PADDY FIELD AREA CONSOLIDATION FOR
SAVING RESOURCES AND FOR BETTER YIELDS IN
SRI LANKAN SOCIO-ECONOMIC CONTEXT

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ABSTRACT

Main paddy farm families in Sri Lanka have been split into sub families, making the family-owned farm lands fragmenting into small parcels. This has created problems in the seasonal cultivation activities in time, problems among themselves, water sharing issues, water management and also issues in using farm machinery in small land plots. This shows a cross section of status of future farmland, indicating the future image of the Sri Lankan farmland sizes and socio economic problems related land fragmentation. Because of these issues, there are land tenure problems, issues in using of farm machinery in small paddy areas, labor shortages in cultivation, seed paddy & fertilizer issues etc.

In Sri Lanka paddy fields under a major schemes are divided into tracts. One tract is of about 500-1000 acres. For each tract there is one or two farmer organizations which look after the member farmers in cultivation. Irrigation water is received from Irrigation department through distributary & field canal network to their farmlands. And farmer organizations’ activities are handled by Project Manager of Irrigation Management Division (IMD) of particular scheme.

Under the study it is expected to have consensus survey with farmers for consolidation of paddy land plots in a particular larger area in a tract, that can be handled and the manner in which for using of large machineries more effectively in farmlands for enhanced cultivation practices. Also it is hoped to examine the possibility of handing over the area to a diligent group which can do the cultivation in a fruitful manner to have better yields and reduced costs for cultivation.

Keywords: Paddy, cultivation, water management, farm machinery, land Fragmentation, farmer organizations, Irrigation water.

1. INTRODUCTION

In Sri Lanka, land resources are limited and most of potential irrigable lands have been brought under cultivation. Major institutes supplying irrigation water are Department of Irrigation (DOI), Mahaweli Authority of Sri Lanka (MASL) & 08 Provincial Councils. Total cultivable area under irrigation is 708,000 Ha. There are 73 major irrigation schemes of DOI, 10 MASL schemes & about 20000 minor tanks of provincial councils, under which paddy is grown. The main staple food is rice. For centuries, despite foreign invasions rice substitutes have failed to replace rice from Sri Lankans’ diet, as it is a culture related issue. Though the country is nearer in self-sufficiency in paddy production, maintaining the production level appears difficult.

The main factors pertaining to the productivity are: Extent of cultivated land, Land tenure issues, Fertilizer application, and Proper water management practices.

There is ownership issues in paddy tracts and the plots of the farmers are not of the same size as their parents originally possessed. Most farmers are subsistence
farmers having no other alternatives for living. Hence, cultivation of area under traditional farming systems is no more able to improve agricultural production.

In Sri Lanka agriculture has developed into a structure where large farms among native farmers are rare. There is an almost complete absence of the competitive, commercial family farms that are necessary for progress. And little is done to persuade farmers under the major irrigation schemes to do so. Besides, agricultural labourers have migrated to other vocations for better employment, thereby creating a large void in routine agricultural practices. These events paved the way for the introduction of agro- machineries to Sri Lanka in past decade. This technical change now has been almost established in the country, creating another scope to be addressed by the government. As a result of this increasing technological change of farm mechanization, farmers are encountering problems in transporting these to farmlands & making entry to paddy plots, also moving the machinery in the farms itself. Hence, this is high time to take a decision on shaping current land tenure issues for the sake of keeping rice production at its optimum productivity level.

In past 2-3 decades under some of the projects, rehabilitation & improvements of irrigation schemes were carried out. But they have not addressed land tenure issues. If these issues are not addressed properly & early, they will aggravate with time and will create more complex situations. It has to be emphasized that inequality between rural and urban areas is emergent in the country. Much rural infrastructure has deteriorated considerably. Villages are becoming less attractive places to live. Many rural schools, public and cultural facilities are suffering from lack of interest of the administration, abetting rural to urban migration. In this context it is necessary to take possible measures that can be implemented. One such measure is land consolidation.

