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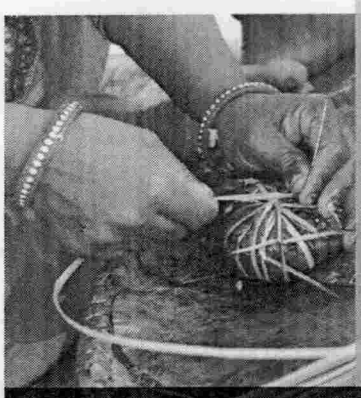
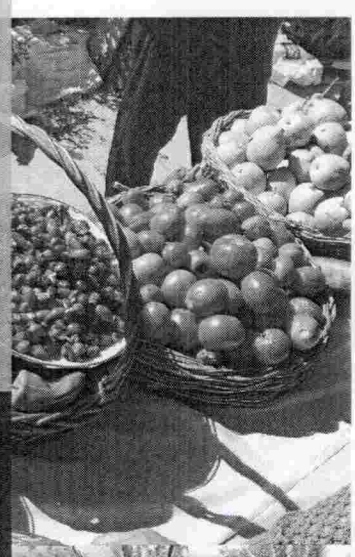
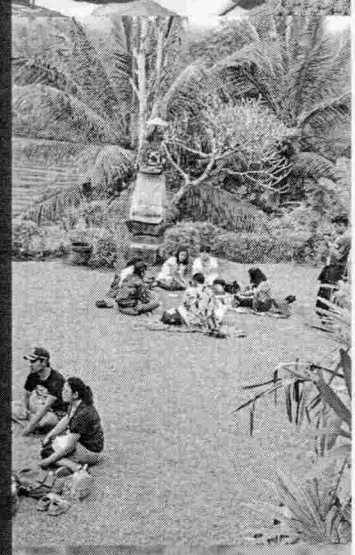




Intangible Cultural Heritage NGO's Strategy in Achieving Sustainable Development:

Goal 2. Zero Hunger



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유네스코 아태무형유산센터

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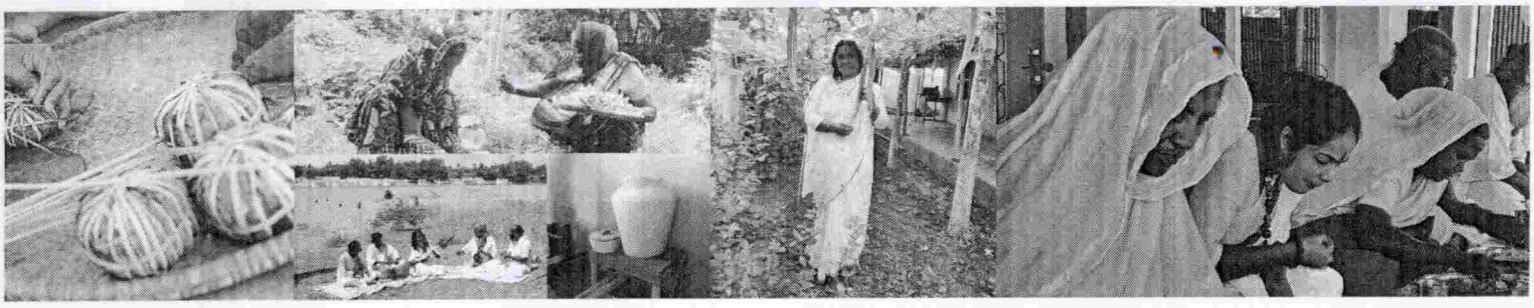

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Study of an Indigenous Method of Agriculture Practice called POKKALI in India

Center for Intangible Heritage Studies – Venugopal, B

Introduction

About the Centre for Intangible Heritage Studies (CIHS)

The Centre for Intangible Heritage Studies (CIHS) is an academic center based at the Sree Sankaracharya University of Sanskrit, Kalady (SSUSK) in the state of Kerala in India. It is the first academic center in India established exclusively for the study of intangible heritage. It should be noted here that the discipline or subject of intangible heritage is relatively new, coming into existence only with the launch of the 2003 UN Convention for the Safeguarding of the Intangible Cultural Heritage (ICH). Up to then, all discussions on heritage were restricted to its tangible aspects. More than a decade since the 2003 Convention, there remains a lack of awareness about this subject at all levels of society. Intangible heritage seems to be to them just that—intangible. This emphasizes the importance of awareness and education about intangible heritage itself. Institutions such as museums and universities are major stakeholders in this regard. The establishment of the CIHS, which involves a museum and a university, may be taken as an example of such efforts in India.

Over the years, museums were considered the custodians of material culture embodied in their collections and objects. However, there were growing demands from within the museum fraternity, led by the International Council of Museums (ICOM), to give due credit to the intangible heritage aspects of museum objects along with their material or tangible aspects. Accordingly, the ICOM Asia-Pacific Organization organized its general assembly in

Shanghai in 2002 to discuss the role of intangible heritage in museums. This later led to the redefinition of museums at the 2004 ICOM general assembly in Seoul where the notion of intangible heritage aspects of collections was incorporated along with the tangible heritage aspects as a key factor when defining museums. This necessitated those intangible heritage aspects becoming a function of museums. However, the question of how to deal with the intangibility of museum collections became a challenge for museologists. Many museums in the Asia-Pacific region tried to answer this challenge.

