The Impact of Ground Water Depletion on Land Values in the Affected Areas of *Uma Oya* Multipurpose Development Project

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Introduction

The controversial *Uma Oya* multipurpose Development project (UOMDP) in Uva Province, Sri Lanka which commence the constructions in 2012, is proposed to divert water from *Uma Oya* to *Kirindi Oya* in order to develop hydropower, drinking water and to irrigate the dry and less developed Uva and southern regions of the country. The expected capacity of the electrical power generation of this project is 120 MW and it was estimated to have irrigation of approximately 25,000 acres of paddy lands.

The project is facing an unforeseen setback as major water seepages has developed in the main underground tunnel runs from *Dyaraba Dam* to *Karadagolla*. The first massive water leak into the tunnel began in 2014. That was only a few months since the underground drilling of the tunnels began. Water, at the beginning, was flowing at a speed around 500 liters per second. The second water leak began in June 2017. It is estimated that 976 liters of water is seeping into the tunnel every second. As a result of drastic decrease of ground water table in the area due to continues water seepage in to the tunnel, estimated number of 7,030 buildings, including houses, business places and religious places, have been damaged (approximately 2,000 building completely damaged). At the same time 3,112 wells, streams and water ways have dried up. These belongs to five divisional secretariat regions – *Uva Paranagama, Welimada, Hali Ella, Bandarawela and Ella.* Thus,

people in more than 30 villages[4] have been affected adversely with no safe drinking water, housing and means of livelihoods, mostly agriculture, including tea, vegetable, fruits, minor export crops and cut flower farming.

Objectives

This paper describes the finding of a study conducted, in selected villages from affected areas due to water seepage of the UOMDP, to examine the impacts of increased water scarcity on land market price.

Methodology

The methodology for analysis the data is quantitative. Ten affected villages as shown in the Table 1 selected for this study and 10 villagers from each selected village also selected arbitrarily for informal interviews. During the interviews prices of the agricultural, commercial (suitable for business purposes) and residential (suitable for housing purposes) land plots before the commencement of UOMDP and after the arise of water scarcity issue due to UOMDP were gathered. These collected price figures utilized to build the discussion of this study and standard formulas derived from the literature used to calculate the total land value loss or gain of the 10 villages. Total land area used in this study in each village is given in Table 1.

[4] Makulella, Heeloya, Kurukudegama, Beddearawa, Liyangahawela, Weheragalathenna, Kurudugolla, Egodagama, Udaperuwa, Medaperuwa, Ampitiya, Palleperuwa, Karagahawela, Boralanda, Rajakotuwa, Puhulpola, Dikkapitiya, Ihala Kotawara, Pahala Kotawara, Abadandegama, Thanthiriya, Keenigama, Dowa, Dikkarawa, Medahinna, Bidunuwewa, Watagamauwa, Gediyaroda, Eththalapitiya, Samachethiya, Panangala, Mirahawaththa and Abhayapura

Table 1 -Total approximate land area in the selected villages

No.	Village Name	Total Land Area (Perches)
01.	Makulella	67,608
02.	Heeloya	12,4145
03.	Udaperuwa	48,234
04.	Palleperuwa	94,888
05.	Thanthiriya	72,747
06.	Mirahawaththa	44,281
07.	Abadandegama	24,9471
08.	Puhulpola	42,699
09.	Bidunuwewa	44,281
10.	Dikkapitiya	56,142

Sources: Survey data

The prices of land plots (per perch) for each land category for each village has taken by calculating the average value using the figures given by each individual interviewed.

Results and Discussion

It is obvious that the construction work of the Uma Oya project, already completed one-third including the tunnel, has created social, economical, ecological and geological issues in 10 villages in Bandarawela. Due to the ad hoc development project, people in these villages have faced serious issues. A growing number of complaints on the damages to houses and drying up wells and springs have made the Government cease construction of the Rs.76.3 billion Uma Oya project temporarily time to time. Villagers and environmentalists claim that the present disastrous situation is created due to the ad hoc decisions by the short sighted politicians. Given this background, we investigate the impact of this project on land prices in the affected area.

As shown in the below Table 2, prices of agricultural, commercial and residential land plots in the selected villages before the commencement of UOMDP and after the arise of water scarcity issue due to UOMDP collected.

