

Full Length Research Paper

On rice and the region of rice civilisation

K. R. Bhattacharya and S. Z. Ali*

Department of Grain Science and Technology, CSIR-Central Food Technological Research Institute,
Mysuru – 570020, India.

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Rice is the staple food for the largest number of people on Earth. Over 90% of world's rice is grown in a relatively tiny region of the world, namely, the south, southeast and east Asia. This region can be termed as the Region of Rice Civilisation (RORC). It has several extraordinary features which set it apart. It is largely characterised by vast flat lands, having rivers with vast deltas and heavy monsoon precipitation, rendering it highly suitable for rice cultivation. The proportion of arable land (21%) is high; nearly double the value in non-RORC world. The tiny RORC area (14% of the world's land area) has been holding more than half the world's population probably throughout recorded history, testifying to the primacy of the region in the world. All (25-odd) RORC countries have a more or less common socio-political history of a millennia-old rich civilisation. There is a broad cultural unity among the countries of the region, and rice plays a dominant role in the community life here. The grain is considered sacred despite the differences in popular religious faith among the people. This region, exhibiting a distinctive politico-cultural status, calls for the attention of historians, anthropologists and social scientists to unravel its mystery.

Key words: Rice, civilisation, human sustenance, rice in human history, rice countries.

INTRODUCTION

Rice is our staple food *par excellence*. But before dwelling on the role of rice as food, let us have a brief understanding of what is food and where it comes from.

According to a fundamental law of physics, the universe's 'entropy' increases relentlessly all the time. Translated into common language, it means there is a constant change from organisation to disorganisation or from structure to chaos in the universe all the time. This statement may be frightening to hear for the first time. But if we look around we see that this indeed is true everywhere. Everything in the world decays or perishes

with time. Buildings eventually collapse, groups disintegrate, vehicles break down, the living dies, empires perish, and civilisations disappear. Indeed, organisation seems to be against the ethos of Nature, chaos seems the natural state of things. That means organisation can happen only at the expense of constant effort, meaning disorganisation of something else. There is no free lunch. But if one pays some thing, one can get some thing. In other words, a living entity can continue to live only if it absorbs the energy and building blocks released by the degeneration of some other entity. That entity is

*Corresponding author. E-mail: zakiuddinali@gmail.com.

food. The original food in the world comes from photosynthesis, which itself in turn occurs at the expense of nuclear reactions in the sun. An infinitesimal bit of the energy released by the nuclear reaction in the sun is absorbed by the chlorophyll located in the green leaves of plants, which enables carbon dioxide from the air and water coming up from the roots to combine to form a primordial sugar. This sugar is then modified and polymerised to form starch, which is stored in some organ of the plant to be used by itself or by its offspring later or by another living entity for its body and soul (after eating). The primary food in the world is thus the seed or other plant organs where the starch formed out of the primordial sugar has been stored. It is like a battery where the electricity from the line has been stored in a dry cell to be used later when and where the need arises. Likewise, the energy of the sun's nuclear reaction is stored via the primordial sugar and starch in the seed to be eaten and digested by a living entity as food and reconverted into energy again later whenever and wherever the need arises.

Cereal grains: Our staple food

Cereal grains form the primary staple food of humankind. Their special importance lies in the fact that cereals are naturally dry, so are not readily perishable; hence they can be stored for long periods. So cereals, unlike most other foods, can be grown once (or perhaps twice) in a year, but eaten all the year round. Domestication of cereal crops some ten to twelve thousand years ago thus formed a watershed event in the history of humankind.

Some half a dozen or a few more cereal crops are grown in the world. Of these, three are major – rice (paddy), wheat and maize –, the remaining being minor (barley, sorghum, rye, oats and millets). The three major cereals are all produced in more or less similar amounts – in the range of around 700 – 800 million tonnes (Mt) in a year each as of now. The remaining grains together form another 300 Mt or so. In this way, at the present time, about 2,500 Mt of cereal grains are produced in the world annually, of which rice (paddy) forms about 27%.

Ironically, although originated and nurtured as human staple food, all cereals are not necessarily used as such in today's industrialising world. Of the three major cereals, rice and wheat are both of primary importance as food, the two for two different reasons. Rice, although not the largest cereal crop, is the largest staple food source (see below). Wheat, if second in terms of quantity of use as a staple, is important because of its one extraordinary quality: It is the only cereal which can be leavened by itself and hence can be baked into a fluffy bread.

Maize, although the largest crop in terms of production, is of less importance as a staple, because people in industrialised countries, in their false arrogance of

abundance, use it (along with sorghum) largely for making animal feed and, lately, for preparing biofuel, apart from making industrial products (primarily starch, liquid sugar). Minor cereals and millets are mostly grown and used by peasant and tribal societies for self-consumption (and/ or for industry).

Importance of rice

Rice is of extraordinary importance for more reasons than one. First is as food, for, although it forms hardly 27 to 28% of the world's total cereal production, it is said to feed the largest number of people in the world as a staple food. As a matter of fact, many agricultural scientists claim it feeds half the world. The *Rice Almanac* (Maclean et al., 2002), the rice data source book prepared by the International Rice Research Institute (IRRI) along with three other international organisations, makes the following statements among many others:

- (1). Domestication of rice ranks as one of the most important developments in history. Rice has fed more people over a longer period than any other crop.
- (2). Rice is the staple food for the largest number of people on Earth.
- (3). Rice is eaten by nearly half the world's population.
- (4). Rice farming is the largest single use of land for producing food.
- (5). Rice is the most important economic activity on Earth.
- (6). Rice is the single most important source of employment and income for rural people.