The National Museum of Natural History (NMNH) in New Delhi took the lead in this direction in India as part of its mission to make museums more useful to society. Inspired by its participation in the ICOM Shanghai and Seoul meetings, this museum, led by its director, organized a large number of exhibitions, conferences, seminars, workshops, and so forth in different parts of India. These included venues such as Calicut (2007), Kochi (2008), Kalady (2011), Jodhpur (2011), Hyderabad (2012), New Delhi (2012), Bhubaneswar (2013), and Jaisalmer (2013). It also organized national intangible heritage festivals (NIHF) in Kalady (2015) and Amaravati (2016) to make museums and the wider community aware of the importance of the intangible aspects of museum collections. While organizing the 2015 NIHF in Kalady, it came to light that the university had teaching resources of two out of the thirteen items from India inscribed at the time on the UNESCO Representative List of the ICH of Humanity: *Kutiyattam* (Sanskrit theater) and Vedic chanting. The series of interactions between NMNH and SSUSK led to the realization that there was a lack of awareness about this new subject within the Indian university system, and that SSUSK could take a lead in correcting this lacuna on account of its teaching resources on intangible heritage. These efforts ultimately culminated in the establishment of the first academic center for intangible heritage in India at Kalady in 2016: CIHS.

The mission of CIHS is to establish itself as a pioneer academic institution of national and international repute in the field of intangible heritage as defined in the 2003 UNESCO Convention for the Safeguarding of the ICH, adapted to Indian conditions. The primary objective is education and capacity-building training on intangible heritage.

Since its formation, CIHS has organized programs including a conference on heritage (for Muziris Heritage Project, Government of Kerala) and workshops on access to heritage (for Archaeological Survey of India, Government of India) and biocultural diversity (for NMNH, Government of India). Three of its major focus works have been on *Mudiyet* (traditional theater), intangible heritage education, and heritage and sustainable development.

As mentioned earlier, SSUSK has resources and expertise in respect of two out of the thirteen Indian items inscribed on the UN Representative List of the ICH: *Kutiyattam* and Vedic chanting. Here it is worth mentioning that three of the thirteen items are from South India, specifically the state of Kerala. The third is the above-mentioned *Mudiyet* traditional theater, which is performed in villages in and around Kalady. Accordingly, Kalady itself can boast of having three out of the thirteen Indian UNESCO-inscribed items. Hence it was decided that CIHS would work on *Mudiyet* as one of its focus areas. To this end, CIHS organized a large number of programs, leading to

the formation of a Mudiyettu Maha Sabha, which involves all the known Mudiyettu troupes.

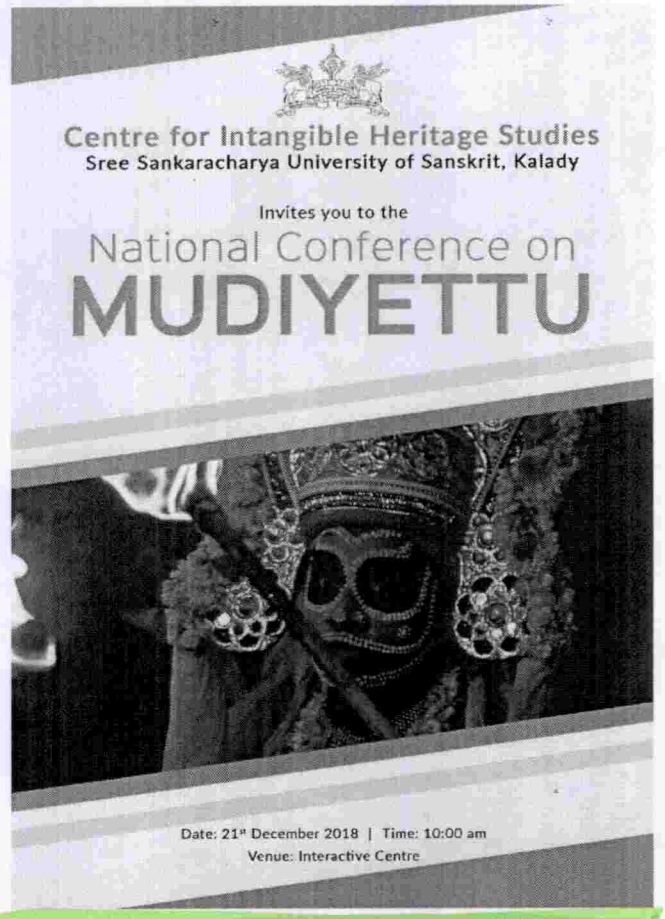

Figure 1. National Conference on Mudiyettu © Venugopal, B

Education and training are important factors of ICH safeguarding. Since CIHS is an academic entity, its primary focus is on imparting education. It recently launched the first certificate program on intangible heritage in South Asia at the 2020 NIHF (Venugopal, 2020). It also plans to introduce more such certificate programs on various aspects of heritage in the coming years.

CIHS Initiative on Intangible Heritage and Disaster

During the 2018 floods in Kerala, in which SSUSK was totally submerged, CIHS played a crucial role as a partner to the Kerala Heritage Rescue Initiative, involving international agencies such as ICOMOS and ICCROM. Later it organized a National Conference on Heritage and Disaster in India (Venugopal, 2019). While working on this, it was observed that the Pokkali type of indigenous agricultural practice was resilient to disasters like flooding. Since then, CIHS has been working on a project with Pokkali as a case study of ICH in sustainable development, especially the UN's second Sustainable Development Goal (SDG), in collaboration with the Palliyakkal Service Cooperative Bank (PSCB) in Ezhikkara, Ernakulam District, Kerala.

Figure 2. CIHS in the KHRI © Venugopal, B

The floods in Kerala in 2018 affected heritage, both tangible and intangible, as well as movable heritage (e.g. museums). However, on account of the lack of standard operating procedures (SOPs), much of the

destruction to heritage could not be assessed. Hence it was felt necessary to develop SOPs for heritage so as to reduce potential destruction in the event of future such disasters. To this end, the National Conference on Heritage, Museums and Disaster was organized for March 2019 (Venugopal, 2019). The case study of Pokkali as an indigenous method of disaster resilience was highlighted during this conference. This attracted the interest of CIHS in Pokkali agricultural practice. The NIHF organized by CIHS in February 2020 in Kerala focused on heritage and disaster (Venugopal, 2020).

