CHAPTER 4

Bamboo Flowering and Human (In) Security: An Historical Survey

4.1. The Preliminaries

The relationship between ecology, environment and human security are close and complex. (Ramakrishnan: 1992; O'Donnell & Phillipson: 1996; Ohrnberger: 1999; Ramanayake & Weerarwardene: 2003; Nepal: 2004; Oprins and Trier: 2006). As discussed elsewhere in the thesis, human security and better quality of life depend on several factors, all of them linked to the environment. Biotic components of the environment and more particularly, its floral components contribute to water security for consumption and livelihood purposes, food and nutrition security, livelihood security, ecological security and social security (Hazarika: 1995; Acharya: 1995). However, these components if not properly managed, may at times become liabilities and threaten human security (Agarwal, Chopra, & Sharma: 1982; Gadgil, Prasad: 1984; Palen: 2006). A great deal of human security is tied to people's access to natural resources and vulnerabilities to ecological and environmental processes and change, as in case of bamboo flowering and associated social consequences of famine and starvation (Arya, Sharma, Kaur, and Arya: 1999; Banik: 1991; Banik: 1994. Banik: 1998; Banik: 2000; Bhangre: 2001 Behari: 2006). India is a witness to such histories of threat to human security since antiquity; and India's northeast in general and Mizoram in particular have evidences of famines, starvations and total human insecurity owing to bamboo flowering in a more pronounced manner

(Goraya, Jishta, Kapoor, and Pal: 2003; Government of Mizoram: 2003).

Bamboo plays an important role in the life and tradition of the Mizo society. It is the perennial source of livelihood and economy but no attention is paid to tap the benefits of this natural resource which is found in abundance in the state. The bamboo is subject to unchecked felling and smuggling, resulting in the loss of revenue in the state. The state of affairs pertaining to bamboo in the state of Mizoram have significant and manifold bearings on the human security of the Mizo people: loss of revenue via smuggling and felling of bamboo, ecological disasters owing to its felling and smuggling, and the cyclical flowering of bamboo leading to the great *Thingtam* and *Mautam* famines- all contributing to human insecurities. However, the only time the state and the people wake up to the importance of bamboo is its ritualistic flowering- a phenomenon ingrained into the Mizo oral history[1] and traditions, which is remembered time and again for its contributions to famine and starvation.

As John and Nadgauda (2002) note, many beliefs are associated with bamboo flowering since time immemorial. It is considered as a bad omen[2]. References of bamboo flowering can be found even in the Mahabharata composed more than 5000 years ago (Prabhakaran &, Michael: 1980). A traditional saying in Mizoram, North-east India goes thus, "When the bamboo flowers, death and destruction follow" (Chauhan: 2003). Folklores apart, biologists argue that the strange phenomenon of bamboo flowering, called '*gregarious bamboo flowering*', causes ecological havoc mainly because of two inter-related causal effects. First, the bamboo plants die after flowering and it takes a few years before bamboo plants produce seeds again, leaving bare exposed

soil — which could be disastrous in mountainous states — and also leading to food scarcity, since animals depend on bamboo plants. The second is that rats feed on the flowers and seeds of the dying bamboo tree. This activates a rapid birth rate among the rodents, which leads to the huge rat population feeding on agricultural crops in the fields and granaries leading to famine (Agarwal, Chopra, & Sharma (eds): 1982; Gadgil, Prasad: 1984; Palen: 2006).

However, analysis of the phenomenon of bamboo flowering as a contributive factor, contributing to famines and such like situations need contextualisation. Hence, in the section that follow, we attempt to present a brief survey of the bamboo diversity in Mizoram and their flowering habits, which will make it evident that the flowering habits and cycles of various bamboo species put together would expose the length and tenure of flowering, which is apt to jeopardize livelihood security of the people inhabiting the area. This shall be followed by an historical analysis of the bamboo flowering in Mizoram to accentuate the recurrent flowering and its production of recurrent insecurities. This calls for an immediate analysis of the history of bamboo flowering and its impact on human security.

