

Impact of Seasonal Rainfall Variation on People's Work Schedule in Extreme Humid Areas: A Case Study in Pynursla, Meghalaya

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Abstract: Climate change, increased pollution levels, and a shift in global atmospheric circulation have resulted in drastic changes in different seasons, affecting the livelihood of people with low incomes in rural areas. The present work focuses on the impact of seasonal rainfall variation on the rural livelihood of people in the Pynursla area. It examines the seasonal variation of rainfall and people's working hours by conducting a household survey to analyse how people respond to the seasonal variation of rainfall. Understanding the link between seasonal variations in rainfall and people's work schedules can lead to better planning, including the search for alternative sources of livelihood and other natural resources as income-generating assets that will help generate a regular flow of income leading toward sustainable development.

Keywords: climate change, seasonal rainfall, rural livelihood, work schedule, sustainable development

Seasonal variations of rainfall in different rainfall regimes vary over time and space. Although the monsoon affects most parts of India, rainfall varies from heavy to scarce in different areas. More than 80 per cent of the annual rain falls in the four rainy months from June to September (monsoon season).

The seasonal variation of rainfall affects the lives of farmers, business owners, and manufacturers in terms of the income earned from their source of livelihood.

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Furthermore, if such variation corresponds to the farmer's predictions, it results in a better harvest, high agricultural productivity, and profits. On the other hand, if seasonal rainfall variability is low or extremely high and does not match farmers' forecasts, this leads to the failure of agriculture, businesses, and other livelihoods, resulting in social, economic, and political chaos.

Located on the southern slopes of the Meghalaya plateau, Pynursla experiences an extremely humid climate. The War people, which are the sub-groups of the Khasi community (Schedule tribe), inhabit this part of the plateau, whose livelihood practises are in direct response to the variation of rainfall in different seasons as they live close to nature (Lyngdoh, 2018), where modernity is recent. The Inter-governmental Panel on Climate Change Report 2007 observed that rainfall patterns such as an early or late start of the monsoon, increasing variability of rainfall with alternating periods of too little or too much rain, and a general shift in the seasonal patterns are essential dimensions of climate change and have a considerable impact on the people in South Asia (Mackay, 2008).

Mikias Biazen (2014) observed that the local people of Ethiopia's Central Rift Valley Region depend on the Maher rainfall for crops like wheat, maize, and barley. However, the frequent delays in the rain and seasonal variations cause crop failure, resulting in low income and making them vulnerable to climate change. A similar study conducted in Bangladesh, where traditional agriculture still plays a vital role, reveals that the failure of the monsoon to arrive at the right time, as expected by the farmers, leads to crop failure and an increase in food prices (Etzold et al., 2014). Janakaraj et al. (2014) pointed out that most farmers in the Janjgir-Champa district of Chhattisgarh experience a decline in their income associated with crop production due to the change in rainfall pattern and a shift in seasonal variation of rainfall in terms of delay or onset impacting working hours, loss of work, food consumption, and security.

From their study in Jamaica, Spencer and Urquhart (2021) reveal that extreme climate events, such as incessant rainfall over a prolonged period, significantly impact absence from work and reduced working hours. However, the extreme climatic events do affect the absence of work of the people engaged in the secondary and tertiary sectors to some extent. However, the people engaged in the primary sector suffer when extreme climatic events occur, as their livelihoods depend directly on nature. The climatic elements, particularly rainfall, play a vital role in the people's work schedule, agricultural produce, and income generation derived from the primary livelihood practises (Lyngdoh, 2018).

Blackmore et al. (2021) discovered that the unpredictability of precipitation influences the subsistence farmers in the Guangaje region of Ecuador, resulting in a cyclical shift in agricultural productivity. According to research participants, climate unpredictability has caused shifts in planting seasons and consequently impacted food output. Further, according to a review of the composite seasonal calendar, households are food insecure for approximately 80% of the year, resulting in food

insecurity and seasonal hunger. The pressure on agricultural production limits households' ability to make enough money from farming to expand their financial and physical capital and make efforts to enhance or change their livelihood strategy. Because agricultural production is declining due to the unpredictability of precipitation, the heads of household, primarily men, relocate temporarily, seeking other sources of livelihood to earn money to fund expenses and other consuming demands. Furthermore, the study's findings indicate that seasonality is a crucial component of Guangaje's vulnerability setting affecting the farming community. Hence, various interventions to improve livelihood outcomes in these communities are necessary.

The present paper attempts to assess how seasonal variation in rainfall impacts the work schedule of the rural folk living on the southern slopes of the Meghalaya plateau, who have diversified livelihood practices. This study will help appraise how the seasonal variation of rainfall affects the working schedule of the people and their livelihood practices, as understanding this fundamental link between seasonal variations in rainfall and the working hours of people engaged in various livelihood activities can lead to better planning and enable people to search for alternative sources of livelihood that will help generate a regular flow of income, especially during prolonged incessant rainfall periods.