The earlier Nava Kerala Mission (an initiative launched in November 2016 with the help and involvement of local self-government agencies, the purpose of which was to address problems faced in four key social sectors: health, education, agriculture, and housing) and the post-disaster initiative Rebuild Kerala (a platform to seek financial support from individuals and institutions in efforts to rebuild the state following the 2018 floods) are positive efforts by the local government of Kerala. The seminar-cum-exhibition "Disaster Risk Reduction for Navakeralam," which ran December 3–4, 2018 in Trivandrum and was jointly organized by the Kerala State Disaster Management Authority, UNDP, and Sphere India, had themes of housing, waste and sanitation, livelihood, solid waste management, health and nutrition, education, volunteer mobilization, inclusion, and lessons learned. However, there was no specific focus on heritage. It is expected that the CIHS work on Pokkali will be a pioneering effort in Kerala to link heritage (especially traditional knowledge as envisaged under ICH) with disaster.

POKKALI

About Pokkali

The term "Pokkali" is often associated with the salt-tolerant variety of paddy crop cultivated in coastal areas of central districts of the state of Kerala in India for about six months from May to October followed by filtration farming of prawns and fish during the next six months from November to April (Sudhan et al., 2016). This rice–prawn alternation makes for a mutually supportive ecosystem. The prawn droppings work as natural manure for the paddy and the tall paddy stalks left after the panicles are cut off during the harvest become a highly congenial habitat for the prawns.

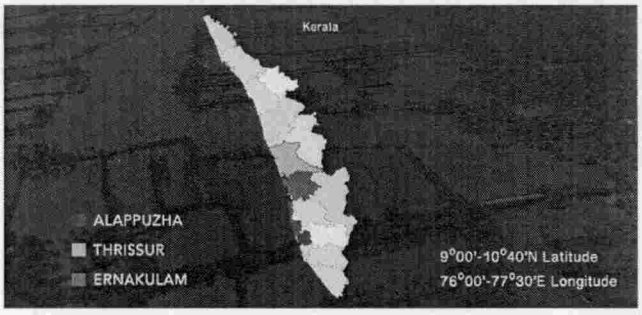

Figure 3. Area distribution of Pokkali in Kerala. © PSCB

Pokkali land is found in thirty-three *Panchayats,* two municipalities, and one city corporation area in the Alappuzha, Ernakulam, and Thrissur districts of Kerala (CPGD-Kerala, 2016). The land areas of Pokkali cultivation are low-lying marshes and swamps situated near the estuaries of streams and rivers not far from the sea. They are waterlogged with poor drainage systems and are subject to tidal action throughout the year. Without Pokkali cultivation,

the entire area would have been flooded and wasted; acidity and toxicity would be high and there would also be less oxygen and more hydrogen sulfide in the water, which would kill the prawn larvae. The Pokkali farming operations ensure good drainage and eliminate all the above-mentioned issues.

Figure 4. Aerial view of Pokkali area. © PSCB

"Pokkali" is a word in the local language (Malayalam) derived from "pokkam," which means high or tall; this refers to the tallness of the rice plant, which usually grows to a height of 2 m in order to survive in the waterlogged fields. Pokkali varieties/cultivars are world famous for their tolerance of salinity. Traditional Pokkali cultivars are commonly cultivated by Pokkali farmers. They have a yield potential of 1,000–1,500 kg/ha. Most of the land races are tall in stature with lodging characteristics. The height of these varieties varies from 160 to 200 cm, depending on season, and the drought or flood situation in the field. These genotypes have the ability to keep their panicles above water level. Upon lodging, fresh roots will arise from the nodes to support the plants. The genotypes also show a special ability for internodal elongation to overcome the effects of tidal and stagnant water. Pokkali varieties have very good initial seedling vigor (attains a height of 40–45 cm within a period of one month), luxuriant growth habit, very high tillering capacity (average 12–16 tillers), long panicles (>25 cm) with a large number (120–160) of medium to long bold grains. All the traditional varieties/cultivars have red kernels. In a recent study conducted at the Agricultural Research Station Vyttila, aiming to explore the medicinal values of Pokkali rice, it was proved that the Pokkali varieties are very rich in antioxidants like oryzanol, tocopherol, and tocotrienol. These content levels are even higher than those of the medicinal rice njavara. The taste of Pokkali rice is well known, particularly in rice flour, rice bran, rice flakes, and many breakfast items that use it. The local people of this tract particularly relish the kanji made with Pokkali rice. Pokkali rice is also considered to be good for people with diabetes (CPGD-Kerala, 2016).

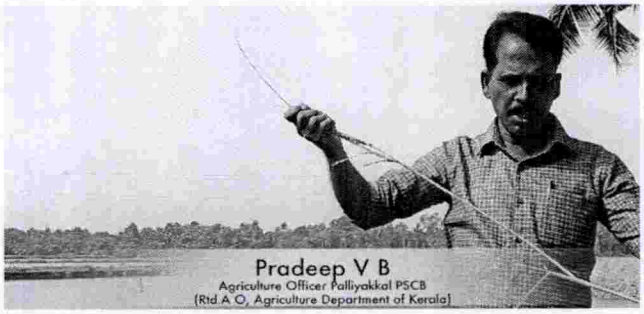

Figure 5. Pokkali paddy stalk. © PSCB

Uniqueness of Pokkali

In Pokkali agriculture, nutrients are recycled and the productivity of both the paddy and prawns remain high. Pest and disease incidence is below threshold level. Since the tidal flows make the fields highly fertile, and the incidence of pests and diseases is below threshold level, manuring and plant protection

operations are not necessary for Pokkali farming, making Pokkali rice a natural, organic product. This style of agriculture is also sustainable. Accordingly, the produce has high market value and many medicinal properties are also attributed to it. Added to this is the fact that Pokkali rice obtained geographical indication registration in 2008–09.