The World Rice Research Conference held in Tokyo as a closing event for the International Year of Rice 2004 summarised the situation as:

'Rice helps feed almost half the planet on a daily basis, employs tens of millions in jobs they cannot live without, and has an enormous impact on our environment ... rice production has been described as the world's single most important economic activity.'

Two attributes of rice are emphasised here. First it is a food and the second as a provider of employment and economic activity. As food, how a little over a quarter of the world's cereal production can ostensibly feed half the people of the world is a mystery, on which we will have an occasion to comment a little later. The other aspect is the suggested importance of rice as a generator of economic activity in the country and as a provider of employment. This is of course mainly true in the specific context of the economic state of most of the rice-producing countries in the past one or two centuries. Being mostly colonies in the preindustrial and

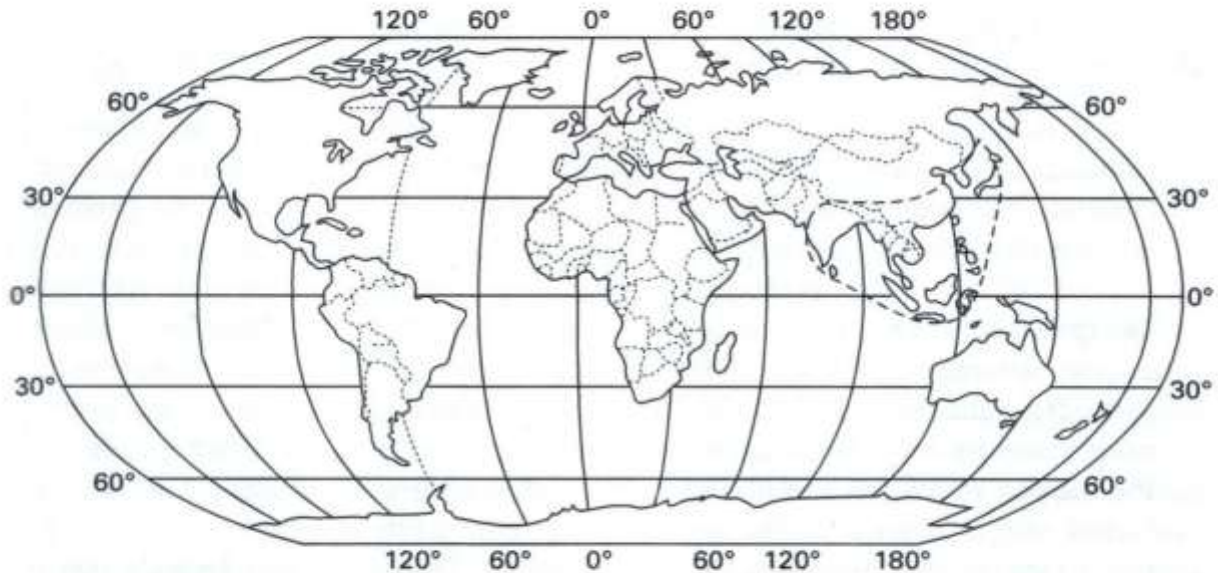


Figure 1. World map, highlighting the Region of Rice Civilisation [Reproduced with permission from Bhattacharya (2011)]

underdeveloped stage a little over half a century ago, the production, processing and utilisation of rice in these countries obviously played a major role in their economy and employment status in the past, and might probably do so to a fair extent even today. Considering the nature and gigantic scale of the work involved, mostly at a low technological level – land preparation, irrigation, sowing, transplanting, weeding, harvesting, drying, storing, transporting, processing, marketing – and the dismal employment position in these societies then, the role of rice as a significant part of the economy and as a last-resort provider of employment in a mostly poor country can be well appreciated. But this attribute of rice (or of any staple) has now decreased and should progressively further decrease in importance as the countries grow in their economic status.

DISCUSSION

The puzzles of rice

But apart from its value as food and as a provider of employment and economy, as referred to earlier, rice has many other surprising attributes and associations. As a matter of fact, it is associated with many puzzles and paradoxes which place the grain and the areas where it is grown in a unique position in history. It is the major aim of this presentation to examine and discuss the uniqueness of rice from various angles, and to explore and comprehend as to how it has been possible for this tiny grain to support the humankind through the history, shaping the life and culture of people in the region of its prevalence. The tenets of consideration have been; the

agro-climatic and geographical features of the region, the concentration of rice cultivation in this area, the diversity as well as the commonality in the culture and the people, the important role rice plays in their lives, and the concentration of human race in the region over the last millennium or more. The analysis and interpretation of the issues concerned are presented below.

Diversity and concentration of rice production

We start with the case of the world distribution of production of rice (paddy) as a crop. All agricultural scientists are unanimous that rice is very adaptable and can be grown under widely diverse conditions. Indeed rice is grown widely, in all continents (other than Antarctica), in some of the hottest as well as the coldest places in the world, in very wet (even 1 to 2 meters under water) to very dry regions, up to 53°North to 40°South latitude and from 3,000 meters above mean sea level down to the sea level. Yet the paradox is that a little over 90% of the world's rice crop is grown in a relatively tiny area of the world – the south, southeast and east Asia (Figure 1). Indeed, the region is so compact and well demarcated from the rest of the world and so well marked by rice production that it can be called the rice countries of Asia or, simply, the Rice Country, or perhaps more appropriately, the Region of Rice Civilisation (RORC), for reasons we shall see below:

Some unique material or physical attributes of the RORC

Specific agro-climatic features: Why has rice

Table 1. Land area and population density in the Region of Rice Civilisation (Rice Country)

