

ECONOMICS MINI PROJECT REPORT

On

EFFECT OF WEATHER CONDITIONS ON VARIOUS ECONOMIC FACTORS IN ODIsha



National Institute of Technology Karnataka, Surathkal

Department of Information Technology

COURSE TITLE:
Engineering Economics (HU300)

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Acknowledgement

We have made this report file on the topic "**EFFECT OF WEATHER CONDITIONS ON VARIOUS ECONOMIC FACTORS IN ODISHA**". We have tried our best to elucidate all the relevant detail to the topic to be included in the report, while in the beginning we have tried to give a general view about this topic. Our efforts have ended on a successful note. I express my sincere gratitude to **Dr Pradyot Ranjan Jena**, for giving us this opportunity to develop a project on Engineering Economics. Without this, it wouldn't have been possible to develop a project report in this domain.

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INTRODUCTION

Human development launched in 1990 focuses mainly on enlargement of people's choice centering on pillars of sound education, decent standard of living and healthy life. Subsidiary choices are political freedom and various ingredients of self respect. The absence of these choices blocks many opportunities. The human development is the end while the economic growth is only a means to this end. The human development is the means for higher productivity, lowering the family size, healthy physical environment, healthy civil society, increased democracy and wider social security. The main pillars are equality, sustainability and productivity (UNDP, 2010).

Besides the economic growth, the climate has significant impact on human development (Akanbi, Satope, 2014). It is observed that development is positively correlated with the change in climate. Abnormal change and deviation from long established climate affects the soil, cropping pattern, productivity of crops, and longevity of human beings, family life and political situation. In short climate change undermines human capital, its capabilities, and freedom and otherwise the human progress. According to IPCC (2007) the developing and the least developed countries are at a higher stake of climate change than the developed countries.

As per United National Framework Convention on Climate Change (UNFCCC) is attributed directly or indirectly to human activity which has bearing on global atmosphere. Essentially the climate change is not same as weather change. Change of weather is seasonal and temporary whereas climate change involves permanency in change of weather. The established meaning of climate is the measure of the average pattern of variation in temperature, humidity, atmospheric pressure, wind precipitation and other meteorological variables in a given region over a long period of time. It is different from weather and describes the short term conditions of these variables in a given region. In narrow sense climate is average weather at least for a period of 30 years as per the World Meteorological Organization.

The climate as observed is now subject to significant change. The Climate of Odisha as set up since ages and the seasons are monsoon, winter, summer, spring and autumn, occur at constant time and continues for certain period. This climate of the state has been determined due to a number of factors such as location, ocean currents, forests, direction of prevailing winds, shape of land and influenced by human to a great extend.

The above factors have changed the climate of the state to a great extent recently. Climate change has become a matter of great concern. Odisha's seasons have all but vanished, its trees have altered their flowering time, and the farmers have changed their farming practices. Not only this, of the six seasons prevalent there seems only two summer and rain that have their effects on Lands of the state. Autumn, spring and winters have slowly vanished from the memory of the people. While summers have become

longer, winters have become warmer and rains have shortened from above 120 to 90 days while becoming erratic beyond point.

Climate is an important input of food grain production of the state. About 70-75 percent of state's population is rural and depends upon agriculture. The agriculture sector contributes about 16 percent of GSDP during the year 2011-12, which has come down from a level of 53 percent in 1980-81, with almost 60 percent of land under rain fed agriculture and with water-dependent rice, as its main crop, the agriculture sector is particularly vulnerable to vagaries of climate change. The normal rainfall of the state is 1451.2mm out of which 75-80 percent is received from June to September by the impact of south west monsoons. But data shows that the rainfall has decreased to 1391.3mm in the year 2012, and it was 1007.8mm in the year 2002. The year 2015 is particularly significant for long spell of drought and monsoon failure. This has affected farmers of the state.

The climate shocks are the crucial factors that have pushed back the progress of the economy. According to a study Status of Agriculture in Odisha, Directorate of Agriculture, Odisha, out of 52 years only thirteen years have been normal years and in all other years the state has been bearing the impact of climate shocks. This almost puts the state with a 75 percent probability of being visited by these climate shocks of any kind. Further it is also observed that there is consistent loss of rice productions because of these events. The climate change has the potential to derail the current growth strategy and deepen poverty in Odisha. Continuing climate variation has altered the sectoral growth including the ability of the poor to engage in farm and nonfarm activities. In short the climate as an important input holds the key for enhancement of food grain productions and assurance of food security of the people of the state.

Because of which Odisha remains the poorest of the 11 major Indian states, with 47.15 percent of the rural population (or 17.35 million people) living below the poverty line. Incidence of poverty in Odisha is 32.59 percent as against India is 21.92 percent in the year 2011-12 according to Odisha Economic Survey, 2014-15.

