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**A REVIEW OF INDIGENOUS KNOWLEDGE
RELATED TO THE TRADITIONAL AGRICULTURE
IN SRI LANKA**

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ABSTRACT

Main intention of this article is to analyze the importance of indigenous knowledge related to the traditional agriculture in particularly paddy and shifting cultivation (Chena) to improve sustainable livelihood practices and conditions in the modern society. This study has used literature review method and relevant literature has been analyzed based on content analysis according to the purposes of the study. The purposive random sampling methods was used to select literature. This study has been analyzed under some major parts namely definitions of indigenous knowledge and its important, introduction to traditional agriculture in Sri Lanka, Indigenous knowledge related to the paddy cultivation and traditional techniques and practices related to the shifting cultivation (Chena) in Sri Lanka. This study shows the significant of preserving and integrating these indigenous knowledge and practices into modern agriculture field and finally has been suggested some implications regarding the sustainable traditional methods and techniques.

KEYWORDS: *Indigenous Knowledge, Traditional Agriculture, Sustainable Livelihood, Paddy and Chena Cultivation*

1. INTRODUCTION

Nature has a universal power to decide the existence of the all living beings and it has performing precious roles related to the survival of human as well from the history of human civilization. Relationship between human society and the nature can be divided basically into three classifications. They are, adaptation for nature, manipulation of nature and depletion of nature. In the present context, human society is in the second and third stages in this process. Hence, as a result of unsustainable agricultural and industrial initiatives with

focusing the use of maximum natural resources to increase the productivity and profits, prosperity and fertility of nature is depleting rapidly. According to that, the tendency of increasing intensity and frequency of natural disasters related to climate change against human society has influenced to focus our keen attention about the importance of investigating sustainable social, economic and environmental strategies and methods in the development process. In this sense, indigenous knowledge is a significant concept to create solutions regarding mitigating natural depletion and maintaining balance of nature. Over the

human civilization, many communities have developed their own traditions, rituals and methods related to different fields such as agriculture, medicine, irrigation systems and architecture in harmony with local ecosystems and nature. Indigenous knowledge is a culminative body of knowledge transmitted through generations and it has built upon the experiences of earlier generations. Sri Lanka has over the 2500 years history and it is a well-known state related to traditional agriculture both paddy and “*chena*” cultivation (Shifting Cultivation) from the ancient history. When reviewing the traditional agricultural strategies and methods in Sri Lanka, it can be identified that livelihood of people of traditional societies had formulated with the better understanding of universal powers and conditions related to nature. It has included great lessons about the significance of developing livelihood activities with respecting to the rules and conditions of the eternal truth of nature. In this context, it is important to investigate indigenous knowledge about sustainable agricultural methods and practices related to the traditional agriculture in Sri Lanka.

2. OBJECTIVES

Main objective of this article is to analyze the indigenous methods and practices related to traditional agriculture in particularly to paddy cultivation and *chena* cultivation (Shifting Cultivation) in Sri Lanka. Specific objectives have carefully formulated in order to achieve the main objective. They are to identify about the concept of indigenous knowledge, traditional agriculture, to study about the nature of Sri Lankan traditional agriculture, to identify the indigenous knowledge related to the sustainable ecosystems in traditional paddy cultivations and to study indigenous sustainable strategies and practices related to the *chena* cultivation.

3. METHODOLOGY

This study is based on data from secondary sources; the data were collected using the qualitative research method. The qualitative research method was used to gain a better understanding of and provide reliable and descriptive analysis related to the research objectives. The literature review method was used for collecting data from relevant journal articles, research reports, textbooks and other academic works. The data that were collected represent the fields of traditional paddy cultivation and *chena* cultivation. The relevant literatures were used according to the purposes of the study under the purposive sampling method. The data were critically analyzed according to the selected main two themes namely indigenous practices and strategies related to the paddy cultivation and traditional methods related to the *chena* cultivation.

4. DEFINITIONS OF INDIGENOUS KNOWLEDGE AND ITS IMPORTANCE

Indigenous or traditional knowledge refers to the accumulation of knowledge including cultural traditions, rituals, belief and methods of local people regarding different fields which provide a unique identity of them (Magni, 2016). According to the *principles and guidelines for the protection of the heritage of indigenous people* it is a complete knowledge system with its own concepts of epistemology, and scientific and logical validity (Battiste, 2002). Thus, indigenous knowledge related to various fields such as agriculture, medicine, water supply or architecture is a precious resource that can utilize for even to the modern development initiatives and process. Indigenous knowledge is a content of knowledge that is the result of intellectual insights, activities and methods including skills, innovations, practices and learning from the traditional lifestyles and livelihood activities of a community (Karunaratna, 2010). According to that, it is not limited to the any specific field and it can be related to the agriculture, livelihood, health care, environment, disaster reduction, medicine, genetic resources or other components of traditional water supply and irrigation, architecture or construction technologies. According to Harris and Ellen (1996), indigenous knowledge is the consequences of practical engagement in everyday life and has been reinforced by experience, trial and error. These experiences are products of many generations of intelligent reasoning (Senanayake, 2006).