4.2 Bamboos in Mizoram with Flowering Habits

The total geographical area of the State is only 21,081 square kilometers of which nearly 40% is occupied by the bamboo forests. It is assumed that approximately 35 to 40 species of bamboo may be available in the state, which apparently is an immense species diversity of bamboo, not expected in such a small area. In any case, proper research in this aspect has not been undertaken till date. However, the folllowing species of

bamboo[3] are said to be found in Mizoram. Species such as *Bambusa nagalandiana, Thyrsostachys oleveri, Neomicrocalamus manni* and *Bambusa mizoramiana* have recently been identified by Dr. H.B. Naithani (Banik:1989). Many species listed here still need proper authentication. Some of the major species of bamboos found in Mizoram (scientific and local names) consist of the following:

Schizostachyum polymorphum (chal),
Sinarundinaria falcate (Lik),
Sinarundinaria griffithiana (Lik),
Sinarundinaria longispiculata (Lik),
Melocanna baccifera (Mautak),
Chimonobambusa callosa (Phar),
Dendrocalamus hamiltonii (Phulrua),
Thyrsostachys oleveri (Phungki Rua),
Bambusa nagalandiana (Ralleng Mau),
Bambusa bambos (Rawhling),
Dendrocalamus hookerii (Rawlak/Rawkhauh),
Dendrocalamus sikkimensis (Rawmi),
Dendrocalamus longispathus (Rawnal),
Schizostachyum capitatum (Rawngal),
Schizostachyum fuchsianum (Rawngal),
Dendrocalamus giganteus (Rawpui),
Schizostachyum mannii (Rawte),
Bambusa nutans (Rawthing),
Bambusa Tulda (Rawthing),
Schizostachyum dullooa (Rawthla),
Neomicrocalamus mannii (Saiman),
Melocalamus compactiflora (Sairil),
Bambusa mizoramiana (Talan),
Dendrocalamus strictus (Tursing)

Apart from these identified species some local species like *Ankuang, Rawchhia* are also available in Mizoram, which are yet to be botanically identified.

The switch to flowering is the most important event in the life cycle of a bamboo plant, signaling its commitment to set seed ensuring survival of the species. Environmental cues are the most effective in bringing about simultaneous flowering in populations growing over wide extents of land. However, flowering in certain species of bamboo is intriguing, in that the cues that trigger flowering still remain a mystery. These manifest a cyclic pattern of flowering after long, and sometimes regular, vegetative periods that extend up to even 120 years (Banik: 1994; Bhangre: 2001; Behari: 2006; Nag: 2008). All individual plants growing over vast expanses of land flower in synchrony along with individuals growing elsewhere far away. This phenomenon of mast flowering or mast seeding is the synchronized flowering and production of seed at long intervals by a large population .(Bourdillon: 1895; Bradley: 1914; Kawamura: 1927; Kelley and Sork: 2002) because the bamboo clumps flower all at the same time only once in the plants' lifetime. In bamboo, the population produces wind-pollinated flowers, sets seed in large quantity and perishes. The seeds regenerate to repeat the life cycle. Thus flowering is related to its life span, similar to that of annuals or ephemerals that flower and set seed only once before perishing. Mast flowering is uncommon in the plant kingdom and even in bamboo, only a few species exhibit this phenomenon. The unpredictable nature of this event has brought about devastations to people whose livelihood depends on bamboo. In the table below, we are presenting the flowering pattern and interval of bamboos.

Table 14: Flowering Pattern and Flowering Cycle of Bamboo Species.

Bamboo Species	Pattern	Location	Interval
B. balcooa	Gregarious	Mizoram (Ind)	35 – 45 Years
B. bambos	Gregarious	Mizoram (Ind)	47 – 64 Years
B. blumeana	Not Fixed	Batangas (Phillipines)	100 Years
B. polymorpha	Not Fixed	India, Burma	35 – 60 Years
B. textilis	Sporadic	India, Burma	No fixed cycle
B. tulda	Sporadic	Mizoram (India), Taiwan	30 – 60 Years
B. vulgaris	Sporadic.	India, China	No fixed cycle
Cephalostachyum pergracile	Sporadic	India, Taiwan	No fixed cycle
Dendrocalamus asper	Not Fixed	China, Philippines	No fixed cycle
Gigantochloa apus	Not Fixed	India, Taiwan	50 – 60 Years
Gigantochloa levis	Not Fixed	Bogor, China	No fixed cycle
G.pseudoarundinacea	Gregarious	Cuba	50 – 60 Years
Guadua angustifolia	Not Fixed	China	No fixed cycle
Melocanna baccifera	Gregarious	India, Burma, Bangladesh	40 - 55 Years
O. travancorica	Not Fixed	Cuba	7 - 23 Years
P. pubescens	Not Fixed	China	67 Years
T. siamensis	Gregarious	China	34 – 49 Years

