



# **WATER POLICY FOR NORTHERN SRI LANKA TO IMPROVE THE LIVELIHOOD OF FARMING COMMUNITY TOGETHER WITH SUSTAINABLE ECONOMIC GROWTH OF THE REGION**

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## **KeyWords**

Subsistence agriculture, Crop diversification, River basin, Water policy, Water Auditing.

## **ABSTRACT**

*Water for Agriculture sector in Sri Lanka is facing challenges through increased demands by other sectors and also confronts the issues of a market economy and international and regional trade agreements that are exerting pressures on prices and thus farmer incomes. Issues of ability of most farmers to secure full employment from irrigated farming thus impacting on their income generation avenues are requiring new initiatives as well. This study identified the potential river basins and irrigation schemes for further development. Utilize the water resources in an effective, efficient, equitable and sustainable manner, consistent with the social, economic, environmental and political needs of present and future generations by practicing effective water management. Shift from subsistence agriculture to commercially oriented agriculture leads to increase in production, especially of high value of crops that would readily find a create employment opportunities and ensure enhanced income level and improve higher standard of living.*

## 1. INTRODUCTION

THE Irrigation Sector is facing increased challenges not only through increased demands by other sectors for the limited water resources but also confronts the issues of a market economy and international and regional trade agreements that are exerting pressures on prices and thus farmer incomes. Issues of ability of most farmers to secure full employment from irrigated farming thus impacting on their income generation avenues are requiring new initiatives as well.

Farming for subsistence is no longer an option and if farming is to be the livelihood, adequate income needs to be assured. If rural urban migration is to be minimized our thrust for industrialization the competitiveness of irrigated small farm agriculture, operating, as an enterprise has to be assured. The needs for value addition, integrated farming operations etc., are becoming increasingly apparent. The role of the state, has to change from being a service provider to facilitator and regulator with beneficiary involvement. More in control of management of irrigation systems and thus their own destinies are now being implemented.

These programs are being further influenced by the need for reduction of costs to the state on aspects such as Operation and Maintenance of Irrigation systems and even improvements and rehabilitation. It is now accepted policy that beneficiaries are party to and need to contribute actively to meet some of the costs of system rehabilitation through labor contribution and in many cases around the World, by collecting their own funds on a regular monthly basis.

Commercialization of small farm agriculture is being actively pursued through pilot programs that envisage sustainability of small scale irrigated farming as an enterprise. These programs are linked to tenure reforms, such a free hold title and water rights which are parallel aspects that need to be examined, as part of providing a suitable environment and incentives for more efficient use of resources and obtaining of investment capital by small farmers, who currently are captive to non-formal institutional credit and other inhibiting factors.

## 2. RIVER BASINS IN THE NORTHERN PROVINCE

The river basins in Northern Sri Lanka is given in fig. 1. A River basin, more precisely the sub basin, is the natural unit to study the water resources concerning rainfall, stream flow, soils and vegetation etc. and the potential of developing water resources for various usages. About 60% of the Average effective yield (Sivakumar, 2002) is being used by the present irrigation system. It is very much necessary to consider the Water Resources Development of each basin, which are coming completely under one Province as one Water Resource Development Initiative.

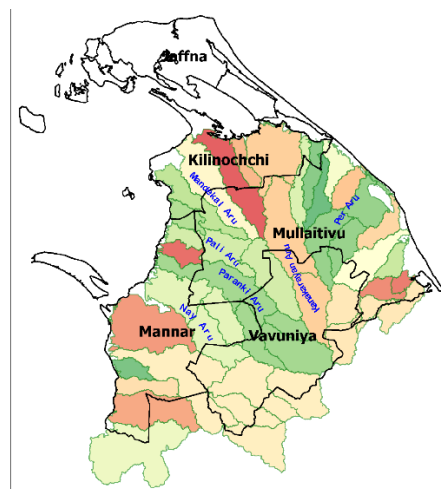


Fig. 1. River basins in Northern Sri Lanka

## 3. GENERAL PROBLEMS

Owing to poor maintenance from recent history of this area, number of major, medium and minor Irrigation schemes are in dilapidated condition. Still some tank bunds and cannel systems are covered by jungle, damaged and breached in some places. The displaced

and resettled farmers living in the area are facing severe problems to provide irrigation to their cultivated crops.

