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## SUSTAINABLE DEVELOPMENT OF WATER RESOURCES, WATER SUPPLY AND ENVIRONMENTAL SANITATION

**Priority for agriculture over housing, water supply and sanitation of Mahaweli settlers***Eng. H Dharmasiri Susith De Alwis, Sri Lanka*

*The Mahaweli Ganga Development Scheme (MGDS) has been the largest multipurpose development project ever implemented in Sri Lanka, using the water resources of the river Mahaweli and related adjacent river basins. Of the thirteen independent development areas identified for integrated development and human settlement, System – H, System –B, System-C, System-G and System-L are either fully or partly developed and operational. The uses of water such as irrigation, power generation and domestic consumption are inter-linked within a basin. As both the quality and quantity of water available for downstream users depend on the activities of the upstream users. However, during the last three decades, the emphasis has been to increase crop production and productivity of land and water, over the development of essential infrastructure. This trend has been so established in agriculture based settlement projects, even the international funding agencies do not attach much importance to the provision or improvement of infrastructure facilities.*

**Introduction**

Sri Lanka is an island with a land area of 65,000 sq. km. with distinct hydrographic features. There are one hundred and three river basins originating from the central area and radially flowing into the sea.

The Mahaweli Ganga Development Scheme (MGDS) has been the largest multipurpose development project ever implemented in Sri Lanka, using the water resources of the river Mahaweli and related adjacent river basins. Land and human are the other resources subjected to integrated development under the MGDS implemented in 1970. (See figure 1).

**Implementation of MGDS**

The river basins that have been augmented with trans-basin diversions are, Kala Oya, Madura Oya, Malwatu Oya and Yan Oya, (See figure 2). Of the thirteen independent development areas (A, B, C, D, J, K, L, M,) identified for integrated development and human settlement, System – H, System – B, System – C, System - G and System – L are either fully or partly developed and operational.

**Mahaweli settlers and settlement planning**

In contrast to the concepts outlined in the traditional irrigation schemes in the dry zone, the fundamental principles of the development strategies of the MGDS have been Irrigated agriculture, Human settlement, and Environmental conservation.

The rural integrated development in the areas developed so far is therefore basically human settlement dependent upon irrigated agriculture and environmental conservation.

Each development area is therefore treated under the system concept, as an area with natural boundaries. In each system or sub-system the principal components are therefore (a) the terrestrial environment, (b) the aquatic environment, and (c) the human environment.

The settlement planning concept of the MGDS has been the clustering of house lots into a hamlet which is located not more than one or two kilometers from the irrigated allotments. Each hamlet comprises about 200-250 settler family units and each unit is allocated 0.2 ha of homestead and 1.0 ha of lowland paddy.

**Issues in water and related natural resources**

Some of the major issues that have been identified at present in the Mahaweli Basin and related river basins out of the exploitation of the natural resources can be summarized as follows:

- growing competition for water resources and water quality degradation
- degradation of upper watersheds and degradation of riverine environment
- over-extraction of groundwater resources and contamination of surface and groundwater
- salinity intrusion arising from deepened river beds and consumptive water uses
- growing conflicts in water sharing among different water users in the light of rapid urbanization,
- absence of an institutional mechanism for river management and water resources planning

The principal purpose of this research study is to expose the importance attached to agricultural production utilizing