(Source: International Network for Bamboo and Rattan Factsheet)

Bamboo flowering has been reported from almost every corner of the world at various times, however, the major cases of bamboo flowering impacting the human lives have taken place in Austria,

Brazil, Canada, China, Columbia, England, Ecuador, Germany, Guatemala, India, Indonesia, Iran, Iraq, Jamaica, Japan, Kenya, Malaysia, Mexico, Nepal, Philippines, Puerto Rico, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Trinidad, Uganda, United States of America, West Java etc (see Kitamura & Ishizuki: 1953; Kitamura: 1963; Lee: 1976; Lakkad & Patel: 1981; Janssen: 1987; Ghavami: 1989 for details). The below given table gives a glimpse of the flowering cycles of bamboo of the priority species, including those flowering in Mizoram in India and the other parts of the world. The recorded cycle of flowering in Mizoram shall be given in the subsequent table in the later part of the chapter.

The various bamboo species available in Mizoram depict myriad variations in flowering patterns, types, mechanisms and impacts. However, bamboo flowering in Mizoram still remains a botanical enigma and there is no scientific method yet developed for predicting flowering. The different species suddenly flower gregariously and die at the end of it (Janzen: 1976). Death in large populations is a cause of concern due to ecological, social and economic crises that set forth (John and Nadgauda: 2002). In bamboo forests of Mizoram, two gregariously flowering species, *Melocanna baccifera* and *Bambusa tulda* occur together. Both are reported to flower every 48 years but not at the same time. *B. tulda* flowers 18 years after *M. baccifera.* According to Indian forest records *B. tulda* gregariously flowered in 1880 through 1884 and in 1928 through 1929 (Liese: 1987; Janssen: 1987; Ghavami: 1989). Mohan Ram and Hari Gopal (1981) had observed flowering of this species in 1976 when gregarious flowering lasted until 1979. It has been reported that gregarious flowering was first observed in the southern parts of Mizoram, which slowly spread to the northern parts and progressed to the

Assam plains. *M. bambusoides* also shows gregarious flowering habits in Mizoram. These species is believed to have an intermast period of 48 years (Tripathi *et al.*: 2002). *Dendrocalamus strictus* is another bamboo that flowers gregariously in Mizoram forests. It is the most widely distributed species in India and used extensively in paper pulp manufacture. In this species there are cohorts that have different intermast periods of 25 years in South India, 40 to 45 years in North East and Central India, 45 years in Bangladesh and 65 years in West India (Banik: 1994). Besides the gregarious flowering pattern, the species also have been observed flowering sporadically with seeds are being available annually.

Table 15: Recorded Flowering of Bamboos in Mizoram

Sl. No	Species	Recorded Year of Flowering						Cycl (Year
		I	II	III	IV	V	VI	
1	*melocanna baccifera* (Gregarious)	1815	1863	1911	1958-59	2005-07	Expected in 2055-56	48
2	*bambusa tulda* (Sporadic)	1785	1833	1881	1929	1977	Expected in 2025	48

(Source: International Network for Bamboo and Rattan Factsheet)

The table shows the records of bamboo flowering in Mizoram of the two priority species, ***melocanna baccifera*** (locally called mautak) and ***bambusa tulda*** (locally called thingtak). The flowering pattern associated with *mautak* is gregarious and is called *Mautam* while the one associated with the *thingtak* is of sporadic type and called *Thingtam* locally. Both the species

flower at an interval of 48 years and simultaneously Mizoram experiencing bamboo flowering at in interval of 20 to 30 years.

4.3. Bamboo Flowering and Human Insecurity in Mizoram: An Historical Sketch

The history of Mizo society at large has been largely a history of people's struggle to come out of the ecological onslaughts, represented by the phenomenon of bamboo flowering and the associated effects on livelihood security. There have been instances of recurring famines, consequent migrations, resulting in socio-political instability. Some major instances of bamboo flowering follow through the folktales, proverbs and folklores of the Mizos and have been communicated through generations in the form of oral history[4]. For the better catch of the impact of bamboo flowering on the Mizo society, we propose to periodise the entire phenomenon in the following phases: a. Pre-British Period, b. British Period, c. Indian independence to the Statehood of Mizoram and d. Post Statehood Period