Since not much proper Water Resources Development took place for the past twenty years in this area, people have difficulties in using their water entitlements for domestic & economic purposes. Even after the rehabilitation of the existing irrigation systems, it is only possible to utilize around 65 % of the average available water yield. Therefore, it is the time to consider the following (Sivakumar, 2020) 1) The full rehabilitation / improvement of the existing Irrigation systems to as much as possible utilize the average available water 2) The possibility for additional water storage facilitates, to cultivate crops in high intensity and to meet all other water demands arising from population growth 3) To reserve at least 40% of the live storage of the surface water stored in any water body or irrigation scheme for domestic, social, environmental and industrial water use.

The key thrust areas in the Irrigation Sector are increased productivity in the use of water, assessment of surface and ground waters potential for conjunctive use, integrated natural resources management of command and source areas of major irrigation systems, improving profitability of irrigated agriculture through integrated farming and increased beneficiary involvement's through joint system management in all major systems.

#### **4. CURRENT POLICY AND PROGRAM INITIATIVES**

The following five are initiatives are in operation presently regarding the water policy.

1. System Rehabilitation and improved Operations and Maintenance with management and Institutional changes to support participatory system management;
2. Restructuring of Irrigation Sector required by changing economic environment and involvement of private sector including new roles and functions of agencies with regulatory, framework for management development and quality control;
3. Facilitation of farmer communities to operate as commercial entities and undertake services for profit including through value addition at point of production;
4. Present Water Resources Management based on administrative and devolved boundaries to be changed to integrated river basin Management approach;
5. Watershed Management, Participatory Forestry, Integrated Farming, Diversified Cropping, Micro Irrigation, Agro-industry and Enterprise Development to support sustainable incomes.

#### **5. WATER BALANCE STUDY FOR OPERATIONAL POLICY OF IRRIGATION SCHEMES**

The yield of water in catchments are calculated using ISO YIELD Curves prepared by Mahallupalagama Agriculture Research Development Centre and Irrigation Department. The hydro data and area capacity data received from Provincial Irrigation Department are used for the detail water balance / operational study carried out in par with the policy and strategy spelt out in previous chapters. The operational study of each scheme has been carried out utilizing a spreadsheet program which utilized the following concepts:

1. Using 60 years monthly rainfall, 75% monthly probable rainfall generated;
2. Using "CropWat" for crop water requirement of crop for various growing stages;
3. Generated Area-Capacity data supplied by Provincial Irrigation Department;
4. Average monthly evaporation of the nearest evaporation stations;
5. Limiting the Chirupoham (Yala) to only 40% to keep the cropping Intensity to the maximum of 1.4;
6. Keeping minimum operation depth of the Reservoirs in Irrigation Schemes between 10 - 15% of the total design capacity of the scheme to maintain the ground water level in the area downstream of the Dam;
7. For both operation and flood study, sill level of sluice is taken as 0.0 and all other parameters are taken from this bench mark of each scheme in Reduced Level (RL).

After several trials of operation study of each irrigation schemes using this spread sheet program, the summary of Operational Policy of Irrigation Schemes recommended are given in table 1. The potential river basins and irrigation schemes are highlighted in the table. The possibility of tapping the highlighted river basins for more yield of water is very high. Hence it is recommended to construct new reservoirs in these river basins.

There is possibility of increasing the capacity of fifteen schemes as per this study. All these fifteen schemes are highlighted in table 1. with 1.4 cropping intensity more than 100 ac.ft water can be spared to other than agriculture use monthly from 39 provincial irrigation schemes.