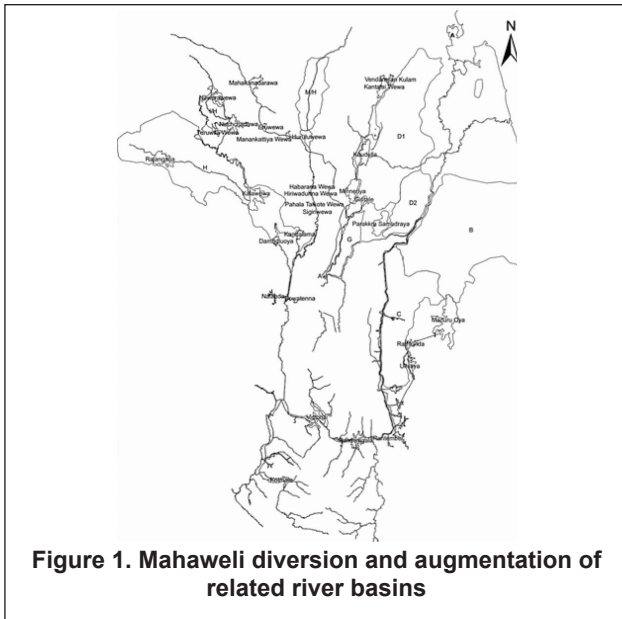


Figure 1. Mahaweli diversion and augmentation of related river basins

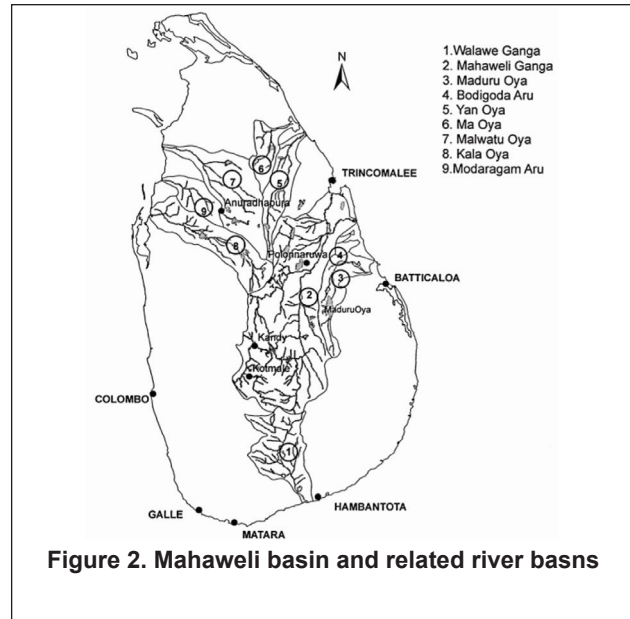


Figure 2. Mahaweli basin and related river basins

the water resources in a river basin, over the basic needs such as housing, water supply and sanitation. The two tables reproduced below show the extents under paddy and production of paddy in each system in operation have increased over the years due to the emphasis and efforts on the part

of the farmers and the management as well.

Similarly, the details about some of the important infrastructure and how the settlers and the management have acted over the years to improve on the numbers are shown in the four tables appearing below.

Table 1. - Integrated development under MGDS

System	Total land Extent(ha)	Irrigable Extent (ha)	Land above Command(ha)	No. of families Settled
B	114,117	35,800	61,110	19,782
C	68,614	24,695	32,448	26,529
H	50,994	30,832	16,485	31,799
G	12,308	5,067	6,847	5,675
L	163,393	3,664	44,019	3,364
Walawe	55,700	12,270	25,004	34,245
<b>Total</b>	<b>465,126</b>	<b>112,328</b>	<b>188,371</b>	<b>128,567</b>

Table 2. - Paddy Extent By System For Selected Cropping Year (Hectares)

Year	System						Total Extent		Mahaweli % of National extent
	B	C	G	H	W	L	Mahaweli	National	
1986	6,703	15,035	4,473	37,533	22,900		86,644	738,870	11
1988	14,202	22,782	5,572	34,498	20,794		97,848	781,006	12
1990	19,928	28,359	7,248	35,487	21,347	483	112,852	735,045	15
1992	21,799	31,858	5,076	30,561	12,000	824	102,118	682,498	14
1993	21,825	35,499	6,506	31,408	20,009	726	115,973	732,690	15
1994	25,660	39,693	8,668	41,155	20,308	844	136,328	798,127	17
1995	25,329	40,297	9,029	42,580	19,820	806	137,861	794,817	17
1996	23,533	39,984	5,803	32,902	17,815	544	120,581	748,745	16
1997	27,074	40,400	7,440	37,401	17,915	519	130,749	729,810	17
1998	29,197	40,458	7,870	38,523	16,993	714	133,755	848,264	15
1999	29,951	40,993	9,589	42,586	16,612	176	139,907	892,053	15
2000	31,282	41,127	9,369	40,395	18,530	641	141,344	877,997	16
2001	29,371	41,833	9,353	41,046	9,725	605	131,933	793,161	16
2002	31,036	40,227	8,588	41,502	17,759	297	139,409	852,532	16
2003	33,226	41,165	9,518	42,843	17,331	861	144,944	982,617	14
2004	34,095	41,733	8,131	34,991	17,154	936	137,040	778,549	17

Source: Mahaweli Authority of Sri Lanka

Source : 1. Dept. of Census & Statistics

2. Mahaweli Authority of Sri Lanka

Note: O.F.C. – Other Field Crops

**Table 3. – Settler Houses**

Year	System						Total
	B	C	G	H	W	L	
Project	21,926	30,125	6,050	36,667	39,002	1,941	135,711
1993	16,330	20,913	2,590	24,258	21,231	1,779	87,101
1994	17,869	20,995	2,590	24,862	21,416	1,793	89,525
1995	18,221	21,160	2,590	24,934	25,439	1,793	94,137
1996	18,372	22,453	2,590	25,209	25,573	1,793	95,990
1997	18,491	23,854	2,590	25,209	25,573	1,793	97,510
1998	18,491	23,854	2,590	25,209	25,573	1,793	97,510
1999	19,041	23,854	2,590	25,209	25,573	1,793	98,060
2000	19,041	24,234	2,590	25,209	25,573	1,793	98,440
2001	19,066	24,234	2,590	25,724	25,573	1,793	98,980
2002	19,066	24,234	2,590	25,898	27,131	1,795	100,714
2003	19,066	25,108	2,710	27,098	27,131	1,853	102,906
2004	19,216	25,108	2,710	33,179	27,206	1,853	109,272
%	88	83	45	90	70	95	81