Indigenous or traditional knowledge is unique to a given culture or society. It is the basis for local level decision making in agriculture, health care, food preparation, education, natural resource management in rural communities. Indigenous knowledge has value not only for culture in which it evolves, but also for scientist and planners striving to improve conditions in rural localities (Warren, 1991). Thus, indigenous knowledge provides the basis for decision making, problem solving strategies for present generations. It represents important methods, knowledge and components to current development issues. Sustainability of social, economic and environment circumstances can be improved through investigating and integrating indigenous knowledge into modern conditions in a suitable manner. Impacts of climate change have been increased by unsustainable using of natural resources into development discourse in the modern society. In the history, people had integrated their livelihood activities and life styles with the correlations of nature and eco-systems. These indigenous knowledge and practices influenced to improve sustainability and balance of nature.

Traditional agriculture practices and methods in Sri Lanka had also included the perceptions of balancing eco-systems, preservation of nature, natural resources and existence of other species. In this sense, studying about indigenous knowledge related to traditional agriculture in Sri Lanka is significant to generate new knowledge about eco-friendly agricultural methods into the sustainable economic, social and environmental development.

5. INTRODUCTION TO THE TRADITIONAL AGRICULTURE IN SRI LANKA

People had developed different kinds of economic activities from the history of human civilization and agriculture is one of significant economic activity which has inevitably bounded over the history of human society. Traditional agriculture has related to the farming which its people have generally practiced based on traditional belief systems and methods (Schultz, 1964). Accordingly, there are two main features of traditional agriculture. They are, farming methods and practices have formulated based on traditional belief systems, customs and knowledge, and labour is an important factor in traditional farming.

When we reviewing the historical sources of Sri Lanka, it is evident that the origin of agriculture in Sri Lanka has extended to the arrival of King *Vijaya* period. Sri Lanka is well-known for its hydraulic civilization beginning from the 3rd century BC (Irangani and Shiratake, 2013). From the ancient history this civilization was based on rice cultivation. Although in Sri Lanka, there are only two main agricultural seasons called *Yala* and *Maha* based on irrigated water, ancient farming system was based on both irrigated and rain fed field crops for three seasons of the year as evident from *Thonigala* Rock Inscription of 4th Century AD. Ancient Sri Lanka agriculture was truly an organic farming system which closely related with the ecosystems (Bandara, 2007). The traditional agriculture system in Sri Lanka represents the upland and lowland paddy cultivation, *Chena* cultivation (Shifting cultivation), mixed home garden systems, cultivation of other grains, crops and vegetables (*Kekulama*) etc. They had closely related with nature, natural ecosystems, water management and pest control systems. Hence, this article, mainly focus on indigenous knowledge related to paddy and chena cultivation (Shifting cultivation) with special reference to the sustainable nature and eco-friendly systems.

6. INDIGENOUS KNOWLEDGE RELATED TO THE PADDY CULTIVATION

6.1. Way of Organizing of the Paddy Fields

Traditional agricultural patterns of Sri Lanka had well organized with the geographical, environmental and climate factors. Paddy cultivation in Sri Lanka can divided into two types based on geographical area. They are, upland rice cultivation and lowland rice farming. Rice farming in Central highlands has basically related with the terraced cultivation called *Helmalu*. Central highlands have more intensity and frequency of rainfall over year. In traditional terraced cultivation of rice, as people had formulated terraced paddy fields with the using of these slopes of highlands, it had well-water drainage ways for rice cultivation. According to Dr. *Nandadewa Wijesekara*, in this terraced paddy cultivation, this is a well-organized way to drain water from top to bottom paddy fields accordingly to the natural water management systems with more realistic principles. It has proved that traditional people had observed natural phenomena operating around them and studied the more effective way to manipulate for their needs without harming to the law of nature (Dharmasena, 2010). It indicates their experiences and observations rainfall patterns, humidity in harmony with nature. Lowland rice farming namely paddy fields in a village had well interconnected with water management and irrigation systems (Bandara, 2007). Traditional paddy cultivation with low rainfall in dry zones had mainly based on irrigation systems and it had developed with the experience and accumulated knowledge of people related to temperature, rainfall patterns and soil behaviors. Irrigation tanks are significant creation which indicate the capacity of adaptation of their livelihood activities into the natural environment. These major and minor irrigation systems are best examples to illustrate the environmental conservation yielded sustainable agriculture. Traditional village functioned based on the irrigated tanks/streams. Paddy fields were situated below the tank/stream. Because of this well-organized location, paddy fields had a gradual water supply from tanks through canals (*Ela*). Organization of small tanks into a cascading sequence within micro catchments allowed greater efficiencies in water use. Drainage from paddy fields in the upper part of the cascade flowed into the downstream tank for reuse in the paddy fields below (Dharmasena, 2010). Catchment areas and natural ecosystems related to tanks was protected and conserved by villagers. Forest cover of catchment area promoted the fertilizer and moisturizer of soil. As a result of this, water capacity of tanks was sufficient for paddy cultivation over year. On the other hand, forest