Table 2 - Prices of land categories before and after the affects

No.	Village Name	Before UOMDP			After the arise of water scarcity issue		
		Agriculture	Commercial	Residential	Agriculture	Commercial	Residential
01.	Makulella	15,000	20,000	15,000	5,000	10,000	10,000
02.	Heeloya	20,000	30,000	25,000	5,000	15,000	10,000
03.	Udaperuwa	10,000	20,000	20,000	2,000	10,000	8,000
04.	Palleperuwa	12,000	15,000	13,000	5,000	10,000	8,000
05.	Thanthiriya	40,000	75,000	55,000	25,000	75,000	55,000
06.	Mirahawaththa	55,000	80,000	40,000	20,000	60,000	30,000
07.	Abadandegama	15,000	15,000	10,000	5,000	10,000	10,000
08.	Puhulpola	45,000	30,000	25,000	20,000	25,000	15,000
09.	Bidunuwewa	50,000	100,000	75,000	25,000	100,000	55,000
10.	Dikkapitiya	30,000	20,000	15,000	10,000	15,000	10,000
	Change as an %				58	18	28

However, it was difficult to find the land area belongs to each land category in each and every village though total land area for each and every village was available. Therefore, calculation was done assuming 80 % land area of every village belongs to all three land categories and 20 % land area has no value in order to find the total economic lose. Accordingly, the average land price for each village was calculated as follows.

$$\text{Average land price} = \frac{\text{Agriculture land price} + \text{Commercial land price} + \text{Residential land price}}{3}$$

Table 3:Estimated total land values before and after the affects

	Total Land Area (Perch)	Land area belongs to 3 categories (80%)	Average Land Price before UOMDP	Total Land value before UMODP	Average Land Price after the affects	Total land value after the affects
Makulella	67,608	54086	16,666	901,440,000	8,333	450,720,000
Heeloya	124,145	99316	25,000	2,482,900,000	10,000	993,160,000
Udaperuwa	48,234	38587	16,666	643,120,000	6,666	257,248,000
Palleperuwa	94,888	75910	13,333	1,012,138,666	7,666	581,979,733
Thanthiriya	72,747	58197	56,666	3,297,864,000	51,666	3,006,876,000
Mirahawaththa	44,281	35424	58,333	2,066,446,666	36,666	1,298,909,333
Abadandegama	249,477	199581	13,333	2,661,088,000	8,333	1,663,180,000
Puhulpola	42,699	34159	33,333	1,138,640,000	20,000	683,184,000
Bidunuwewa	44,281	35424	75,000	2,656,860,000	60,000	2,125,488,000
Dikkapitiya	56,142	44913	21,666	973,128,000	11,666	523,992,000
				17,833,625,333		11,584,737,06

Source: Authors calculation using survey data

Conclusion and Policy Implications

The purpose of this research is to throw light on one problem that is emerging due to unplanned development activities implemented in haphazard manner, damaging environment, especially land resources.

According to the calculation, agricultural, commercial and residential land prices has reduced by 58 %, 18 % and 28 % consecutively. Accordingly, the biggest loss has incurred to the agricultural lands. Yet, falling of the market for residential and commercial lands in the villages would be stop for some extent by providing pipe born water to the villages. However, increase the price for agricultural lands cannot be guaranteed if the solutions to stop water seepages to the tunnel couldn't regenerate and improve the water table in the area as hoping. Providing irrigation water to all the affected areas are also impossible due to the diverse geography and topography of the region. According to approximate calculations, the total land value loss due to the water

loss is Rs. 6,248,888,266.67 (RS 6.24 billion) approximately. Even only from these 10 villages, this loss is a colossal economic loss to the country.

According to the project of UOMDP, the total project cost is Rs. 76,316,307,770 (Rs. 76.31 billion). Thus, this loss is about 8.1% from the total project cost. Therefore, the total loss could go beyond the total project cost if the total land value loss calculated for all the affected areas. Considering that, if all physical, biological and sociological loss of the UOMDP calculated, that total loss can go beyond many times than total project cost. Therefore, further studies need to be conduct using accurate property valuation methods and covering all the affected villages

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