However impact of climate change is just not confined to agriculture, it is impacting other areas of development too. Risk and vulnerability is getting compounded due to devastating natural, social, physical, economical and environmental capital, combined with poor political representation followed by nutritional and health hazards causing to disrupting the livelihoods that causes distress migration. Migration of families triggered by crop failure has affected education and health of people. Children often accompany their parent in their search of livelihood in cities beyond the state. They fall into the trap laid by human trafficker, child prostitution rackets, child sale, women trafficking with rampant social, mental and physical abuse and are exposed to inhuman work environment often facing exploitation and subject to inhuman drudgery.

PROBLEM STATEMENT

Impact of Weather conditions like Rainfall, Temperature and Reference Crop Evapotranspiration on various Economic sectors which includes Agriculture, Manufacturing and Construction, and then finally relate it to Net District Domestic Product for each district of ODISHA and Analyze the result for the entire state.

LITERATURE SURVEY

UNDP (2009) in his study tried to find out that the impact of Indian agriculture, still mostly rain fed are mostly disastrous. Increasingly pests' attacks accentuate the crises being felt by millions of marginal and small farmers. Human health is affected by an increase in vector- borne disease like malaria. The coastal areas of the country are threatened by a rise in sea level leading to crises of drinking water caused by saline ingress and infrastructure and flow loss. Climate change increases the vulnerability of the poor and those dependent on natural resources for their livelihood. It leads to less secure livelihood, increasing health risk and constrained economic opportunities due to short term and long term impacts on drought and floods. Khosla, Hunter (2007) in their study has stated that in the face of climate related environmental change rural resident are forced to migrate in search of work, creating new migration patterns. Brown (2009) has found out that according to United Nation Population Fund's State of the world population 2009 there will be an increase in migration trends which would reach up to 200 million by 2050. Brooks (2003) made an attempt to develop a conceptual framework of risk, vulnerability and adaptive capacity that synthesizes a variety of approaches. By distinguishing between social and biophysical vulnerability the apparent conflict between different formulations of vulnerability in the climate change literature can be resolved.

Chandran (2013) has tried to found out that Climate change is a human development issue which undermines expanding human potential, developing capabilities and enlarging freedom. Climate change poses major obstacles to progress in meeting the Millennium Development Goals (MDGs) and maintaining progress raising the Human Development Index (HDI). Climate change is closely linked to the broader sustainable development agenda to reduce poverty, child mortality and morbidity.

Objective of the study:

The climate change is associated with the vulnerabilities of human system arising from climate variability. The study envisages analyzing the impact of climate change on human development. The study envisage specifically:

1. To find out the change in land use pattern, cropping system and productivity of the major crops.
2. To study the change in rate of migration, skill, pattern of employment and other related factors in the area under study.
3. To make an analysis of the standard of living, literacy and human health status.
4. To make a comparative analysis of development in both the districts.

Conceptual Framework:

The World Bank has divided Odisha into four regions. And climate varies from regions to regions. Odisha is highly vulnerable to the levels of impact of climate change. Climate is affecting economic development

and associated with poverty. The climate is shaping standard of living, employment, education, health etc. The economic development of different regions is highly associated with change of climate. In the coastal areas of Odisha, there erratic and untimely rainfall increased the salinity of the soil due to frequent tidal surges, rising temperature, increasing frequency and intensity of cyclones and low pressure during crop seasons has hit the main crop paddy. These factors have also led to increase in pests attacks. Expenses on production have increased on account of investment in increasing quantities of costly chemical fertilizers and pesticides. Facing crop losses as well as fall in income level the small and marginal farmer has abandoned agriculture.

Frequent drought is also punishing the people to a more vulnerable condition. Farmers borrow money at high interest rate and invest in agriculture production but sudden drought, drag the farmers towards poverty and hinder their development. So climate is affecting economic development.

Hypothesis:

Due to climate change there is a change in land use pattern, cropping system and productivity of major crops like rice, cereals and pulses.

There is a change in rate of migration, productivity of human beings and pattern of employment.

There is a change in standard of living, literacy and human health.

MATERIALS AND METHODOLOGY

1. Area of the Study:

The study will be confined to the districts of Puri and Balangir of the State to study the impact of climate change on human development. Districts has been selected purposively, Puri representing the coastal zone associated with more rain, cyclone and flood as against Balangir represents western Odisha associated with high temperature, more migration, low and erratic rainfall.