4.3.1. Pre-British Period

The Mizos started settling in and around Lushai Hills following the period 1450 AD (Sangkima: 2004, Lalthangliana: 2005). However, they had to experience a series of natural phenomenon of bamboo flowering that led to famines. The Mizos considered this to be the wrath of the god and considered it as a bad omen (Heck: 1956; Ghosh and Rehman: 1956; Itoh and Shimaji: 1981; Janssen: 1981; Godbole and Lakkad: 1986; Janssen: 1986). However, not much has been recorded of the incidences of such bamboo flowering, rodent outburst and the consequent famines. Although the written or documented history of bamboo flowering

in Mizoram dates back to 1881, yet they are scanty and inadequate. The flowering of *meloccana baciferra (*Mautam*)* in 1861-63 and the subsequent famine that followed had a huge impact on the Mizo society. This famine totally devastated the famous town known as 'Tualte town'[5]. The famine totally destroyed the Mizo economy. The flowering of *bambusa tulda* (*thingtam*) in 1881, the first ever recorded famine also had an adverse impact on the Mizo society. The rodent explosion destroyed the entire jhum and terraced cultivation creating a severe food crisis leading to large scale starvation and deaths. Approximately 60,000 people were affected by these famines in north and south Lushai Hills (Ghosh: 1965; Ghosh: 1980; Rokhuma: 1988; Alam: 1995). The Lushai Chiefs attempted to minimise the impact by operating reliefs from their own sources, but the exercise could not address the situation. Almost 15,000 people died out of starvation (Chatterjee: 1995). Since the pressure of famine began to be felt, the three principal chiefs, Poiboi[6], Khalkom[7], and Lalhai[8], met and agreed to a cessation of hostilities, and at once sent men into the Cachar district to obtain supplies of food[9]. The famine arose from the depredations of rats, who multiplied exceedingly the previous year owing to the ample food they obtained from the seeding of the bamboo.[10] Even, the basic and necessary items were not available for consumption. The plague that followed the famine also contributed to the loss of lives. The rodents devastated the jhoom fallows and other agricultural fields. The people had to sell off cattles and other belongings like guns etc in exchange of foods that was being imported from the neighbouring areas of Assam and Burma. The Mizos were in fact reduced to the state of destitution (Suhas Chatterjee 1985). The Mizo tribe who were dependent on jhum agriculture and hunting was helpless and

entirely dependent on the external intervention especially in the time of famine. (Nag: 2000)

4.3.2. British Period

The British had come into contact with the Kuki and Lushai tribes with the acquisition of Diwani of Bengal (1765) along the Sylhet frontier. This contact turned into confrontation in 1832 when Cachar was annexed to the British Empire. After a series of violent and bloody expeditions and warfare which lasted more than half a century, the British entered the Mizo hills (then Lushai hills) and set up a rudimentary colonial administration to rule the subjugated tribes. It was these colonisers who recorded the one such famine which took place in 1862 when many died due to starvation and those who were bulky enough to survive became lean and thin beyond description. The British recorded the second such famine in 1881 when an estimated 15,000 Mizos had perished (Ghosh: 1965; Ghosh: 1980; Rokhuma: 1988; Alam: 1995). In fact it is said that the Mizos had resisted the British for about 50 years. But the 1881 famine had devastated and debilitated them so much that they easily surrendered to colonial subjugation. The British took over the administration of the Lushai Hills by the year 1890. During this famine, the chiefs sold out their ivory, jewellery and other valuables for the sake of food. They exchanged their guns and other arms for food. They lost their numbers due to plague, pestilence. Their jhooms were exhausted and even rubber which offered ample means of subsistence was failing. They had no means to purchase articles such as salt, tobacco, etc. In short they were reduced to a state of destitution (Chatterjee: 1985), and hence the British could easily establish their control over the entire area in and around the Lushai Hills. Therefore, we can

safely identify the period between the year 1890 to the year 1947 (Indian independence) as the period.

Exactly 30 years later another famine struck the hills in 1911-12 resulting in similar hardships (Itoh and Shimaji, 1981; Ghosh and Rehman: 1956; Janssen, 1981). The only difference being, this time the Mizos were under a foreign paternalistic[11] government who had to extend succour. At the same time, it was the Christian missionaries and European tea planters who lent a helping hand to the suffering tribals (Nag: 2008). The partial failure of crops in 1910-11 as an indirect result of the flowering of the bamboos was followed by serious scarcity all over the district. The effect of this flowering was to cause a tremendous increase in number of the rats who destroyed all crops. The missionaries too reported the similar stories of tragedies[12].