2. LAND CONSOLIDATION

Land consolidation is joining small parcels of agricultural lands into larger & better shaped parcels to enable the farmers introduce better farming techniques. Land consolidation projects will result in substantial changes in land tenure arrangements and resource management. Agricultural productivity will come through better water management practices, farm mechanization development, increasing rice production & reducing production cost, introducing secondary crop, improving access facilities to fields, increasing farmer incomes etc. It was learnt that some discussions & attempts have been made in the past, but it didn't progress well.

2.1 What should be considered in land consolidation

The study aims to find out suitable strategy for a sustainable land consolidation programme. It also plans to suggest new approaches and techniques, and to set an example in the country.

2.2 Case study: Study Area for Land Consolidation Programme

The study area selected to plan land consolidation is in RidiBendi Ela/ Magalle Scheme of Nikaweratiya in North West of Sri Lanka, limited to 2 Farmer Organization areas, where farmers have an interest to carry on the land consolidation. These are Kebelawa & Danduwawa Farmer Organization (FO) areas.

Magalle scheme is controlled by Department of Irrigation, and its farm practices have been managed by Resident Project Manager of the Scheme. The cultivable area is 5170 acres, which is divided among 14 FOs and it started functioning as a colonization scheme in 1942. According the records, the number of initial land allotters were 372. The 2 FO areas selected for this land consolidation in Keelawela and
Danduwawa areas consist of 404 acres with 346 farm families and 433 acres with 259 farm families, respectively.

Table 1. RidiBendi Ela/Magale Scheme – Detail of Farmer Organization

<table>
<thead>
<tr>
<th>Name of F.O.</th>
<th>No. F.F</th>
<th>Irrigable Area (Ac)</th>
<th>No. of DCC</th>
<th>DCC Length(Km)</th>
<th>No. of FCC</th>
<th>FCC Length (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danduwawa</td>
<td>259</td>
<td>432.5</td>
<td>1</td>
<td>1.59</td>
<td>28</td>
<td>4.730</td>
</tr>
<tr>
<td>Kebellewa</td>
<td>346</td>
<td>403.5</td>
<td>2</td>
<td>2.440</td>
<td>9</td>
<td>6.459</td>
</tr>
</tbody>
</table>

Abbreviations: FF – Farmer Families, DCC – Distributary canals, FCC – Field canals

2.3 Land-use planning procedure

This process of land consolidation is being done on a normative approach. It includes predicted/forecast results after changes in land consolidation. From those results outcomes can be interpreted, quantified and specified the approaches for using land and relevant resources for land consolidation process.

In order to carry out this task, it is necessary to recognize possibilities, to study the trends of changes, to forecast the results of changes, to define the activities for achievement of the proposed goals, and to assess the impacts of proposed activities. It was necessary to have discussions with farmer members and as well as relevant government officials in this planning work.

2.4 The Maps of FOO Areas

As indicated with the black lines in the above satellite images, entire land area could be divided into separate sections to undergo collective farming which will facilitate the use of machinery in large scale. This division should be in a way such that it facilitates efficient delivery of water.

Study area was selected from Kebellewa and DanduwawaFO administrative divisions. Almost all land lots are very small, usually average size is about 1 ½ acres. Originally 3.0 acre plot was owned by a farmer. Many of these farms are owned by elderly farmers. One farm lot comprises 15-20 parcels. The size of a parcel is about 0.15 acres. These parcels are normally rectangular in shape and some are awkwardly shaped because of boundaries. Some farms are given on lease, by original farmers.
2.5 Roles & Responsibilities

The Farmer Organizations (FOO) are regulated and administered by Irrigation Management Division (IMD) office. So the legal responsibility lies with Irrigation Management Division. As FOOs are registered under Department of Agrarian Development (DAD), they also have a role to play with this issue. The most significant role has to be played by FOO. FO is also a legal body, it has to cope up with internal matters within FO and all efforts regarding land consolidation have to be coordinated by Farmer Organization. In addition to this Department of Irrigation (DOI) has to play a major role in construction works as well as in water management works.

It is expected that this programme will need nearly 2 years to complete proposed activities comprising 4 cultivation seasons. By joining the farm parcels, area of boundary ridge demarcating the lots are also added to the total area causing the enlargement of farmland. The farmers of Keblelewa and Danduwawa FOs are going to be benefitted from this land consolidation programme.