Country	Land area		Arable area		Population	
	(% of world)	(% of its land area)	(% of world arable area)	(% of world)	Density(persons/ sq km)	
Rice country	14	21	25	54	202	
World excluding 'Rice Country'	86	11	75	46	28	

Source: This Table is a summary of detailed data presented in Tables 1.2 and 1.3 in Bhattacharya (2011) for approximate period 2005 - 2010. Reproduced with permission from Bhattacharya and Ali (2015).

production been so heavily concentrated in such a relatively small part of the world? Agricultural scientists have explained this concentration on the basis of agro-climatic characteristics of the region. The *Rice Almanac* (Maclean et al. 2002) says:

'Rice occupies an extraordinarily high proportion of the total planted area in South, Southeast, and East Asia. This area is subject to an alternating wet and dry seasonal cycle and also contains many of the world's major rivers, each with its own vast delta. Here, enormous areas of flat, low-lying agricultural land are flooded annually during and immediately following the rainy season. Only two major food crops, rice and taro adapt readily to production under these conditions of saturated soil and high temperatures.'

D.H. Grist, an authority on rice of yesteryears, has written (Grist, 1959) that these great flat rice lands were the results of erosion because of heavy precipitation and annual flooding by the great rivers (Yangtze Kiang, Hoang Ho, Mekong, Red River, Irrawaddy, Brahmaputra, Ganga, Godavari, Krishna etc.) and their vast deltas. He stated further:

'It is probable that paddy is grown because there is no other cereal which can grow under such high monsoon rainfall. Rice has enabled the populations of Asia to survive and indeed increase, because paddy checks – but does not entirely prevent – erosion. Had the people of Asia attempted to live by any other cereal, they could not possibly have maintained their high density population for thousands of years.'

In other words, the region is naturally endowed with certain specific physical and climatic features which also happen to make it especially suitable for production of rice. But this is only the beginning of its unique characteristics. The region has many other unique features as we see below.

Proportion of arable land: One of the little-noticed wondrous characteristics of the RORC is that its arable land area as a proportion of its total land area is very high

– one-fifth or more, about 21% to be precise (Table 1). This proportion is nearly double the corresponding figure (about 11%) for the rest of the world (total area of the world, excluding Antarctica, minus that of the RORC). That means there is something in the physical attributes of the region or in its prevailing civilisation and culture that makes for a high proportion of its land area being rendered arable.

Population density: If the above comparative proportion of arable land is a revelation, the status of the population density is stunning – again a factor rarely spoken of. What comes out on enquiry is staggering. It turns out that the proportion of people living within the RORC represents more than half of the total population of the world. The actual data corresponding to roughly the period of 2005 to 2010 CE are shown in summary form in Table 1. It shows that the RORC, representing only some 14% of the total land area of the world, has an arable land area of 25% of the world and a staggering 54% of the population of the world. To put these data in perspective, it means that the rest of the world (world minus RORC), with over 85% of the land area and 75% of the arable land area, carries less than half (about 46%) the number of people in the world. Put in terms of density of population, RORC currently shows a population density of 202 people for every square kilometre, the corresponding figure for the rest of the world being a mere 28 people per square kilometre! Such is the pressure of people on land in the RORC and, conversely, such is the capacity of rice to sustain that population. Thus, the widely-held belief or myth about rice feeding half the world must have originated from this fact (although nowhere explicitly stated, so far as noticed by us).

While the earlier mentioned data on the population of the RORC is stunning, there may still be a nagging doubt. These data pertain to the very recent times (around 2000 CE). Now we are aware that there was a great spurt in the population of the region (probably of the entire 'third world') during the twentieth century, especially around the period 1950 to 1980s CE. What if the high population percentage of the RORC as a proportion of the world as seen in Table 1 was only a reflection of that spurt and not

Table 2. Proportion of world's population in the region of rice civilisation through the historical period.

World population estimates (Million) in the year (CE)									
1	1000	1500	1700	1800	1900	1950	2000	2010	Source
226	267	438	603	-	1563	2525	6062	-	A
-	-	458	682	978	1650	2521	5978	6896	B
-	-	-	-	978	1650	2532	6123	-	C
-	-	-	-	-	-	2526	6128	6916	D
-	-	-	-	906	1609	2400	-	-	E
-	-	-	-	-	-	-	6122	6895	F
Proportion of world population (%) living in RORC*									
66	61	53	63	-	~54	52.3	56	-	A
-	-	~50	~58	~59	~53	~57	~56	~56	B
-	-	-	-	~60	~53	~52	~56	-	C
-	-	-	-	-	-	52.5	56.8	56.0	D
-	-	-	-	~64	~61	~56	~52	-	E
-	-	-	-	-	-	-	54.8	54.3	F

*Compiled from the data presented in the source indicated, A: Maddison (2007); B: Wikipedia (2015); C: GeoHive (2015); D: United Nations (2013); E: UBHD (2015); F: FAO (2012).

of that of the long-term historical trend? Examination of data pertaining to the period 1950 to 2010 CE, as obtained by Internet search, did not suggest any significant difference in the trend. Doubts still remained.

A careful search of the world's population distribution throughout the historical periods was therefore carried out in the Internet. What emerged was nearly as stunning as the initial data shown in Table 1. It transpires that the population of Asia and of RORC have always largely been surprisingly stable as a proportion of that of the world throughout the historical period (Table 2). To be precise, the population of Asia and that of the RORC have always been around 60 and 55%, respectively, of that of the world as a whole throughout the period, 1 to 2010 CE, despite large changes in the absolute numbers everywhere throughout the two millennia.

