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Jesurathnam Devarapalli
Pondicherry University

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ARTICLES

Natural Disturbances and Cultural Responses on a River Island in Andhra Pradesh

JESURATHNAM DEVARAPALLI

Abstract

Ayodhya Lanka is a river island situated in Vasista Godavari in Andhra Pradesh, India. The island, due to its strategic location in the channel bed, is endowed with rich alluvial soil and provides a rich ground for fishing operations attracting both farming and fishing communities who made their permanent abode on it since times immemorial. Owing to certain special physiographical and ecological features the island possesses five ethno-ecozones (micro-environments) that are effectively managed and exploited by the islanders under the fluctuating environmental conditions. As such, the island is exposed to three important recurring natural disturbances such as perennial floods, erratic rainfall and frost of which the first one has very serious consequences. Depending upon the level of inundation the flood situation is distinguished as normal and severe. It is these severe floods that are having a telling effect upon the life and economic endeavors of the islanders. The islanders respond to these natural disturbances through a battery of cultural responses in order to effectively adapt to natural circumstances. This study is intended to show how the different natural disturbances trigger a set of cultural responses, the manner in which they are interrelated, and ultimately how they allow for a suitable adaptation to the island environment. The study concludes with an observation that economic stability plays a significant role in the process of developing a viable adaptation to the natural disturbances of the island.

Introduction

An important ecological parameter that has a bearing on resource exploitation and that necessitates socio-cultural adjustment is ecological fluctuation or disturbance in multiple forms. These ecological fluctuations/disturbances are also known as calamities, disasters, devastations, catastrophes, etc., depending upon the intensity and the amount of loss to both social and physical environments. Natural calamities deserve special analytical attention in order to observe socio-cultural implications that they bring about in societies.

The studies of environmental hazards gained momentum in anthropology along with ecological studies in the 1960s. Such studies viewed the

natural disasters as socio-cultural events rather than as physical calamities alone (Lessa 1964; Schneider 1957; Spillius 1957). Drought is a global phenomenon that is widely studied among the African populations where it is a recurring event (Colson 1960; Lovejoy and Baier 1975). A detailed study of hurricane devastation is available from the works of Firth (1959), Lessa (1964), Tonkinson (1968, 1979), Palacio (1976) and Marshall (1977). Responses to devastative frosts are studied by Waddell (1974) and Margolis (1973, 1978). Floods and their impact upon the socio-cultural systems were attempted by many anthropologists (Almagor 1971; Gluckman 1941; Greaves 1973; Hackenberg 1962; Scudder 1962).

Approaches to these early disaster studies were broadly categorized into two types which are fundamentally contrasting according to Torry (1979). His analysis shows that most of the disaster studies project the theme that tribal societies maintain long-term stability in a harsh and capricious environment, under aboriginal conditions, through a battery of institutional safeguards. He refers to this approach as homeostatic. The studies based on societies under the influence of modernizing pressures present disaster agents as one of several forces which disrupt social stability and promote change, which Torry termed developmental. To avert the dangers due to natural calamities, human groups adopt strategies of transhumance and mass dislocation of settlements as recorded in ethnographic reports. The seasonal shifting of residence coincides with the seasonally fluctuating water levels (Evans-Pritchard 1940; Kjekshus 1977; Turton 1977). Some scholars contend that natural hazards are followed by the decline and disappearance of cultures (Dales 1966; Raikes 1965; Raikes and Dales 1977). Wallace (1956) has claimed that disasters are “isolated and annoying interruptions of norms” that create “breaks in patterns.” This paper is aimed at understanding the impact of natural disturbances faced by a river island community and the role of native wisdom in mitigating the crisis situations.

Social Composition

The present study is conducted on Ayodhya Lanka, a human-inhabited island situated in the river Vasista Godavari in Andhra Pradesh, India. The island has an area of 4.6 square kilometers and is surrounded by water year round. The 556 households of the island are distributed in ten settlements. Seven of these settlements—Manikondavaripet, Pallipalem, Baddevaripet, Mattaparthi Musalaiahpet, Gudalavaripalem, Pithalavaripet and Agnikula Kshatriyula colony—are clustered in the northeastern part of the island, which is popularly referred to as Marrimula. The remaining three settlements, Yatamvarikapupalem, Muppinavaripet and Merakapalem are located in the southern part of the island. The island population of 2768 persons with almost equal representation of males and females is heterogeneous based on caste. The four major castes **Kapu**, **Settibaliya**, **Marakallu** and **Mala** constitute 98.20 percent of the population (Table 1). Of the remaining population belonging to 13 households, seven of the households are of **Mala Dasu** and three are of **Madiga**. These two castes along with Mala are a part of untouchable castes in the traditional caste hierarchy commonly referred to as **Panchamulu**. The remaining three households are one each of **Brahmin**, **Vysya** and **Rajulu** caste, who are all recent immigrants and are twice born castes occupying a place above Kapu. For all these people Telugu is the mother tongue.

Table 1. Population distribution by caste.

Name of Caste	No. of Households	Percent of Household	Male	Female	Total	Percentage
Kapu	157	28.24	383	375	758	27.39
Settibaliya	135	24.28	319	350	669	24.17
Marakallu	110	19.78	290	278	568	20.52
Mala	141	25.36	363	360	723	26.12
Mala Dasu	7	1.26	11	14	25	0.90
Madiga	3	0.54	6	6	12	0.43
Vysya	1	0.18	4	2	6	0.22
Brahmin	1	0.18	4	1	5	0.18
Rajulu	1	0.18	1	1	2	0.07
Total	556	100	1381	1387	2768	100

Table 2. Population distribution by settlement and caste.

