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State Climate Change Cell, Manipur

Directorate of Environment
Government of Manipur

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BEYOND SCIENCE: COMBATING CLIMATE CHANGE THROUGH TRADITIONAL WAYS

“every community in the world has its own measures of adapting to changes that happened in its surrounding.”

- Yengkokpam Satyajit Singh

The advent of industrial revolution brought a new awakening that has not only change the way of life but also resulted in the destruction of environment and the very foundation of cultural diversity. With the continuity of change in climatic condition all over the world, new science has been trying to materialize solution based on theories and hypothetical knowledge. But Science which is viewed as a way to development comes with wanton exploitation of the natural resources and it cannot alone bring the goal of a sustainable development. Adaptation approaches to climate change from the scientific perspective has also not yet brought the effective result. Human population continue to rise on every count and the instinct of survival keeps increasing the pressure on environment. It is reported that variation in weather condition has become extreme in the last few decades with atmospheric temperature rising and rainfall becoming erratic. The best example of climate change happening in this age is the global warming which is experienced in most part of the world.

Nature is inclusive with our life and since the early days, every community in the world has its own measures of adapting to changes that happened in its surrounding. Even at this age of science, it is required to understand the importance of cultural attachment with regards to preservation and conservation of plants and animals. Realization of human destructive activities dawn late and there is a need to develop a culture to minimize the exploitation and look for an alternative and sustainable approach to adapt to the ever changing world. Much development in science through innovations and inventions has been witnessing. However, lack of diffusion of these technologies to the backward communities hindered the process of adaptation. Since new ideas are not readily accepted with the apprehension of the degree of its effectiveness, any adaptation approach to changes in climate should be suited to the old ways of life. It is important to follow what our forefathers did to adapt to the new environment with the traditional knowledge.



Following the old ways in modern time

Generally, there exist two ways to combat the changes in climate and global warming. The Operational model which follows the scientific approach and the Cognitive model that is based on the traditional ways of dealing with nature. Science is the new invention that has brought us to the present condition of existence. However the indigenous knowledge of the people that had lived through ages are encoded in the beliefs and rituals that we practiced. Every community has its own concept of preservation and conservation, which is a very old culture of the people and there were no wanton exploitation in these indigenous societies. Adapting to new changes comes from their close proximity with nature and their ability to understand it. But the indigenous knowledge began to thinned out with the development of science.

At the present scenario of climate variability and change, it has become a necessity to blend the two approaches to bring a better solution. The holistic knowledge of the old and the new will be more helpful in synthesizing adaptation measures against the changing climate. As science takes a head start in search of solution, the need of the hour to decode the old beliefs and rituals for addressing the environmental problems and to make adaptation more effective. The indigenous communities in Manipur have a close relation with Nature and they had been adopting various process of adaptation through the years with the time tested knowledge rendered through generations. In the earlier days before the arrival of scientific technology, people have their way of predicting the weather. Behaviour of insects and animals also gave clues about the pattern of rainfall that is likely to occur. With agriculture as the sole source of livelihood for majority of the population, they rely on the prediction of weather and seasonal change as an adaptive measure against crop failure. The type of paddy/rice sowed was decided depending on that prediction.

The indigenous communities in Manipur have a close relation with Nature and they had been adopting various process of adaptation through the years with the time tested knowledge rendered through generations.

The ecosystem continue to degrade with integration of exotic species that invaded the habitat of the indigenous species. This is further accelerated due to over exploitation of natural resources by human activities. Large scale deforestation has even led to extinction of species. The earlier system have certain rules in case of felling trees. In order to stop wanton exploitation of the environment, there are restrictions on felling of trees on any day of the week. Auspicious days are selected and rituals are performed before felling trees that have itself build an ecosystem of its own with birds, insects and many other small animals. An aged tree is often protected by associating it with God and Goddess. Not only that, all the plants and animals in the Nature are divided into two groups – Profane (for economic exploitation) and Sacred (for preservation). The preservation and conservation of the plants and animals through the concept of Cognitive model maintained the balance of the ecosystem and kept the environment in check.