cover related to tank area helped to promote drainage of water and prevented the soil erosion. According to that, it is evident that, traditional paddy cultivation methods even in organization of paddy fields and water management systems had based on geographical and environmental conditions in harmony with nature in traditional village in Sri Lanka.

6.2. Soil Fertility Management Techniques in Paddy Cultivation

Farmers in traditional societies, had well-awareness about fertility of soil can directly affected to the fertility and taste of seeds. First, farmers cut the field to incorporate the debris into paddy fields. This debris gradually composes and provides nutrients to the soil (Irangani and Shiratake, 2013). Next, farmers apply cattle manure, straw, rice husks, dung, green manure such as *Walsooriyakantha (Helianthus annuus L.)*, *Wathupalu (Mikania scandens)* etc. into the rice field. These materials are directly related to enhance the soil fertility. These natural fertilizers created more congenial condition to soil and small animals live in soil such as earthworms, worms and ants. It indicates the indigenous techniques regarding soil fertility with concern to the sustainable agriculture.

6.3. Methods and Practices of preparation and sow of paddy seeds

After creeping the harvest farmers preserved some kinds of fertile seeds for sowing in next season. These seeds store in water a specific time period preferably 24 hours to prepare for sowing. And also, moisture seeds spread out in Banana leaves and cover from Banana leaves or bulrush mats to protect moisture of seeds. In the nascent stage of seed, well-trained farmer sow paddy seeds with walking back to prevent tread of sowed seeds. The seed varieties were differ based on weather condition and water level in the reservoir of the season. They selected sort-term seed varieties with more tolerance to droughts for *Yala* season. Long-term seed varieties were used in *Maha* season as sufficient rainfall and water have for this time period. According to *R.W. Ievers*, farmers have used *Heenati, El Wee, Suwadel, Kuru vee* and *Kanni Murunga* etc. seed varieties for *Yala* season and *Dik Vee, Madal, Maha Ma Vee, Hondaru Walu* and *Bata Maa Vee* etc. varieties for *Maha* season with the capacity of survive in flooding or heavy rainfall conditions (Dissanayake, 2010). These techniques and practices illustrate the capacity and knowledge about climate resilient and adaptation methods among traditional farmers in Sri Lanka.

6.4. Indigenous Techniques Related to Pest Control Methods

From ancient history in Sri Lanka, paddy farmers used wide range of environment friendly pest

control methods to prevent diseases and to keep the pests away from crops. These traditional methods had closely interrelated with rituals, secret methods. These secret treatment methods of pest control are called as *Kem* methods. A *Kem* is a kind of practice, technique or custom which follow to obtain some favorable effects from a problem (Senanayake, 2006). These kem methods are results of careful and long-term observation and research about nature and natural phenomena of ancient forefathers. But they have rapidly disappeared after introducing chemical pesticides. But as a result of that, not only paddy fields, canals, water reservoirs but also, entire biological diversities have been challenged by unsustainable artificial using in the modern society. But traditional farmers used different kind of methods such as spread of wood ash to the paddy field (*Alu Saththuva*) to control leaf eating caterpillars, spreading sands and white mustard with mantras, spread of spelled milk to prevent destroying the harvest. The concept of privacy has basically related to these kem methods (Gunasekara, 1991). When reviewing biological pest control methods, they had developed various methods to attract birds which feeds of harmful insects. Thus, they have developed spaces for birds to perch in the fields. And also, they used some mechanical methods to protect their crops from pests. For instance, keeping oil lamps around the paddy field, burning the natural litter around the field. They performed as traps to control harmful insects (Ulluwishewa, 1992). When considering botanical pest control methods in traditional agriculture, farmers had identified a wide range of plant species which have a power to control pests effectively. The traditional farmers had identified some plants which have a repelling smell such as *Madu (Cycas Circinalis)*. Because the flower of this plant generate smell to repel pests. They also believed that insects dislike to yellow colour flowers such as *Marigold* and planted around and near the paddy fields. Moreover, some farmers had used chopped creepers, leaves and flowers such as *Thiththa wel (Anamirta cocculus (L.) Wight and Arn.)*, *Keppetiyi (Croton laccifer L.)* and spread of crushed seeds of *Kithul (Caryota urens L.)*, to repel pests (Irangani and Shiratake, 2013). These eco-friendly pest control methods illustrate the knowledge and experiences of traditional farmers about nature, natural phenomena, resources and their medical value. And also, they had accepted the right to live in this earth not only for human but also for all living beings as these techniques and methods had based on harmony with nature. Therefore, it indicates the humanity among traditional people in even livelihood activities.