2. Sampling Technique and Study Design:

Multi-Stage sampling technique will be adopted to select the sample units. In the first stage, Puri and Balangir districts will be selected purposively, Puri representing coastal and Balangir western Odisha. In the second stage two blocks from each district will be selected purposively. In the third stage from each selected blocks two Gram Panchayats total eight Gram Panchayats will be selected purposively on the basis of above parameter. From each Gram Panchayat one cluster of four to five villages will be selected. From each cluster of village's 75 farmers consisting of large, small and marginal will be selected. Number of farmers will be selected on the basis of proportion to the number of farmer existing in the group of farmers. The sample will be interviewed about economic condition, size of land, productivity, education and other socio economic factors. The farmer will be interviewed with structured questionnaire on personal contact.

3. Sample selections:

The sample size contains four blocks, eight gram panchayats, fourty villages and six hundred respondents.

4. Sources & Tools of Data Collection:

The data for the study were collected from both primary and secondary sources. The data collection from the primary sources will include interview with respondents through a semi-structured pre-tested questionnaire and researcher's observation. The questionnaire covered personal, demographic, social and economic information, details of participation, perception on cohesion and impact and constraints of climate change. Besides, focused group discussion, informal interview method, participant observation method will also be used to collect information relating to the study. The various sources for collecting secondary data will include human development reports, UNDP reports, ADB reports, published and unpublished documents including journals, books, occasional publications, working papers, popular magazine and annual publications of social development organizations and others.

Proper Statistical analysis will be used to analyse the data in view of the stated objectives. The data after collection will be edited then there will be gap filling and if necessary again visiting the field for collection

of data will be done. The data will be analysed with the help of statistical tables and diagrams. Trend and regression analysis will be done in view of the objectives.

ANALYSIS

The Analysis for each district of ODISHA is done here. The Weather factors which are taken in consideration are

1. Precipitation
2. Average Temperature
3. Reference Crop Evapotranspiration

These factors will then be analysed with the NDP of the districts.

PRECIPITATION : In meteorology, precipitation is any product of the condensation of atmospheric water vapor that falls under gravity. The main forms of precipitation include drizzle, rain, sleet, snow, graupel and hail. Precipitation occurs when a portion of the atmosphere becomes saturated with water vapor, so that the water condenses and "precipitates". Thus, fog and mist are not precipitation but suspensions, because the water vapor does not condense sufficiently to precipitate. Two processes, possibly acting together, can lead to air becoming saturated: cooling the air or adding water vapor to the air. Precipitation forms as smaller droplets coalesce via collision with other raindrops or ice crystals within a cloud. Short, intense periods of rain in scattered locations are called "showers".

AVERAGE TEMPERATURE : The average high or low temperature is the normalized high or low temperature for at least a 30 year period. Thus, an average high or low is a statistical average. Records need to be kept at least 30 years for an average high or low temperature to be statistically meaningful. Often high and low temperature information is misinterpreted as being the TYPICAL high and low temperature. Average temperatures are NOT typical temperatures. Typical temperatures are the MOST COMMON temperatures a location experiences. While an average temperature is the average of the extremes and everything in between, the typical temperature is the temperature you would most expect for a location.

REFERENCE CROP EVAPOTRANSPIRATION : Evapotranspiration (ET) is the sum of evaporation and plant transpiration from the Earth's land and ocean surface to the atmosphere. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and waterbodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapor through stomata in its leaves. Evapotranspiration is an important part of the water cycle. An element (such as a tree) that contributes to evapotranspiration can be called an evapotranspirator.

DATA ANALYSIS on the GRAPHS of Various Districts:

1. Weather Conditions

Years in consideration : 2002 - 2017

Years are divided in 2 intervals : 2002 - 2009 and 2010 - 2017

GRAPH Coordinate (Average Temperature, Precipitation, Reference Crop Evapotranspiration)

X - Coordinate -> Months of The Year (January - December)