Objective

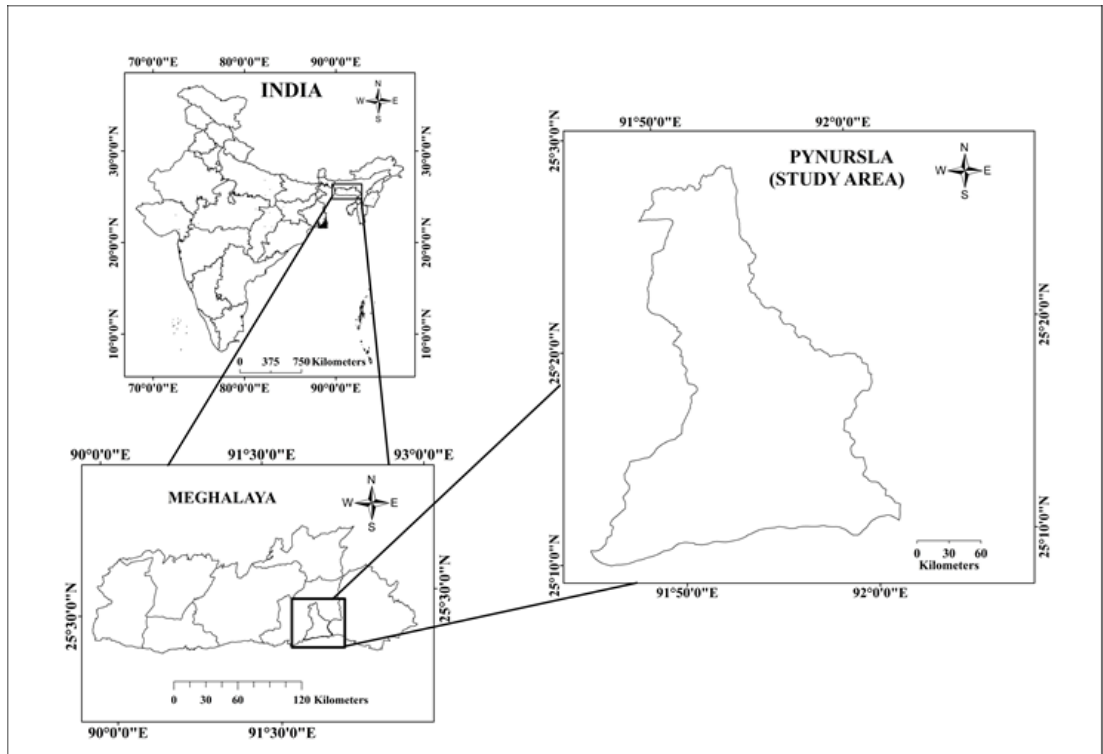
To assess the link between seasonal variation in rainfall and the working schedule of the head of household (the primary bread earner) engaged in different livelihood practises in the Pynursla area.

Research Question

Is there a marked linkage between the seasonal rainfall variation and the head of household (the primary bread earner) work schedule in the Pynursla area?

Regional Setting

Situated on the southern slopes of the Meghalaya plateau, Pynursla is bounded by Myllem Community & Rural Development (C&RD) Block to the north, Bangladesh to the south, Shella Bholaganj Community & Rural Development (C&RD) Block to the west and Amlarem Community & Rural Development (C&RD) Block to the east (Kharmyndai, 2013). The area chosen for this research lies under the jurisdiction of the Pynursla Community & Rural Development (C&RD) Block and falls under the administration of the East Khasi Hills District. The areas extend from 91°53'11.855" to 91°55'2.83" east longitude and 25°18'7.027" to 25°19' 11.759" north latitude, as shown in Figure 1.

Figure 1*Location of the Study Area*

Besides being a hilly terrain, the study area has unique physiographic diversities characterised by undulating slopes and a rugged terrain where the south-flowing streams have brought many changes to the landscape. The altitude of the area is about 1500 meters above sea level. The topographic features suggest youthful relief produced by the rejuvenation of the old peneplain surface during the post-Eocene period, and this is evident from the occurrence of land features termed the Jaintia formation (Dikshit, K. R. & Dikshit, J. K. 2014, p.122).

The geological and physical structures significantly control the drainage and drainage patterns of Pynursla and follow parallel and trellis drainage. Numerous rivers, such as Um-Sohra, Um-Rem, Um-Song, Wah-Rew, and Wah-Pathaw, drain the Pynursla region and are perennial, owing to the existence of springs. In contrast, the smaller streams are non-perennial, flowing only in the summer when precipitation is high, especially with the onset of the southwest monsoon. Further, the alluvial, loamy, fine-loamy, and coarse-loamy soil characterises the Pynursla region, where the slope gradient, vegetal cover, and surface runoff greatly influence the soil structure and formation. Experiencing a highly humid climate, evergreen trees, deciduous trees, shrubs and ground vegetation, including lichens, mosses and climbers, dominate the vegetation of the study area. The main species found

are *Myrica Esculenta*, *Cinnamomum Tamala*, *Cedrela Toona*, *Betula Alnoides*, *Mohonia Pycnophylla*, *Commelina benghalensis*, *Artemisia spp* and *Lantana camara* (Kayang et al., 2005; Tynsong & Tiwari, 2010; Tynsong et al., 2012).

Pynursla is a region characterised by the highest annual rainfall in the world (Rakhecha & Clark, 1999). The study area is predominantly a rural block where the tribal population still lives near nature. Moreover, lying on the southern slopes of the Meghalaya plateau, the region experiences a highly humid climate with a distinct wet season (Lyngdoh & Ryntathieng, 2023) and heavy torrential downpours, especially during the peak monsoon seasons, limiting agriculture-dependent livelihoods and non-farm-based livelihood practises and affecting the work schedule of the people here.

Data Sources and Methodology

The Meteorological Data Archive of Bangladesh/Northeast India provided the daily rainfall data of Pynursla station for the last four years (2013–2016) and calculated it on an average monthly basis. In addition, from the average monthly rainfall for four years (2013–2016), the different seasons, namely the pre-monsoon (March to May), monsoon (June to September), post-monsoon (October to November), and winter (December to February) (Taher & Ahmed, 1998), mark and analysed. The generation of empirical data for this paper was retrieved through a field survey carried out from 2013 to 2016; hence, the rainfall data also corresponds to this period. Further, the current observations reveal that there have not been many significant changes in the seasonal variation of rainfall in recent years, nor has there been much development work in the Pynursla area, as the rural people here continue to live close to nature, where the seasonal variation of rainfall plays a significant role in the work schedule of the villagers.

Secondly, the identified and selected villages for the survey are Madanshatsngi, Nenggate, Pynursla, and Umkor, which fall under the jurisdiction of Pynursla C&RD Block. Further, four focus group discussions took place in the selected villages with the village elders, consisting of the headman (Rangbah Shnong) and the executive members of the Village Panchayat (Dorbar Shnong).