7. INDIGENOUS KNOWLEDGE RELATED TO THE SHIFTING CULTIVATION (*CHENA*)

7.1. Land Use of *Chena*

Shifting cultivation represents another important part of traditional agriculture in Sri Lanka. Grains such as Sesame, Mung beans, Cowpea, Maize, Finger Millet (*Kurakkan*), Millet (*Meneri*), gingelly (*Thala*) and mustard (*Aba*) and some kinds of vegetables such as Pumpkin and Green Chilies etc. are mainly cultivated in this type of cultivations as these types of crops are more suitable for dry zone in *chena* cultivation. *Chena* cultivation involves systematic forest clearing and cultivation for two or three seasons. After they abandon to regenerate of forest, native vegetation and to protect level of soil fertility. Therefore, it never violates the norms of nature and did not challenge to the fertility of soil, vegetation or bio-diversity. Because traditional farmers followed good ecological principles and soil conservation strategies. It had adopted environmentally friendly systems based on rituals and traditions. The selection of land and clearing of forest had a systematic process before cultivation of crops. Before clearing forest, farmers classified the forest into different parts based on vegetation and topography. They are,

Mukalan Chena: this is the main forest land with higher soil fertility. Traditional farmers never clear this area for cultivation.

Navadeli Chena: this is a dense forest land.

Athdandu Chena: this area consists vegetation in particularly trees with a girth about size of fore arm of an adult man. This is an abandoned area for about 10 years after cultivated of crops. In this recovery period helped to improve soil fertility and to regenerate of natural eco-systems of nature.

Landu Chena or *Pillewa*: this is the selected area for *chena* cultivation (Bandara, 2007).

These systems and traditions indicate the knowledge and concerns of tradition farmers about sustainable economic and livelihood activities without harming to the existing of other living beings or natural environment.

7.2. Traditions and Rituals before Clearing and Burning of the selected area for Cultivation:

Tradition farmers clear *chena* area based on specific systems based on rituals. First, they clear undergrowth, slashing small plants at the ground level, then, pruning tall bushes, cutting small branches of tall bushes but leaves arm size bushes at the eye level and last, lopping tree branches (Bandara, 2007). This specific way of clearing selected area of forest promoted regrowth of forest and preservation of soil cover. Before burning the cleared area, farmers usually

take a fire light and make loud noise, address deities, and they beg pardon from wild animals for clearing and firing the area. The main intention of this process is to chase away small animals, birds, serpents and creeping from the cleared area before firing commences. This symbolizes the respect and accountability into nature and bio-system in traditional agriculture patterns.

7.3. Methods of Crop Cultivation (Crop Diversity)

Mixed methods of crops were usually done by farmers such as grains, vegetables, root crops, oil crops etc. crops are grown as intercrops and they mature at different time in a season. Main intentions of this crop diversity are to control pests, to prevent erosion during monsoon rains as these different kinds of crops work as ground cover.

8. DISCUSSION AND IMPLICATION

After considering all this information, it is crystal clear that traditional agriculture methods, techniques and traditions in Sri Lanka are results of proper interrelation with nature and natural phenomena. Most traditional knowledge systems have been developed with the better understanding that people are part of the environment. This philosophy was more helpful to preserve ecological balance and sustainability of socio-economic activities of ancient people. And also, this information indicates that traditional agriculture has based on more realistic principles and they have derived from experiences, observation of traditional people on natural phenomena such as rainfall patterns, temperature, humidity and soil behaviours etc. And also, those farming practices had done least disturbances to soil and organic biomass. Traditional people integrated with natural power and resources into their livelihood in a sustainable manner. Thus, living of ancient Sri Lankan people were self-sufficient and sustainable. Therefore, it is important to preserve this indigenous knowledge and practices regarding traditional agriculture to prevent negative impacts of climate challenges, chemical fertilizers and pesticides in the modern society. Thus, identification of indigenous knowledge through social and technical researches, recording and documentation by using modern tools, experiment about these traditional methods and practices through implications interrelated with modern agriculture knowledge and techniques are important to mitigate negative impacts of unsustainable agriculture practices and to promote sustainable and socio-economic and environmental conditions. As well as, these necessary actions will surely useful in order to establish a Sri Lankan identification in the agriculture field with respect to the norms and values of nature and natural phenomena.

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