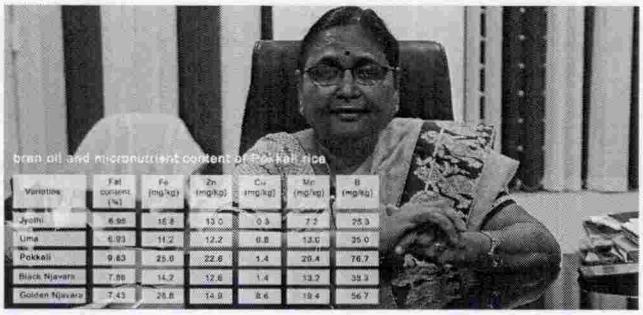

Figure 6. Importance of Pokkali. © PSCB

It should be mentioned that Kerala, with its vast coastline, is a state that is expected to be seriously affected by climate change and coastal erosion. Accordingly, forward-thinking agriculture in Kerala, which depends primarily on rice, demands the selection of rice varieties that are adapted to survive coastal erosion, increased salinity, climate change, and so forth. Pokkali fits the bill as it has proved itself in the 2018 floods that ravaged Kerala.

There are different types of prawn culture practices followed in the Pokkali fields such as prawn filtration, extensive prawn culture, and semi-intensive culture. Prawn filtration (*chemmeen kettu*) is organized by collecting seedlings entering the estuary during high tides in the Pokkali fields, which ensures high rates of utilization of the coastal wetlands in the area. The crop is harvested within 150 days. Prawns in Pokkali fields subsist on organic matter from decayed stubble, drying waterweeds, and so on, and in turn the fields are enriched by the manure and organic wastes from fish and prawns. Extensive prawn culture (*chemmeen vatu*) activities take place year-round and are not confined to six months alone. Culture during the six-month prawn-farming period is on a commercial basis, and the laborers have the right to catch fish only at the end of the season. Semi-intensive culture is the most modern culture system, which applies modern science and technology to produce living organisms. It is not practiced in its true form; rather it is a modified semi-intensive culture system that is practiced in the backwaters of Cochin (Smiji, 2018).

The Decline in Pokkali Cultivation

Over the years, Pokkali cultivation has declined. There are various reasons for this, and some of them are described below:

a) Reduction in area: In the 1990s, there were more than 25,000 hectares of Pokkali lands in Kerala. Now, even here the farming has reduced significantly. Only 2,200 hectares are currently maintained under Pokkali farming (CPGD-Kerala, 2016).

b) Monoculture: Unsustainable prawn monoculture is growing in the Pokkali lands and is observed to have gained momentum since 2010. Though this form of farming provides higher net returns over the traditional rice–prawn system in the short run, it is found to be unsustainable in the long run, from both ecological and social perspectives (Smiji, 2018). It was reported

that short-term economic incentives form the primary reason for the shift to prawn monoculture. There is also a conflict of interest between paddy farmers and the aquaculture lobby.

c) Soil acidity: The acid sulfate soils of the Pokkali wetlands need regular tidal influx and monsoon fresh water runoff to neutralize the acidity and sulfur content of the soil. The increase in acidity and sulfur content, besides the increase in growth of undesirable plant species, render the wetlands unsuitable for farming. The decrease in salinity in certain areas of Pokkali wetlands have resulted in excessive growth of the exotic weed water hyacinth, which is difficult to remove (CP-GD-Kerala, 2016). The farmers, however, had another reason to keep up the brackish-water farming. Within a few years, adjoining freshwater land too became acidic and fell to ruin while drinking water sources became brackish, reducing regularly cultivated Pokkali fields to merely a tenth of the productive area of the 1990s. Bit by bit, the tracts were left fallow, tidal embankments fell into disrepair and seawater came deeper inland. In other cases, the tracts were used for growing prawns year-round, converted into coconut farms, or the land use was irretrievably changed with jetties and other infrastructure built on it.

d) Labor: Pokkali harvesting is highly labor-intensive. According to Smiji (2018), it is calculated that 100–150 man days are needed for rice cultivation and 350–400 man days for prawn farming. The youth prefer to earn a living through jobs like construction work rather than in Pokkali-related ones. The local Pokkali farmers are thus finding it difficult to continue on account of economic pressures and the lack of available agricultural laborers, especially during the harvest season (Smiji, 2018).

e) Anthropogenic issues: Pokkali areas are also destroyed by anthropogenic activities such as the creation of landfills for dumping solid waste and being a point for discharging untreated industrial and domestic effluents. Most Pokkali tracts lie close to the Vembanad and Kochi backwaters, both of which are severely polluted by the indiscriminate effluent discharge from factories, by oil from outboard boat engines, and also by all kinds of waste from the cities of Alappuzha, Kottayam, Kochi, and other nearby towns. Many allege that on the prawn-harvesting day (April 15), contractors sprinkle pesticides in the *chemmeen kettu* (prawn farms) to maximize their catch. The idea is to stun or kill the prawns so that they float along rapidly with the draining water as the tide flows out.

f) Megaprojects: A recent anthropogenic factor responsible for a reduction in Pokkali was the construction of the Vallarpadam Container Terminal Road and the rail link in the backwaters of Cochin. As a result of the acquisition of land for this mega project, the traditional way of prawn farming in Pokkali fields was affected (Smiji, 2018).