Bambusa tulda began to flower again in 1925-26 and hence the prediction of an impending famine with signs of fear became apparent. (Koshy and Harikumar, 2000; Nadgauda: 2004) The seeding of bamboo was soon followed by the manifold increase in the number of rodents in the bamboo forest areas. Based on the previous experience, the masses began the rat hunting campaign well in advance and hence more than 50,000 rats were killed in Aizwal district alone(Khondker: 1986; Nadgauda: 2004; Rokhuma: 1988) The rat hunting masses were assisted by the administration of the government, non-governmental organisation, church etc. But still, the famine could not be avoided as the rat multiplied themselves following the consumption of bamboo seeds. The famine arose to the concurrent testimony of all persons concerned, from the depredation of rats. The seeding of the bamboo after flowering

had produced abundant food for the rats and this caused an immense increase in multiplication of rats (Saha & Howe: 2001).

In 1925, the rats had caused severe crop damage in more than one lakh hectare of land and impacted more than 80,000 families in the Mizo hills area (Alam: 1995; Nag: 2008). In addition to consuming, destroying or contaminating food, feed, and produce, or damaging properties, structures, etc., some species of rats were also reported to be notorious vectors of deadly diseases, such as plagues (bubonic plague), Hemorrhagic fever, Hantavirus, Lassar Fever, Arenavirus, Salmonella, Tularemia, etc. (Ghosh: 1965; Ghosh: 1980; Chatterjee: 1985; Rokhuma: 1988; Alam: 1995; Nag: 2008). The gregarious or simultaneous flowering of bamboo as a phenomenon that occurred in Mizo hills was followed by a rapid growth in the rat population because eating bamboo flowers enhanced estrogen (a sex hormone) secretion in rodents, causing early puberty and elevated sexual activity, a kind of "aphrodisiac lure". Healthy rodents, feasting on bamboo blossoms, bred up to eight times a year, far more than normal. The bamboo flowers also provided abundant food supply to the rodents, but when they dried up, the rodents began attacking crops and granaries. This situation triggered a cascade of severe food insecurity as thousands of rodents started feeding on crops and green vegetations and invading more granaries. Incidences of human tragedy were reported by different missionaries and the British officers. It was reported that, the wild yams and sago palms in the jungle helped people to keep themselves alive (Lorrain: 1912). In addition, gregarious flowering of bamboos resulted in large-scale deaths of the trees and subsequently lead to ecological disaster as it left the ground bare and the soil exposed to wind and water erosion as well as causing animals that thrive on bamboo plants perish

due to lack of food. This was followed by a severe famine leading to creation of human insecurities and also having a toll on human lives. The enormity of the problem can be understood if considered that each of these periodic famines have taken 10,000 to 15,000 Mizo lives (Ghosh: 1965; Ghosh: 1980; Chatterjee: 1985; Rokhuma: 1988; Alam: 1995; Nag: 2008), whose total population was no more than a couple of lakhs at the time of Indian independence.

4.3.3. Indian independence to the Statehood of Mizoram

With the independence of India in 1947, Lushai Hills District was retained under the state of Assam but rechristened as the Mizo Hills district. The fate of the Mizos would not change with the changes in administration and hence, *Melocanna bacifera* started flowering once again in Lushai hills area (now Mizo Hills area) as early as 1957-58, which itself was preceded in 1956 by the gregarious flowering of another species of bamboo known to Mizo people as *Phulrua* (*Dendrocalamus hamiltoni*) (Rokhuma: 1988; Alam: 1995; Nag: 2008).. In 1957, *Melocanna* itself flowered and produced fruit at scattered localities but the rice harvest was mostly unaffected. The following year, gregarious flowering and fruiting of *Melocanna* commenced in the eastern parts of the district, where a great multitude of rats fed on these bamboo fruits, with extensive crop damage around the time of harvest (Rokhuma: 1988). Elsewhere in the region, good harvests were obtained in most areas. In 1959, *Melocanna* flowering and fruiting activity occurred throughout the region and "the rate of increase in rat population was beyond imagination" (*ibid*).

