	Mahakirimetiyawa	1/Y2	122	124
	Mid Yan Oya	73	Hettuwewa	7/Y4	116	118
		74	Kon Wewa	6/Y4	111	113
		75	Ithalwatuna Wewa	5/Y4	122	124
		76	Maha Hammillewa	4/Y4	133	135
		77	Moragahadigiliya	3/Y4	114	116
		78	Pemorakewa	2/Y4	120	122
		79	Patanaya	1/Y4	82	84
	Horowpothana	80	Nilla Wewa	2/Y5	111	113
		81	Rathmala Wewa	4/Y5	89	91
		82	Ralapanawa	1/Y5	92	94
	Wahalkada	83	Hammillawa	1/Y6	98	100
		84	Dutu Wewa	5/Y6	65	67
		85	Kapugollewa Ela	2/Y6	84	86
		86	Wagollakada	3/Y6	62	64
Ma Oya river basin	Mora Oya	87	Maha Wewalkadawa	9/MA1	137	139
		88	Walahawidda Wewa	10/MA1	127	129
		89	Ulpathagama Wewa	11/MA1	114	116
		90	Ulpotha	12/MA1	110	112
		91	Kiriketu Wewa	13/MA1	106	108
		92	Mahatikka Wewa	15/MA1	123	125
		93	Elapattewa	14/MA1	106	108
		94	Gallewa Wewa	16/MA1	96	98
		95	Thala Thammennawa	8/MA1	123	125
		96	Kiulekada Wewa	7/MA1	123	125
		97	Ayiyatige Wewa	6/MA1	137	139
		98	Palupuliyam Kulama	5/MA1	111	113
		99	Ithalwiddawa Wewa	4/MA1	113	115
		100	Mahanettiyawa	3/MA1	100	102
		101	Olugaskada	2/MA1	105	107
	Mukunu Oya	102	Sinhaya Ulpotha	10/MA2	82	84
		103	Pahala Herath Mami	1/MA1	76	78
		104	Medagama Wewa	9/MA2	75	77
		105	Kunchuttuwa	7/MA2	118	120
		106	Puliyan Kulama	8/MA2	103	105
		107	Maha Ralapanawa	6/MA2	122	124
		108	Migakada Wewa	5/MA2	111	113
		109	Viharahalmillawa	2/MA2	87	89
		110	Nikawewa	1/MA2	78	80
Parankiaru (Menankddy) river basin	Upper Parangiaru	111	Puthuk Kulam	5/PAR1	111	113
		112	Putuk Kulam	4/PAR1	89	91
		113	Periya Kulam	3/PAR1	87	89
		114	Kollamutamadu Kulan	2/PAR1	92	94
		115	Chinna Kulam	1/PAR1	87	89
		116	Parandikallu	6/PAR1	114	116
	Periyakattu Aru	117	Periyakada	6/PAR4	105	107
		118	Kidachchuri	7/PAR4	93	95
		119	Mullaik Kulam	8/PAR4	82	84
	Upper Parangiaru	120	Karunkalisinna Kulam	7/PAR1	112	114
	Thurumpamaddiaru	121	Marutan Kulam	3/PAR2	108	110
		122	Naveli Kulam	4/PAR2	107	109
		123	Kasawapulaiyan Kula	5/PAR2	103	105
		124	Alankulam	6/PAR2	91	93
		125	Podun Kulam	7/PAR2	82	84
		126	Palaimoddalk Kulam	8/PAR2	77	79
Kanakarayan Aru river	Upper Kanakarayan	127	Chamalan Kulam	7/MGA1	111	113
		128	Periyapuliyan Kulam	6/MGA1	106	108