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Ruza: An Indigenous Farming System Practiced in the Hills of Nagaland, North-East India

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ABSTRACT

The tribal communities residing in Kikruma village of Phek district, Nagaland, in North-East India practice a traditional farming system known as the Ruza farming system, more often reported as the Zabo farming system. This system practiced at higher elevations is a crucial component of Indigenous Knowledge Systems (IKS) as it represents an indigenous approach to managing rainwater for agricultural development in the village. This farming system, which has been practiced since time immemorial has been proven to be sustainable and economical as it depends only on locally available resources. This system integrates agriculture with livestock such as cattle, fisheries, poultry, and piggeries along with water harvesting structures constructed and managed as per their traditional wisdom. The combination of traditional wisdom and communal efforts shows the efficacy of indigenous knowledge in overcoming the problem of water scarcity for cultivation and allied activities. This paper deals with an overview of the Ruza farming system, its different components, and its socio-economic impacts on the hill tribals.

Keywords Ruza, North-East India, Rainwater harvesting, Traditional farming system.

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INTRODUCTION

Irrigation development has a special role to play in assisting tribal hill communities in fulfilling their basic needs and achieving cultural goals. Water from various sources such as rivers, lakes, springs, is drawn and directed to the fields by irrigation systems designed to augment crop water requirements. Traditional and indigenous methods of irrigation water management systems have been practiced since prehistoric times. Several archeological discoveries have proved that traditional irrigation methods have been used in Indian agriculture for at least 5000 years (Sengupta 1985). These traditional methods of collecting rain-

water have been proven economical and sustainable, and are often meant for small-scale applications as they are constructed and managed by local farmers.

The North-East India is distinguished by its diverse social and cultural practices, challenging hilly topography, low population density, dense forests, and unpredictable rainfall patterns. This region is one of the world's highest rainfall regions (Dikshit and Dikshit 2014). The climate varies from sub-tropical to alpine. Despite high rainfall, most of this region experiences water shortage during the dry months. Most of the villages in Nagaland are located at the hilltops with a steep slope. Due to its topographical condition, a large extent of the rainwater is lost as surface runoff. Water demand for domestic and agricultural purposes become more challenging as the population in the villages has been increasing since their establishment. Therefore, there is a need for judicious and efficient management of water resources in the villages.

The Ruza system is the soil and water management system developed by the villagers to cope with a water supply shortage for irrigation and domestic purposes. Because of its solid scientific (proper foundation and reliance on locally available resources, this system has remained sustainable for centuries. Since no inorganic fertilizers are used and no deforestation, unlike shifting cultivation, the system has a unique capability to minimize erosion and soil loss and improve the quality of the environment (Sharma and Sharma 2004). The significance of this system lies in its potential to highlight the beneficial relationship between environmental sustainability, traditional practices, and socio-economic development. The combination of traditional wisdom and communal effort shows the efficacy of indigenous knowledge in overcoming the problem of water scarcity for cultivation and allied activities. Due to a wide range of temporal and spatial variations in water availability, the state's water crisis is expected to worsen, which will most likely be affected by factors such as climate change, which can increase the likelihood of water-related disasters. This integrated farming system that integrates crop production, fish, livestock, and varieties of trees, preserves, and protects the forest and, is a great way to sustain the agricultural system.