Y - Coordinate -> mm of Rainfall

2. Economic Factors

Three Economic Factors have been taken into consideration

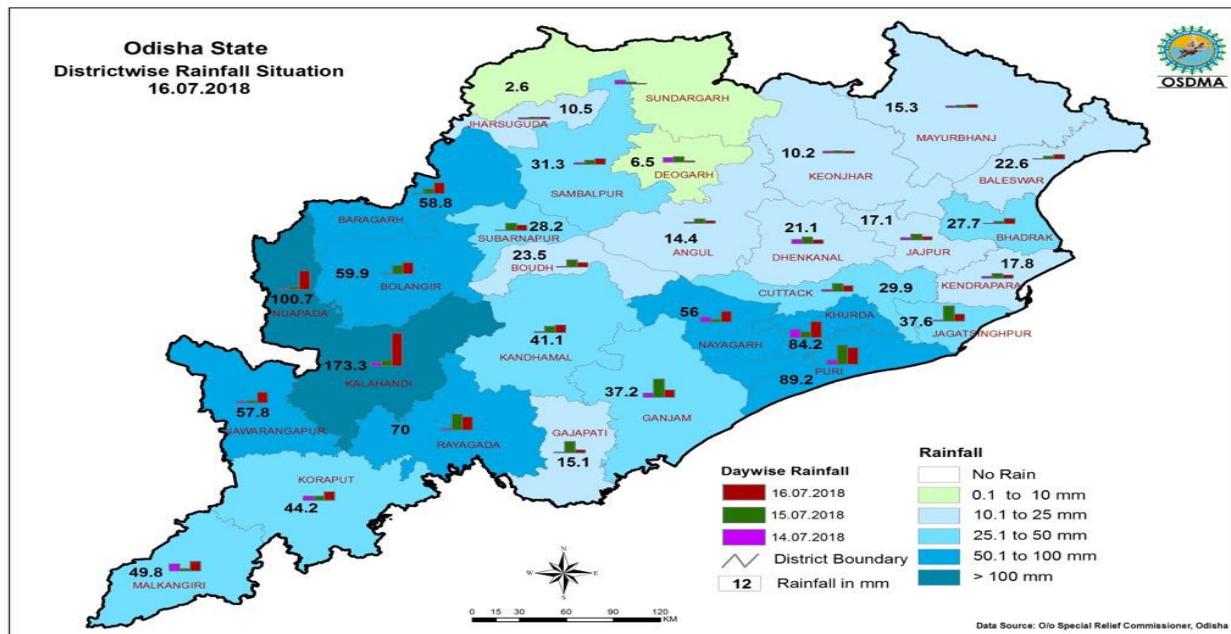
GRAPH Coordinate

Each subsequent color graphs represent the time period of 1 year.