What emerges from all this exercise is really incredible. It shows that RORC, or the Rice Country in Asia, has always been an extremely highly populated region throughout recorded history, beyond any comparison with any other area. In that sense we can say that the RORC has always been, throughout history, one of the most – if not the most – important, perhaps the wealthiest and prized, regions of the world. The earlier mentioned population data (Table 2) thus set the rice civilisation region (RORC) as a distinct entity on Earth and indirectly testify to its primacy in the world in many respects. How it came about and what it meant are something for the historians and sociologists to explore. Also, how far rice as the region's main staple was involved in this denouement as a major or minor causative factor, or whether it was only an accidental association, is also something for agricultural and social scientists to

examine.

Other specificities of RORC

What we have shown earlier is that the RORC has certain unique physical or material specificities of its own. The 25-odd individual countries (20-odd giant (China, India) to small (Bhutan) and 5-odd tiny (Singapore) countries) have certain commonalities such that the region as a whole has acquired some sort of a common specific characteristic. But the region has certain non-material (cultural, historical, ideational) commonalities and regional specificities too.

Common socio-political history: In a rice-researcher's life, early in his/her career, an occasion comes when he/she feels baffled to contemplate upon an apparent rice paradox. This happens when one juxtaposes two widely accepted rice facts or proposition; that is to say rice is the most widely eaten staple food of humankind and, over 90% of world's rice crop is grown in a part of Asia. This is doubly baffling. On one hand, the two propositions seem irreconcilable at first sight (that is, until the issue is reconciled later after delving into the population data). On the other hand, most of this Asian region is clearly economically underdeveloped or at any rate had been very much so until a few decades back.

Japan is undoubtedly an exception, but one should not forget that this is rather a recent phenomenon. Japan was not much different from the others hardly a century back and became a modern industrialised country only

recently. So what was the clear association of rice with poverty due to? It is only after long reflection over many years that the mystery gets clarified when it is realised that it is but a case of being a part of a common historical process.

Actually, the RORC, unlike most other regions in the world, had a flourishing civilisation of its own until two or three centuries back. Then, due to certain confluence of historical factors, the industrial revolution happened in Europe and Europe marched ahead in economic development. This was soon accompanied by colonisation of virtually the entire rest of the world by Europe, including and especially the RORC, which thereby fell gradually into abject poverty. No doubt this state of affairs was not something unique for RORC but was common for the entire world (other than Europe and its extension).

But the preceding flourishing civilisation, the later active struggle for decolonisation, finally freeing themselves, and the subsequent economic stirring currently seen there, suggesting as if the region is rising again, surely make its case rather unique. What is noteworthy is that despite minor differences (for instance, China was never politically colonised, but the economic subjugation was identical), the process was common and very similar in the entire region and quite different from the other parts of Asia (west, central and northern Asia). It can therefore be well considered as a specific character of the region. No other region of the world seems to have gone through this historical process in totality.

Common cultural influence: Another tantalising commonality can be seen within the region. We are referring here to certain commonalities of cultural symbols and some common Indic influence within the region. Thus one can clearly notice an influence of Sanskrit in the languages of many countries of the region, especially the nouns. The way the words are pronounced are although different, the Sanskrit root of many words in the languages of Thailand, Myanmar (Burma), Indonesia, etc. is clear enough. Some mythologies are common too. Thus, the Ramayana story of India is a rather common popular narrative in many countries of the region (Indonesia, Myanmar, Thailand, etc.). Garuda, the name of a mythological bird in Ramayana, is the name of an airline in Indonesia. The famous Ankor Wat temple in Cambodia (Kampuchea), a world-famous structure, one of the wonders of the world, is dedicated to Lord Vishnu. The deep influence of Lord Buddha and of Buddhism throughout the region is well known. The fact that many of these traits seemingly originated from India, testifies to the apparently close cultural and civilizational mutual exchange within the entire region.

It is possible also that one could find other cultural or linguistic or ritual commonalities originating elsewhere.

Perhaps historians, anthropologists and social scientists might be able to identify or notice such influences originating from other countries. For instance, just to speculate, there might be subtle commonalities originating from Confucian or Taoist thoughts or Shinto practices or other philosophies, rituals and beliefs. However, all in all, the presence of a subtle commonality in the culture and civilisation of all the countries in the region is clear enough. That is the reason why we can call this region the Region of Rice Civilisation.

Some specificities related to rice *per se*

What we have discussed above is to point out certain commonalities and specificities, no doubt relating to rice but more specifically, to the RORC rather than to the rice grain. Let us now discuss the commonalities of perception about rice – the grain or the crop as a material and also as a concept – within the region.

Rice modulates community life

One may notice that rice is not just an item of food or economy, but a visible cultural symbol within the region. Within the RORC, the rice grain is very much a part of the rural community life and social organisation as well as a part and parcel of the community culture. The words for rice and food are synonymous in most languages of the region. People are invariably offered rice, meaning food, when they visit homes. The life of village people in the region revolves round the seasonal activities related to production of the 'golden grain'. Every phase of its production, including ploughing and land preparation, sowing, transplanting, weeding, harvesting and threshing is modulated with the progress of the season. In fact each phase is connected to a particular ritual, celebration, community activity and religious function.

Rice is sacred

Again, regardless that rice is a food, indeed the major part of the food in the region, the grain is also considered sacred. This adds another dimension to the unity and identity of the region of rice civilisation. The rice grain or cooked rice is part and parcel of all social and religious ceremonies. The newly married are blessed with grains of rice/paddy. Cooked rice is offered to the spirits of the dead. Rice is also offered in other religious ceremonies as a symbol of auspiciousness.