In this study, the authors have tried to provide

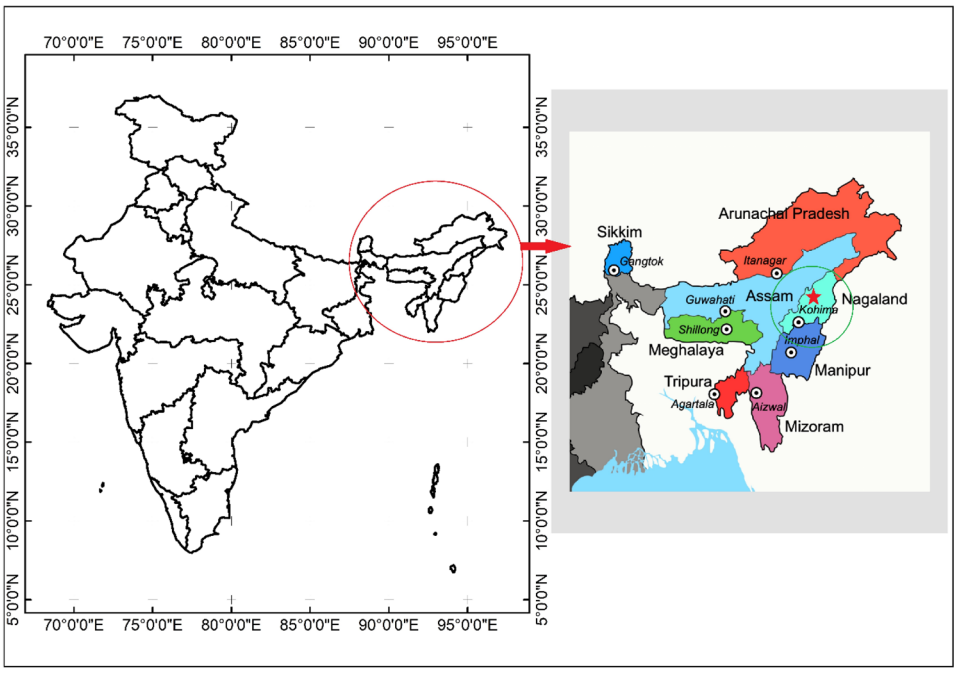

Fig. 1. Study area.

a brief overview of the age-old indigenous farming system, its socio-economic impacts, and challenges. To get an in-depth knowledge of the Ruza farming system, 25 farmers practicing this system of farming in their fields were selected and interviewed. The selected farmers belonged to different age groups and were well-versed in English and Nagamese (local common language).

Study area

The Kikruma village in Phek district is one of the biggest and oldest villages of Nagaland state which existed thousands of years ago. It is a mountainous village and lies in the geo-coordinate latitude of 25°34′50′′ N and longitude of 94°13′1′′ E (Fig. 1). It has an elevation of 1604.01 meters above sea level and has a temperate highland tropical climate with a dry winter climate. It typically receives an annual rainfall of about 461.18 mm. The village has its coldest month in January (13.42°C) and warmest month in August (annual high temperature is 25.24°C).

An overview of the Ruza farming system over the years

In the olden days, the villagers practiced Jhum cultivation to cultivate paddy near the river banks. With time, the population in the village increased and water became insufficient for irrigation as agriculture is their primary occupation and one of the villagers' main livelihood sources. Therefore, the pioneers and skilled leaders came together and decided to practice a new idea of a farming system called Ruza in their local dialect, and thus the Ruza Farming System came into practice. Ruza, where "Ru" means rain and "Za" means deep hole, is a local name given by the villagers referring to a big pond to collect rainwater. The agricultural system of the village is rain-fed and relies completely on rainfall for water. The objective of the farming system was to provide food for the villagers by cultivating crops, rearing livestock and all kinds of additional sources like fruits and vegetables.

The villagers highlighted the vital role of a pond which can act as a reservoir and started with the foremost component of the system by digging ponds in the hilly slopes to store and harvest rainwater. As explained by the farmers they follow certain criteria to select a site for making the reservoir. The rainwater is collected from the forest area located not too far from the reservoir. The farmers maintain narrow channels like pathways to let the rainwater pass into the reservoir followed by other components such as rearing livestock and fish and paddy fields respectively. The other plantations like fruit trees and vegetables are grown on the side and surrounding of the paddy field.

Elements of the Ruza farming system

Ruza farming system consists of different parts and is shown as a flowchart in Fig. 2 and the details are

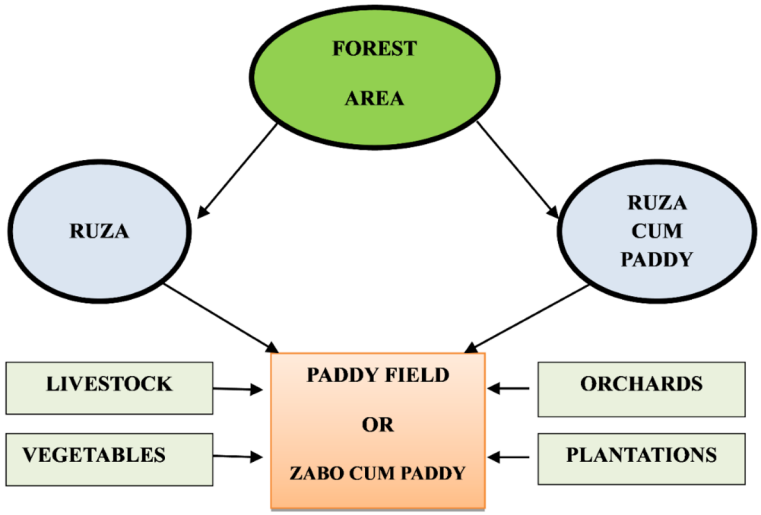

Fig. 2. Elements of the Ruza farming system.