X - Coordinate -> Represents

1. Agriculture
2. Manufacturing
3. Construction

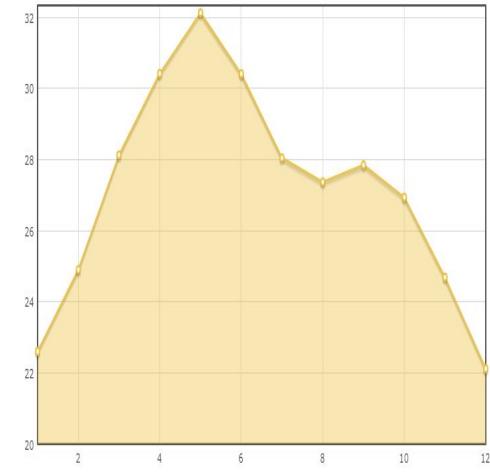
Y - Coordinate -> Rs in lakhs



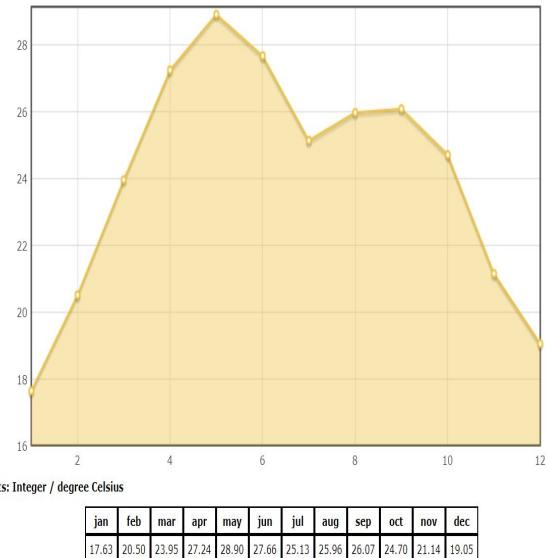
Example of Rainfall Map of Odisha

MALKANGIRI and KORAPUT

AVERAGE TEMPERATURE

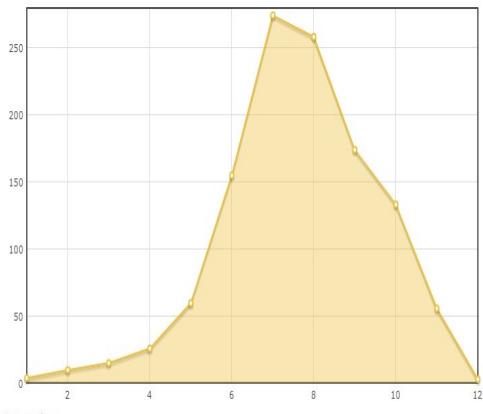


2002 - 2009

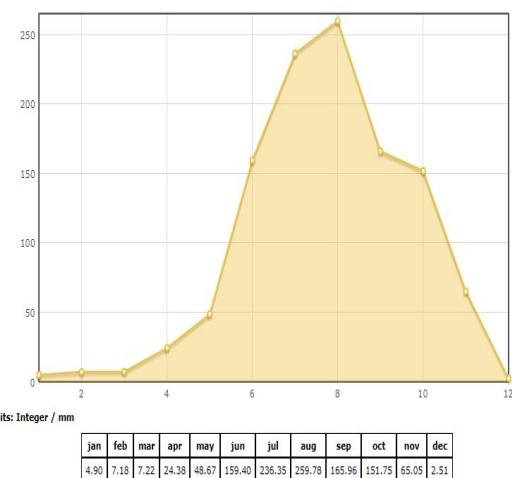


2010 - 2017

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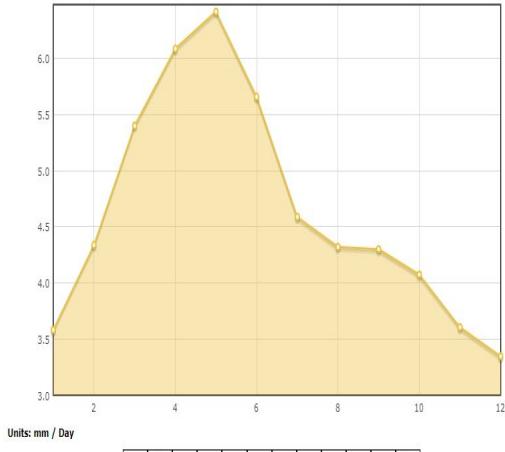


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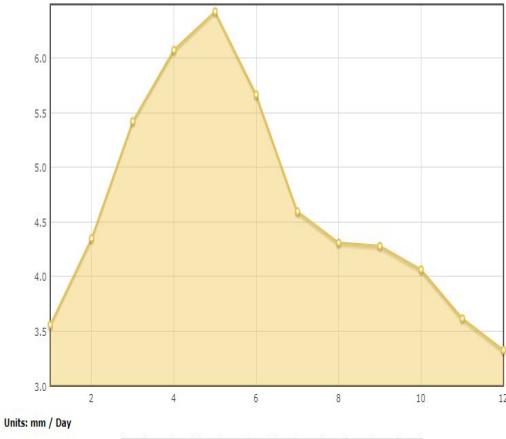


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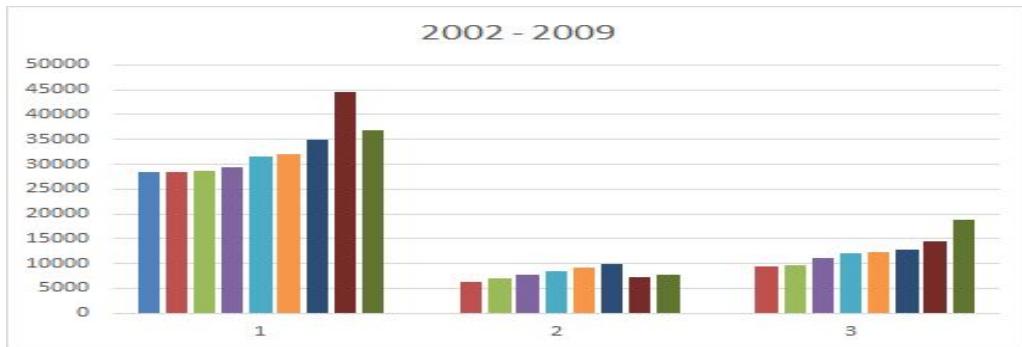


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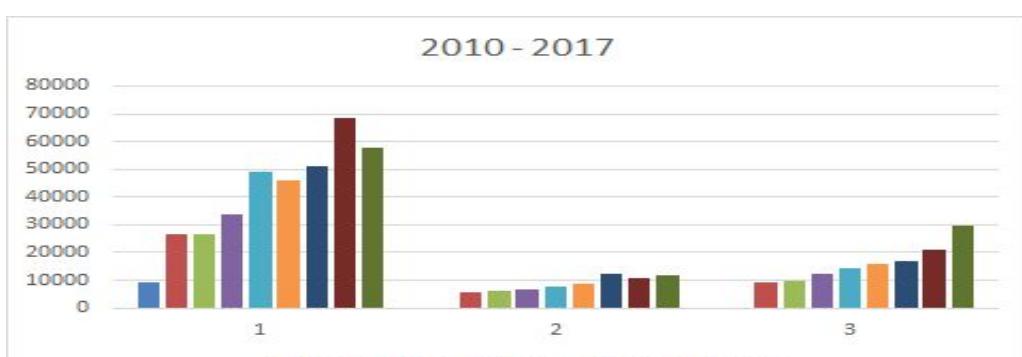