There is another striking aspect of the sacredness – the spirit of the rice grain. This aspect has been recently brought out by a massive study carried out by the UCLA (University of California Los Angeles campus) Fowler Museum of Cultural History. The Museum carried out an

extensive project running over several years and in several rice-growing countries of Asia. The outcome was a memorable travelling museum travelling from one land to another along with production of a multi-authored, beautifully illustrated, giant volume under the name 'The Art of Rice' (Hamilton 2003). The intention was to bring out the inherent features of the 'spirit and sustenance in Asia'.

The volume points out that in most rice-producing countries of Asia the rice grain is not just a food grain or an inert seed but a living all-pervading entity dominating all aspects of the community life. In most communities in Asia, the volume shows, rice and everything connected with the grain are considered to be endowed with spirits which need to be always protected, respected and propitiated. The grain, as preserved as seed, is said to have the spirit of rice which has to be properly protected and propitiated before sowing to result in a bounty of harvest, as well as for the wellbeing of the people. The perceptions, beliefs and rituals too are significantly, largely unaffected by differences in religious faith or economic status within the countries of the region. Every aspect of rice production cycle has to be preceded by proper ritual customs whereby the corresponding spirits are invoked and propitiated to see that one is rewarded with a bountiful harvest and also for a peaceful and happy community life. The author (Hamilton 2003) goes on to say:

'There are many beloved rice deities, especially goddesses, who create and protect the sacred grain; rice deities are associated directly with a bountiful crop as well as with prosperity more generally. Indeed, rice is so fundamental to the many Asian people who grow and eat it that it has become synonymous with life itself. A key tenet of rice culture is that rice is a sacred food divinely given to humans that uniquely sustains the human body in a way no other food can.'

The discussion continues to emphasize that this culture, or rice and its spirits and rituals connected with it, is religion or faith neutral in spite of the fact that a great religious diversity exists in the region, as he records:

'Hinduism is the majority religion in India, Islam in Indonesia, Buddhism in Thailand, Roman Catholicism in the Philippines, and so on. Many countries have mixed traditions, such as Shinto and Buddhism in Japan, or Taoism and Confucianism in China. Besides, minorities in each country follow their own faiths. Yet rice culture is expressed in all of this diversity like an underlying current. Clearly these aspects of rice culture, as related especially to rice spirit beliefs, would have been established before the development and spread of the major world religions.'

With all these unique and uniform characteristics as discussed earlier, the rice civilizational region can surely

lay claim to be a unique and distinct region in the world and be termed as 'Region of Rice Civilisation' or simply the 'Rice Country'.

However, the earlier mentioned considerations also raise many intricate sociological questions, a few of them enumerated below, which need to be answered to explain various observations and facts presented above. These could be the topics of further research.

Historical and sociological questions that the uniqueness of RORC raises

1. One of the unique physical characteristics of the Rice Country region is the high proportion of arable land that the 20-plus countries comprising the region display. This high proportion is not a statistical artefact but is displayed by almost all the individual countries comprising the region. Now if the flat lands, rivers and monsoon precipitations in the region are Nature's gifts, the high proposition of arable land cannot be entirely so. Human intervention also must have equally contributed to it. The question is why and how. Is it a by-product of the long period of rich civilisation that the region experienced? Is it because of a high population growth that the rich civilisation may have engendered? Was the somewhat favourable conditions for growing of rice and for agriculture in general in any way responsible for rendering more land arable – rice bringing prosperity, population growth, more effort?
2. A similar question arises about the extraordinarily high population density of the Rice Country region. This high population density is no statistical sleight of hand. The fact is this relatively tiny area holds more than half of the world's population. How did it come about? What sustains it? Demographic biology says population (not only human, of any genus or species) does not just increase (or decrease), it does so due to favourable (or unfavourable) circumstances, including primarily the availability of food. So what were these conditions here? What is the historical process that has been going on here for centuries and millennia that it retained its prime position throughout recorded history until it was colonised by a technological superior European power?
3. Another intriguing question is this: Why did this highly civilised and presumably advanced area not experience an autonomous industrial revolution on its own? What are the ingredients for industrial revolution in a society? What was missing here? Was, by any chance, the easy availability of food (rice) and consequent easy life make the society too 'soft' contented and phlegmatic? Was there an ennui, leading to lack of initiation or desire for adventure? Another parallel question is: why were these societies so easily conquered (or dominated) by outside invaders (or politico-economic forces)? Did they become too soft or corrupt or internally divided – partly because of easy food (rice)?
4. A final question is about the sacredness of rice,

including the deep, visceral emotional attachment to it. In this ethos, rice is much more than food, much more than a material or a technology or wealth; it is raised in a pedestal to the level of a reverent existence or a sacred concept. And, significantly, this is true even of post-industrial Japan, which is discussed further below. The point is: what explains this deep, primordial perception? Is there any parallel to this? One wonders. Do communities who grow and live on wheat or maize or millets display such raw emotions about their staple grain?

Clearly rice is much more than a food or commodity, and the RORC as much more than an inert territory or a geographical entity. These realities throw a strong challenge to anthropologists, sociologists and historians to unravel these mysteries.

Why the strong emotional bonding

The strong, almost blind, emotional bonding of people with rice, especially seen in Japan, as narrated below, is an especially striking sociological puzzle. A question that arises is: Is this relationship specific to rice or to Asia or else to what? There are many places in the world where rice is economically important or even the staple, but where the characteristic rice culture is not found. Examples are west Africa, the Caribbean, Madagascar, Egypt, Italy, Spain, parts in the United States, Brazil and Australia. Clearly then the emotional and spiritual connection of the rice people to rice may not be specific to rice *per se*.