By August, 1959, the *Melocanna* fruit was observed to be all eaten up and destruction of rice and other crops intensified. (Alam: 2001; Anonymous: 2008). According to Alam: 2001; the losses of crops were very severe and widespread with very insignificant harvest which could last only for few months. The population of rat/rodent increased enormously during 1959 which created a devastation of agricultural fields and jhums (Nadgauda & Mascarenhas: 1994; Hazarika: 1995; John & Nadgauda: 2002; Chauhan: 2003; Katwal & Pal: 2004). However, with the completion of fruiting period, the rat population started decreasing by the middle of 1960. Despite this, the productivity in the subsequent few years was low due to some pertinent reasons: The bamboo clums had dried which was followed by forest fires putting an end to the vegetation thus exposing open and barren land, the top fertile soil of which could be easily eroded during the rains coupled with the impacts of insect pests and diseases (Ghosh: 1965; Ghosh: 1980; Chatterjee: 1985; Rokhuma 1988).

Officially, the number of deaths from malnutrition and associated diseases through this period is not accurately recorded; however, local sources estimated the number of excess deaths through this period at around 10,000, or about 5% of the total population of around 200,000 people (Hazarika: 1995; Nag: 1999). A high rate of infant mortality and local outbreaks of cholera contributed to this total, both probably exacerbated by malnutrition among many populations. Rokhuma (1988), notes that gregarious flowering of *Rawthing* bamboo commenced in 1975 in Tripura State to the east of Mizoram but not until 1976 in the west of Mizoram. At that time, people reported "a swarm of rats came from the neighbouring Tripura" (Hazarika: 1995; Chauhan: 2003; John & Nadgauda: 2002; John, Nadgauda &

Mascarenhas: 1994; Katwal and Pal: 2004; Lianzela: 1997). More widespread flowering occurred in 1977 and "rats multiplied exceedingly great in numbers" (*ibid*). Some farmers had decided not to grow rice in anticipation of *thingtam* and many had grown ginger[13] in response to government directives to produce cash crops rather than rice. However, according to Rokhuma (1998) - "it posed great difficulty in marketing ... (and) ... thousands of mounds (sic) were unsold and left on the roadside rotting."

4.3.4 Post Statehood Period

Sporadic flowering of *Melocanna* was recorded at three localities in July 2001, at 33 localities in February to July 2002, and more widely between February and July in 2003 to 2006 (Government of Mizoram: n.d; Shibata: 2009). This sporadic flowering activity resulted in some fruit production but not in the death of the culms. Gregarious flowering occurred first in the northwestern district of Mamit in January 2005, covering an estimated 500 hectares(Nag: 2008). Widespread flowering occurred in the eastern, southern, and central districts in 2006, involving approximately 25% of the total area of *Melocanna* forests. Flowering continued throughout Mizoram in 2007 and extended into 2008 in the northwest, with similar phenology each year flowering commencing in late October to January, followed by fruit production 3 to 4 months later (Talukdar: 2008; Chakraborty: 2008; Kar:2008).

The studies carried out by Talukdar, (2008), Chakraborty, (2008), Kar, (2008) have observed that in many areas, the majority of *Melocanna* stands flowered in a single year. In some localities, flowering occurred over two consecutive years, usually in different stands but in some instances involving different

plants within a single patch of forest. Mamit District was observed as unusual in having both early and late phases of flowering activity. Around Aizawl, where the process was followed closely by the Kyoto University research team (Murata et al: 2009; Shibata: 2009), gregarious flowering started in November 2006 with shedding of dead leaves from January 2007. Seeds developed on the culms from February and began to fall in large numbers from May 2007. Fallen seed germinated from June 2007, immediately upon the onset of monsoonal rain (Talukdar: 2008; Chakraborty: 2008). Our analysis based on different observations of Kar (2008) Nag (2008), in central and northwestern Mizoram suggest that the gregarious flowering activity of 2007-08 began in late October to November 2007 in all areas but that the timing of fruit production and fruit fall varied considerably.