2.6 What is proposed

Land leveling & making of contour plan to determine water distribution plan.

(a) Periphery area of the proposed land with the lengths of the ridges to be removed
(b) Preparing the cost estimate
(c) Sharing of cost between FO & lead agency (50% from FO & 50% from Agency proposed)
(d) Definitely it is hoped that benefits will exceed costs as the ridge area is removed and added to the farmland. And saving of some inputs in labor because agricultural works are to be performed on collective effort.
(e) As FOOs have some financial capability their manpower can be given on free basis, will be an added advantage. So it is expected to have 50% contribution from the FO and other 50% cost shall be borne by the government (IMD)
(f) As the lease out lands are very few, they will be removed from the programme, if they are willing to join to the programme, it will be discussed in the internal FO meeting for approval and forwarded to the Project Management Committee (PMC) for formal approval.
(g) When all basic planning works are completed, with the tentative estimated cost, the land consolidation proposal will be produced to the PMC of the scheme for approval and then to the IMD Head office to arrange government approval & required funds.
(h) Make Memorandum of Understanding (MOU) with stakeholders & farmers and individual agreements with farmers to cover legal aspects in the process.
(i) FOO & IMD will jointly supervise the programme in the design and implementation works.
(j) Awareness programme to stakeholders on proposed land consolidation fragmentation.
(k) After budgetary provisions, make arrangements of construction works for land plot preparation works as per leveling plan
(l) Completion of construction works
(m) It is expected to collect money in two installments from the farmers required for the cultivation season. Normally for cultivation of one acre of paddy land, a farmer needs Rs. 30000/-. So at the beginning of a cultivation season, 50%
of that amount has to be collected by the FOO and keep it as the capital for cultivation process.

(n) The income will be divided between farmers as per their original land area proportion. Internal arrangements have to be made to provide the income either as money or raw product.

2.7 How will the detailed consolidation plan be prepared and approved

After formation of the diligent group, the works will be handed over to that group to carry out farm activities, on behalf of all farmers. At the end of the cultivation season, the yield will be valued and final budget will be prepared to know eligible share to each farmer on proportionate holding basis. Irrigation Management Division (IMD) has the responsibility in successful implementation & completion of the programme.

2.8 Objectives of Land Consolidation Programme are as follows

Improvement of rural livelihood by increase food production & food security, Sustainable management of natural resources, Participatory & community-driven practice, Adoption of new modern techniques & methods in cultivation

2.10 What should be considered in a land consolidation pilot project

Kebelewa area is getting water from RB Main Canal that go through Kebelewa village, while Danduwawa area gets water from the canal which off-takes from RB main canal from Balagollagama, which is located at Nikaweratiya – Heelogama road. These canals & existing drainage canals have to be improved for better water management. The on-farm facilities improvement is to be designed in such a manner that each plot of paddy field is in connection with the farm road, enabling taking of farm machinery to the farmland.

2.11 Agricultural Development

Under the agriculture development it is planned to have a third crop, as the cultivation is going to be undertake by the farmer organization diligent group, Cropping Intensity (CI) can be increased. Average current CI is 1.7, it can be taken up to 2.5, hence FO can go for high productivity and higher profitability.

2.12 Farmers Organization Role

Kebelewa&Danduwawa FOO have to do key roles in implementation of this land consolidation programme. The functions and activities of farmers organizations needed for planned production are: Undertake management of land consolidation programme, Coordination with government agencies, Formation of a diligent group to carry out the cultivation activities as a cooperative system, Arrangement of funds, Machinery for operational works, Arrange farm inputs and so on.

2.13 Water Management

Irrigation water in these areas received from RB canal of Magalle Scheme, as already system is there, no extra effort have to be made despite minor improvements to canal system. Nevertheless most of farmers have been used to take water on continuous irrigation, making considerable losses. It has been noticed that still majority of farmers in Sri Lanka used to come to the field in the early morning, fill water up to the top of ridge and go home, not knowing the water depth to be prevailed in the farm plot for better yields. This has to be avoided and make arrangements to do proposed on farm
water management activities by giving necessary water management trainings to stakeholders.