Settlement Name	Caste									Total
	Kapu	Settibalija	Marakallu	Mala	Mala Dasu	Madiga	Vysya	Brahmin	Rajulu	
Merakapalem	-	185	-	-	-	-	-	-	-	185
Muppinavari pet	-	-	-	180	-	-	-	-	-	180
Kapupalem	733	92	-	-	-	-	-	5	-	830
Agnikula Kshatriyula colony	-	60	143	-	-	-	-	-	-	203
Peethalavari pet	-	21	-	66	-	-	-	-	-	87
Gudalavari palem	-	157	-	27	-	-	-	-	-	184
M.Musalaiah pet	-	122	5	-	-	-	-	-	-	127
Baddevari pet	-	-	-	211	25	12	-	-	-	248
Palli palem	-	-	420	6	-	-	6	-	-	432
Manikodavari pet	-	-	-	203	-	-	-	-	-	203
Scattered in coconut grove	25	32	-	30	-	-	-	-	2	89
Total	758	669	568	723	25	12	6	5	2	2768

All the Kapu of the island stay in Kapupalem settlement which is the single largest settlement on the island. This is the centre that controls the affairs of the governing **panchayat**¹ and is the hub of village politics. The Kapu settlement consists of rows of houses on either side of lanes. The houses are built with spacious courtyards extending from 5 to 10 **cents** (equivalent to 1/20th to 1/10th of an acre). The Settibalija, however, are distributed over six settlements, three of which constitute the single largest group (Merakapalem, Gudalavaripalem and Mattaparthi Musalaiah pet). They are in minority in the other three settlements. The Marakallu reside in two settlements – Agnikula kshatriyula colony and Pallepalem. These two settlements have parallel, planned streets. Earlier, these fishermen used to live in two congested settlements. As these fishermen have no land ownership on the island, the government purchased **jiraithi**² land and allotted a house plot of 5 cents to each nuclear family. The remaining four settlements are occupied by the Mala – Manikondavaripet mostly by **Manikonda** lineage. Baddevaripet, Pithalavaripet, and Muppinavaripet are the three other settlements of Mala (Table 2).

Of the nine castes inhabiting the island, the top ranking caste in the local hierarchy is Kapu by its numerical strength, economic growth and political power. Though the Mala are also close to Kapu in numbers, economically and politically they lag behind. In that sense Settibalija also dominated the Mala with respect to local ranking, followed by Marakallu who claim a higher status than Mala and Maladasu. The lone Vysya and Rajulu families, though insignificant in the local affairs due to their recent entry, enjoy respect among all the castes. The lone Brahmin, despite not performing the sacerdotal functions, commands respect and reputation from all sections of the island population by reason of his medical services, as well as due to his ritual status. The Madiga, who are numerically insignificant and economically poor, are considered lower than Mala, though Madiga, Mala and Mala Dasu together termed **Panchama**³ are lowly placed in the eyes of all other castes. Food taboos prevail among these three castes, based on the concept of purity and pollution (Kolenda 1997:66; Dumont 1970:59-61).

Political power is exercised by the Kapu whether or not **sarpanch**⁴ is from their caste. Even

Table 3. Land holdings by caste.

Caste	Landless Households		Land-owning Households	
	Number	Percentage	Number	Percentage
Kapu	27	17.20	130	82.80
Settibalija	31	22.97	104	77.03
Mala	53	37.59	88	62.41
Marakallu	106	96.36	4	3.64
Mala Dasu	4	57.14	3	42.86
Madiga	3	100.00	-	-
Vysya	1	100.00	-	-
Brahmin	-	-	1	100.00
Rajulu	1	100.00	-	-

the Mala sarpanch works as per the tune of Kapu leadership. Though no strict **jajmani**⁵ system prevails, the Panchama still have clientele relationship with Kapu. This tendency actually leads to the social denigration of the Panchama, that a Kapu boy can address an old Panchama man or woman by name or even by derogatory terms.

Hinduism prevails on the island. The temples originally located in Kapu settlement and all the major festivals are organized under the leadership of Kapu, and even the Settibalija cannot be active participants. This led to development of two other temples – one in a Settibalija settlement and another in the **lanka**⁶ land of Settibalija. The beleaguered Panchama can not find any respectable place in these religious activities and as such they are only outside spectators and a few of the Mala converted to Christianity.

Occupational Structure

In the words of White (1959:51) “some habitats are suitable for agriculture, a pastoral economy, or fishing, manufacturing, etc. And others are not.” Agriculture and fishing are the two major occupations on the island. Agriculture is practiced by all caste

groups on the island except Marakallu who subsist upon fishing alone. Literally Kapu means **kayuvadu** ‘who takes care of land’ or ‘farmer.’ Most of the Kapu subsist upon agriculture. They are the largest landholding group, as 83 percent of them own land. Their per household acreage is higher than other castes, except for the one Brahmin (Table 3). The remaining 17 percent of landless Kapu work as agriculture labor or carry out jaggery and coconut business, and a few look after coconut gardens of absentee landlords. Among the Settibalija, 77 percent of the households possess land. Out of these, a great majority own land ranging from 0.5 acres to 4 acres. Only one Settibalija joint family owns over 10 acres. Unlike the Kapu, both men and women equally take part in agriculture activities. Landless Settibalija work as agriculture labor. A few of the Settibalija boys work as **palerlu** (annual farm servants) under Kapu. But Kapu do not work as laborers under Settibalija and Mala. Only eight of the Settibalija families follow their traditional occupation of toddy taping which is only seasonal, i.e., during flowering season of the palmyra palm.

Of Malas, 38 percent (i.e., 53 out of 141 households) do not own land. Twenty eight of the 53 landowning households possess less than half an

acre of land, and the largest Mala landholdings are 3.5 acres, owned by two households. As the output on these small plots is not sufficient to maintain the family through the year, all Mala families work as agriculture laborers under any caste group on the island or the mainland. Many of the adolescent boys and even married men work as palerlu under Kapu and Settibaliya. Broom making is common among Settibaliya and Mala women and girls. Both Settibaliya and Mala women work as daily wage laborers.