Fig. 3. Forest area and Ruza cum paddy field.

given below.

Forest area

This system of farming is practiced on a hill slope where the hilltop portion is a conserved forest area and is under natural permanent vegetation cover. The forest area is not owned by any individual farmer. It acts as a catchment and the water is channelized through earthen channels from the catchment area to a water harvesting pond constructed at the mid-hill section. The channels need proper maintenance as they can retain and allow unwanted impurities to pass to the water harvesting pond. Fig. 3 shows the conserved forest area and a Ruza cum paddy field.

Water harvesting pond (Ruza)

The Ruza is a water harvesting pond dug and maintained by the farmers and serves as a traditional way of storing the rainwater from the catchment area (forest area). The constructed Ruza ponds are not always individually owned but some ponds are commonly owned and shared among two or more farmers for their farming and other activities. At the time of construction, the bottom surface of the pond is properly rammed, and the side walls are plastered with mud mixed with paddy husk to minimize the passage of water through seepage (Amenla and Shuya 2021). If the Ruza is not rammed properly, water does not last for a long time and dries up. If rammed and maintained properly, Ruza can store water for longer periods or even throughout the year and it can continuously rear fish and livestock without facing water scarcity issues. The size of the pond depends upon the field area to be cultivated and the amount of water to be harvested. The pond is constructed in such a manner that the surplus water from one pond flows to another pond (Maibam and Ritse 2018). This pond serves as a storage tank for storing rainfall at the same time fish are reared in it as an additional source of food for the farmers.

Livestock and orchards

Water harvesting ponds not only serve as water reservoirs for irrigation, but they are also a source of drinking water for cattle and other animals as well as used for irrigating the trees/orchards (Fig. 4). The water stored is passed down to supply for livestock such as pigs, cattle. The enclosures are made with wood and bamboo and are constructed on the lower side of the pond. A spillway is provided at the bottom of the side wall, which is closed or open using with wooden log to release water. During irrigation, it carries the excreta of the animals to the field which acts as manure for the paddy fields making the soil fertile. The farmers also grow different types of fruits and vegetables surrounding the livestock and paddy fields. The commonly grown fruits are bananas, guava, pears, peaches, sweet potatoes, mango, bitter bean, tomatoes. These fruits are self-dependent and

Fig. 4. Cattles and orchards at the mid-section of the system.

also act as a source of food for both animal and human consumption. The decayed leaves and seeds decomposed into soil, adding nutrients to the paddy field.

Zabo cum paddy

Zabo is a small hole or pit, dug out in the paddy field, of depth of about 5 to 6 ft made for rearing fish. It is constructed at the bottom section of this system. During the dry season, some water is still left behind in this hole and the fish rest in it. The most common species of fish reared in Zabo is Common Carp. The Zabo is located in the middle of the paddy field and can also be termed as Zabo cum paddy (Fig. 5). Water from the Ruza is passed down through the animal yard before entering the Zabo or Zabo cum paddy field. In this way, the water carries the dung and urine of the animals to the field which helps keep the soil fertile (Singh 2007).

Contribution of the system to the socio-economic development of farmer

In Kikruma village, where employment and income are primarily derived from agriculture, farming is the main source of livelihood for farmers. Ruza farming stands out as one of the exceptional types of farming systems that obtain environmental sustainability, great economic impact, and enhancement in societal implications and livelihood, despite the many farming systems practiced throughout the state, such as shifting cultivation, alder tree-based farming, and wet terrace rice cultivation.