Thirdly, for the generation of the socio-economic data and work schedule data of the population living in the Pynursla area, a household survey of the selected villages, namely Madanshatsngi with a total of 160 households (2011 census), Nenggate with a total of 171 households (2011 census), Pynursla (Iew and proper) with 250 households (2011 census), and Umkor with 266 households (2011 census), was conducted with the help of a semi-structured questionnaire, where the technique followed was random sampling, surveying 40 households from each village in the study area. Further, to analyse how seasonal variation in rainfall affects the working hours of the head of household (HH), 40 respondents who were the HH representing 40 households responded to the semi-structured questionnaire in each of the selected villages.

Discussion

Socio-economic Profile of the Head of Household (HH) or Respondent in the Four Villages

The Household survey conducted for 40 households in each selected village reveals that most HHs or respondents belong to the War Khasi community. However, an insignificant segment of the population, i.e., 2.5 per cent of the total surveyed households in Nenggate village, belongs to the Assamese-speaking community. It is interesting to note from the household survey that 57.5 per cent and 55 per cent of the HH are females in Umkor and Pynursla villages. In comparison, 87.5 per cent and 65 per cent of the HH or respondents are males in Nenggate and Madanshatsngi villages, respectively.

The HH in all the selected villages live in their own houses, and most of the respondents and their family members practice Christianity as their religion. However, in Madanshatsngi and Nenggate villages, 50 per cent and 47 per cent of the respondents, respectively, report that they still practice the traditional religion (i.e., Seng Khasi and Seng Raid).

Regarding the HH's literacy status and educational qualifications, the result reveals that the educational qualifications vary from illiterates to graduates. The survey suggests that Umkor village has the highest share of dropouts and illiterates, accounting for about 72.5 per cent and 15 per cent, respectively. The HH in Madanshatsngi village has a literacy rate of only 30 per cent, with 70 per cent of students dropping out at various stages in primary and secondary levels of education. Interestingly, Nenggate and Pynursla villages record the highest percentage of literate HH, accounting for about 52.5 per cent and 45 per cent, respectively. Further, the survey in the four selected villages reveals that the Thabah, the Khongthaw and the Tynsong clans own most of the farmlands. These clans, along with the Village Panchayats (Dorbar Shnong), look after the land and associated disputes so that the maximum population within the clan have access to the common land and other resources like forests, rivers, etc., and derive diverse livelihood practices, thereby enhancing their income and nutritional levels.

The household survey suggests that tourism is slowly emerging as an essential alternative livelihood practice even in this remote area, where about 6.88 per cent of the respondents are giving out rooms for rent to tourists as the concept of bed and breakfast. Similarly, Government officials from different districts work in the Pynursla area and reside in rented houses given to them by the respondents or HH. Apart from tourism, the Government is playing a vital role in enhancing the income of the HH by providing 100 days of employment as an alternative source of livelihood for every financial year through the National Rural Employment Guarantee Scheme (NERGS) and Meghalaya State Rural Livelihood Society (MSRLS). Hence, this has

become an essential coping strategy for work loss during heavy and incessant rainfall and cold and dry winters.

Work Participation Rate in the Four Villages

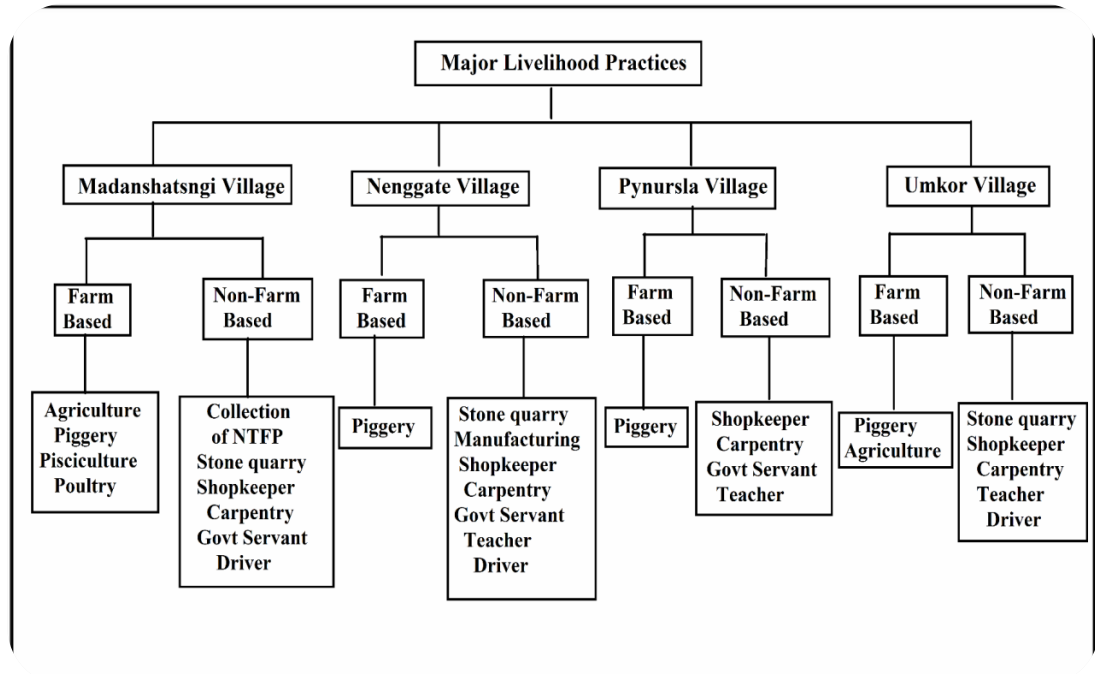
This section highlights the work participation rate of the HH engaged in different livelihood practices in the four selected villages according to the 2011 Census Report,

The 2011 Census Report suggests that the villages of Nenggate and Madanshatsngi have the largest share of the main working population to the total working population, with 86.11 per cent and 77.04 per cent, respectively. Similarly, the villages of Pynursla and Umkor record the highest share of the marginal working population to the total working population, with 37.87 per cent and 33.69 per cent, respectively. Further, the Census Report reveals that the village of Nenggate has the maximum share of the non-working population to the total population with 74.04 per cent.

Major Livelihood Practices of the Head of Household (HH) or Respondent in the Four Villages

Figure 2

Major Livelihood Practices of the Respondents in the Selected Villages, Pynursla Area



For analytical convenience, the primary livelihood practises in the four selected villages are categorised into two types, namely farm-based and non-farm-based, as shown in Figure 2.