Then is the emotional attachment to rice related to rice in Asia? Ken-ichi Matsumoto, Professor of International School of Economics and Business Administration, Reitaku University, Japan, presented a very interesting paper entitled 'The power of settled life – rice farming as a lifestyle' in the World Rice Research Conference 2004 in Tokyo (Matsumoto 2004a), which is relevant in this context. In this paper the author quotes a Japanese folklorist to say that the Japanese can be defined as rice farmers on an island. That is, Japan is defined by insularity and rice cultivation; also by settled life rooted in a community and a plot of land. He says:

'Now let us focus on settled rice farming as an ethnic lifestyle. The reward of your life as a farmer is to sustain your paddies and paddy terraces passed down from your ancestors. Issho-kenmei, a Japanese idiom for "do your best" literally means "maintain a piece of land for all your worth". This idea had been supported as an ethnical ethos of Japanese. This describes why Japanese pay more respect to the process of "doing your best" than to getting good results or high profits.

Sharing the ethos of isscho-kenmei, people living in an area work together to dig drainage ditches, build irrigation

systems and weed the whole village. The working group unavoidably encourages the development of a community system.

In these community work systems, innovations and processes to increase productivity develop in order to improve the ancestral farming land.' One can clearly see that rice production in Japan is not just food or economics;

It provides the core values of Japanese life and community. Similar emotional attachment to rice is seen to varying degrees in other rice-producing regions of Asia.

What does one ascribe this emotional attachment to?

Professor Matsumoto in another context wrote about 'mud civilisation', 'sand civilisation' and 'stone civilisation' (Matsumoto, 2004b). He defines the rice area in Asia as representing mud civilisation, the area around western Asia as the centre of sand civilisation and the modern European and American countries as the region of stone civilisation. He goes on to say that the skyscrapers in Europe and America symbolise stone civilisation in the sense that they want to dominate the world just as the skyscrapers seem to try and dominate the surroundings. Sand civilisation, he says, is characterised by lack of water, making it difficult for life to emerge and survive. As a result, monotheism, i.e., one God and also a father God, meaning male God, are its characteristics. This civilisation is also characterised by austerity but extraordinary networking. Mud, on the other hand, is conducive to life. Mud civilisation, therefore, is characterised by polytheism as well as by gods of both genders. This is especially true of mother gods, as a symbol of fecundity and promoter and protector of life.

This colourful and tantalising imagery is very evocative. But what precise Asian quality does it refer to?

One wonders on the basis of the discussions so far that the sentimental perception of rice may not be specific either to rice *per se* or to Asia. Is it then perhaps a preindustrial perception? In that logic, the attitude of say the California's rice farmer – who has no sentimental or spiritual attachment to rice and to whom rice is no more than a profitable crop to be replaced by another if that is more profitable – would be considered a postindustrial attitude.

But then the doubt would be, why do the Japanese – surely an industrial society for at least half a century – still have such a strong emotional bond to rice? Professor Matsumoto (personal communication) in this context has another significant thing to say. He quotes the Japanese creation myth *Kojiki*, according to which the Japanese

land was created by making the rice fields. The Japanese value of 'do your best' came from that myth.

Significantly even the industrial community in Japan, Professor Matsumoto says, uses the same phrase when imploring or promising that one must do one's best! Listen also to Ms. Satoko Musumi (then United Nations University Fund Coordinator, Yokohama, Personal communication, 2010):

'RICE is NO commodity for business for Japanese, even for the young, alien-like generation. RICE is our blood, even its annual consumption dropped from 120 kg+ (in the 1950s) down to 58 kg today.

It's still not a mere calorie-, nutrition- or biological stomach-filling resource.

Much more than cultural/ritual/historical. Japan's presence exists on RICE as much as on Toyota, Sony, Camera, Anime industries!'

(Emphasis in original). Clearly, rice and rice civilisation are a rich, complex, historical and civilisational entity waiting to be fully explained and understood by anthropologists, sociologists and historians.

Is 'mud civilisation' waking up?

While on this subject, it may not be out of place to mention one interesting phenomenon: the economic stirring currently being seen in these countries. As the twentieth century was coming to a close, there were clear signs that the rice countries of Asia were beginning to stir. Japan had already changed completely since the 1950s. Then came the 'Asian tigers' – South Korea, Taiwan-China, Hong Kong-China and Singapore. It was then the turn of China, which today looks like a giant in making. And now India, Vietnam, Indonesia and Malaysia are all clearly showing signs of being on the go. Does it mean that there is something in the 'mud civilisation' that made it flourish in the past, then decline, and now rise again?

Diversity within unity

With all these commonalities in agriculture, food habits, life style and cultural traits, it would be wrong to think that the RORC is an undifferentiated monolith. It is interesting that there is actually a systematic diversity in the type of the rice within the region. Around 90% of the solid matter of rice is starch. Now starch is of two kinds, called amylose and amylopectin. More amylose makes rice cook firm and fluffy, less amylose makes for soft and sticky cooked rice. It is found that there is a systematic variation in the kind of rice within the RORC. The RORC can be hypothetically divided into three fairly distinct zones: (A) east, (B) southeast and (C) south Asia (Figure 2). There is an interesting systematic gradation of the kind of rice among these three zones which can be

summarised as follows:

