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The Dilemma of Achieving SDG 6 Targets Under The Global Water Agenda - Analysis From Dry Zone Basins In Sri Lanka

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Abstract: Achieving SDG 6 targets in Sri Lanka by 2030 requires assessments of sociotechnical implications in a quasi-cultural context supported by critical analysis of data. Sri Lanka has moderate water stress (2-3 in a scale of 5), however, high to medium stresses are assigned for agricultural (3.10), domestic (2.28) and industrial (2.65) sectors. With GDP per capita (4073.74 USD) and a rural population of 81.62% (2017), the agricultural and industrial requirements show an increasing trend threatening SDG targets. Presently, improved access to drinking water and sanitation services have been achieved for 90% of the population, yet IWRM implementation is low and other targets show inadequate data. Moreover, studies based on Deduru Oya basin and tank cascade systems (TCS) show evidence of existing sustainable water management at the household or farm level. Such ancient practices are now facing a threat due to modern irrigation supported by ad hoc politically driven policies, which instigate a backlash to the sustainability lasted for 1500 years. The article discusses the need for a re-evaluation of local socio-technical practices and translates them on to current SDG 6 as to achieve the full benefits under the Global Water Agenda.

Keywords: SDG 6; IWRM; Sri Lanka, Sociotechnical, TCS

Introduction:

Food and water supply to 7.7 billion people without jeopardizing the sustainability is the most difficult challenge laid in front of the world. To achieve SDG 6 targets under the global water agenda, therefore, has been purview as a dilemma in the dry zone of Sri Lanka considering the competing water demands by different sectors. Especially people in the developing countries with earnings below the poverty level are severely affected by such challenges which could lead to political and social instability. At present the official poverty line in Sri Lanka is Rs. 4890 which is approximately US$ 24 and lower than the world bank estimates (Department of Census and Statistics, 2019), however the share of the population below poverty line is 4.1% in 2016, the lowest in the region (ADB, 2019).

Sri Lanka as a lower-middle income developing country has the 2nd highest GDP per capita in the South Asian Association for Regional Cooperation (SAARC) region. The GDP in 2017 was at USD 4073 while the economic growth rate was 5.8% in the last seven years (World Bank, 2018a). The agricultural industry contributes only 8% of its GDP whilst 55% of it comes from the services sector which is heavily reliant on the availability of water resources that Sri Lanka has to offer (World Bank, 2018b). For a developing state such as Sri Lanka, the economic impact of mismanaged water resources can result in a decline in growth rates as much as 6% by 2050 ensuing sustained negative growth (World Bank, 2016). Rankings based on river basins suggest that the country has marginally high-water stress in a scale of 5, with sectoral stresses at 3.10 for agriculture, 2.28 for domestic and 2.65 for industrial water demands (Gassert *et al*., 2013).

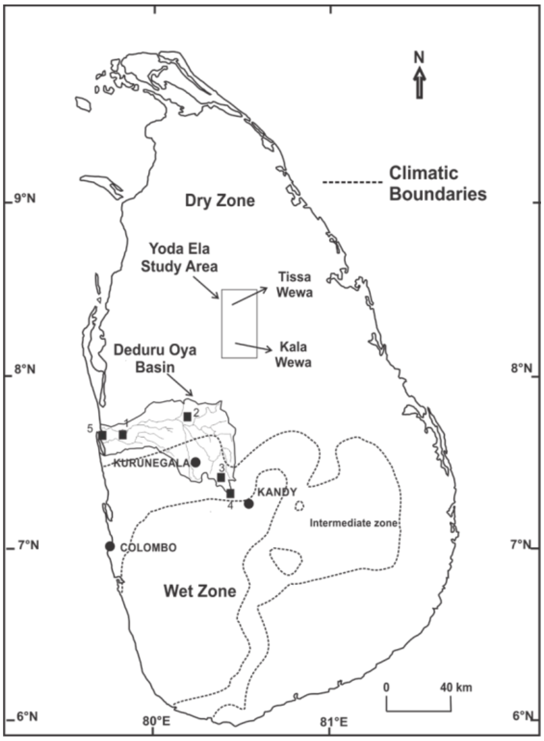

Figure 1. Locations of families interviewed; inset Yoda Ela, 1. Weerakodiyana, 2. Rakogama, 3. Hedeniya 4. Aladeniya. 5. Chilaw.