Mala Dasu are traditional priests who used to perform life crisis ceremonies for Mala, but now their services are not utilized and only three households have land; they all eke out their livelihood through daily wage. Three families of Madiga are landless laborers, while two of the Madiga youth work as palerlu for a non-resident landlord. The lone Brahmin, Vysya and Rajulu are the recent immigrants to the island and all are landless except Brahmin. The lone Brahmin man is the unqualified medical man while the Vysya carry out their traditional business (provisions shop). The Rajulu family guards the coconut grove of one of the landlords.

Though the island Marakallu live with the farming communities, they have developed neither skills nor interest in agriculture. They solely subsist upon year-round fishing, except for four families who live by ferrying. When profitable catches are not possible around the island, a few of the fishermen migrate for short periods to **Narasapuram** or **Antarvedi** (coastal villages) where the waters are deep and provide plenty of fish. The Marakallu women sell the fish on island or in the **shandies**. There is a taboo on the participation of unmarried girls in fish marketing. The undisposed fish are dried and preserved for marketing. Thus optimum utilization of fish resources is observed. None of the fishermen work as agriculture laborers, except a few of the women during harvest, when higher wages are paid.

Crop Pattern

The crop pattern of the island is designed taking into consideration land type, title deeds and flooding season. With the introduction of seed cultivation (sorghum and maize) in the early 1970s, the crop pattern on the island has undergone substantial

changes. Some of the traditional crops like tobacco (*Nicotiana tabacum*), red chillies (*Capsicum annuum*), water melons (*Citrullus lanatus*), millets (*Panicum miliaceum*) and **budam** paddy (e.g., *Oryza spp.*, a native variety) were discontinued, while some have assumed lesser significance with reduced acreage and periodicity like vegetables, green leafy vegetables, etc. As the people's primary concern has shifted to sorghum (*Sorghum spp.*) and maize (*Zea mays*) cultivation, vegetable crops are relegated to secondary place and are restricted to only certain periods of the year. During the period from October to June when sorghum (CSH-6) and maize (D-103) are cultivated, we see only a few small vegetable plots, too small for seed cultivation. From July to September in the flooding season, only a few vegetables, green leafy vegetables, and maize (for local consumption and not for State Seeds Development Corporation—SSDC) are raised. All these crops are cultivated in the **lanka** lands (the land types explained in the following section). The most desired and monopolizing crop on the island is coconut (*Cocos nucifera*). All the jiraithi lands are covered by coconut palms, and some of them are nearing 100 years old. All the land owners on the island want to have coconut gardens, as it gives continuous income with the least investment. The other important reason for the affinity for coconuts is that coconut palms are a good adaptation to recurring floods. As the initial investment to raise a coconut grove is very high, the islanders have accepted to under take seed cultivation for the State Seeds Development Corporation because it is highly remunerative, and thus these profits can be used for raising coconut gardens.

Local Politics

The traditional caste councils are gradually losing their significance in urban and rural areas (Ahuja 1994:248-249), and the democratic village panchayat have carved out their niche and begun to operate in every part of the country. The study island is panchayat-lead, with an elected council headed by the sarpanch. The sarpanch along with the council of representatives is responsible to provide civic and welfare facilities. This village administrative unit also includes the **munsiff**,⁷ who is the government appointee. The

panchayat plays a vital role in redressing crises situations faced by islanders, whether natural or social in origin. There are three big men on the island who are rich and play a proactive role in all affairs. Two big men from the island belong to the Kapu caste. One of these big men is from Yatam lineage of Kapu, the then sarpanch of the village. He enjoys the support of all his lineage members along with the members of **Nalla** and **Chittnidi** lineages of Kapu. The second big man is from **Gorre** lineage, supported by Kapu lineages of **Posimsetti**, **Jaddu**, **Addala** and **Kanchustambham**. These two big men try to win the support of all other castes in addition to their own caste men by showing benovelence and charity. They strive to win the hearts of the islanders with an intention to capture political power. The third big man is the absentee landlord hailing from **Kshatriya** family. He is the largest producer of coconuts on the island. He liberally contributes to the islanders at individual and as well as at caste level. His intention is not to capture political power on the

island but to ensure safety and security of his wealth on the island, and to enjoy popularity.

Ethno-ecozones

The island appears to be a single undivided entity to outsiders, but inhabitants have divided the island into five ethno-ecozones (classification according to native wisdom) based on observable physical features. The ideal cross section of the island (Figure 1) has a rough pyramid-like appearance, with jiraithi land on its top flanked in the lower gradients on either side with the remaining four zones – Lanka land, **Dubbula badava**⁸, **Thippa**⁹, and the Godavari River.¹⁰ Each of these ethno-ecozones is characterized by certain special features, such as soil condition, flora, fauna and their degree of exposure to floods. The jiraithi land, which is protected from the recurring floods due to its elevation, is ancestral property of the owners and is occupied by coconut groves. At its lower gradient on either side, jiraithi land is followed by the lanka land