In February 2008, people across the whole of Mamit District worked to clear new *jhum* fields in areas of established *Melocanna* forest. In some localities (Tlangkhang Village), people reported that falling bamboo fruits posed a serious hazard when cutting the bamboo culms, whereas, in other places (around Zamuang), the bamboo fruit was at only an early stage of development during bamboo clearing. Two other bamboo species underwent gregarious flowering broadly coincident with that of *Melocanna baccifera (mautak).* The first being the *Dendrocalamus hamiltoni,* known as *Phulrua* to Mizo people, and the second *Pseudostachyum polymorphum,* known as *Chal* or *Rawte.* The *Dendrocalamus hamiltoni* species appears to have a 48-year reproductive cycle, synchronized with that of *Melocanna baccifera,* and is the dominant bamboo species in some parts of Mizoram. The fruits of *Dendrocalamus hamiltoni* resemble grains of rice and develop in clusters of 150–190 grains (Kelly: 1994;

Pearson,Pearson & Gómez.1994), while those of *Pseudostachyum polymorphum* resemble those of *M. baccifera* but are much smaller, averaging 6 g in weight (Kelly: 1994; Pearson,Pearson & Gómez.1994).

Agricultural production suffered heavy losses in the eastern and central parts of Mizoram. Both the jhum cultivation and irrigated wetland rice cultivation were devastated by the attack of rats. In the cropping of 2006-07, the eastern and central part suffered the maximum losses while in 2007-08 the southern part of Mizoram experienced more losses. This decrease in the harvest of the principal agricultural food grains created acute food crisis in the entire state of Mizoram (Nag: 2008; Kar: 2008; Chakraborty: 2008). The following table has been provided to assess the losses incurred in the agricultural production.

Table 16: Yield of Principal Food Crops

Crop	2004-05		2005-06		2006-07		2007-08 (Mautam Year)		
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Loss In %
Paddy	57085	107661	55754	107740	52847	106197	54541	15688	85.22
Maize	10505	16645	11742	22703	10775	20969	7328	729	96.14
Pulse	6741	7971	6361	7670	5054	5833	5048	2632	55.01
Oil seeds	5817	5321	4816	5429	4075	3755	8485	748	86.35
Sugar cane	1357	13565	1383	10753	1340	12187	883	828	91.72

(Source: Statistical Handbook of Mizoram 2010)

(The Area is shown in Hectares and Yield in Metric Ton)

Converting the loss of the yield to the then actual market price, the loss in agricultural production was calculated at around Rs. 143.48 crores in 2006-07 and rs. 312.01 crores during 2007-08 coupled with further destruction by the rodents. (Nag: 1999; Bhangre: 2001; John & Nadgauda: 2002; Katwal: & Pal: 2004). Local newspapers in Mizoram (Aizawl Observer, Sunday Post), reported that many people committed suicide due to poverty. Robbery was also in the increase along with growing food crisis

At no time since 1981, when the keeping of state records began, had rice production been so meager. Therefore, in all areas, losses to maize were even more extreme than for rice, with almost no maize harvested at all during 2006-07 and 2007-08. The maize seeds were eaten up by the rats immediately after sowing and even before they germinated. The little early maturing maize was attacked by the rats (*rattus rattus*) in due course of time resulting in limited/nil yield. One small variety of rat was identified by many local people which could sit on the rice crop which the Mizos refer as *Chaichim*[14]. In some villages of Tlangkhang in Mamit district, the rats inflicted a heavy damage to the crops which were almost ready to be harvested. The fate of rice too was similar in all parts of Mizoram and hence the situation created livelihood insecurities among the Mizos. (Nag: 2008; Kar: 2008).

4.4. Concluding Observations

As revealed from the foregoing discussion, it is evident that the whole history of the Mizos in the present day Mizoram is replete with recurring instances of the ecological process of bamboo flowering and consequent famines, starvations and deaths. In other words, the history of Mizos throughout has been a history

of recurrent threats to human security and desperate attempts to cope with shocks and stress. The recorded years of famines since the British period have presented it as a source of food and livelihood insecurities. It has been rooted in the Mizo society and culture to such an extent, that the Mizos have been transmitting the information to through the generations orally and thereby considering it as a bad omen.

However, a close and an analytical look at such a history of human insecurity reveals that at each stage of such history, the circumstances of management of crisis situations and adaptation mechanisms have provided contexts of power play and political struggles, albeit in a microscopic form. The sections that follow in the forthcoming chapters will analyse as to how such historical events of insecurity have offered arenas of struggle for power.

Notes

[1] Oral history is a term used to refer to a wide ranging activities from informal conversations about the past (beetein din) among family members, neighbours or co-workers especially among migrant communities or displaced persons, to formal rehearsed accounts of the past presented by culturally sanctioned traditions-bearer to printed compilations of story told about past times or about experiences-old memories and needs a certain degree of ice-breaking between the narrator and the audience.