2010 - 2017

NET DISTRICT DOMESTIC PRODUCT

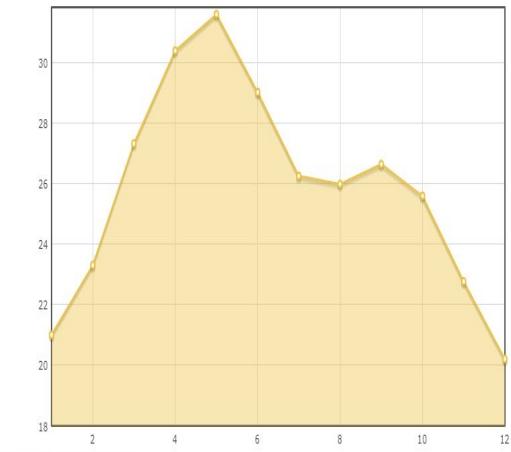


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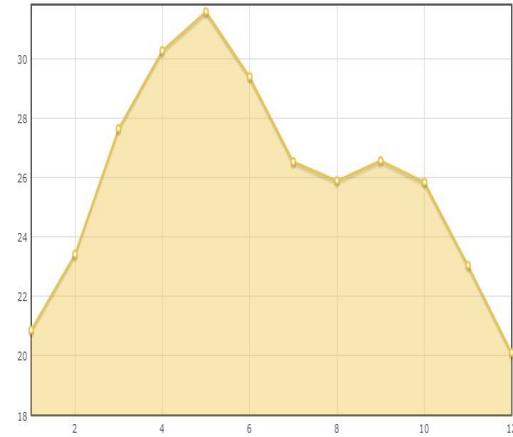


NABARANGPUR and KHORDA

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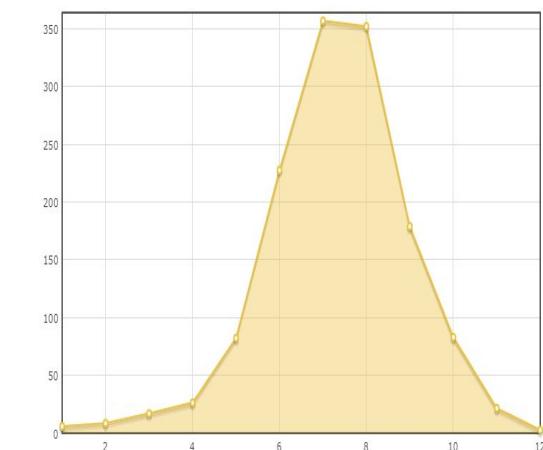


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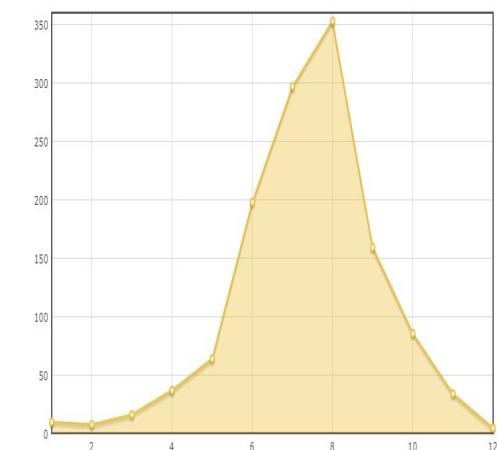


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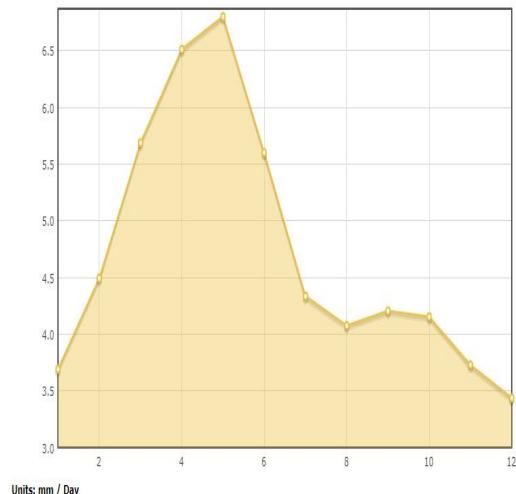


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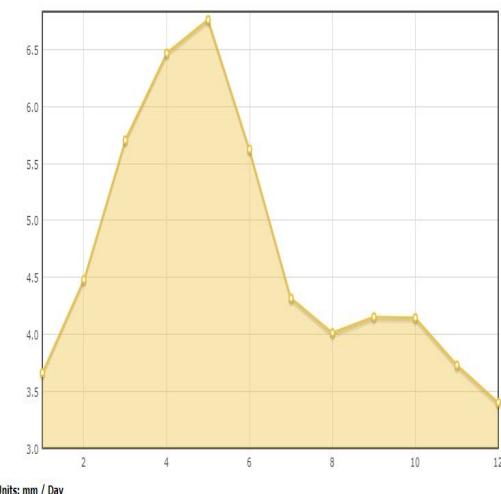