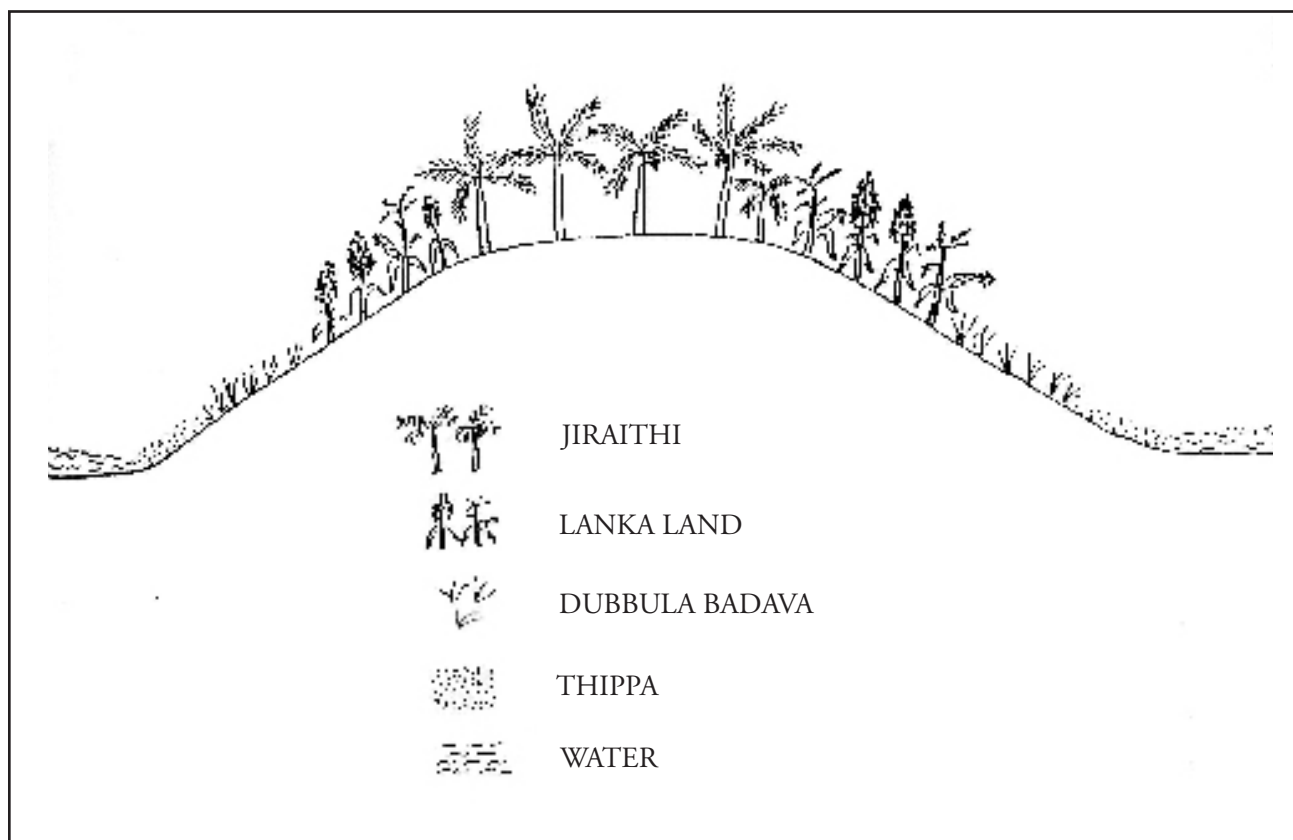


Figure 1. Idealized cross-section of the channel island (Ayodhya Lanka) showing ethno-ecozones.



Figure 2. After doing business on the mainland, the islanders come back to their settlement through flood water—in a normal flood situation. The background huts are the provision and tea shops on the street side.

with high concentrations of sand and is the ground for the cultivation of sorghum, maize and vegetables; it is this zone that is subjected to the ravage of perennial floods. The third eco-zone, called dubbulabadava, falls below the lanka land, and is characterized by fine sand and thin soil. Here grows the tall grass called **dubbugaddi** (*Saccharum spontaneum*), which has a crucial role in holding together the soil particles. The dubbulabadava leads into the Thippa, or the sand bed, which is devoid of any plants. The sand bed runs into the Godavari's water course, which forms the fifth ecozone. The description of these ethno-ecozones is of considerable importance to understand the flood situation, as these ethno-ecozones are inundated one after the other, and thus signal the islanders to take appropriate steps to face the eventuality ahead.

Islanders face three major natural disasters that have a significant affect on the physiography, agricultural outputs, crop patterns, and vulnerability to loss of life and property, which consequently determine the well-being and economic position of the island community. These disasters include recurring floods, erratic rainfall, and destructive frost.

Floods

The recurring flooding of the Godavari River has both harmful and beneficial effects for the river-bank and island communities. The Godavari floods commonly occur during the months of July, August and September when the monsoon is active and vigorous, causing the river to rise. The islanders can perceive the rise in flood level and can also predict the rise to occur in the following few hours. When the Thippa is inundated and water is still moving swiftly, only a few hours remain before parts of the Lanka land will be inundated. If the water is lapping at the edge of the island and still there is steady flow, it is an indication that within a few hours flood water will enter jiraithi land.

Depending upon the levels of inundation, floods are distinguished as either normal or severe by the islanders. The normal flood does not evoke much response from the islanders, since floods have become routine and do not hinder normal life on the island (Figure 2). One important precaution the islanders take during normal floods, however, is to prevent cattle from going close to the river by

holding them in the cattle shed lest they be carried away by flood waters. The islanders consider floods severe only when water enters the settlements, thus restricting the movement of cattle and people. Drinking water becomes scarce, as the wells are covered under flood water. Electricity supply is cut off, and movement of essential commodities to the island is hindered—leading to a steep rise in the prices of food stuffs. Feeding and milking of cattle becomes difficult. The floods are a recurring feature almost every year, but it is not possible to ascertain the frequency of severe floods. Though the islanders say that the severe floods occurred a number of times, only the 1953 and 1986 floods could be established beyond a doubt to have led to a rise in the elevation of the settlements to a great degree.

Erratic Rainfall

The second important ecological disturbance with economic consequences is erratic rainfall. This island landscape has an elevated terrain where the surrounding river water is not easily accessible for irrigation and, therefore, rain plays a vital role in agricultural pursuits of the people; rain-fed cultivation prevails on the island. In the recent past, groundwater has been used for irrigation through filter points and diesel engines. However, the ground water of the island at different locations has varying concentrations of salinity which affects the growth of crops. For example, many vegetable varieties cannot flourish under saline water. The maize and sorghum though can withstand moderate salinity, but for healthy growth require fresh rainwater at least at the stage of seedling. Moreover, the promotion and development of the coconut plantation depends upon the economic stability of the farmer, which in turn relies upon the production of maize and sorghum whose productivity is determined by the seasonality of rainfall.