**Table 4. – Settler Latrines**

Year	System						Total
	B	C	G	H	W	L	
Project	21,926	30,125	6,050	36,667	39,002	1,941	135,711
1993	10,780	16,617	2,318	20,697	17,485	511	68,408
1994	11,855	16,965	2,318	21,273	17,617	519	70,547
1995	12,478	17,507	2,318	21,438	21,019	519	75,279
1996	13,691	17,507	2,318	21,692	21,019	519	76,846
1997	13,731	19,343	2,318	21,708	21,019	519	78,738
1998	13,816	19,343	2,318	21,708	21,019	519	78,823
1999	14,836	19,343	2,318	21,708	21,019	519	79,843
2000	14,836	19,723	2,318	21,708	21,019	560	80,264
2001	15,098	19,723	2,318	23,805	21,019	560	82,623
2002	15,098	19,723	2,318	23,855	24,533	1,460	86,987
2003	15,098	20,635	2,498	26,577	24,533	1,563	90,904
2004	15,248	20,635	2,948	31,150	24,578	1,563	96,122
%	70	68	49	85	63	81	71

Source: Mahaweli Authority of Sri Lanka

**Table 5. – Domestic Wells**

Year	System						Total
	B	C	G	H	W	L	
Project	18,509	21,036	2,015	12,600	9,173	650	63,983
1993	5,963	8,831	109	9,673	3,565	113	28,254
1994	6,409	9,482	163	10,060	3,599	139	29,852
1995	7,400	9,569	163	10,084	4,070	139	31,425
1996	7,401	11,176	163	10,846	4,154	139	33,879
1997	7,401	11,212	109	10,846	4,154	139	33,861
1998	7,401	11,212	109	10,846	4,154	139	33,861
1999	7,406	11,212	109	10,846	4,154	139	33,866
2000	7,406	11,212	109	10,846	4,154	153	33,880
2001	7,492	11,212	109	10,940	4,154	153	34,060
2002	7,492	11,212	109	11,372	9,173	153	39,511
2003	7,492	12,240	169	11,886	9,173	256	41,216
2004	7,542	12,240	169	12,600	9,173	256	41,980
%	41	58	8.39	100	100	39.38	66

**Table 6. - Tube Wells (Community)**

Year	System						Total
	B	C	G	H	W	L	
Project	459	28	163	282	306	130	1,368
1993	414	23	163	185	274	65	1,124
1994	421	23	163	200	288	130	1,225
1995	432	23	163	200	302	130	1,250
1996	432	23	163	200	306	130	1,254
1997	432	23	163	201	306	130	1,255
1998	432	23	163	201	306	130	1,255
1999	432	23	163	201	306	130	1,255
2000	432	23	163	201	306	130	1,255
2001	436	23	203	201	306	130	1,299
2002	436	23	203	201	306	130	1,299
2003	436	28	203	201	306	130	1,304
2004	436	28	128	201	306	130	1,229
%	95	100	79	71	100	100	90

## Discussion

The annual average yield of paddy in the Mahaweli Systems have been increased from 3.60 metric tons per hectare in 1984 to 4.10 metric tons per hectare in 2004 while the contribution to national paddy production has increased from 16.87% in 1994 to 24.0% in 2004. The national average of paddy yields during the above period has been increased slightly from 3.08 tons per ha. to 3.63 tons per ha. (See Table 1 and 2)

In the housing programme, except in System – G, the percentage of progress is 70 and above and it is satisfactory. However, during the first two decades, no satisfactory level of occupancy rate had been realized except in System – L. (See Table 3)

Regarding latrines, the situation has been very poor throughout. Regarding the percentage of housing in each System the number of latrines constructed in the homesteads has not been comparable right along.

Similarly, the number of ground wells constructed as a source of domestic water has also been poor, except in System-H and Walawe. In fact, the provision of ground wells in System – G clearly indicates, that the settlers have been dependent upon the irrigation canals for their domestic supplies over the years. (See Table 4, 5 and 6)

## Conclusions

The findings of the study can be briefly summarized as follows.

- (i) Housing, water supply and sanitation should be incorporated with other facilities during planning.
- (ii) Awareness and concern of settlers for housing, water supply etc should be created at the time of induction of the settlers.
- (iii) Both quality and quantity of domestic water should be tested and checked before the alienation of lands.
- (iv) Sources of pollution of water should be identified early and the issues addressed effectively.
- (v) Funding agencies should pay special attention to housing, water supply and sanitation.
- (vi) Quality of water should be periodically tested, particularly drinking water.
- (vii) Health of settlers and the facilities available should be monitored periodically

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