As the farm parcels are going to be amalgamated, it is necessary to do a land levelling before the process and accordingly shall arrange the big parcels to receive water and remove drainage water as necessary. This process has to be carried out with the support of Irrigation department officers, corresponding to their practices. After completing planning of reshaping & readjusting the farm plots, construction works have to be take forward and prepare the farmland, enabling anticipated water management practices. As water management directly connected with better yields, every attempts shall made with farmers to improve water management practices. Also, it is required to have a water management time table to deliver the required irrigation water to the new parcels. Also, diligent group & farmers have to be made aware & trained on water management by irrigation department.

2.14 Formulate, implement, and monitor policy (implementation support).

Followings issues have to be addressed and attended for formulating and preparing monitoring policy before implementation

(a) The existing land boundaries of each legal farmer have to be recorded in GPS coordinates with maps, for any required legal issues in future.
(b) Formulate an advisory committee consisting of government officers and volunteers for advising on follow-up action and decision making process.
(c) Agreement with individual farmers and collectively with farmer Organization for carryout the land consolidation process.
(d) Agreement with diligent group to take over the land and do cultivation, with all conditions to prevent possible future conflicts.
(e) MOU with institutions who are going to be involved in the process.
(f) Government funds & required credit facilities have to be arranged by the RPM- Irrigation Management Division (IMD).
(g) Arbitration committee for dispute resolving among farmers.

2.15 Methods and procedures

Generally, this study was a descriptive - analytical one of the comparative type. In this study, 2 field visits were made, participated in 2 PMC meetings with farmer organization & government officers and available documents in IMD office of Nikaweratiya was reviewed.

To take a preliminary views of the farmers of RidiBendi Ela Project, I attended the Project Management Committee (PMC) monthly meeting on 28.04.2016 and thereafter for further discussions participated in 26.05.2016 PMC also.

2.16 Meeting Outcomes

In the Project Management Committee meetings held on 28.04.2016 & 26.05.2016, the key farmer representatives were made aware on implementation of land consolidation in their FO areas and after lengthy discussions, initially FOO of Danduwawa and Kebellawa FO voluntarily agreed to carry out land consolidation programme. The FOO together with RPM identified the issues important to increase sustainability of land utilization systems, which are increasing yield, carrying out cultivation works by giving it to a diligent group consisting of young farmers, making agriculture business competitive to other sectors (cost-effective), Improve farmers’ participation & define government responsibilities. It was learnt that many farmers of
the tract are interested in land consolidation and they are willing to participate actively in the decision-making process.

2.17 Effects of Land consolidation Plan

2.17.1 Reducing the No. of Parcels in the area

Average size of each beneficiary in Kebelewa region is 1.2 Ac and that of Danduwawa is 1.7 Ac. Number of parcels per beneficiary at the current situation is 15. After land integration process this can be reduced.

2.17.2 Farmland Expansion

Table 2. Crop acreage, before and after the integration of land in FO areas

<table>
<thead>
<tr>
<th>Name of the FO</th>
<th>TheTotal irrigable land area (Ha)</th>
<th>Area covered by plan (Ha)</th>
<th>Area Of Added land (Ha)</th>
<th>Acreage before integration</th>
<th>The percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kebelewa</td>
<td>163</td>
<td>147</td>
<td>14</td>
<td>132.3</td>
<td>9.52%</td>
</tr>
<tr>
<td>Danduwawa</td>
<td>175</td>
<td>35.2</td>
<td>3.3</td>
<td>31.7</td>
<td>9.38%</td>
</tr>
</tbody>
</table>

Note 1: Ridge area before consolidation = 10% of the total land area. Width of a ridge is approx. 2 feet (0.6m). Perimeter of ridges is calculated approx. using google maps, multiply it by ridge width to get approx. ridge area.

Note 2: Ridge area after consolidation is calculated using the new perimeter along new ridge boundaries.