Frost

The third and the last ecological fluctuation that is worth consideration in the context of this study is frost. It is the deadly enemy for sorghum, though its harmful effects are successfully withstood by maize. Winter turns severe by mid-January with a marked

difference in day and night temperatures. The nights experience biting cold from midnight till 9 a.m. with a thick blanket of fog that makes things invisible even from a few meters. By the time both of these sharply contrasting weather conditions prevail on the island, the sorghum should have matured to be ready to harvest in a few days. But due to late sowing or other unknown reasons, some of the sorghum fields fall victim to these contrasting weather conditions. When the grains are still immature, their thin delicate hulls rupture due to fluctuating extreme temperatures and the process is at times augmented by the working of a type of virus. A sweet milky white and gummy fluid oozes out of the ruptured pods which turns blackish on exposure to air. Thus the entire sorghum spike becomes black, which is locally called **dayyapu--kanki** 'devil spike.' Such fields are not harvested, but left for cattle grazing and such farmers are not in a position even to repay the bank loans taken. According to the islanders, they experience the effects of frost with no alternative except to bear the loss painfully. The conditions under which the frost works as a destroying force is not well understood by the islanders, though experience tells them that the late sowing is one important cause, and that erratic rains that determine planting cannot be avoided as they are nature-controlled. They are also not able to name and explain the viral effect, but they accept its impact rather than inventing mechanisms to combat or withstand it.

Cultural Responses

The island community is traditional and has no exposure to modern technology; they thus apply their native wisdom to face the natural disturbances. In this section, I present the culturally devised arrangements that help islanders deal with the recurring floods, erratic rainfall and frost. Of these three natural disturbances, floods attract greater attention and wider publicity among the island community and the government agencies.

As the floodwaters begin to enter the island, the islanders move their cattle and their fodder to the high places, yet neither anxiety nor fear is noticeable in the people, since they make no attempt to escape it but only prepare to face it by acquiring essential

commodities. The firewood is also shifted to elevated places protected from flood waters, for it is essential for cooking. During the summer months, just before the onset of monsoons, each household accumulates food stuffs like dried fish, oil for cooking and illumination, rice, etc. in preparation for anticipated floods. If the food resources are exhausted, then they have to either go to the mainland to purchase food or await the government relief aid. The increasing water levels pull down the walls of the houses, and house posts may wash out, thus tilting the house. With the first sign of water submerging the settlements, the seriously ill and women of advanced pregnancy are shifted to the mainland.

When the floodwater enters the houses, the occupants initially stay on the cots. With the increase in water level, women and children move over to the upper level and men continue on the cots. During such times food is cooked on the upper levels over a layer of mud to prevent the ignition of underlying wood. They also use large metal drums (about four feet tall) on the top of which they cook food. In every settlement there are one or two strong houses located on highly elevated platforms, which are packed full of people when the situation warrants it. During these situations, cooking of food is not possible and they wait on government relief supply.

Every household keeps a swimming plank called **teppakoyya**,¹¹ which is a thin wooden plank attached to the belly like a surfboard while swimming. This is used only by men. This helps them to move through the flood waters on the island to enquire of friends or relatives, to meet the big men for help, or to go to cattle shed and milk the cattle. When the **dibba**¹² is overcrowded, some of the cattle are made to swim to the flood banks, and those animals that are not able to swim are carried by boats.

Government Intervention

The emergency management apparatus of the government alerts the people of the impending danger through hourly weather bulletins on radio. The emergency managers also get prepared to undertake rescue operations evacuating the habitats along the flood plain when the water is expected to enter the settlements. But the people of Ayodhya Lanka rarely

heed the advice of the officials, and the villagers prefer to remain on the island instead of going to the rescue camps that are arranged on the mainland beside the flood bank or directly on the flood bank itself. They contend that it is safer to be on the island during the flood rather than on the flood bank. The mainland flood bank village dwellers also accept this argument.

In their time-tested experience, the islanders maintain that when the flood waters reach the doorsteps of the houses on the island, the river will be level with flood banks on the mainland. At this level, floodwater may overflow or breach the flood bank, gushing into the mainland and sweeping away or submerging nearby villages. Under such conditions, it is dangerous for the islanders to be relocated to the rescue camps. Another reason is all their cattle, fowl, utensils and other movable property left back in the houses may be stolen or washed away by floods. An old man commented that “**memu yetigattuki yelthe, kunda, chembu, kodi dongilincevallu vastaru**” (‘if we move to the flood bank, thieves come to steal our household articles and our fowl’). This statement implies that all their movable precious belongings are on the island and it is not possible to take them to rescue camps where security is not ensured. Except for a few cattle, none of their belongings are moved to the mainland. And, if nobody is at home, thieves would loot grain, money, ornaments, equipment, etc.

The islanders also say that the rescue camps are very unhygienic, unprotected and crowded, thus spreading disease and epidemics. Under these circumstances it is good to be on the island, provided they have sufficient to eat or enough money to purchase food from the mainland. A young male respondent observed that it is comparatively better to step into the boat from our door and get down at **Gannavaram** or **Nagullanka** (mainland market places), pick up the food stuffs and go back. He also said that life is thrilling on the island during the time of floods, but the only thing needed is to have sufficient money. The islanders face acute drinking water problems since wells get submerged by flood waters. In response, many residents collect the flood water and boil and filter it before drinking. Some of

them also add **patiki** (alum) to this dirty water, which sublimates the suspended mud particles, rendering it clear and clean.

Apart from the above-cited adjustments to the situation, authorities from the village level administration, the panchayat, and the state in general also extend help to the flood-affected people. The support from the village panchayat through the sarpanch is extended by providing relief boats to maintain contacts with the mainland, thus ensuring supply of essential commodities during severe floods. The sarpanch provides two boats from the panchayat fund. These boats pass before every house of their allotted settlements once a day in order to carry people to the mainland to obtain essential commodities and bring them back home. Also, many private boats from outside—and those of the local Marakallu—travel the island all day to take people to the mainland for a fee. Since fishing is not possible during severe floods, the Marakallu divert their fishing boats for transport service. Every **Marakadu** who has a boat earns substantial income via providing transport during this period, which offsets the loss of fishing income. The boats are required not only by the islanders but also by those villages that are on the flood banks subjected to inundation.