The household survey suggests that the HH practices 12 major livelihoods in the four selected villages (Table 2). Further, Table 2 indicates the share of the HH in each of the significant livelihood practices and suggests that very few respondents practice agriculture, piggery, poultry, pisciculture and collection of non-timber forest products as their primary livelihood as compared to business (shopkeeping), transport services (drivers), Government service and carpentry in the selected villages.

Table 2

Major Livelihood Practices of the Respondents or Head of Household (HH) in the Four Selected Villages in the Pynursla Area

Villages →	Madanshatsngi	Nenggate	Pynursla	Umkor
Major livelihood practices	Share in % to total workers			
Agriculture	10	0	0	2.5
Piggery	2.5	2.5	12.5	15
Pisciculture	5	0	0	0
Poultry	2.5	0	0	0
Collection of NTFP	7.5	0	0	0
Stone quarrying	5	2.5	0	5
Manufacturing *	0	12.5	0	0
Shop keepers	25	12.5	47.5	35
Carpentry	25	37.5	25	25
Government Services	2.5	17.5	10	0
Teaching	0	7.5	5	2.5
Driver	15	7.5	0	15
Total percentage	100	100	100	100

Manufacturing* of crude household items and farm equipment from scrap iron, welding and small-scale iron smelting.

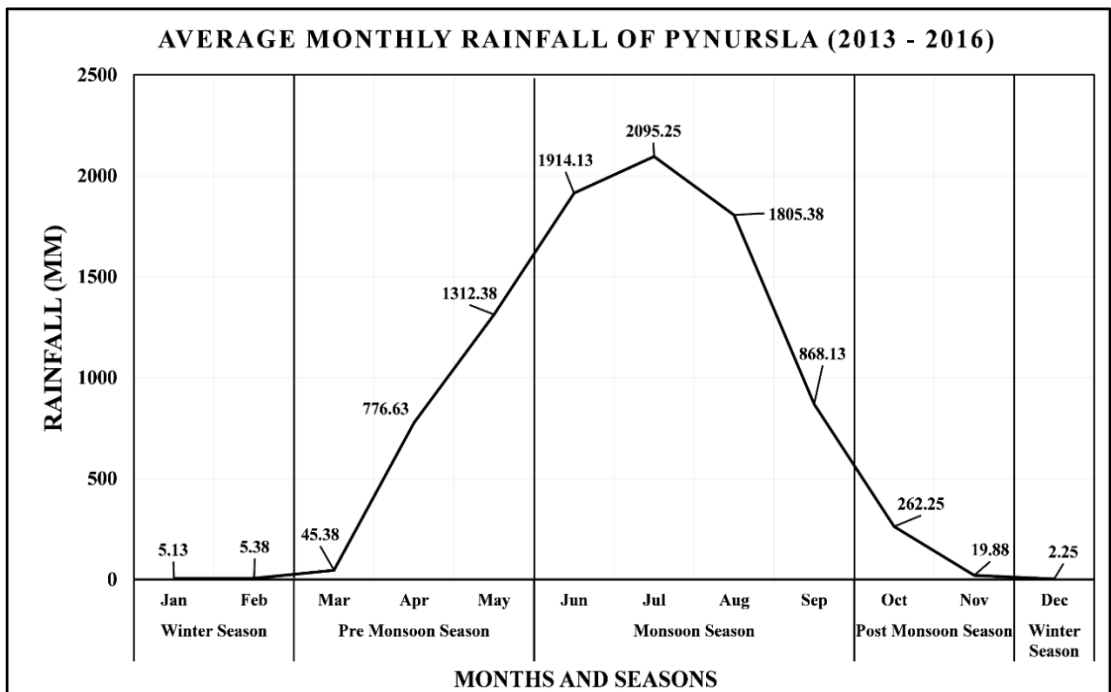
Source: Household survey

Link between the Seasonal Rainfall Variation and the Head of Household (HH) Work Schedule in the Selected Villages of the Pynursla Area

This section highlights the linkage between the seasonal rainfall variations and the work schedule of the respondents or HH in the selected villages of the Pynursla area. Figure 3 depicts a graphic of average monthly rainfall from 2013 to 2016 divided into distinct seasons to help understand such a link. Secondly, a graph showing the working schedule chart where the Y-axis represents the percentage of workers (head of household), and the X-axis represents the primary livelihood practices of workers in different seasons.

Figure 3

Average Monthly Rainfall of Pynursla (2013 – 2016)



Furthermore, this section discusses the link between the seasonal rainfall variations and the HH work schedule in the selected villages following colour schemes depicting the working hours of workers engaged in diverse livelihood practices.