In the modern age of science and development, the nature has taken a back seat and the importance of the relationship with the nature seems to fade with the present generation. Conservation of nature and ecology as well as adaptation to the vagaries of climate has become very important with the changing scenario of the global climate. So, in dept knowledge of the practices and rituals followed since generations by the loi (Scheduled caste) community in Manipur may be properly documented to enhance adaptation process against climate change. Lois are considered to be the original inhabitants of Manipur and continue to practice the traditional faith and religion which is very close with nature. They had retained the culture, tradition and religion of the Meiteis for centuries. Understanding the existing traditional knowledge and blending it with modern science would be effective in climate adaptation action.

The importance of the traditional knowledge was adopted as the Aichi Target by the Convention on Biological Diversity (CBD) at its Nagoya conference in 2010. The parties of COP 10 agreed that previous biodiversity protection targets are not achieved, so new plans and targets that can be achieved need to be formulated. With the environment continuously effected by the changes in weather and the indigenous people amongst the first to be affected by the adverse impacts of climate change; the traditional knowledge held by the indigenous people becomes critical while addressing climate change in terms of mitigation and adaptation. Thereafter, COP 21 recognizes the importance of the traditional knowledge related to addressing and responding to climate change and establishes a platform for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner. The Local Communities and Indigenous Peoples Platform (LCIPP), first

mandated by the Paris Agreement (COP 21), provides an opening for traditional knowledge to influence climate policy at local, regional and international levels. But only in 2018, the COP 24 at Katowice, Poland marked a large forward step in the implementation of the LCIPP.

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With all the talks on the importance of knowledge that passed on from generation to generation, proper understandings of the practices of the indigenous people need a fresh look. A mosaic of tribes also inhabited the rugged topography of hills and valleys of Manipur and each of these tribes have their own distinct culture and beliefs. An amalgamation of the knowledge of all the different communities would infuse a new approach in combating the changing climate. However, the relevance of those knowledge in this age may be questioned with the monsoon wind keep missing its date and the winter shower taking a pass. For example, the prediction of the intensity of rain for this year by looking at the direction of bending branches of agave plant may no longer give us a true picture. So new technology will also be needed to adapt to new conditions which are not experienced in the earlier days. Thus, a transformational adaptation based on traditional knowledge and modern science is required as the vulnerabilities and risks of climate change increases.

“A people without the knowledge of their past history, origin and culture is like a tree without roots”

- Marcus Garvey



COMPOSTING: A STEP TO CLIMATE CHANGE MITIGATION

“organic waste with high compostable fraction comprised around 60% of the municipal solid waste generated from various sources”

- Dr. Bharati Brahmacharimayum

Urban dwellers in Imphal eagerly await the songs/ whistles played on the loudspeakers of the garbage collection vehicle on the designated days of the week. Leaving the comical part, the arrival of the garbage collection vehicle is such a relief for the residents to dispose of their domestic garbage to maintain hygiene in their houses. If the collection vehicles fail to turn up even for a single day, piles of garbage can be seen dumped in the street corners. The fate of the garbage post-disposal is no man's worry and generally the waste is disposed of in landfills or some other unused land in the outskirts of the city. Moreover, lack of proper sanitary landfills will lead to unhygienic conditions ultimately leading to contamination of soil, water, air thereby harming both the human as well as environmental health. Taking clue from the signs of rapid urbanization pattern over the years, it can be said with certainty that landfills or the dump yards will exhaust its capacity and soon there will be no space left to throw/dump our garbage.

By practicing composting even at the household level, the carbon content of the soil can be enhanced by addition of the organic compost thereby reducing the release of green house gases from arable soil.

On the global front, almost 50 percent of the compostable wastes such as vegetable peels, food waste, paper, dry leaves and wood are thrown away as garbage. Even for a small city like Imphal, organic waste with high compostable fraction comprised around 60% of the municipal solid waste generated from various sources. According to a UN report,

3.3 billion metric tons of carbon dioxide is estimated to be generated through the energy used up in the production and management of the wasted food. After the waste reached the landfills, methane gas is released into the atmosphere due to the decomposition of the waste which ultimately affects the global climate. Unknowingly by throwing away our compostable wastes, we are not only wasting the resources but contributing to climate change. Who could have imagined that just a simple action of throwing the compostable wastes would play a role in accelerating the global climate change?