The flood relief program through the state's revenue department has two phases. In the first phase, immediate relief food and water packets are dropped on the roofs of the houses or on the dibba where the people gather. If the water level on the island is not very deep, rice and dhal are supplied to every household depending on the number of persons in the house. In the second phase of relief, the households are supplied with cooking vessels, plates, and spoons. Clothing, like saris for women, dhotis for men and blankets are given to every household. In addition, damaged homes receive financial assistance accordingly for repair or reconstruction of the house.

The government has also taken certain permanent relief measures in recent years. A cyclone shelter was constructed in the Marrimula area of the island after the 1986 floods. The building is constructed on concrete pillars six feet tall. This is a suitable plan to tide people over during inundation.

A similar concrete structure designed for an upper primary school was constructed during the years of 1991-92 in Kapupalem. These structures serve the dual purpose of lodging schools and as cyclone and flood relief shelters.

The local political power, kinship ties and caste favoritism greatly interfere with disaster relief distribution (Marshall 1979), and sometimes the persons who are most affected receive the least help. The political power of the island is vested in the hands of the sarpanch, who is also one of the three big men of the island, and in the village munsiff, who is the local level functionary of the state revenue department. It is at their supervision that the victims are enumerated and the relief distributed. The sarpanch and the big men favor their caste members and loyalists and help them get more than their quota of relief assistance by providing false details and by using other ingenious methods to convince the enumerating authorities. These aspirants to power use their influence not only to register their supporters' undamaged houses as damaged, but also by ignoring the fully damaged houses of their opponents. Thus, caste favoritism also plays a very important role in relief disbursement. All of these manipulations are done in nexus with the relief officials from the district administration. People of the lower Mala caste are usually the worst-hit victims in the process, as they cannot influence the officials to receive their proper share of relief.

All these relief and restoration efforts of the state are meant to ensure safety for the flood affected island people, to provide basic necessities during flood, and to compensate the loss of household belongings and property. Still, the cultural adaptive strategies of the people to minimize the damage due to such disasters are worth our consideration.

Biophysical Impacts

Dubbugaddi (*S. spontaneum*), the tall grass that grows naturally along the river banks and island margins, not only helps to reduce erosion but also accelerates the expansion of the island. If this grass is not found in certain pockets especially along the island edges and in Dubbulabadava, people grow it intentionally there for its beneficial effects, thus

Table 4. House types and building materials by caste.

House Type		Name of the Caste									Total	Percent
Roof	Walls	Kapu	Settibalija	Marakallu	Mala	Mala Dasu	Madiga	Vysya	Brahmin	Rajulu		
Dubbugaddi	Methanam	5	12	4	12	-	-	-	-	-	33	8.42
Dubbugaddi	Mud	6	3	1	8	-	-	-	-	-	18	4.60
Dubbugaddi and Others	Methanam	-	1	-	2	-	-	-	-	-	3	0.76
Dubbugaddi	Brick with mud	12	7	-	3	-	-	-	-	-	22	5.61
Dubbugaddi	Brick with cement	6	3	-	1	-	-	-	-	-	10	2.55
Palamyra	Methanam	21	17	70	43	2	-	1	-	1	155	39.54
Palamyra and Coconut leaves	Methanam	9	11	18	22	1	1	-	-	-	62	15.82
Palamyra and Coconut leaves	Mud	-	7	4	10	-	-	-	-	-	21	5.36
Palamyra	Brick with mud	11	10	2	7	2	1	-	-	-	33	8.42
Palamyra	Brick with cement	3	3	-	1	-	-	-	-	-	7	1.78
Tiles	Brick with mud	2	2	-	-	-	-	-	*	-	4	1.02
Tiles	Brick with cement	14	6		1	2	-	-	-	-	23	5.87
R.C.C. Slab		-	1	-	-	-	-	-	-	-	1	0.25
Total number of houses on the Island												392

*Lives in a room of a settibalija house

pointing at their ecological awareness. Planting castor bean (*Ricinus communis*) and another bean (*Dholicus lablab*) in the Dubbulabadava, which also helps in the accretion process of the island, is an important adaptive mechanism to make use of land not suited for agriculture.

In spite of various adaptive measures taken, the islanders suffer certain losses due to these floods. One of the major areas of damage in the lives of the islanders is soil erosion and slumping. The margin of the island gets washed away and huge patches of the edges fall back into the river. As a result, farmers lose their lands and even house sites, thus shattering the economy of a family (Zaman 1989). The **gandralanka**, which was forty acres of cultivable land in 1950s, now has only twelve acres left since the rest has been engulfed by the river through the years. The plight of the affected population of Merakapalem and Muppinavaripet settlements is another case in point. At present, these settlements are exactly on the edge of the island due to continual erosion and slumping of patches of land into the river. A few of the houses in these settlements were washed away during the earlier floods. Some of them have left the island in search of shelter and employment, and those that have relied on close relatives in the same settlement are living in crowded houses. The majority of those who lost agricultural lands in the process are working as agricultural labor, leading to degradation in social and economic position. Flood waters can also bring sand into the fields, thus rendering them useless for a period.

However, there are a few benefits to the island by flood waters. The beneficial effects include silt deposition and accretion. The flood waters bring in rich alluvium that enriches the soil fertility and results in good yields to the farmers. These depositions also favor the growth of coconut plants. During this process, the Dubbulabadava is converted to lanka land, and Thippa is turned into Dubbulabadava. As the people say, the present cultivable lanka some time back was part of Dubbalabadava, and still earlier Thippa. The floods thus help in bringing about two contrasting processes—erosion and slumping on one hand, and silt formation and accretion on the other.