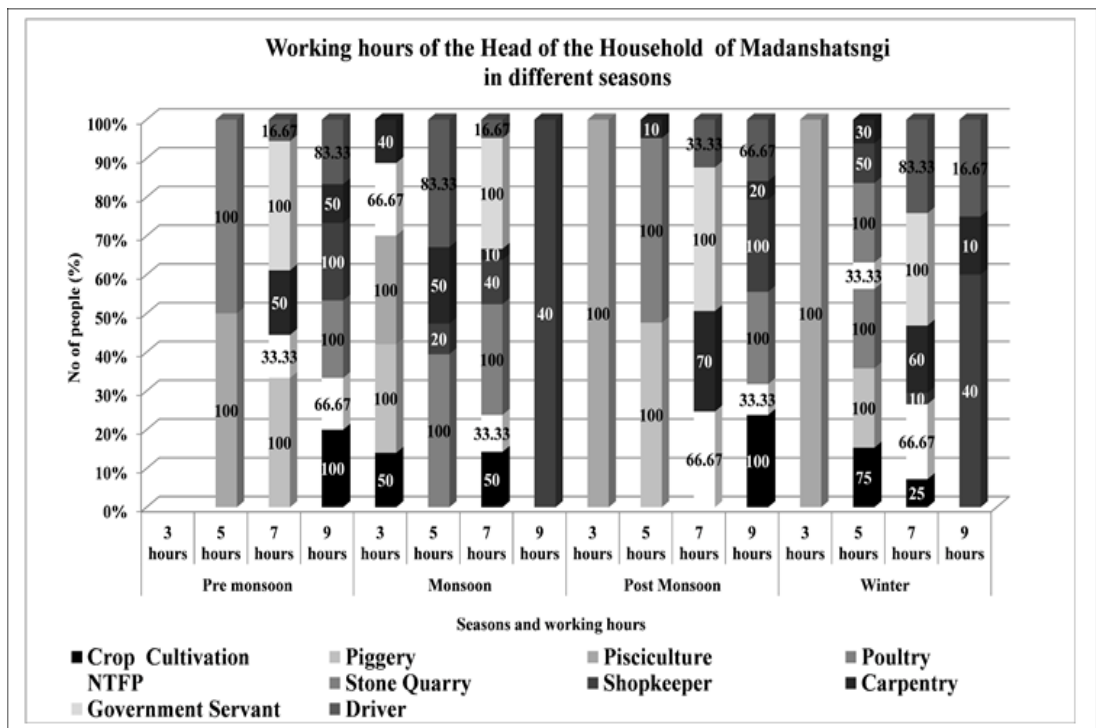
Link Between the Seasonal Rainfall Variation and the Work Schedule of the HH in Madanshatsngi Village

Figure 4 suggests that the HH in Madanshatsngi village practices ten significant livelihood practices. Ten per cent of the HH are engaged in agriculture,

working 7 hours a day during pre-monsoon and post-monsoon seasons. The farmers here work from 9 a.m. until 5 p.m. during the pre-monsoon and post-monsoon season. The main work of the farmers during these seasons is sowing (pre-monsoon) and harvesting the crop (post-monsoon). Field data suggest that during monsoon season, the farmers work for fewer hours in agricultural fields due to incessant rains, which significantly affects agricultural productivity, reducing the HH income to only rupees 2000-4000 per month. During the winter seasons, the HH reporting agriculture as their primary livelihood seeks other alternative sources of livelihood, like daily wage labour and the establishment of petty businesses to generate more income for sustenance. Further, to cope with the losses from crop failure due to incessant heavy rainfall during the monsoon season, the farmers get government assistance from the C&RD Block office to procure fertilisers and seedlings at a subsidised rate.

Figure 4

Working Hours of the HH of Madanshatsngi in Different Seasons



With an income generation ranging between rupees 4000 to above 10,000 per month, the households reporting piggery, poultry, and pisciculture as their primary livelihoods work for 3 to 5 hours daily, and the seasonal rainfall variation does not hamper their work schedule. Survey reports reveal that the people engaged

in piggery and poultry complete their work during the morning hours. At the same time, during their free time, the HH diversifies their livelihood by engaging in other alternative sources of livelihood, including petty businesses and daily wage labour in the NERGS scheme, enabling the HH to earn an extra income, i.e., rupees 3000 extra per month. Further, the household survey results reveal that the HH engaged in the above livelihood practices gets support from the C&RD Block office to procure piglets and fingerlings at a subsidised rate.

Field data suggest that 7.5% of the HH collects non-timber forest products (NTFP) from Madanshatsngi village, working for 3 to 5 hours daily and earning about 300 rupees daily. Figure 4 shows that the work schedule of the HH engaged in the collection of NTFP is least affected by the average monthly rainfall during the pre-monsoon and post-monsoon seasons. During this season, the HH diversifies their livelihood by opening small shops and selling the collected NTFP product, earning an extra monthly income of rupees 1500 to 2000. During these seasons, 5 per cent and 2.5 per cent of the NTFP collectors work for about 3 to 5 hours daily. During the monsoon and winter seasons, due to heavy rainfall and cold, dry climatic conditions, the collection of NTFPs becomes difficult, and livelihood diversification becomes restricted.

Five per cent of the HH in Madanshatsngi village report stone quarrying as their primary livelihood; the HH engaged in this source of livelihood practice work for approximately 5 hours a day during the pre-monsoon, post-monsoon, and winter seasons. Since the HH income derived from this livelihood is only rupees 4000 to 6000 per month, the HH diversifies their livelihood, works as daily wage labour, and earns 2000-3000 extra. On the other hand, during the monsoon, which is associated with high rainfall ranging from 868.13 mm to 2095.25 mm, work in stone quarrying becomes difficult, affecting the income derived from stone quarrying.

During the pre-monsoon, post-monsoon, and winter seasons, household surveys suggest that the carpenter's work schedule remains unaffected, and they work for about 7 hours a day, earning rupees 4000 to 8000 per month. On the other hand, the field data suggest a reduction in the working hours of the carpenters during the monsoon season when heavy and incessant rainfall deters work efficiency as 7.5 per cent and 17.5 per cent of the carpenters work for 5 hours and less than 7 hours, respectively. Similarly, field data suggest that the work schedule of the HH engaged as shopkeepers is more during the pre-monsoon, post-monsoon, and winter seasons, as 12.5 per cent of the shopkeepers work for 7 to 9 hours a day earning rupees 4000 to above 10,000 per month. Furthermore, if heavy and continuous rain persists, some shopkeepers lose as demand in the market decreases.

Figure 4 reveals that the average rainfall does not affect the work schedule of government servants. However, the work schedule of the drivers constantly changes according to the seasons and market days.