Revival

During the 2018 flood disaster in Kerala, the majority of agricultural crops were damaged, except those of Pokkali. This resilience has kindled hope that indigenous traditional knowledge practices of agriculture (an example of intangible natural heritage, under UNESCO's fourth domain of ICH, "knowledge and practices concerning nature and the universe") can help achieve food security, especially in times of crisis such as natural disasters. This has given a boost to the revival efforts of Pokkali cultivation already initiated by the local government of Kerala and the cooperative sector. The Kerala State Government has initiated several laws and schemes for the conservation of the Pokkali system of agriculture. These include:

a) Punja Act: This piece of legislation stipulates that low-lying brackish water wetlands are to be used for prawn culture only for a period of six months and the remaining six months are to be compulsorily used for paddy cultivation. A special package for reviving Pokkali cultivation under which a sum of INR 25,000 per acre was extended to farmers willing to take up Pokkali cultivation in the abandoned fields and INR 5,000 per acre for continuing Pokkali cultivation.

b) Fish Farmers Development Agency (FFDA): The agency supports fish farming both in open Pokkali fields and also in cages sited in Pokkali fields. It has been calculated that while the traditional Pokkali rice only farming generated a profit of INR 25,000 per hectare, paddy–prawn integrated culture yielded INR 50,000 per hectare. This success prompted the FFDA to launch a subsidy scheme called Integrated Fish Farming in Pokkali Fields.

c) Krishi Vigyan Kendra (KVK): In order to ensure more income from Pokkali fields per unit area, the Central Marine Fisheries Research Institute's KVK supported cage fish farming involving species such as pearl spot, mullet, and sea bass (Smiji, 2018).

d) Pokkali Land Development Agency (PLDA): In 1996, the government instituted the PLDA for the promotion of paddy cultivation in the wetlands. The information obtained through this agency helped in a highly disaggregated analysis of the activities of Pokkali *padashekarams* (paddy fields). According to the PLDA, the total area under Pokkali farming has shrunk from 25,000 ha as recently as the 1990s, to a mere 8,500 ha. Only 5,500 ha of that is actually under rice cultivation. The rest is either left fallow or used only for prawn farming. Unavailability of farm laborers, especially for harvesting, is the main cause for the decline.

e) Pokkali Samrakshana Samithi (PSS): An agency established for the protection of Pokkali involving local stakeholders, PSS has leased 140 acres of marsh-like Pokkali fields that have been fallow for a quarter of a century. It has found a new way to finance its efforts: by selling informal "Pokkali bonds."

f) Mechanization: Kerala's Fisheries Department, which secured funding of INR 337.3 million from the National Adaptation Fund on Climate Change to restore 600 ha of low-lying wetlands for climate-resilient Pokkali and another similar farming systems, ignores mechanization altogether, admitted by most experts to be a major hurdle to the Pokkali revival. Kerala Agricultural University have made some efforts in the field of mechanization, such as developing a prototype amphibian harvesting machine for use in inundated Pokkali fields; this is yet to demonstrate results (CPGD-Kerala 2016).

Figure 7. Mechanization in Threshering. © PSCB

Figure 8. Mechanization in harvesting. © PSCB

g) Geographical indication and markets for Pokkali rice: In order to develop market for Pokkali to make it a profitable venture, Pokkali received geographical indication recognition coordinated by PLDA and Kerala Agricultural University (KAU). It was also expected to increase exports to generate increased revenue. The government offers a minimum support price of INR 50 for a kilogram of Pokkali rice, several times the price offered for commercial varieties. Exporters too are ready to pay INR 150 per kilogram (Jena, 2017). However, the rate of production has not risen enough to meet the demand in local and international markets.

h) Cooperative banks: PSCB in Ezhikkara, which was established in 1943, is showing interest in reviving Pokkali farming as part of its project on promoting good and organic agricultural practice. PSCB is now venturing into related efforts such as establishing a rice mill for promoting Pokkali rice processing. Other projects by the same bank in this area include the development of a "Food Security Army" and self-help groups. These initiatives have helped the bank to be selected as an active member of the recently established Kerala Food Platform (KFP).

THE ANNUAL CYCLE OF POKKALI

The Annual Cycle

As mentioned earlier, the Pokkali type of agricultural process involves alternate cultivation of paddy and prawns during the first phase (low-saline season; heavy southwest monsoons, June to October) and second phase (high-saline season; November to

mid-April), respectively. The heavy southwest monsoons that occur during the first phase cause salt to be flushed out from Pokkali land, meaning rice cultivation can start. The rice varieties used are highly tolerant to salt. In order to survive in the waterlogged field, the rice plants grow up to 2 m, but as they mature they bend over and collapse with only the panicles standing above the water. By the end of October, harvesting begins. Only the panicles are cut and the rest of the stalks are left to decay in the water, in time becoming food for prawns. In November, when the rice harvest is over, juvenile prawns swim in from the sea and the backwaters to the field. They feed upon the leftovers of the harvested paddy crop. The various stages of the Pokkali method of agriculture that take place over a period of twelve months are described in more detail below.

Phase 1: Paddy/rice farming

The first phase takes a period of about six months, from April 14 (Vishu, the local Malayalam New Year) to October 15, and includes three steps: preliminary preparations, paddy cultivation, and paddy harvesting.