Technological Adaptations

The islanders irrespective of caste display conscious and unconscious, and physical and psychological, adaptive behaviors to face the discomfort caused by the natural calamities. The cultural adaptation of the people to these recurring floods can be understood through their types of houses, their building materials used and their crop patterns for reducing losses.

More than 80 percent of the houses on the island are huts with thatched roofs and mud walls (Table 4). Though the mud walls cannot withstand the force of flood water, their collapse doesn't cause any serious injuries to the residents. The **metthanam**¹³ type of wall is much safer because the outer layer of clay and dung may be dissolved in the water, but the internal framework of branches remains intact and can be daubed with clay when the water recedes. Every hut has two opposite doors that facilitate the inward and outward passage of water without exerting pressure on the house structure and facilitating quick escape routes. The provision for attics in the design of the house helps provide a safe shelter if the flood waters rise beyond the danger level. The attic is made of thick wood which is almost like a floor upon which to sleep and cook. Invariably, all the houses are built on dibba (Figure 3) and in due time the entire settlement is found elevated from the ground level. Islanders take note of the maximum flood water levels and accordingly raise the height of their house platform if necessary.

To the best of their memory, the islanders have twice raised their house platforms—after the devastation of the 1953 and 1986 floods. Even the wealthy are observed to live in thatched houses. When questioned, one of them immediately replied—**“lankalo illu mukyam kaadu, dibba mukyam”** (‘in the island an elevated platform is important, and not a pucca house’). This clearly shows their houses are constructed to escape from the flood waters, and to take into account rising river bed and flood bank levels. Compared to 1953 floods, the 1986 flood waters reached three feet higher, which made all the islanders raise the dibba. These changes in the height of dibba would not be possible if the houses were concrete structures.



Figure 3. House with metthanam wall and thatched roof built on dibba (elevated platform)—an adaptive strategy resulting from annual floods.

The agricultural sector is one important area where many adaptations are incorporated in order to reduce losses from floods. Though the cropping pattern depends on local ecological conditions like soil and water, in the present context the annual floods are also observed to have an impact on the variety, timing and duration of the selected crops. This reflects the influence of the farmer's perception of flood risks on the land use pattern (Burton 1962). By the time the flood season arrives, only a few vegetable crops and commercial maize remain in the fields. The vegetable crops are timed so that by the arrival of the flood the farmers have harvested nearly three fourths of the crop. Even if the flood waters enter these fields, the damage and loss will be minimal. Further it is

to be noted that the investment cost for vegetables is minimum. Similar is the case with commercial maize, as it is plucked off when the seeds are still milky. This crop can withstand inundation for a few days. Even if the plant dies, there will not be any loss, for the smooth corn still has market demand. Thus the timing of the crops seems to be part of a strategy to overcome ecological disturbances.

Sorghum cultivation, the major source of income for the islanders, is adversely affected by heavy and untimely rains. The high moisture content in the soil due to heavy rains while sowing maize and sorghum prevents germination and causes seed decay in the soil. The heavy rains not only kill the seedlings, but also wash away the fertilizer before the plants absorb it, making farmers restart the laborious process. Since time is also lost in the process of sowing and re-sowing, a decline of yields is expected. During the year of field work, with the exception of a few farmers who could gauge the weather conditions and thus delayed sowing, the majority of farmers have to sow seeds twice due to continuous heavy rains for four days. The islanders believe that if the monsoon is delayed, there will be heavy rains in the later part of the season affecting the crops. These beliefs based on native wisdom help them to plan accordingly and minimize the losses.

Unlike the sowing period, late rains during the fertilization period differentially affect sorghum and maize. The amount of moisture and the reduction of direct sun by fog are injurious to sorghum (Netting 1975), while at the same time maize benefits from the increased moisture (Johnston 1958:66). In the case of sorghum, the inflorescence in the beginning is enclosed in a tight sheath terminating into a funnel-like small leaf. The sheath breaks longitudinally starting from the top, and the rupture progresses gradually downwards as the inflorescence pushes out. It takes about two to three days for the spike to come out of the sheath completely. This process is locally called **eenadam**.¹⁴ Late rains have serious consequences if they happen during the eenadam process, as well as when the grains are still on the threshing floor.

Even if there is low rainfall, but water enters the sheath of the flower and remains there, the flowers of

that portion still get sterilized. Though the inflorescence ultimately comes up to blossom, the sterilized flowers remain unproductive, remarkably reducing the output. On December 27th 1991, a mild drizzle started at 2 p.m. and then turned into a moderate rain at 4.30 p.m. while I was sitting with a group of farmers at the provisions shop. The farmers were happy with the rain because their sorghum plants have not yet attained the age of flowering. But others expressed their anguish over this untimely rain. I took note of those fields and when I visited them at the harvesting time, I noticed many of the ears did not bear seeds at their lower portion. A similar situation occurred in 1989 where the untimely rains greatly reduced the yields plunging the farmers into insolvency. Yet, this problem does not arise with maize; even the heavy rains do not malign the process of pollination and fertilization.

Harvesting season is the time of mounting anxiety and speculation at the sight of encroaching black clouds because it is the time when the fortunes of the islanders are at nature's mercy. Inevitably, every farmer, except a few Christians, propitiates **vigneswara**¹⁵ (god that dispels hurdles) before harvesting. They also make blood sacrifice of a chicken on the first day of harvest to bring favorable weather until the day the grains are lifted from the threshing floor. In case of mild rain, the maize and sorghum grain heaps are protected by covering with palm and coconut leaves. But they cannot escape the ravage of heavy rains leading to the stagnation of water in the threshing floor. In the year 1989 when all the sorghum and maize heaps were still on the threshing floor, there was a sudden heavy rain that continued for four days. The farmers were left helpless when the grains were soaked in rain water and spoiled, and therefore were rejected by the seed corporation. As such, the farmers failed to recoup even their input costs.

Conclusion

The study reveals that the natural disturbances and ecological fluctuations are affecting the property and life of humans and cattle respectively, as well as the crop pattern and agricultural output in Ayodhya Lanka. It would be surmised that the islanders are

aware of these hazards and have suitably evolved some long-term and some spontaneous strategies to meet the situation according to its severity.