One of the simplest steps to reduce our carbon footprint and battle climate change is “COMPOSTING”

The silver lining in this scenario is that the fight for climate change can be initiated through simple and inexpensive habits. One of the simplest steps to reduce our carbon footprint and battle climate change is “COMPOSTING”. Vegetable peels, egg shells, food scraps/wastes, dead leaves, if composed rather than simply dumping in the garbage bin, can help to rejuvenate the environment instead of harming it. This painless step will improve the carbon content of the soil; ensure efficient management of the waste, reduce the generation of garbage, and undoubtedly play a major role in combating climate change. By practicing composting even at the household level, the carbon content of the soil can be enhanced by addition of the organic compost thereby reducing the release of green house gases from arable soil. Starting off with a compost bin at home and reducing the garbage load would be an ideal initiative to save the environment. With time, the habit of minimalism can be culminated in our daily activities whether in buying food, use of non-biodegradable products like plastics, choosing to cycle and these will go a long way combating climate change. At times, it is just about bringing oneself back to nature to sustain successfully.

“Doing the little things can make a big difference”

– Yogi Berra



MONTHLY ANALYSIS OF MEAN MAXIMUM AND MINIMUM TEMPERATURE AND RAINFALL OF MANIPUR FOR THE 4th QUARTER, 2018

DISTRICT	OCTOBER			NOVEMBER			DECEMBER		
	Max temp (°C)	Min temp (°C)	Total Rainfall	Max temp (°C)	Min temp (°C)	Total Rainfall	Max temp (°C)	Min temp (°C)	Total Rainfall
BISHNUPUR	30.68	14.64	S	27.08	7.51	NR	24.56	5.62	E
CHANDEL	35.52	13.4	E	32.68	10.18	S	28.74	7.12	NR
CHURACHANDPUR	32.5	13.8	E	28.38	6.32	S	27.12	2.28	E
IMPHAL EAST	34.02	14.7	D	30.51	7.76	S	28	5.64	E
IMPHAL WEST	34.13	13.12	E	30.34	6.04	S	27.28	4.32	E
SENAPATI	31.12	10.38	E	27.36	4.26	S	24.94	2.98	E
TAMENGLONG	36.96	6.07	E	33.97	8.26	D	31.76	5.94	E
THOUBAL	31.94	13.58	E	27.88	7.04	E	25.14	4.52	E
UKHRUL	27.4	10.44	E	26.36	6.81	S	22.37	3.93	E
MEAN	32.70	12.24		29.40	7.13		26.66	4.71	
MANIPUR	AAM	MBN		AAM	ABN		AAM	N	

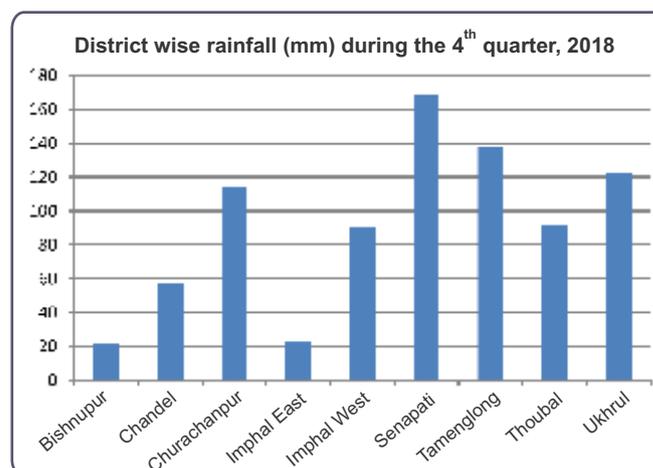
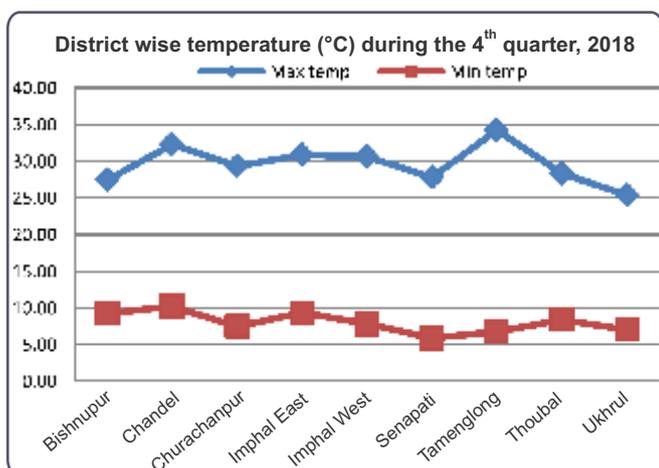
Note :