Link Between the Seasonal Rainfall Variation and the Work Schedule of the HH in Nenggate Village

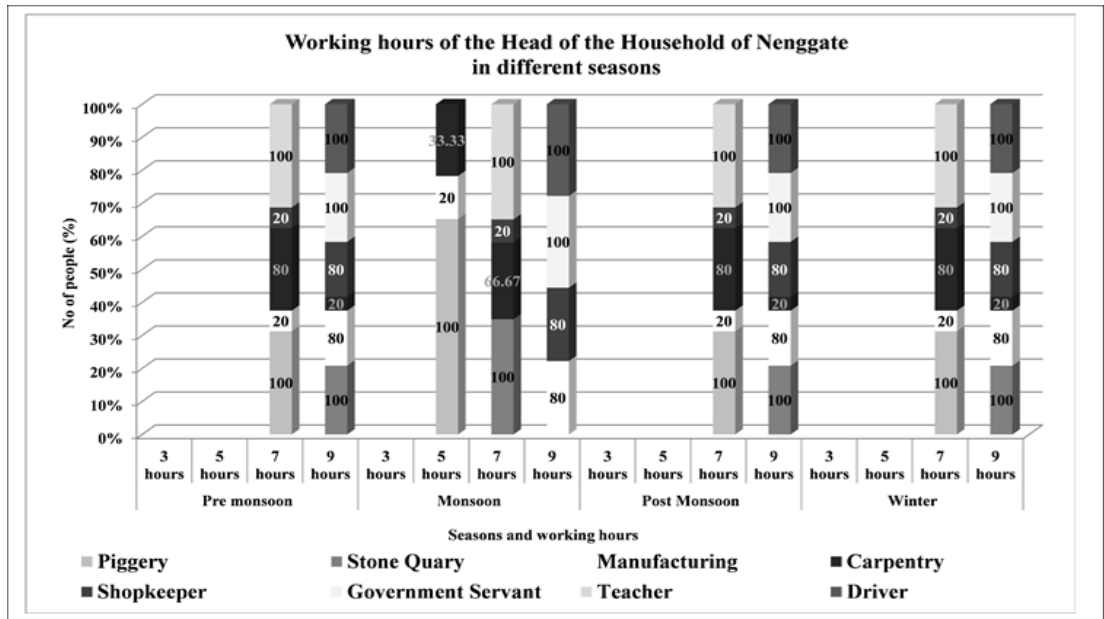
A field survey from Nenggate reveals eight livelihood practices. 2.5 per cent of the HH engaged in piggery farming work 3 to 5 hours a day during the pre-monsoon, post-monsoon, and winter seasons, earning rupees 4000-8000 per month. Field survey reveals that the HH get help from the C&RD Block office in buying piglets at a subsidised rate. Further, the HH also diversifies their livelihood and gets engaged as daily wage labour earning an extra income; however, during the monsoon season, the people engaged in this livelihood miss work as they can usually work from 9 a.m. until noon, as heavy rain usually arrives during the afternoon restricting livelihood diversification.

Field survey suggests that 2.5 per cent of the HH engaged in stone quarrying works for 9 hours a day and are least affected by seasonal rainfall except during the monsoon when the average monthly rainfall ranges between 868.13 mm and 2095.25 mm. In the quarry mines, work starts from 8 a.m. and continues till 5 or 6 p.m. during pre-monsoon and post-monsoon seasons; however, during the monsoon season, due to torrential rainfall, stone quarrying becomes difficult, and the daily wage labourers engaged in this livelihood practice have to seek for other alternative sources of livelihood.

Figure 5 reveals that 12.5 per cent of the HH are engaged in small-scale manufacturing, and the manufacturers work 7 to 9 hours daily during the pre-monsoon, post-monsoon, and winter seasons, earning around rupees 6000-8000 per month, on average. Further, the field report reveals that 2.5 per cent and 7.5 per cent of the small-scale manufacturers work 7 to 9 hours a day, respectively, unaffected by seasonal rainfall. However, during the monsoon season, the work schedule of these manufacturers diminishes to 5 a day due to heavy rainfall varying between 868.13 mm and 2095.25 mm on average. During this season, 2.5 per cent and 10 per cent of the manufacturers work only for 5 to 7 hours a day, respectively. The survey also reveals that heavy rainfall during this season results in frequent power cuts, making it impossible for manufacturers to use their tool, which runs on electricity.

Figure 5

Working Hours of the HH of Nenggate in Different Seasons



Field findings reveal that 12.5 per cent of the HH engaged in businesses are shopkeepers. The shopkeepers work for 5 to 9 hours a day. Further, during the pre-monsoon, post-monsoon, and winter seasons, 7.5 per cent and 5 per cent of the shopkeepers work for 7 and 9 hours a day, respectively. However, with heavy monsoon rainfall, the work schedule of the shopkeepers changes and reduces to 5 to 9 hours daily. Consequently, heavy rainfall restricts customers from coming out, and as a result, the income of the shopkeepers is reduced during this season.

Field survey reveals 37.5 per cent of the HH engaged in carpentry in Nenggate village, out of which 35 per cent and 2.5 per cent of carpenters work for 7 and 9 hours a day, respectively, and their work schedules are least affected by rainfall during the pre-monsoon, post-monsoon, and winter seasons. On the other hand, with an average monthly rainfall varies between 868.13 mm and 2095.25 mm during the monsoon season, 12.5 per cent and 25 per cent of the carpenters work 5 to 7 hours daily due to continuous downpours; this significantly affects the work schedule of the carpenters resulting to a decrease in the income earned.