Of the three natural disturbances considered, floods—a regular destructive feature—cause the greatest havoc in the lives of the people. The island community has evolved certain adaptations with regard to the house type, crop pattern and erosion control measures. As already mentioned, on one hand, the islanders prefer thatched houses built on dibba to be protected from inundation and that causes relatively little injury to the residents in the event it collapses. The reconstruction of this type of house is also not very burdensome monetarily. On the other hand, the islanders are physically and mentally prepared to withstand the flood situation by keeping a supply of the essential commodities and expressing their reluctance to vacate the island and join mainland relief camps.

The crop pattern on the island is also planned in such a way that the constraints imposed by island physiographic conditions are effectively overcome by selecting two major crops like sorghum and maize. These crops can grow well under the existing natural conditions and can be harvested before the flooding season commences, thus bringing high returns and strengthening their economy. Yet, all the farmers on the island are very conscious that they should invariably protect the island from erosion and slumping. As an effort in this direction, all those farmers whose lanka lands are contiguous with the Dubbulabadava undertake frequent transplant of Dubbugaddi whenever it is found scanty in the Dubbulabadava. These tall grasses not only minimize soil erosion, but also promote accretion of the lanka land during floods.

The farming community on the island is very anxious to opt for coconut plantations on all the jiraithi and lanka lands. This may be the best solution to the recurring floods. But the coconut plantation requires a large capital investment difficult to achieve for many farmers. In order to attain this goal, the farmers have resorted to sorghum and maize cultivation which has improved their chances of later adding coconut. All the jiraithi lands already have coconut groves, and the lanka lands are

still in the process. It may be recalled here that the flood waters do not stay long on the jiraithi land due to its high elevation, thus coconut plantations have survived and flourished. However, although coconut plantation is undertaken on lanka land, survival chances are less due to perennial flood inundation—the coconut plantations chances for survival are bleak if the inundation continues for a week. Hence the farmers have to repeat coconut planting many times in the lanka lands. Once the plant survives and grows to a height of about five feet, it will then be able to even withstand severe floods. In order to achieve the sustainable adaptation under the prevailing natural conditions of the river island, it requires a battery of cultural responses commanding economic stability, as well as key forms of support from local, regional and national governments. On the other hand, the impact of erratic rains and frost are almost absolute, and it is less clear whether and how a viable strategy has been developed to face these situations.

Jesurathnam Devarapalli, Department of Anthropology,
Pondicherry University, drjesudev@gmail.com

Notes

- 1 Panchayat is the village level administrative council formed by elected representatives. This body is entrusted with the responsibility of village welfare, administration, revenue collection and every other issue pertaining to the village.
- 2 Jiraithi: The lands that are ancestral property with clear title deeds for the owner [either individual or group] who can enjoy it and can dispose of it at will. Such lands have high permanency.
- 3 Panchama: The quadruple varna theory shows that the Rig vedic hindu society is stratified into four varnas based on colour initially and later based on social functions and individual characters as Brahmin, Kshatriya, Vysya and Sudra. In the later vedic period, Manu condemns Pratiloma (Hypogamy) marriages; i.e., the marriage between a woman of a higher varna and a man of a lower varna, the worst being the marriage of a Brahmin woman with a Sudra man. The offspring of such marriages are designated as **Chandalas** who are later on categorized into a fifth varna; i.e., Panchama (Kuppuswamy 1977:72-73).
- 4 Sarpanch: He [or she] is the chief of the panchayat who is also an elected member who chairs the council and the chief manager of the activities of the panchayat.
- 5 Jajmani: The services, duties and payments which the various castes perform for one another are regulated by a socio-economic system known as the jajmani system with strong clientele relationships (Beidelman 1959:1-10).
- 6 Lanka: A mass of land situated in the river bed or between the river bank and flood bank subjected to perennial flooding and inundation. The state government is the natural owner who can lease out, assign, or grant this land to the individual or groups with restricted rights to dispose of it. The permanence of these lands is not certain due to erosion and slumping and its physical features are subjected to change after every flooding.
- 7 Munsiff: The village scribe who is the direct appointee of the state government is the important officer who maintains the records pertaining to revenues, crop particulars, births, deaths, natural calamities, etc.
- 8 Dubbulabadava: This term derives from two roots **dub-bugaddi** 'tall grass' and **badava**, which is a water logged area. This term refers to that marshy area of the island with less soil and profuse sand. This area is thinly separated from the water line.
- 9 Thippa: Refers to sand margins of the river contiguous with the river bed and constantly exposed to the daily fluctuations of river due to tidal affect for its proximity to sea.
- 10 Godavari: Though it is the name of the river, the usage of the term in the local parlance indicates river water which is symbolically given a divine status due to its dynamism and resourcefulness.
- 11 Teppakoyya is a single piece of a shallow wooden plank used as a primitive means of travel on the water on the island during flooding. It is attached to the belly while swimming. Literally it means 'floating plank' (**teppa**=float, **koyya**=wooden plank).
- 12 Dibba: The high place formed naturally or by human effort by deposition of mud and stubble. The islanders raise this platform by dumping black clay and fencing around it with branches and coconut fronds. The houses are invariably built on this high place to be protected from inundation.
- 13 Metthanam is a type of wall made of bamboo (or other branches) wattle daubed with clay, which is plastered with a layer of dung and clay, and a superficial layer of dung. As the dung contains a lot of fibre it gives strength to the wall. When the houses are marooned the walls take sufficient time to collapse, which happens layer by layer and the harm will be very minimal.
- 14 Eenadam: This term literally means giving birth and in this context refers to the stage when the sorghum inflorescence or spike is coming out of its sheath.
- 15 Vigneswara: A hindu deity with an elephant head, considered to be the one who can free people from all sorts of evil and hardships, and hence is worshipped before commissioning any auspicious activity.

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