Preliminary preparations include strengthening of bunds, preparation of mounds, and management of water. By April, the bunds are strengthened and sluices repaired and ready to regulate the water levels. Fields are then drained during low tide and the sluices are closed. The land must be dried under the hot sun for almost a month, by which time the salt left over from the prawn-farming period is ready to be washed off by the first monsoon rains. In the soil, mounds 1 m wide and 0.5 m high are formed. At the start of the rice cultivation period, the field owners employ skilled laborers for the preparation of these mounds. This facilitates the washing down of the dissolved salts from the surface of the mounds, which are ultimately removed from the field by tidal action. The mounds act as elevated *in situ* nurseries and protect the seedlings from flash floods. The soil condition can be tested along with the salinity profile to analyze the crop management. Then water is filled to the appropriate depth required for rice cultivation. Unwanted or excess weed growth will be removed by the skilled laborers.

Figure 9. Preparation of soil for Pokkali paddy cultivation 1. © PSCB

Figure 10. Preparation of soil for Pokkali paddy cultivation 2. © PSCB

Paddy cultivation involves traditional Pokkali cultivars and high-yielding varieties derived from these cultivars. Pokkali, Choottupokkali, Chettyviruppu, and Cheruviruppu are the traditional cultivars prevalent in this tract. Improved varieties (VTL-1 to VTL-8) developed at the rice research station Vyttila at KAU

are now popular mainly with respect to high yield (CPGD-Kerala, 2016). A special method is adopted for sprouting the seeds. The seeds are tightly packed in a basket made of pleated coconut leaves, the inside of which is lined with banana or teak leaves. These baskets are immersed in fresh water ponds for 12 hours. They are then taken out and stored in the shade. The radicle just sprouts and remains quiescent under this condition for about 7 days. When the soil and weather conditions become favorable, the baskets containing the seeds are re-soaked for 6 hours before being sown on the mounds. The seedlings will be ready for scattering by July (in about 30 days). At this point the seedlings on mounds will be scooped up using hoes and scattered throughout the field. In Pokkali farming, there is no transplantation as practiced in modern rice farming. There is also no purposeful removal of weeds in this farming system.

Figure 11. Seeds kept in traditional basket for sprouting. © PSCB

Paddy harvesting needs to be done within seven days once it is ripe. The panicles of the plant are harvested, leaving the larger part of the stubble in the field. About 50% of the potential yield is lost because of lodging and associated damage caused by fish, tortoises, and rats.

Figure 12-13. Njaru or Seedling(left), Harvesting of Paddy(right). © PSCB

Figure 14-15. Transportation of harvested Paddy 1,2. © PSCB

Figure 16-17. Threshering(left), Winnowing(right). © PSCB

Phase 2: Prawn farming

The second phase also takes a period of about six months, from October 15 to April 14, and includes two steps: preliminary field preparations, followed by prawn cultivation and harvesting.

Preliminary preparations include strengthening of the field by bunds and sluices along with control of weeds and water. After the paddy harvest, at the end of October, the fields are allowed to have free exchange of water. By this time the rainy season will be over and water salinity is conducive for large-scale migration of post-larvae and juvenile prawns in the coastal inlets and adjoining rice fields. Floating weeds like *Salvinia molesta* and *Eichhornia crassipes* are removed from the fields. Bunds should be strong enough to withstand the tidal fluctuations and other operations during supplementary feeding, miscellaneous activities, and harvesting. Bunds are

1 m wide at the top and height is maintained at the level of 1.5 m. The standard sluice is 3.5 m in length, 1.25 m wide, and 2.25 m high (Sudhan et al., 2016). Shutter planks, made of wood, are used to regulate the water flow into the field. Optimally, between eight and twelve shutter planks are used and the number is related to the height of the sluice. The standard specification of a shutter plank is 1.25 m length and 0.15 m width. A nylon mesh screen will be fixed on the sluice to prevent prawns from escaping to the backwaters and river. The nylon net sluice screen has a mesh size of about 2.5 mm (Sudhan et al., 2016; Jena, 2017).

Figure 18. Bund sluice gate for Prawn farming. © PSCB

Figure 19. Harvested Prawn © Venugopal, B

After these preparations, water is let into the fields at night during high tide through the sluice, where a hurricane lamp is hung to lure in prawns. At low tide, water is let out through a bamboo screen that prevents the fish and prawns already in the field from escaping and also brings down the water level, so that more water can be allowed in at the next high tide. The process is repeated for two or three months.

According to Smiji (2018), prawn farming in Kerala may be of three types:

a) Prawn filtration (*chemmeen kettu*): Undertaking during the six-month period (mid-April to mid-October) after the Pokkali rice farming. This is the most popular method.

b) Extensive prawn culture (*chemmeen vattu*): Performed year-round rather than being confined to a set period of six months. Culture during the next six months is on a commercial basis and the laborers have the right to catch fish only at the end of the season.

c)Modified semi-intensive culture: In this system, techniques of modern science and technology are applied. It is practiced especially in the backwaters of Cochin.

Chemmeen kettu, the most popular method, is a traditional culture system where the Pokkali fields are used as ponds and prawns are stocked. In this system, there is no selective stocking or supplementary feeding. Only the organic vegetable waste from the Pokkali paddy cultivation is used as natural feed material for the prawns and fish. However, the survival rate (against majority viral attack) is generally only 5%. Therefore, a nursery hatching capture system is also employed. In the capture system, young wild prawns are trapped in the Pokkali field, grown

for a certain period, then harvested in the nursery established nearby. The young prawns (hatchlings) are fed with artificial feed. After one month, these are transferred from the nursery to the Pokkali field. A particular net is used for prawn filtration. According to Smiji (2018): "It is conical in shape and has a total length of 4.5 m with a trap system in the middle and a valve at the cod end for easy collection of the catch. The net is fabricated in close mesh, tied to a wooden frame and fitted to the sluice with its cod end kept in the channel or backwaters outside. When the water is let out of the fields, during low tide the prawns and fishes are carried along with water and are collected in the prawn filtration net. Luring in of prawns continues simultaneously along with fishing till the end of March, when the fields are finally drained for taking up paddy cultivation." Non-chemical toxins (tea seeds) are boiled and applied to remove unwanted smaller fish. These poisoned fish normally die below the water level or at the ground, and will float to the surface after death. These dead fish are filtered out with nets (Jena, 2017).