Primarily Sri Lanka has a rural-based economy; drinking water data shows a supply largely consisted of non-piped sources which are 65.42% of the rural water supply (Joint Monitoring Program, 2018). The percentage of the rural population showed a gradual increase up to 2015 and is at 81.6% as of 2017 (World Bank, 2018c). In comparison to significant agriculture-based economies, Sri Lanka reports 87% water withdrawal as opposed to agricultural giants such as China which uses 65.7% (FAO, 2015).

The current situation with a high percentage of rural population having a non-piped water supply (dug and tube wells), as well as tank cascade system (TCS), based water supply, the assessment and evaluation via the SDG indicators show a gap, which needs to be addressed by data collection under a quasi-cultural framework. The present study aims at addressing several issues of assessing the progress of achieving SDGs in a local scale, with questionnaire-based data collection from the dry zone basins, Deduru Oya and Yoda Ela in Sri Lanka (Fig. 1). The inadequacies as pointed out above may be evaluated based on the findings of the survey results.

SDG 6 Targets

Targets and indicators of the SDG 6 have provided a framework for comprehensive assessment and goals to capture water security through clean water and sanitation by 2030 (United Nations, 2018). Water-related issues present evidence of direct and indirect impacts from society, environment and economy of a country. Presently, the drinking water and sanitation targets have shown, over 90% population with access to improved safely managed drinking water and sanitation services when compared to the past 25 years (WHO, 2015). As per indicator 6.1.1, Sri Lanka is on track for universal access of water by 2030 and results of 6.1.2 shows 94.2% of the population has basic sanitation services as well (WHO and UNICEF, 2017). Nevertheless, indicator 6.5.1 show very low IWRM implementation (11 to 30 on a scale of 0-100) and targets 6.3, 6.4 & 6.5 do not report adequate data representation to monitor in terms of achieving SDG 6 (UN Environment, 2018). Our study on several SDG 6 targets covering the Deduru Oya basin and Yoda Ela surveys resulted with some outputs as given below (Fig. 2).

Target 6.3 – Wastewater Treatment

When comparing the questionnaire data collected during the Deduru Oya survey compiled in 2005 and the Yoda Ela survey conducted in 2014, changes in household wastewater discharge patterns with time can be noted. In agricultural areas at least above 40%, people discharge their wastewater to the household plants whereas in peri-urban townships discharge through unpaved systems to open area is higher and over 50% (Table 1).