**Table 1:- Summary of Operational Policy of Irrigation Schemes & River Basin Utility**

River Basin No	River Basin	Utilization % of Water Resource	Catchment Area of the River Basin (sq.mls)	Major Medium Irrigation Scheme	Minimum Operation Depth (ft.)	Maximum Acreage Recommended for Maha (ac.)	Maximum Acreage recommended for Yala (ac.)	Cropping Intensity	Maximum Possible Other Demand monthly (ac.ft.)
70	Churiyan Aru	10.00%	29.28	nil					
71	Chavar	7.16%	11.96	nil					
72	Paladi	26.90%	23.92	Neethukai Kulam	Available data not sufficient				
73	Mannal Aru (Munadal Aru)	65.70%	28.16	Thannimurippu Scheme	9.00	2,364.00	945.60	1.40	214.00
74	Kodalikallu Aru	67.40%	28.94	Kannukerny Kulam	5.00	1,284.00	513.60	1.40	39.00
				Madavallasingam Kulam	5.00	398.00	159.20	1.40	399.00
75	Per Aru	86.00%	145.83	Muthuyankaddu kulam	10.00	6,112.00	2,444.80	1.40	125.00
76	Kalmaduru Aru (Pali Aru)	12.50%	32.79	Maruthamadu Tank	5.00	370.00	148.00	1.40	337.00
77	Maruthapillay Aru	12.50%	15.82	Idaikaddu Kulam	3.00	167 + 75			
78	Theravil Aru	58.00%	35.11	Uddayarkattu Kulam	8.00	1,280.00	512.00	1.40	274.00
79	Piramenthal Aru	57.20%	32.02	Pirapanthal aru Kulam	4.00	602.00	602.00	2.00	101.00
				Visuvamadu Kulam	5.00	808.00	323.20	1.40	138.00
80	Nethali Aru	63.53%	32.02	Kalmadu tank	5.00	3,450.00	690.00	1.20	nil
81	Kanakarayan Aru	95.15%	349.54	Iranamadu	8.50	21,985.00	8,794.00	1.40	550.00
				Kanagarayan kulam	5.00	314.00	125.60	1.40	6.00
				Chemamadu	4.00	600.00	240.00	1.40	181.00
				Malikai Tank	5.00	220.00	88.00	1.40	64.00
				Kanagambikai Kulam	4.00	260.00	104.00	1.40	125.00
82	Kalawalappu Aru	39.70%	21.99	Puthumurippu Tank	4.50	985.00	374.30	1.38	Nil
83	Akkarayan Aru	91.04%	74.85	Akkarayan kulam	10.00	3,175.00	1,270.00	1.40	139.00
				Kudamuriddy Tank	2.00	650.00	260.00	1.40	304.00
				Maruthan Kulam	6.00	450.00	180.00	1.40	72.00
84	Mandekal Aru	35.82%	115.74	Vanneri Kulam	3.00	343.00	137.00	1.40	3.00
				Anaivilunthan Kulam	Available data not sufficient				
				Ambalaperumal Kulam	4.50	623.00	249.20	1.40	222.00
				Koddai kaddiya Kulam	4.00	405.00	162.00	1.40	57.00
				Iyankan Kulam	3.50	952.00	380.80	1.40	115.00
				Paliya Murukandi Kulam	4.00	356.00	142.40	1.40	53.00
85	Pallavarayan Kadu Aru	89.85%	62.11	Kariyalai Nagapaduvan	3.00	1,505.00	135.45	1.09	nil
				Therankandal	4.00	300.00	120.00	1.40	11.00
				Thenniankulam	3.00	850.00	340.00	1.40	169.00
86	Pali Aru	90.00%	176.00	Vavuni Kulam	10.00	6,897.00	2,758.80	1.40	262.00
				Kollavilan Kulam	4.00	262.00	26.20	1.10	nil
				Kalvillan Kulam	5.00	400.00	140.00	1.35	nil
				Mallavi Kulam	3.00	250.00	17.50	1.07	nil
88	Paranki Aru (Menankaddy)	39.00%	324.85	Panankamam Kulam	2.00	300.00	0.00	1.00	nil
				Kalmadu Kulam	4.00	400.00	160.00	1.40	110.00
				Mamaduwa Tank	5.50	659.00	263.60	1.40	289.00
				Erothana Tank	4.00	238.00	95.20	1.40	59.00
				Kombuvaithakulam	3.00	47.50	1.19	1.17	nil
				Nampankulam	3.00	256.00	58.88	1.23	nil
				Turampimaddai Aru anicut	Available data not sufficient				
	Per Aru sub-basin			Kurai tank	Available data not sufficient				
				Mahakachchikodiya Tank	3.50	257.00	102.80	1.40	91.00
				Madukkanda	4.50	400.00	160.00	1.40	10.00
				Vavuniya	6.00	435.00	174.00	1.40	146.00
				Maharambikkulam	5.00	215.00	86.00	1.40	64.00
				Moonayamadu	2.50	215.00	86.00	1.40	38.00
89	Nay Aru	14.36%	218.75	Velan Kulam	2.50	224.00	44.80	1.20	nil
				Aliyamaruthamadu (Madukkulam)	3.00	233.00	81.55	1.35	nil
				Welimaruthamadu	3.00	750.00	300.00	1.40	163.00
				Pampimadu	5.00	270.00	108.00	1.40	64.00
				Periathampanai kulam	Available data not sufficient				
91	Kal Aru		10.67	Thadchanamaruthamadu	Available data not sufficient				
				Periya pandivirichan Tank	Available data not sufficient				
				Mullikulam	Available data not sufficient				
				Periyamadhu	Available data not sufficient				
				Kallaru Tank	Available data not sufficient				
				Chittattu Pudavaikaddiyakulam	Available data not sufficient				