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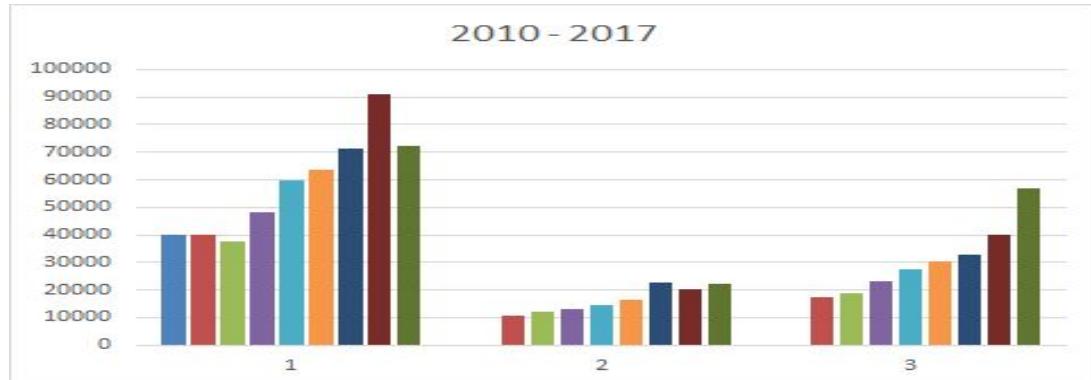
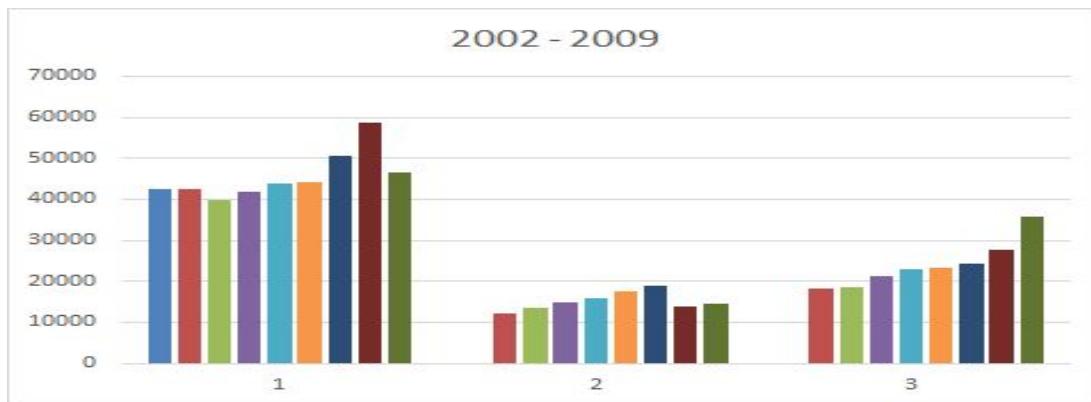


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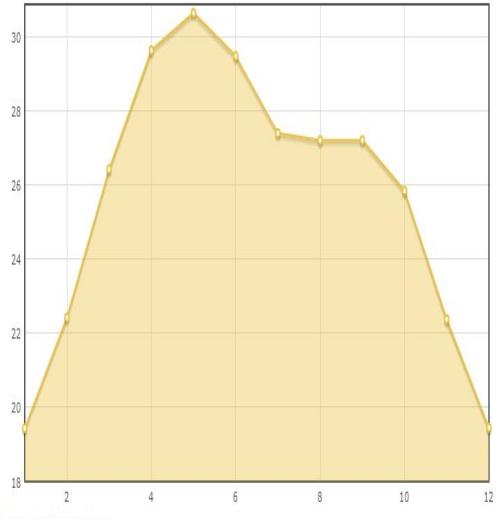
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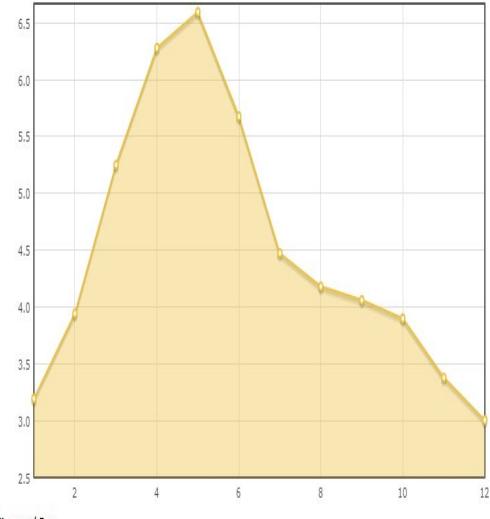