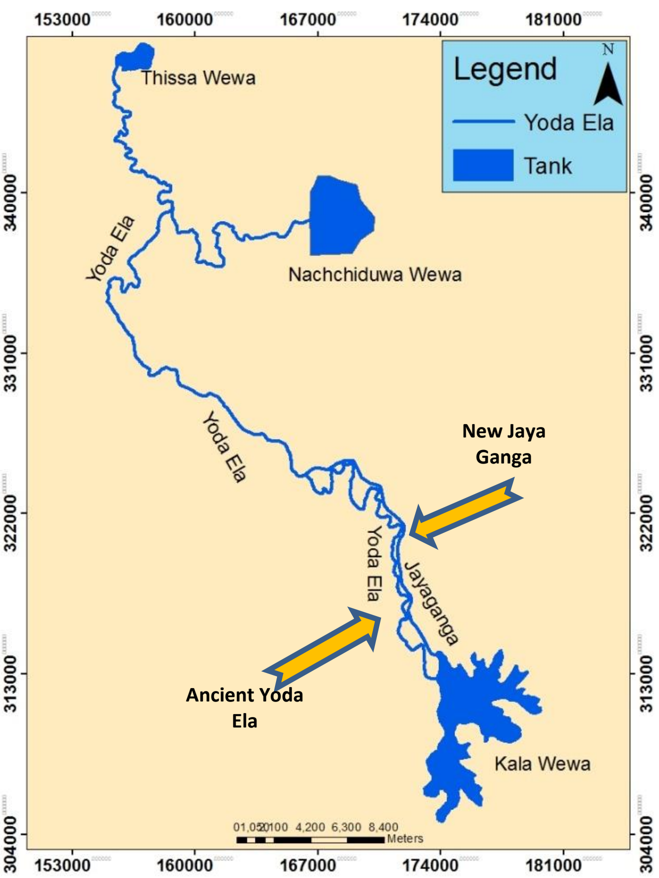

Figure 2 Locations of ancient Yoda Ela and new Jaya Ganga along the path towards Tissa wewa from Kala Wewa.

Yoda Ela survey reported significant traditional knowledge embedded in the system of water allocation in the community. At present, families (above 85%) were aware of water shortage due to drought and they believe it has coupled with the current climate change effects. A significant polarization of the methods of wastewater utilization was noted where people tend to disregard the discharge to the plants which in terms of a water efficiency point of view are constraints in assessing via SDG indicators (Jayasena and Selker, 2007a; Jayasena and Selker 2007b; Chandrasena et al., 2017).

Table 1. Wastewater discharge for Yoda Ela farming areas, Peri-urban town (Chilaw) and 3 villages.

	Plants	Unpaved	Rivulets	Paved	Other
Yoda Ela	40	58	0	0	2
Chilaw	4	70	0	0	26
Weerakodiyana	94	2	0	0	4
Rakogama	60	14	0	0	8
Aladeniya	7	47	3	40	3

Target 6.4 – Water Use Efficiency

The data, collected from families living in 3 villages and 2 peri-urban towns (Chilaw and Aladeniya) from the Deduru Oya basin and farming community along the Yoda Ela, on per capita water usage, wastewater discharge and perspectives on ancient and modern water management, have been tabulated in a matrix (Table 2).

Table 2. Per capita domestic water requirements **(l/day)** in the Deduru Oya Basin

	Drinking	Cooking	Washing	Toilets	Bathing	Total
Chilaw	2.3	3.4	10.2	6.8	77.1	99.8
Weerakodiyana	3.5	4.2	11.9	7	62.8	89.4
Rakogama	2.6	3.7	5.6	5.3	87.4	104.6
Hedeniya	3.6	5.2	11.6	9.7	126.2	156.3
Aladeniya	2.7	4.2	9.1	6.5	86.7	109.2
Average	3	4.1	9.7	7	88	111.8

The domestic water usage as tabulated for the Deduru Oya basin varies from 89 l/day as observed in Weerakodiyana to 156 l/day in Hedeniya. As such to maintain the minimum acceptable quality of life, a person needs at least 110 l/day. The data indicated a significant increase in water usage towards the wet zone where bathing required over 75% of the water requirement. The findings focused on the importance of integrating rural community practices of bathing done at common wells, irrigation tanks and diversion canals where return flow directly go back to the ground or surface water reservoirs as opposed to piped water supply systems. These results need to be assessed when managing domestic water usage and assessing SDG 6 indicators.

Target 6.5 – Water Resources Management

Comparison of ancient (Yoda Ela) and modern (Jaya Ganga) irrigation shows, at present, farming communities get more water from Jaya Ganga due to feeder canals from Mahaweli river diverting water to Kala Wewa. Therefore, the discharge through original Yoda Ela was reduced and at places completely dried up causing undue social, environmental and hydrological problems in terms of maintaining sustainability in the dry zone (Fig. 3).