- N : Normal (N, N+1, N-1)°C
- * : Cold/Heat wave condition
- ** : Severe Cold/Heat wave condition
- BN : Below Normal (N-2)°C
- AN : Above Normal (N+2)°C
- ABN : Appreciably Below Normal (N-3, N-4)°C
- AAN : Appreciably Above Normal (N+3, N+4)°C

- MBN : Markedly Below Normal (N-5 and Below)°C
- MAN : Markedly Above Normal (N+5 and Above)°C
- E : Excess, (+20% or more of Mean rainfall)
- N : Normal, (+19% or -19% of Mean rainfall)
- D : Deficient, (-20% to -59% of Mean rainfall)
- S : Scanty, (-60% to -99% of Mean rainfall)
- NR : No Rain, (-100% of Mean Rainfall)

The last quarter of the year 2018 shows a wide variation in its maximum and minimum temperature for all the districts. The drop in maximum temperature from October to December is much less as compared to the decreased in minimum temperature. While the Automatic Weather Stations (AWS) at Tamenglong and Chandel district recorded maximum temperature, Churachandpur and Senapati district have the minimum recorded temperature. Diurnal temperature range was averaged at 21.56°C. The mean temperature for the state is moderate during this quarter with maximum of 32.70 °C in October and minimum of 4.71 °C in December.

Post monsoon rain was received well in most of the districts during October but it thinned out in November with rainfall recorded in many district as scanty. December month received some amount of rain, however it was not equally distributed. Senapati district received the highest rainfall during the quarter followed by Tamenglong district, while Bishnupur district recorded the minimum rainfall. Among the hill district, Chandel district has least rainfall and Thoubal district received most rainfall in the valley region. Heavy downpour was not recorded but the amount of rain received during this quarter was excess from the normal but lesser than previous year.



Source: State Climate Change Cell, Manipur, Directorate of Environment, Government of Manipur

— Analysed by Yengkokpam Satyajit Singh

THOUBAL: DISTRICT OF LAKES*- Dr. Salam Rita Devi and Ashem Rahul Singh*

Human civilization is closely knit with wetlands which play a vital role for thousands of lives. Wetlands provide various ecosystem services and also support diverse floral and faunal diversity. However, the importance of wetland is rarely considered with the modern development that surrounds us. Most wetland ecosystem is at the brink of extinction with continuous deterioration due to various anthropogenic activities. The need for wetland conservation was given serious consideration at the global level since the 1960s. About 2.85 % of Manipur geographic area is covered by various categories of wetland as per the National Wetland Atlas, 2009. Though Bishnupur district has highest concentration with around 30.7 % of geographic area under wetland, Thoubal recorded the highest numbers of lakes among all the districts of Manipur occupying 30.29 % of its total geographical area.

Thoubal district is topographically a valley region with few hills of low height surrounding most of the district. A number of meandering rivers that closely inter-twined with folk tales and stories flows through the district. Amongst them the Imphal and the Thoubal are the most significant rivers beside other rivers namely, the Wangjing, the Arong and the Sekmai that flow in the district. About nine lakes (pat in local dialect) out of the 23 (estimated) important lakes of Manipur, with the exception of Loktak Lake, are in this district (sources: Manipur State Wetland Authority Report). These lakes include Ningthikhong Pat, Aongbikhong Pat, Kharam Pat, Ikop Pat/ Kharung Pat, Khoikum/Pumlen Pat, Ithai Pat, Lausi Pat, Waithou/ Punem Pat and Ushoipokpi Pat. Out of this, Ithai Pat is the smallest while Ikop Pat/ Kharung Pat is considered the largest. Waithou Pat covers portion of both Imphal East and Thoubal districts.