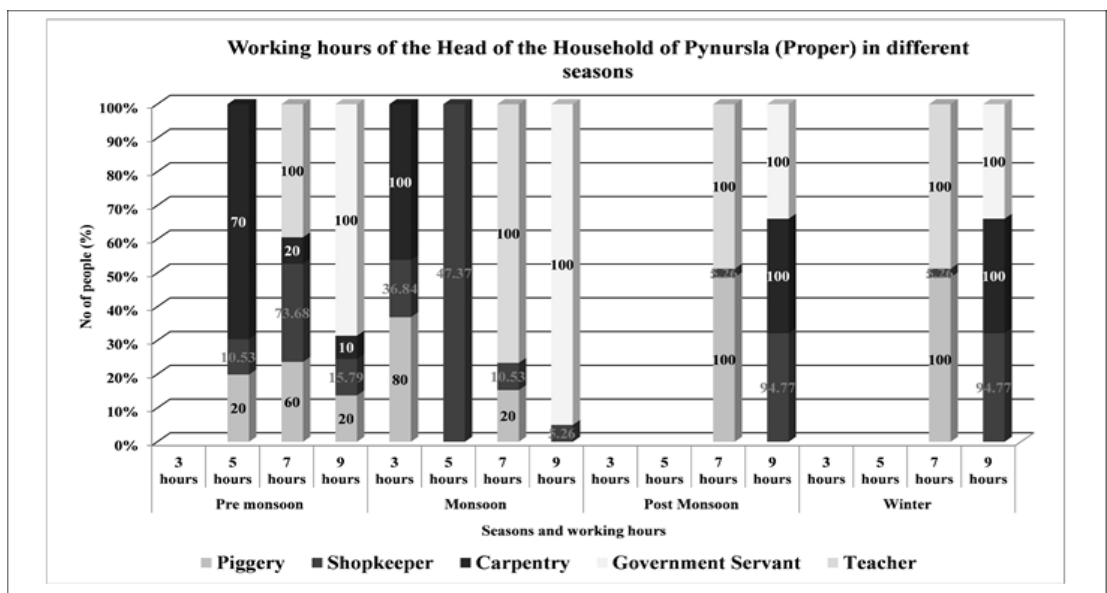
From Figure 5, the field survey suggests that 17.5 per cent and 7.5 per cent of HH are government servants and teachers unaffected by the seasonal rainfall variation. Similarly, Figure 5 shows that 7.5 per cent of the people work as drivers. During monsoon season, the drivers work 7 hours a day, as heavy rainfall affects their work schedule. On the other hand, with the decrease in rainfall during the post-monsoon and winter seasons, the drivers continuously work for 9 hours.

Link between the Seasonal Rainfall Variation and the Work Schedule of the HH in Pynursla Village

The household survey suggests that HH practices five types of livelihoods in Pynursla village, most of which are non-farm-based activities. Figure 6 depicts that 12.5 per cent of the HH engaged in piggery farming work 3 to 5 hours a day, and their working schedule constantly changes according to the seasons. During the pre-monsoon, post-monsoon, and winter seasons, field surveys reveal that the HH works 5 hours a day, and the seasonal rain does not influence their work schedules. After completing their work, they diversify their livelihood and engage in petty businesses (small local shops), enabling them to earn an extra income. However, during the monsoon season, when the average monthly rainfall is high, their work schedule changes from 5 to 3 hours daily. Further, field survey reports suggest that only 2.5 per cent out of 12.5 per cent of the HH get help from the C&RD Block office in buying piglets at a subsidised rate.

Figure 6 shows that 47.5 per cent of the HH are shopkeepers, and their work schedule remains the same during the pre-monsoon, post-monsoon, and winter seasons, enabling them to earn rupees 8,000 to above 10,000. During these seasons, 7.5 per cent and 40 per cent of the shopkeepers work 7 and 9 hours a day, respectively. On the other hand, during the monsoon season, the work schedule of the shopkeeper changes; during this season, 10 per cent and 37.5 per cent of the shopkeepers work 5 and 9 hours, respectively, daily. Further, a field survey reveals that 10 per cent of the shopkeepers affected by the heavy monsoon rain work approximately 5 hours a day as most of their shops lack proper building materials and are in poor condition, affecting their income.

Figure 6
Working Hours of the HH of Pynursla in Different Seasons



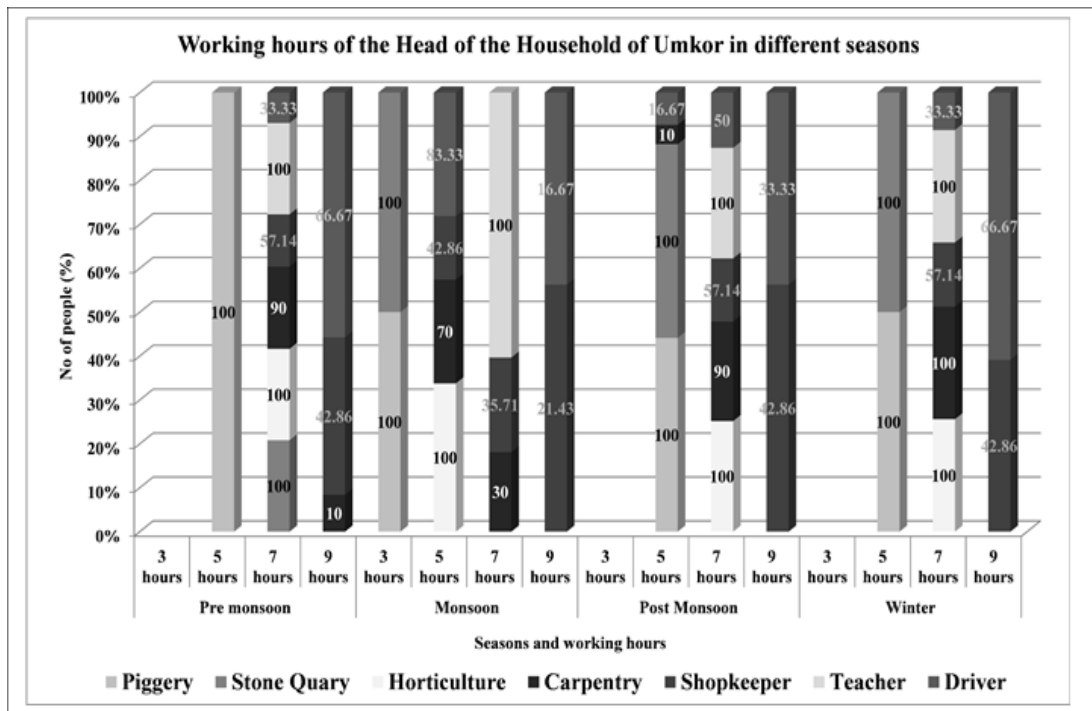
During the pre-monsoon, post-monsoon, and winter seasons, rains do not affect 25 per cent of the HH engaged in carpentry, and the carpenters work 9 hours a day, earning about rupees 6000 to above 10,000 a month. On the other hand, during the monsoon season, incessant rainfall affects the work schedule of the carpenters due to the poor condition of their workshops, resulting in a fall in the income earned. During this season, they work for 7 hours a day.