POKKALI SUSTAINABLE AGRICULTURE SYSTEM

Sustainable Development Goals

The Pokkali type of agriculture is an apt example of sustainable agricultural practice, which is resilient to the problems of climate change and concomitant rises in sea level that affect ecosystems. Such practices can therefore represent a futuristic type of agriculture for people to adopt for their own survival.

A set of global goals for the period 2016–30 called "Transforming our World: The 2030 Agenda for Sustainable Development" was adopted by the 193 member states of the UN on September 25, 2015. The aim of the 2030 Agenda is to plan a course of action for people, the planet, and prosperity. It charts a plan for the future, shifting the world onto a sustainable and resilient course and leading to transformation (FAO, 2017). It contains 17 goals with 169 targets and 230 indicators covering a broad range of sustainable development issues. Targets embrace the specific conditions that must be satisfied in order to achieve the relevant goal. Indicators are tools used to measure concrete progress toward the achievement of SDG targets.

The SDG relevant to the present report on Pokkali is goal number 2. It is considered that actions to achieve SDG2 will accelerate progress across most other goals and targets including poverty (SDG1), health (SDG3), climate change (SDG13), life below water (SDG14), and life on land (SDG15), as well as SDGs and the three core dimensions of food systems: economic, social, and environmental. The concepts of food security and malnutrition, which are part of SDG2, underpin the 2030 Agenda.

SDG2 focuses on the following:

a) End Hunger
b) Achieve food security and improved nutrition
c) Promote sustainable agriculture.

SDG target 2.1 is applicable to the task of ending hunger. Its goal is to end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious, and sufficient food year-round. The progress

of SDG2 in 2019 shows that "hunger is on the rise again globally and undernutrition continues to affect millions of children. Public investment in agriculture globally is declining, small-scale food producers and family farmers require much greater support and increased investment in infrastructure and technology for sustainable agriculture is urgently needed" (UN Economic and Social Council, 2019).

SDG targets 2.3 and 2.4 are applicable to food security. Target 2.3 aims by 2030 to double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment. Meanwhile, target 2.4 aims to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding, and other disasters, and that progressively improve land and soil quality. "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2014). SDG target 2.4 stipulates ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity. There is growing consensus that rather than increasing production, expanding food availability while making farming less environmentally damaging should be a priority. Addressing food loss and waste is also part of this approach (BCFN, 2018).

Improved nutrition is addressed by SDG target 2.2. It suggests ending all forms of malnutrition by 2030, including the intermediate aim of achieving, by 2025, internationally agreed targets on stunting and wasting in children under 5 years of age, and addressing the nutritional needs of adolescent girls, pregnant and lactating women, and older persons. The Pokkali system of agriculture is an example of local efforts for ending malnutrition to some extent. "Eradicating malnutrition and its associated social and economic costs must begin with agriculture and food systems. The role of agriculture in producing food, generating income and supporting livelihoods is fundamental, and its direct role in enhancing nutrition deserves greater policy attention" (FAO, 2014).

In terms of sustainable agriculture, the global food system is at a crossroads. FAO (2020) argues that agriculture must meet the challenges of hunger and malnutrition—against a backdrop of population growth, increased pressure on natural resources including soils and water, the loss of biodiversity, and the uncertainties associated with climate change. It mentions that while past efforts focused on boosting agricultural output to produce more food, today's challenges—including climate change—demand a new approach. Therefore, it argues for a transition to more sustainable food systems—food systems that produce more, with more socio-economic benefits, and with less environmental consequences. It suggests building synergies by which agroecology can support food production and food security and nutrition while restoring the ecosystem services and biodiversity that are essential for sustainable agriculture. It reiterates that agroecology can play an important role in build-

ing resilience and adapting to climate change. The Pokkali type of sustainable agricultural practice is an excellent example in this regard.

Pokkali Sustainable Agriculture and Food Security

This study on Pokkali is based on the Pokkali system of sustainable agriculture during its revival by the PSCB in Ezhikkara. As part of its revival of the Pokkali agriculture farming in Ezhikkara in the 1990s, the PSCB selected rice–prawn/fish integrated farming culture (RPIFC). As mentioned, this helped the bank to be selected as an active partner of the KFP, a new food security initiative of the Kerala Development and Innovation Council (K-Disc) to gather stakeholders (farmers, cooperative societies, banks, other producers, large- and small-scale merchants, and consumers) under one platform. The role of the PSCB and its successful Pokkali RPIFC was also specifically mentioned by the Kerala Finance Minister while presenting the state budget for 2020–22 (Special Correspondent, 2020; Narayanan, 2020).

In this time of Covid-19 when all nations are beholden to the pandemic in all activities, food security has become ever more important. Here it is relevant to note the latest observation on food security in India, especially in the context of Covid-19, by Dr. M. S. Swaminathan, former Independent Chairman of the FAO Council, Director General of International Rice Research Institute and president of the International Union for the Conservation of Nature and Natural Resources. He draws on some of his early research on the potato, focusing on the spread of pests and diseases, to highlight a few lessons for the future of food and agriculture in the context of Covid-19. He explains how India can be prepared for the spread of diseases, including viruses, in Indian agriculture, while ensuring the food security of the farming community and rural poor. Swaminathan highlights two points to be taken note of in terms of food and nutrition based on the lessons in today's context, for the future of agriculture in India: promotion of genetic heterogeneity and seed security (Swaminathan and Nitya Rao, 2020).