The occurrence of number of lakes attract many migratory birds from across the world, especially during the winter season of the year. One can hear the songs or the calls of endemic birds as well. In addition, varieties of Tharoi (Snails), Kongreng (Oysters), Ngamu, Ngakra, Ukabi (Fishes) and others edible insects like Naoshek, Tharaikokpi and Harou, are observed during the monsoon season. The local bird, Urengkonthou (Moorhen) demonstrates the importance of

habitat heterogeneity in lakes richness and abundance. In fact, the lakes also served as a lifeline for thousands of villagers through fishing and collection of the edible and medicinal plants from these lakes.

Scientifically, wetlands play an important role in the water cycle, carbon sink, flood control, groundwater recharge, nutrient removal and biodiversity maintenance. The presence of riparian type (Ithai Pat) in Thoubal performs a variety of functions that are of value to society, especially the protection and enhancement of water resources, and provision of habitat for plant and animal species. Ikop Pat has another notable achievement in the cultural, tradition and livelihood of the Thoubal people.

At present, changing temperature, rainfall pattern and sudden floods or drought are shifting the balance of nature causing lakes to become a carbon sources rather than a carbon sink. Flooding is a common sequence during monsoon season whereas the district become like a heat island in summer season. Locals ascribe the changes of lakes to various reasons like encroachment, low and erratic rainfall, temperature, change in vegetation structure and water pollution which facilitates the spread of different kinds of diseases and diminishes the water quality of most lakes in the district.

Such devastating impacts of climate variability slows the economic growth and rather enhance the biodiversity loss of the region. Certainly, we cannot avoid such impact of climate change or climate variability. However, we can minimize such impact with proper understanding of the flow of ecosystem services. At this point, we should realize that wetland play a major role in ecosystem conservation, as wetlands are the most important ecosystem amongst all type of ecosystems. Fortunately, Thoubal districts hold the major important wetlands of the state where further adaptation and mitigation strategies of any climate variability can be streamline. The only important task is to prioritize the adaptation and mitigation strategies. Awareness amongst the researchers, land owners, developers and policy makers about the important of wetlands is the foremost important step. We should never forget, whenever there is conflict between man and nature, nature will always hit back at some point.



Courtesy : Rameshwar Elangbam

TRAINING OF TRAINERS (ToT) ON CLIMATE

- Ashem Rahul Singh

The State Climate Change Cell, Directorate of Environment organized a “three day training programme on Training of Trainers (ToT) level 4 at Institute of Cooperative Management (ICM) Lamphelpat, Imphal from 14th to 16th November, 2018. The programme was conducted in collaboration with Indian Himalayas Climate Adaptation Programme (IHCAP) of the Swiss Agency for Development and Cooperation, a bilateral programme with the Department of Science and Technology (DST), Government of India. The objective of the training is to create awareness and sensitization on climate change besides providing better information on climate change and adaptation issues at different levels. College teachers from all the districts of the state participated in the training programme.

The first day began with the inaugural session where Dr Y. Nabachandra Singh, Director, Directorate of Environment, welcome the participants and highlighted the importance of understanding the issues of climate change and adaptation process particularly in the fragile Indian Himalayan Region. He also gave brief information on the National Action Plan on Climate Change (NAPCC) by giving emphasis on disaster risk reduction.

Other speaker of the inaugural function Dr N. Ranjana Devi, Director, Institute of Cooperative Management (ICM) talk about the changing climate scenario and steps to be taken as adaptation measures. W. Nabakumar Singh, Retired Professor, Department of Anthropology Manipur University, said that climate change is a problem of mankind. He added that due to the lack of morality and ethics, science has become disastrous to mankind. Professor N. H. Ravindranath, Indian Institute of Science, Bangalore, said climate change is global problem faced by every individual, and it requires more awareness, workshop, seminar to be organized in villages, panchayat, block level and others. Divya Mohan of Indian Himalayas Climate Adaptation Programme (IHCAP) pointed that most of the mountain regions in the Himalayan States are sensitive to climate change and mentioned that acknowledging this challenge the central government had launched a specific mission dedicated for the mountain region.

PN Praveen Kumar, General Manager of NABARD highlighted the ongoing projects, climate change and other livelihood projects for the tribal people besides doubling farmers' income and sustainable agriculture. He said that NABARD is the world's largest micro-finance groups having 12 crore members in the country. Dr. T. Brajakumar Singh, Deputy Director, Directorate of Environment, drew the attention on the fast climatic changes visible in our day to day life. He briefed the congregation on the background of the training program and also on the need to know WHERE and to WHAT extend the climate change is happening and affecting us.