## 6. CONCLUSION AND RECOMMENDATION

The surface water potential available within Northern Province is sufficient for food production, domestic use and industrial use if it is managed properly in par with Integrated Water Resource Management (IWRM) concept. With 1.4 cropping intensity more than 100 ac.ft of water can be spared to other than agriculture use (Domestic and Industrial) monthly from 39 provincial irrigation schemes with the present storage capacity. In the case of Jaffna peninsula it has become a serious crisis because the same contaminated groundwater source is used for drinking, agriculture and sewage disposal. The intensification of agriculture, petroleum waste and urbanization in recent years have all further contaminated the groundwater unfit for human consumption in Jaffna peninsula in many places. Desalination of lagoons cannot be implemented without disturbing the socio ecological and environmental balance but only possibility is partitioning of lagoons with various levels of salinity to maintain the socio ecological and environmental harmony. But this will help only to improve land productivity but not a substitute for domestic water supply of an urbanizing area like Jaffna peninsula. For sustainability in agricultural development and implementation of Integrated Water Resource Management (IWRM) concept, the following principal features of the development strategy are recommended:

1. Conserve surface water by adhering to strict water management principles and techniques;
  - a. The possibility of tapping further yield of water from eighteen river basin in Northern Province is very high. Hence it is recommended to construct new reservoirs across Churiyan Aru, Chavar, Paladi, Mannal Aru (Munadal Aru), Kodalikkallu Aru, Per Aru, Kalmaduru Aru (Pali Aru), Maruthapillay Aru, Therravill Aru, Piramanthal Aru, Nethali Aru, Kanakarayan Aru, Kalavalappu Aru, Akkarayan Aru, Mandakal Aru, Pallavarayan Kadu Aru, Pali Aru, Paranki Aru (Menankaddy), Per Aru sub-basin and Nay Aru for the effective and economic utilization of water resource available in the province.
  - b. The possibility of increasing the capacity of fifteen provincial irrigation schemes as per the study is also very high. Hence it is recommended to raise the full supply levels of Kanukkerny Kulam, Madavalasingam Kulam, Maruthamadu Kulam, Udaiyarkaddu Kulam, Pirapanthal aru Kulam, Chemamadu, Malikai, Kanagambikai Kulam, Kudamuriddy Kulam, Ambalapurumal, Therankandal, Kalmadu Kulam, Erappottana, Mahakachchikodiya, Welimaruthamadu and Pampimadu Kulam.
2. Strictly implementing all the major water supply projects with the following guidelines for getting water source for meeting the drinking water demand;
  - a. Around 60% of water demand from existing surface irrigation schemes. Out of this 50% from existing irrigation schemes and 10% through new irrigation schemes or diversion schemes;
  - b. Around 10% of water demand from seawater Reverse Osmosis (Mainly during the drought periods);
  - c. Around 15% of the water demand from groundwater in selected non-contaminated areas;
  - d. Around 15% of the water demand from any lagoon projects such as River for Jaffna, Thondaman Kalappu Project, Modified River for Jaffna and Jaffna Channel Project;
2. Strictly implement the orders made by Minister of Irrigation and Water Resources Management via the gazette No. 2010/23 ,March 16, 2017;Strictly control (through licensing etc.) the drilling of new tube wells, the volumes abstracted and control pumping from existing tube wells using electric, petrol, kerosene or diesel pumps;
4. A Provincial statute shall be enacted to:
  - a. Strictly limit Yala paddy cultivation to only 40% to keep the cropping Intensity as 1.4 in all Irrigation Schemes in the province;
  - b. Reduce percentage of land used for paddy cultivation during Yala, and introduce crop diversification, to cultivate subsidiary food crops with special emphasis on the cultivation of pulses which consume less water compared to paddy;
  - c. Keep minimum operation depth of all the Irrigation Schemes between 10 - 15% of the total live storage capacity of the scheme to maintain the groundwater level in the downstream area at a high level;
  - d. Allocate only a maximum of 60 % of live storage capacity of reservoirs for agricultural use and the remaining 40 % to be used by all other users.
5. Maximize the utilization of physical and natural resources of the region on a sustainable basis;
6. Break away from subsistence agriculture and embark on a program of commercial agriculture including high value crops and establish an agro industrial base in the province;
7. Make use of the available human resources to effect the required technological and managerial transformation of the agricultural sector.

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