The Ruza farming system, along with advancements in agricultural knowledge, has gradually changed the economic landscape. Farmers indicated that they are able to earn more income as the crop yields are comparatively higher and agricultural activities are more varied. Furthermore, the extra produce can be sold in markets to stimulate the local economy and provide the community with new business opportunities. The use of chemicals is not reported by the farmers therefore, the farming system encourages environmentally friendly behaviors. Its main goals are to reduce pollution in the environment,

Fig. 5. Zabo cum paddy field.

preserve biodiversity in the area, and promote organic farming practices. To ensure long-term sustainability, the system incorporates conservation measures that both prevent soil erosion and improve soil fertility. In addition to enhancing agricultural methods, the Ruza farming system has raised tribal communities' standard of living in general. Ruza farming boosts farmers' social standing and general well-being by giving them a steady source of income and lowering their reliance on unpredictable weather patterns. A sense of pride in their cultural heritage and sustainable practices is also fostered, strengthening the bonds within the community.

From Table 1, it was found that out of 25 farmers, only some of them (32%) knew the traditional farming system while (68%) had little to no knowledge of it. Most of them (92%) agreed that this farming system has positive socio-economic impacts as it improves their socio-economic status. They agreed that through this farming system, they become self-sufficient as products such as rice, sticky rice, fish, and even livestock are reared which helps them to sustain themselves throughout the year. During the off-season, vegetables were grown and therefore, the need to purchase from the market has drastically reduced. The harvest is also shared among themselves especially those who are in need and this helps them to maintain good relations with family, friends, and villagers, improving their social life.

Only rainfall water is used for farming which flows to the harvesting pond, Ruza due to gravity with the help of earthen channels. It also does not require any additional fertilizers; the farmers agree that this farming system is cost-saving. The crop residue and wastes from livestock provide all the necessary nutrients required by the crops for survival. Ruza farming system makes use of limited resources available to the farmers and skillfully managed these natural resources to improve the lives of the people. Among them, 96% agreed that this system improves their livelihood as it contributes to food security, prevents dependency, and enhances self-reliance. Most of them (96%) agreed that they can diversify their income sources through the Ruza farming system. One example is that the sticky rice can be sold as it is or can be grounded and used for making sticky rice cake or roti. It is also used for making Zutho (rice wine). All the farmers (100%) agreed that practicing this system of farming helped preserve the cultural heritage of their forefathers which has been passed down over the ages.

Table 1. Impact of the Ruza farming system on the farmers.

Impacts		Distribution	
		Frequency	Percent
Knowledge of traditional farming	Moderate	17	68
	High	8	32
Improvement of the socio-economic status	Low	1	4
	Moderate	21	84
	High	3	12
Socio-economic impacts	Impact was made	23	92
	No impact	2	8
Cost saving	Yes	25	100
	No	0	0
Improved the livelihood	Yes	24	96
	No	1	4
Income diversification	Yes	24	96
	No	1	4
Preserving the cultural heritage	Yes	25	100
	No	0	0

Challenges and constraints

One of the main constraints in the Ruza farming system is the construction of Ruza (water harvesting pond). It is labor-intensive work and requires time to pound the walls of the pond to reduce the seepage losses. This system requires digging of soil to store the water and constructing the earthen channels to convey the water to the Ruza and the paddy fields. Sometimes bamboo channels are also used. Another challenge faced is the erratic weather pattern and the system is dependent on rainfall only.

Since earthen channels are constructed to channel the water, most of the earthen channels are damaged due to high runoff. Therefore, the channels must be checked and maintained at the beginning of every season for any damage or blockage. Rat infestation is another challenge faced as they damage the earthen embankments as well as the crops. It was also mentioned by some farmers that wild boar often destroys the crops grown in the field.

Ruza farming system has huge environmental benefits but the farmers are not able to use it on a

large scale due to the economic and initial monetary requirements. Despite the prosperity and progress in the entire village, people are living below the poverty line. Awareness programs on different government schemes and policies for supporting the farmers may be provided by various stakeholders to practice and improve the system. The knowledge that the present farmers possess is passed down through generations and they lack proper in-depth knowledge. Therefore, scientific intervention with their traditional method of farming practices may need to go parallel to understand, maintain, and sustainability of this traditional farming system. Improvement of this system in different domains of cultivation practice may be provided to enhance productivity and sustainability.

CONCLUSION

Ruza farming system not only provides and benefits the farmers but also conserves forests, harvests rainwater, and recycles nature to provide nutrients to the field to make the soil more fertile in cultivation. While this system of farming has been proven to be beneficial to both farmers and the environment, more scientific studies are needed to improve this traditional method of farming. The findings from this study can be helpful for policymakers in effectively managing water resources. Specifically, these findings can aid in mitigating the adverse consequences of water scarcity in irrigating crops for better crop performance in rainfed regions.

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