Link Between the Seasonal Rainfall Variation and the Work Schedule of the HH in Umkor Village

Field survey results reveal that Umkor village reports seven types of primary livelihood practices. Figure 7 is illustrative in many ways. 2.5 per cent of the HH practices horticulture and mainly grows cabbage. The HH engaged in horticulture work 3 hours a day, and the pre-monsoon, post-monsoon, and winter rain does not affect the work schedule of the HH engaged in this livelihood practices, enabling them to diversify their livelihood to earn an extra income, which averages around rupees 4000 to 6000 per month. However, during the monsoon season, horticultural farmers cannot work in open fields due to heavy rainfall, affecting their income and livelihood.

Figure 7

Working Hours of the HH of Umkor in Different Seasons



Field findings suggest that 15 per cent of the HH engaged in piggery work for 3 to 5 hours and earned about rupees 6000 to 8000 per month. During the pre-monsoon, post-monsoon, and winter seasons, 5 per cent and 10 per cent of the HH engaged in piggery work of 3 to 5 hours a day, respectively. The HH diversifies livelihood during these seasons by working in construction sites to earn an extra income for a better standard of living. On the other hand, the incessant monsoon rains adversely affect the working hours of the HH engaged in this livelihood practice, where 7.5 per cent of HH work for only 3 hours, and another 7.5 per cent work for 5 hours a day, restricting livelihood diversification and reducing income generation during the monsoon season.

Five per cent of the HH work in stone quarries. During the pre-monsoon, post-monsoon, and winter seasons, the quarrymen work for 7 hours a day, enabling them to earn rupees 1500 per transport (per jeep); however, quarrying activities come to a standstill during the monsoon season because of the heavy rainfall, and this drastically affects their income and standard of living.

Thirty-five per cent of the HH engaged in businesses, mainly as shopkeepers, work 5 to 9 hours a day, generating a monthly income of rupees 4000 to above 10,000. Field surveys suggest that 15 per cent and 20 per cent of the shopkeepers work for 7 hours and 9 hours a day, respectively, and their work schedules are least affected by pre-monsoon, post-monsoon, and winter rains. On the other hand, there is a reduction in the working hours of the shopkeepers during the monsoon season because of heavy rainfall. Field data reveals that 25 per cent and 10 per cent of shopkeepers work for 7 hours and 9 hours a day, respectively, during the monsoon season, adversely affecting the income derived from these livelihood practices.

Twenty-five per cent of the HH in Umkor village work as carpenters, earning about rupees 4000 to 8000 per month. The HH works 7 hours a day without facing any problems during other seasons; however, in monsoon season, incessant rainfall limits the work schedule of the carpenters as frequent power cuts hamper their work. Moreover, the poor condition of the workshops limits their working hours, adversely impacting their income and livelihood.

Further, 2.5 per cent of the HH engaged in teaching work 7 hours a day, earning about rupees 6000 to 8000 per month, and their work schedule remains constant in all seasons. Similarly, 15 per cent of drivers' work schedules are unaffected by pre-monsoon, post-monsoon, and winter rains, and they work 7 and 9 hours a day, respectively. On the other hand, during the monsoon season, due to heavy rainfall resulting in fewer passengers, the drivers' work schedule changes, where 7.5 per cent each work for 7 hours and 9 hours a day, and their daily income also gets affected.

Results

During the pre-monsoon and post-monsoon seasons, field data from the household survey conducted in the selected villages reveal greater livelihood diversity among the respondents or HH. On the contrary, during the monsoon season due to heavy rainfall and during winter because of cold and dry weather, field data suggest limited livelihood diversification among the HH in the study area. Further, the field survey reveals that the HH work schedules constantly change as per the rainfall variability in the different seasons. Interestingly, except for teachers and government services, all other livelihood practices of the HH in all four villages report a loss of working hours, especially during the monsoon season followed by the winter. The heavy rainfall and the cold, dry conditions during the above seasons adversely affect their primary livelihood practices and income generation, unfavourably affecting their sustenance. Here, policy intervention is necessary to enhance alternative livelihood opportunities to generate income to maintain their families.

Further, the focus group discussion report reveals that families get Government and non-government assistance to cope with the adverse effect of seasonal rainfall variability. However, out of the total 160 households surveyed, only nine respondents whose primary livelihood practices are related to agriculture, piggery, pisciculture and horticulture reported that they got help from Meghalaya Rural Bank in the form of loans and from Pynursla C&RD Block Office to procure agricultural equipment's, fertilisers, piglets, and fingerlings (baby fishes) at a subsidised rate.

Conclusion

Field survey significantly reveals a direct link between the seasonal rainfall variation with the major livelihood practices and the HH's working hours in all four villages. It is interesting to note that incessant torrential downpour almost every day during the monsoon season restricts the working hours of the HH and their various livelihood practices except for the HH engaged as teachers and government services. Similarly, in the winter season, due to the cold and dry climate, the working hours of the HH engaged in farm-based activities are relatively less when compared to pre-monsoon and post-monsoon seasons since during this time of the year, the agricultural lands in Pynursla are left fallow to regenerate its fertility for the next sowing season. Hence, the HH reporting farm-related primary livelihood practices reports shorter work hours as the days are also of short duration during the winter season, adversely affecting their income.

The HH, which reports the collection of NTFP, also report shorter working hours during the winter as the bay leaf trees, medicinal herbs, fruits, and other food items from the forests dry up and dwindle during this season. During the monsoon season, heavy torrential rainfall results in the luxurious growth of vegetation, making

the forest impenetrable to venture on the slopes of Pynursla, restricting the collection of NTFP, resulting in loss of working hours and limiting livelihood diversification; however, the winter reduces the working hours of the HH due to cold, windy days, making outdoor life difficult. The incessant rainfall during monsoon and cold, dry climatic conditions during winter affect the livelihood practices and income generation of the rural marginalised population, making it difficult to sustain their families. The Government has introduced the MSRLS scheme and the NERGS for the people, enabling them to get employment and enhance their income. However, the hour needs to create more alternative indoor-based livelihood practices, especially during the monsoon season.

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