[2] See for instance the discussion by M.S.Haque (1984) Vol.21 Pages 474-476 Science reporter and Kashyap S. Gupta, the Indian Express, 21 Dec. 1998, Page 9. Peoples beliefs that bamboo flowering is a bad omen has been reasserted by Koshy and Harikumar recently (Koshy and Hrikumar, Current Science 2000, vol.79, pp. 1650-1652). They have reported that their work was seriously hampered when local people at Cherthala in Alappuzha District of Kerala burnt down the

flowered clumps of *Bambusa Vulgaris* because of a belief that flowering of bamboo heralds disaster.

[3] Bamboo species listed below is a result of collective efforts given by individuals such as Forest Officers, Botanists and experts in the colleges/universities etc. for which avenue is widely open for extensive research.

[4] Oral history is a term used to refer to a wide ranging activities from informal conversations about the past (those days) among family members, neighbors or co-workers especially among migrant communities or displaced persons, to formal rehearsed accounts of the past presented by culturally sanctioned traditions-bearer to printed compilations of story told about past times or about experiences-old memories and needs a certain degree of ice-breaking between the narrator and the audience.

[5] Tualte town (now a Village) is presently located in Khawzawl Tehsil in Champhai District in Mizoram State of India. It is situated at a distance of around 60 kms from the state capital Aizawl. This village, once one of the flourishing small town was abandoned by the people following the havoc created by the rats following the bamboo flowering in the year 1881(Ghosh: 1965; Ghosh: 1980; Rokhuma: 1988; Alam: 1995).

[6] Poiboi, the chief of the some villages eastern lushai hills was considered as one of the strong chiefs and frequently practiced plundering, headhunting and warfare activities with other chiefs.

[7] Khalkom the western chief was the master of aizawl ram and powerful enough to fight the eastern chiefs Poiboi and Lalhai.

[8] Lalhai is one of the chief of the eastern lushai hills.

[9] An extract from the Military Report on the "Chin-Lushai Country" by Col. E.B. Elly, assistant Quarter Master General.

[10] An extract from "The Lushai Hills" (culled from History of the Frontier Bordering on Assam from 1883-1941) by Sir Rober Reid, Governor of Assam, 1937-1942, "...the partial failure of crops in 1910-11 as an indirect result of the flowering of the bamboos was followed by serious scarcity all over the district. The effect of this flowering was to cause a tremendous increase in number of the rats who destroyed all crops". As the British entered the Mizo hills (part of the Indo-Burmese range of hills, then known as the Lushai hills) to chase the headhunting tribal raiders and try to gain control over them by securing a foothold in the heart of the hills at Aizawl, they witnessed an amazing ecological phenomenon: a severe famine apparently caused by rats. The Mizo hills are covered extensively by various species of bamboo, which periodically rot, flower and seed. The bamboo seeds appeared to be a delicious food item for jungle rats,

which emerged in massive numbers to devour them, and the consumption of bamboo seeds seemed to produce a vast increase in the rodent population. Once the millions of rats had exhausted the bamboo seed, they began to attack the standing crops in the fields. As they devoured the grains the resulting scarcity of food led to massive hardship, starvation and deaths...."

[11] Nag: 2008, in his book, "Pied Pipers in North East-India, Bamboo-Flowers, Rat-Famine and the Politics of Philantrophy (1881-2007)", argues that British used the famine relief work as a site for politics of paternalism in Lushai Hills. Based on numerous records on both colonial rulers and the missionaries. (Nag : 2008) substantiates that the famine provided a site for the politics of humanitarianism in Lushai hills as both colonial government and Christian missionaries played pied pipers role. By arranging famine relief, it made them completely dependent on the administrative machinery. The British Government was the new order and Christian missionaries through their work helped people to accept and adjust to the new order.

[12] One heartbreaking scene recorded was that a grown-up man sitting near one of the dug holes, large enough to admit a man, crying like a child because after toiling for hours for the root, he found his way blocked by a huge rock. At another site there was a widow with her baby on the back, working with all her feeble strength to extract the tuber. Often she would become so exhausted that she would lay down to rest, only to find insects crawling all over her and if she did not get out of the jungle before dusk, the wolves would devour her (Nag 2001).

[13] Ginger is a rat proof cash crop as it has been observed that the rats and rodents do not feed on the ginger and hence its cultivation remains safe (Government of Mizoram:2001).

[14] *Chaichim* is a Mizo name used for the species of genus *Mus*.