1. Two of the zones (zones B and C) lie in the tropical or the subtropical region. The other (zone A) falls in the temperate region (Japan, Korea and northern and eastern China) (Figure 2).
2. The prevailing agricultural growing temperature varies accordingly. Thus, rice is grown in extreme cold conditions in the northernmost part of Japan (Hokkaido island) in zone A, as against that grown in the warm and humid climate of south and southeast Asia (zones B and C).
3. There is a striking gradation in the type of rice grown among the three zones. That grown in the relatively cold and temperate climate of East Asia (zone A) is what is called the japonica type of rice. The grains are relatively short in size and roundish in shape. They also have a relatively low content of amylose starch and cook soft, moist and sticky. In contrast, the rice grown in the relatively warm, humid, tropical and subtropical areas of southeast (zone B) and south (zone C) Asia is indica type. The grains are rather longish in size and slender in shape with more amylose starch.
4. But there is a difference between the two latter zones (B and C) also. Though both grow indica rice, the rice in zone B has by and large an intermediate amount of amylose starch while that in zone C possesses a high amount of amylose starch. So rice in zone B cooks to an intermediate, soft consistency, but that in zone C largely cooks rather hard (firm), dry and discrete.
5. As a result, the texture of cooked rice varies accordingly, as shown in Figure 2 with the arrow. While in the east region (zone A), the rice by and large cooks soft, sticky and moist, that in south Asia (zone C) cooks relatively hard, integral and dry. Indeed people in south Asia are so much enamoured of relatively hard-cooking rice (high amylose), that a vast section of rice eaters here (about 65%) prefer to eat parboiled rather than raw (i.e. non-parboiled) rice. One should note that parboiling makes rice still more hard-cooking. The rice of Southeast Asia (zone B), located in the middle, is indeed intermediate between these two extremes. So there is a gradual and systematic gradation of the preferred rice texture from east to southeast to south of Asia (see Fig. 2) – soft (zone A) to intermediate (zone B) to hard (zone C).
6. As a parallel to the above differences in the type of rice, there is another interesting and amusing difference among the respective people. This is in relation to their liking for the process of ageing of rice. It is well known that rice ages after harvest and progressively becomes hard-cooking with time of storage. While people in south Asia (zone C) heartily dislike soft and sticky-cooking freshly harvested rice and prefer aged rice, those in Japan and other regions of east Asia (zone A) prefer the opposite. They like freshly harvested rice and heartily dislike aged rice. People of Southeast Asia (zone B),

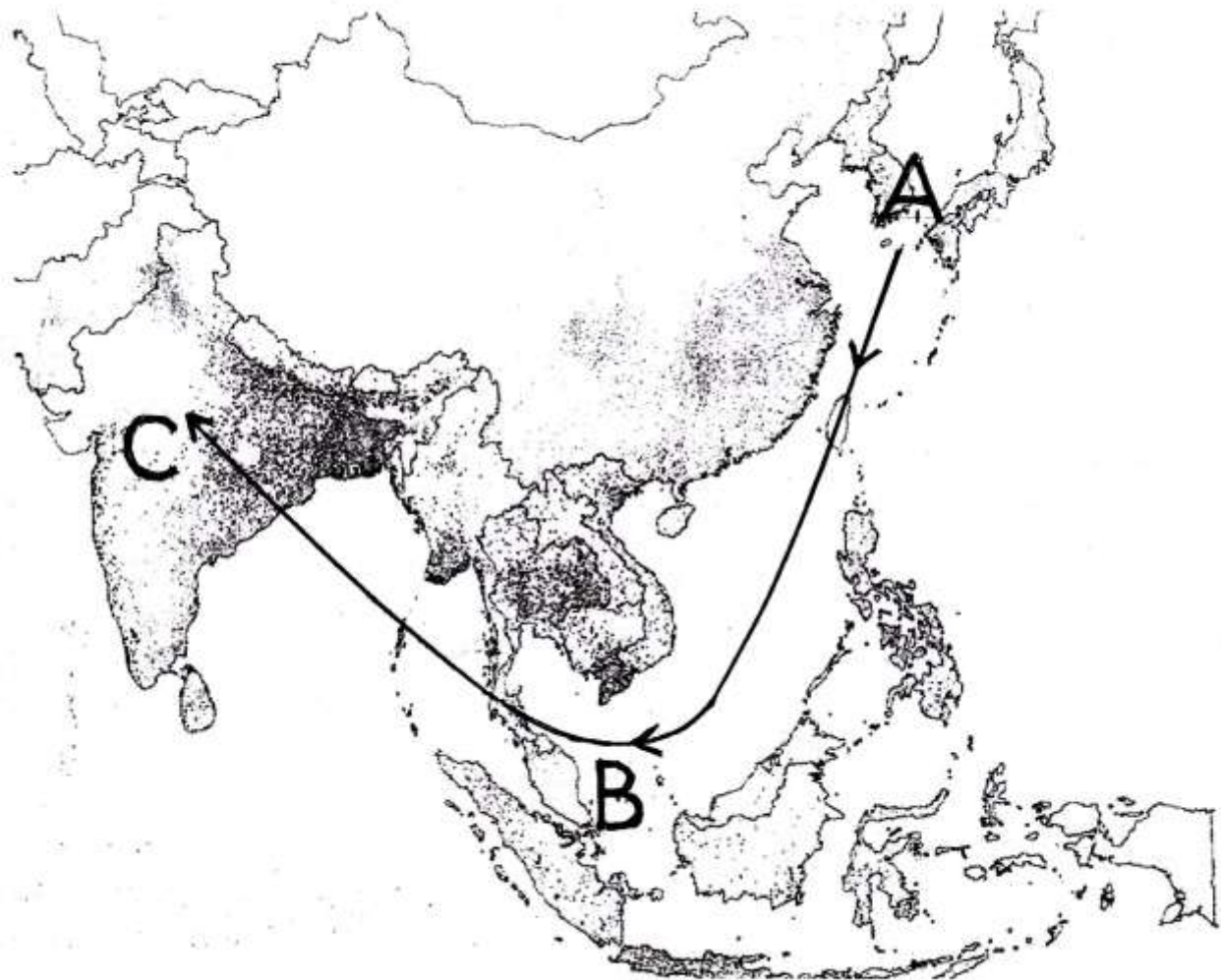


Figure 2. Map of the region of rice civilisation. Over 90% of world's rice is grown and consumed in 20-25 tiny to giant countries in east (zone A), southeast (zone B) and south (zone C) Asia. The original map is reproduced from IRRI (2007). The arrow (depicted by author) shows the gradation of texture of cooked rice from soft and sticky (zone A) to firm and free-flowing (zone C). Reproduced with permission from Bhattacharya and Ali (2015).