Note 3: After consolidation, use of machineries for large plots will reduce machinery cost around 10%

2.17.3 The application of agricultural machinery and equipment

Table 3. Cost (Rs.) for agricultural machinery for Paddy in various stages

<table>
<thead>
<tr>
<th>Crop</th>
<th>Use of Machinery/ha before land consolidation</th>
<th>Use of machinery/ha after land consolidation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Land Prep</td>
<td>Planting</td>
</tr>
<tr>
<td>Paddy</td>
<td>20000</td>
<td>10000</td>
</tr>
</tbody>
</table>

Source: IMD- Nikaweratiya

Cost currently used for machinery in the area:
Cost incurred for combined harvester: Rs. 25000 /Ha, Cost incurred for Tractor for land preparation: Rs. 20000/Ha, Cost incurred for Harvester: Rs. 15000/Ha.

Note 4: In usage of Harvester additional labour power is required which cost around Rs 20,000 per Ha. Overall cost for harvesting can be estimated as Rs 35,000 (Labour + Harvester machine)
2.17.4 Crop yield in the FO areas

**Table 4.** Crop yields, before and after Land consolidation, in selected FO Areas

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Average Yield</th>
<th>Before Land consolidation</th>
<th>Expected After Land consolidation</th>
<th>The percent changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td></td>
<td>5.0 MT/ Ha</td>
<td>6.7 MT/ Ha</td>
<td>34%</td>
</tr>
<tr>
<td>OFC (3rd Crop) Green Gram</td>
<td></td>
<td>-</td>
<td>1.0 MT/ Ha</td>
<td>100%</td>
</tr>
</tbody>
</table>

2.17.5 Income from agricultural products

**Table 5.** Comparing costs and revenues of various agricultural produces

<table>
<thead>
<tr>
<th>Prod. Name</th>
<th>After Land Consolidation</th>
<th>Before Land Consolidation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Efficiency (Kg)/Ha</td>
<td>Price/Kg (Rs.)</td>
</tr>
<tr>
<td>Paddy</td>
<td>6700</td>
<td>37</td>
</tr>
<tr>
<td>Green Gram (3rd Crop)</td>
<td>1600 Kg/Ha</td>
<td>150</td>
</tr>
</tbody>
</table>

With consolidated land: Income for 6 months = Rs. 184,900.00 / ha
Before land consolidation: Income for 6 months = Rs. 110,000.00 / ha
Thus, the net profit can be increased by 68% after land consolidation.

Still the income per month is not enough when compared with the average earnings of a labour. But after the implementation of land integration process, as cultivation is done in a more systematic way through FOQ, farmers may have additional free time which could be used to engage in different employment.

3. CONCLUSION

There is a direct relationship between Land consolidation agriculture and agricultural produces. Land is a factor in increasing the yield of agricultural products.

According to Table (2, 3, 4 & 5), with land consolidation, the income from crops will increase. Thus, there is a direct relationship between the Land consolidation of agriculture and farmers' income.

From the study, it can be concluded that land consolidation improves the land-use especially in the paddy field area and promotes agricultural productivity in different ways. This can be achieved by handing over the consolidated land to a diligent group of the farmer organization who is interested in profitable venture.

Cultivation of a third crop (preferably Green gram – OFC) between main two cultivation seasons can be introduced to the system and a large income can be extracted without much effort. This is practiced in Sri Lanka to some extent and farmers have experienced its high profitability.

Though the Irrigation management Division (IMD), nominated as lead agency for legal activities a separate government agency should be assigned for overall legal responsibility for land consolidation.
It is said that usage of excess fertilizers by individual farmers has caused for occurrence of chronic kidney disease in Sri Lanka during recent times. But with the systematic implementation of consolidation process, use of fertilizer can be minimized and this will help to address kidney disease problem as well.

Migrations to cities, Unemployment, Labour shortage in agricultural sector, Lack of capital for cultivation, Elderly farm community are some significant issues that were noticed in the study. By joining small parcels of land plots together, larger areas of farmland can be developed through land consolidation process and it will facilitate usage of machinery in efficient & productive ways, in a planned time frame of the cultivation season.