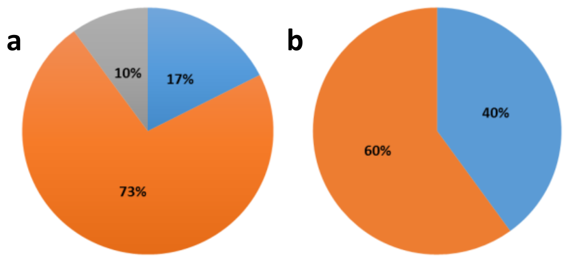

Figure 3. After Jaya Ganga was constructed a) Whether the farmer received more water from Jaya Ganga, b) Whether farmers in the original Yoda Ela system received less water. Orange “yes” and Blue “no” Grey “uncertain”

In general, people’s perspective supports water management via Yoda Ela compared to modern Jaya Ganga, though the latter provides various pseudo benefits. About 85% of the families interviewed thought that they have lower quality water at present which indicates detrimental effects caused by the introduction of lower quality Mahaweli water from adjacent basins. About 68% thought that they have witnessed a flow increase, however, it was not possible yet to identify the localised segments where such increase was observed (Fig. 4).

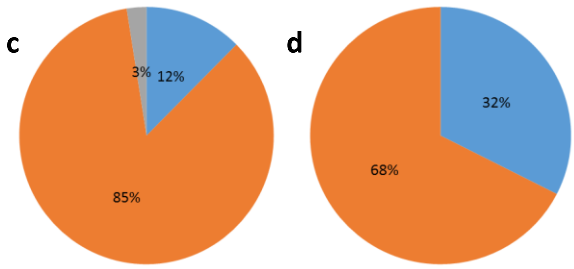

Figure 4. After Jaya Ganga was constructed c) whether farmers received low-quality water d) whether flow increased in Yoda Ela. Orange "yes" and Blue "no" Grey "uncertain"

With Mahaweli water when passing through the Jaya Ganga, the system responded with increasing erosion. The anicuts across the Yoda Ela to divert water towards new paddy cultivation created a situation where backwater effects along the ela partly support for the bank erosion or sediment accumulation, however in the early system it was controlled by "Diya Kali" supporting backwater in a gently sloping bank on one side of the flow (Brohier, 1934). The findings of this study show a gap in institutional cooperation in the implementation of development projects that could hinder the sustainability of existing irrigation practices.

Target 6.6 – Water Related Ecosystems

After the construction of Jaya Ganga, 90% of the families interviewed thought that they found invasive plants instead of native plants. Once Jaya Ganga was constructed, 70% of the families, believed the annual water discharge through Yoda Ela has decreased (Fig. 5).

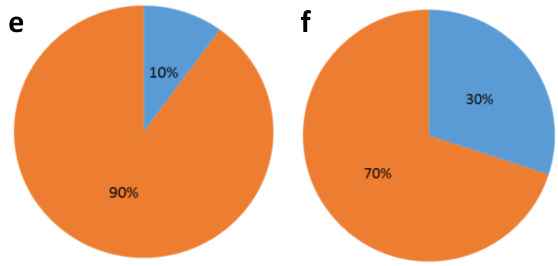

Figure 5. After Jaya Ganga was constructed e) whether vegetation along the banks reduced f) whether annual discharge decreased in Yoda Ela. Orange "yes" and Blue "no" Grey "uncertain"

The sustainability of irrigation projects has played a significant role in their livelihood when communicating with farming families in the region. Therefore, it is important to address how one could efficiently translate local indicators onto measures of assessing targets. This study will contribute to the knowledge when assessing SDG indicators in Sri Lanka, following baseline indications in the formulation of the SDGs. Data collection within the last five years referring to Water Security and the Global Water Agenda encompassing SDG 6, active localized participation and data analysis have not been shown relative to many indicators. Effective translation of localized analysis has not been portrayed through the evaluation reports of the data recorded per respective indicators.

Impact on the analysis towards current efforts with a critical viewpoint based on application and transferability of local progress indicators are likely to improve reporting and context of the situation of SDG 6 in Sri Lanka. Improved assessments could impact the efficiency, reliability and data transferability which identify the actual context of water security-related issues in the country. Efforts are more transparent and reported success will mirror localized and community-centric success or failures which can be applied in the country's water sector as required.

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