On the 2nd day, a group exercise was initiated by dividing into six groups based on districts and the following points of discussion were assigned to each of the groups:

- To identify one focus sector/district for the group
- To list down key impacts of climate change which have been observed on that sector/district
- To list down key factors which are making the sector/district more vulnerable
- To categorise the factors as Sensitivity or Adaptive Capacity

A field visit was organized on the morning of the 3rd day and trainers were taken to Phayeng village which is about 13 kms away from the Imphal city. In the afternoon session, Prof N. Mohendro Singh, Honorary Advisor, State Climate Change Cell, Manipur and Former Member, Steering Committee, NER Vision 2020, DONER, Govt. of India, appreciated the participants for taking keen interest on climate change. Quoting the message of World Bank, “Act Now, Act Together, Act Differently”, with response to Climate Change, he urged the young participants to act as a UNIQUE identity and start doing something from today to conserve the nature. His lecture was followed by a speech on integrated gender in climate change adaptation- community based self-help group network in Manipur- cooperative movement in Manipur was given by a faculty of ICM. Towards the end of the day, a talk on Climate change strategy knowledge-networking in climate change information- trainings at institutional and communities was presented by Professor N. Rajmuhon Singh, Department of Chemistry, Manipur University.

The training programme concluded with distribution of certificates.



About the State Climate Change Cell

The State Climate Change Cell was established in 2013-14 under the Directorate of Environment, Government of Manipur. The Cell has been undergoing research on climate change issues and coordinating with all the stakeholders in respect to the regional climate information. Now, the Cell has been strengthened by the Ministry of Science and Technology, Govt. of India since October 2014 aligning to the two specific dedicated missions under the National Action Plan on Climate Change (NAPCC) viz. National Mission for Sustaining the Himalayan Ecosystem (NMSHE) and National Mission on Strategic Knowledge for Climate Change (NMSKCC).

Thematic sectors of the Cell

Agriculture and its allied Sectors:

All agricultural production is sensitive to the climate variability. Extreme events like droughts, floods, tropical cyclones, heavy precipitation and heat waves are known to negatively impact agricultural production and farmers' livelihood. Yield variability can be attributed to the increase in temperature and CO₂ concentration coupled with the change in rainfall pattern over the region. Climate change could have positive as well as negative impacts on the agricultural production in Manipur.

Health Sector:

Climate change and its impact may link to health directly and indirectly in many ways. It may lead to extension of the window period for propagation of the vector borne diseases such as malaria, dengue, JE etc, and deterioration in nutritional health due to loss of food security and reducing cereal yields. Moreover, with projected increase in surface temperature along with increase in frequency and intensity of extreme events such as hailstorms, heavy precipitation etc. in the future; the impact of climate change on human health are likely to escalate.

Water Resources:

Different catchment areas are likely to respond differently to climate drivers, depending largely on catchment physio-geographical and hydro-geological characteristics. The IPCC has also predicted that the drought will increase in frequency as well as its severity on the affected areas. The trend in precipitation in the NER exhibits considerable spatial variability with respect to the predictions for the year 2030. An overall increase in water yield is seen in Manipur with a magnitude up to about 40%.

Forests & its ecosystem and biodiversity

The forest could be vulnerable due to many factors such as forest fragmentation, forest degradation and forest conversion. A Composite Forest Vulnerability Index (CFVI), developed by the INCC (Source: Report on Climate Change India: 4x4 Assessment) for the two scenarios viz.: current CFVI and future CFVI, found that the forests of some districts of Manipur namely Bishnupur, Churachandpur, Senapati, Imphal, Tamenglong and Chandel have high CFVI (have high overall vulnerability).

Socio-economic based on source of livelihood

The state of Manipur with an agrarian economy has a major section of population depending upon agriculture as their source of livelihood. Increasing population and decreasing land productivity, relatively higher dependence on natural resources (e.g. forests) are also major constraints for Manipur's environmental sustainability. Vulnerability to climate variability will depend on the ability of the populace to adapt to the changes.



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