Intangible Heritage Involving Traditional Knowledge

The Pokkali revival works of PSCB show that better use of traditional knowledge (related to ICH) and existing practice of Pokkali RPIFC can also contribute to a more sustainable food supply chain like the KFP. Traditional practices used in Pokkali farming in Ezhikkara—such as no-till in which the soil is not disturbed, thus increasing retention of water, organic matter, and nutrients—are also recognized as sustainable methods of farming. SDG target 2.5 is applicable here. It aims to maintain by 2030 the genetic diversity of seeds, cultivated plants, and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional, and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge.

The various aspects of sustainable agriculture practice as effected through Pokkali RPIFC are described in the next section.

Figure 20. Intangible Heritage in the strengthening of Bund.
© PSCB

Figure 21. Intangible Heritage in the sprouting of seed.
© PSCB

POKKALI RICE/PRAWN INTEGRATED FARMING CULTURE

Experience over years shows that depending on only one type of crop for farming has become less attractive in areas of continuous environmental fluctuation or ecologically sensitive areas like those where Pokkali farming takes place. It has been suggested that undertaking multiple-culture farming can be successful as a safety measure. Multiple-culture farming involves more than one type of farming system being employed in the same area in different seasons according to the specific environment. Judicious use of multiple farming cultures is also known as integrated farming culture (IFC). IFC offers effective utilization of resources (waste or byproduct from one system is effectively recycled by the other) and farming space (for maximizing production). Examples include the combinations of rice and prawn or fish, horticulture and fish, mushroom and fish, and sericulture and fish.

Rice–Prawn/Fish Integrated Farming Culture

It is reported that only a small percentage of the land available in India is now used for rice–fish culture. This method of farming has the advantages of economical utilization of land, savings on labor costs (toward weeding and supplemental feeding), enhanced rice yield, and additional income and diversified harvest such as fish and rice (from the waters of the farm/field), and onion, beans, and sweet potato (from cultivation on bunds).

RPIFC is usually conducted in one of two ways: simultaneous and alternate (rotational). In the former, rice and fish/prawns are farmed simultaneously or together, while in the latter they are farmed on an alternating (rotational) basis. In the case of Pokkali RPIFC, an alternating culture of rice and prawns/fish is practiced. The advantages of this include improved soil fertility (as prawns/fish promote recycling of nitrogen and phosphorus through bioturbation and their waste increases the amount of organic fertilizer in the Pokkali rice field for the next season), prevention of soil degradation, and control of mosquitoes, insects, snails, and water-borne diseases (since fish are their predators).

In the Pokkali RPIFC, as mentioned earlier, the two farming cultures employed are rice farming followed by prawn/fish culture. Pokkali rice is cultivated from mid-April to mid-October when the salinity level of the water in the fields is low. In order to survive

in the waterlogged field, the rice plants grow up to 2 m. But at maturity, they bend over and collapse with only the panicles standing upright. Harvesting takes place by the end of October when only the panicles are cut; the rest of the stalks are left to decay in the water, which in time become feed for the prawns that start arriving in November–December in the next phase.

From mid-November to mid-April, when salinity is high, prawn culture takes over. In Kerala, three different types of prawn/ fish culture are generally practiced (Smiji, 2018): prawn filtration (locally known as *chemmeen kettu*), extensive prawn culture (*chemmeen vattu*), and modified semi-intensive culture. The first is the most popular method of prawn/fish culture in Pokkali farming in Kerala, compared with the other two. While the first and the third methods may be implemented during the six-month period October–April, the second is done year-round. The third method, which uses the techniques of science and technology and is recommended by various scientific institutions, is, however, not popular with traditional Pokkali farmers.

Kerala Food Platform

The importance of the Pokkali RPIFC in clinching recognition of PSCB into the KFP has already been mentioned.

CONCLUSION

The environmental consequences of unsustainable lifestyles and patterns of production and consumption are now widely accepted. According to the Intergovernmental Panel on Climate Change (IPCC, 2015), the anthropogenic greenhouse gas (GHG) emissions in the "Agriculture, Forestry and Other Land Use" sector are mainly driven by deforestation, agricultural emissions from soil and nutrient management, and livestock (IPCC, 2015). In India, traditional practices that are sustainable and environmentally friendly, such as Pokkali farming, continue to be a part of people's lives.

CIHS will continue with the activities of the revival project of Pokkali RPIFC promoted in Ezhikkara by PSCB now that the latter has become active with the KFP. It has also become strategically important in the aftermath of the Covid-19 and the prediction that floods will become a regular feature in Kerala. During NIHF organized by the CIHS in Ezhikkara with the collaboration of the PSCB in February 2020, organizing more popular programs such as "Pokkali Festivals" was recommended on an annual basis. A further recommendation was establishing a Pokkali museum to showcase the community resilience that helps the Pokkali agricultural system to survive the various problems of climate change, flooding, and rising sea levels that affect the state of Kerala in general and places like Ezhikkara (which is very near to the city of Kochi) in particular.

During the recent meeting of the board of studies of CIHS at SSUSK, a case study of Pokkali was included in the syllabus of Kalady University's certificate program on intangible heritage. Working toward getting Pokkali recognition as a globally important agricultural heritage system is also on the agenda of CIHS.

The Pokkali type of agricultural practice, which is sustainable and futuristic, needs to be encouraged. The CIHS project on Pokkali for ICHCAP is expected to facilitate this.

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