true to their middle position, are indeed in between. On the whole they prefer aged rice but are not so emotionally attached to it.

7. Another interesting difference exists. While a majority of rice snack products made in east (zone A) and southeast (zone B) Asia are a number of wet-ground and cooked rice cakes, the most common rice snack in south Asia (zone C) is granular whole-grain products (puffed and flaked rice).

8. Finally waxy rice (which has no amylose starch, so cooks very sticky and soft) is used fairly commonly, both for cooked table rice and for snacks, in southeast and east Asia (zones A and B). But waxy rice is not at all common in south Asia (zone C).

So, the RORC or the Rice Country is a case of a striking unity containing a systematic material diversity within.

CONCLUSION

Over 90% of world's rice is grown in 25-odd countries in south, southeast and east Asia. This region, a mere 14% of total land area, contains more than one-fifth of the total arable land on Earth. It is endowed with highly favourable agro-climatic and geographical features that are ideally suited for rice cultivation. With a very high population density (more than 9 times than for the rest of the world), this region has been carrying more than half of the human race throughout the recorded history. The countries of this region also have a fairly identical socio-political history of being a highly civilised region for millennia in the past, but missing out the industrial revolution, colonised by the industrialised Europe, going through prolonged struggle for decolonisation, achieving the same, and now showing the signs of rising again.

Despite country to country differences in popular religious faiths, the entire region shows a fairly strong cultural similarity – many seemingly originating from India, testifying to the apparently close cultural and mutual exchange within the region. Rice is considered sacred in the region. It dominates the village life and culture, modulating the community activities, life style, rituals, social organisation and celebrations – all connected with different phases of rice cropping. This entire region could thus be termed as ‘Region of Rice Civilisation’.

However, the earlier mentioned recognition as an entity also raises some intricate sociological questions. For example, whether it was due to human intervention that the proportion of arable land is double than seen in the rest of the world? How is it that this tiny (14%) land area of the Earth has been holding more than half of the world’s population for millennia in the past? What is the historical process that has contributed to its prime position throughout the recorded history until it was colonised by industrialised Europe? Why did this highly civilised and presumably advanced region miss out its own industrial revolution? These questions therefore call for further research to unravel the mysteries.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Bhattacharya KR (2011). *Rice Quality: A Guide to Rice Properties and Analysis*. Cambridge, England, Woodhead Publishing.
- Bhattacharya KR, Ali SZ (2015). *An Introduction to Rice-grain Technology*. New Delhi, India, Woodhead Publishing India.
- FAO (2012). *FAO Statistical Year Book 2012, Economic and Social Welfare Department, Food and Agriculture Organization of the United Nations, Rome* <http://www.fao.org/docrep/015/i2490e/i2490e01a.pdf> (Accessed May 8, 2015).
- GeoHive (2015). *Population by continent*. http://geohive.com/earth/his_history1.aspx (Accessed July 7, 2015).
- Grist DH (1959). *Rice*. 3rd edn, Longman Group, London.
- Hamilton RW (2003). *The Art of Rice: Spirit and Sustenance in Asia*. Los Angeles, CA, ULCA Fowler Museum of Cultural History, University of California.
- IRRI (2007). *Annual Report, International Rice Research Institute, Los Banos, Laguna, Philippines*.
- Maclean JL, Dawe DC, Hardy B, Hettel GP (2002). *Rice Almanac*. 3rd edn, Los Banos (Philippines), International Rice research Institute; Bouake (Cote d'Ivoire), West Africa Rice Development Association; Cali (Columbia), International Center for Tropical Agriculture; Rome (Italy), Food and Agriculture Organisation.
- Maddison A (2007). *Historical Statistics for the World Economy: Statistical Appendix (2007, ggdc.net)* https://www.ggdc.net/maddison/Historical_Statistics/horizontal-file_03-2007.xls (Accessed May 7, 2015).
- Matsumoto K (2004a). 'The power of settled life - Rice farming as a lifestyle', Plenary lecture, World Rice Research Conference, Tokyo, 5 November.
- Matsumoto K (2004b). 'The civilisation of mud', *Reitaku J Interdisciplinary Studies*, 12(2):17 - 27.
- UBHD (2015). *University of Botswana History Department, Estimated world population, 1800-1950*. <http://www.thuto.org/ubh/h202/wpop1.htm> (Accessed August 18, 2015).
- United Nations (2013). *World Population Prospects, The 2012 Revision. Vol. II: Demographic Profiles*. Dept. of Economic and Social Affairs, Population Division, United Nations, New York. https://esa.un.org/unpd/publications/Files/WPP2012_Volume-II-Demographic-profiles.pdf (Accessed July 23, 2015).
- Wikipedia (2015). *World Population – Wikipedia* https://en.wikipedia.org/wiki/World_population (Accessed July 15, 2015).