MAYURBHANJ and KENDUJHAR

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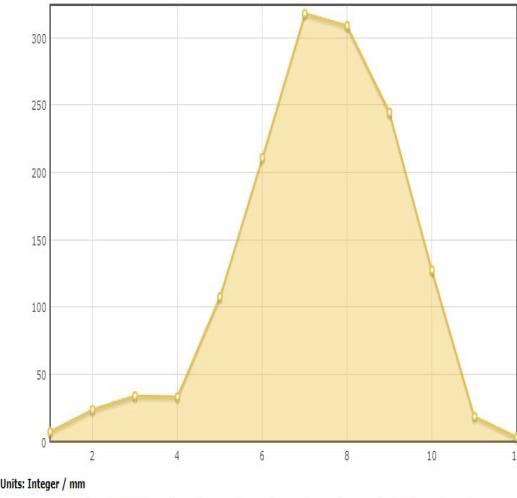


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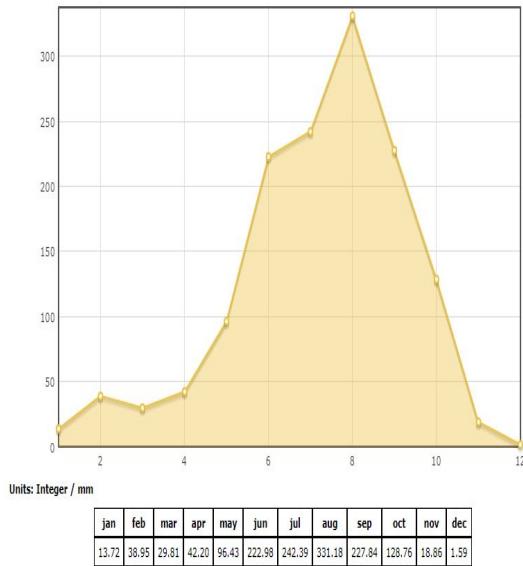


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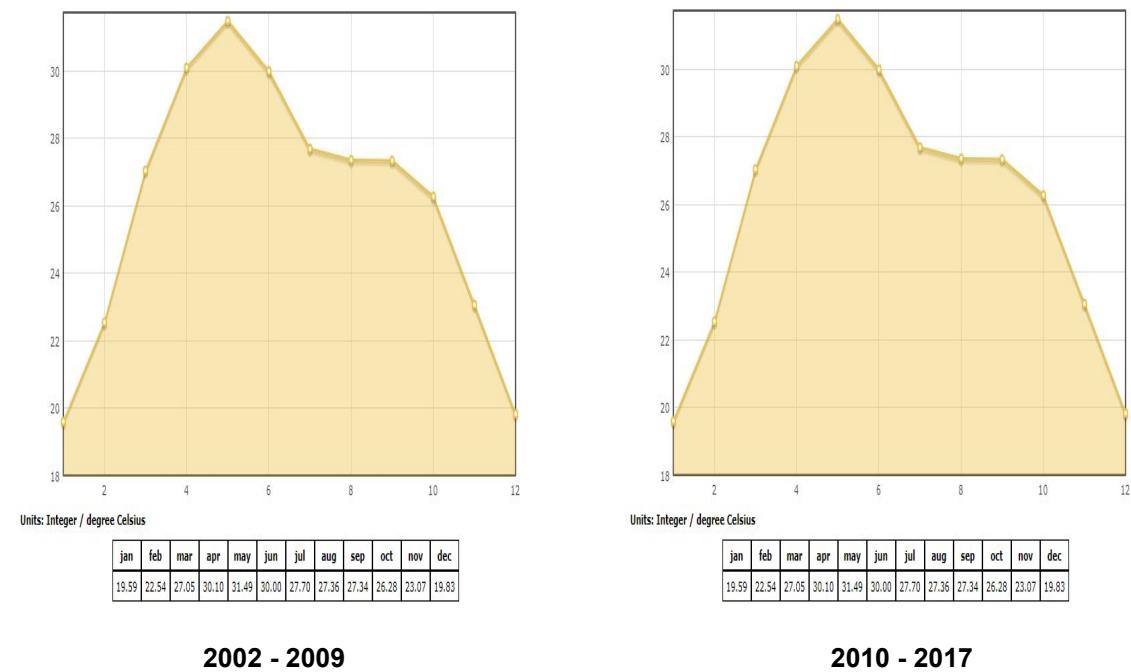


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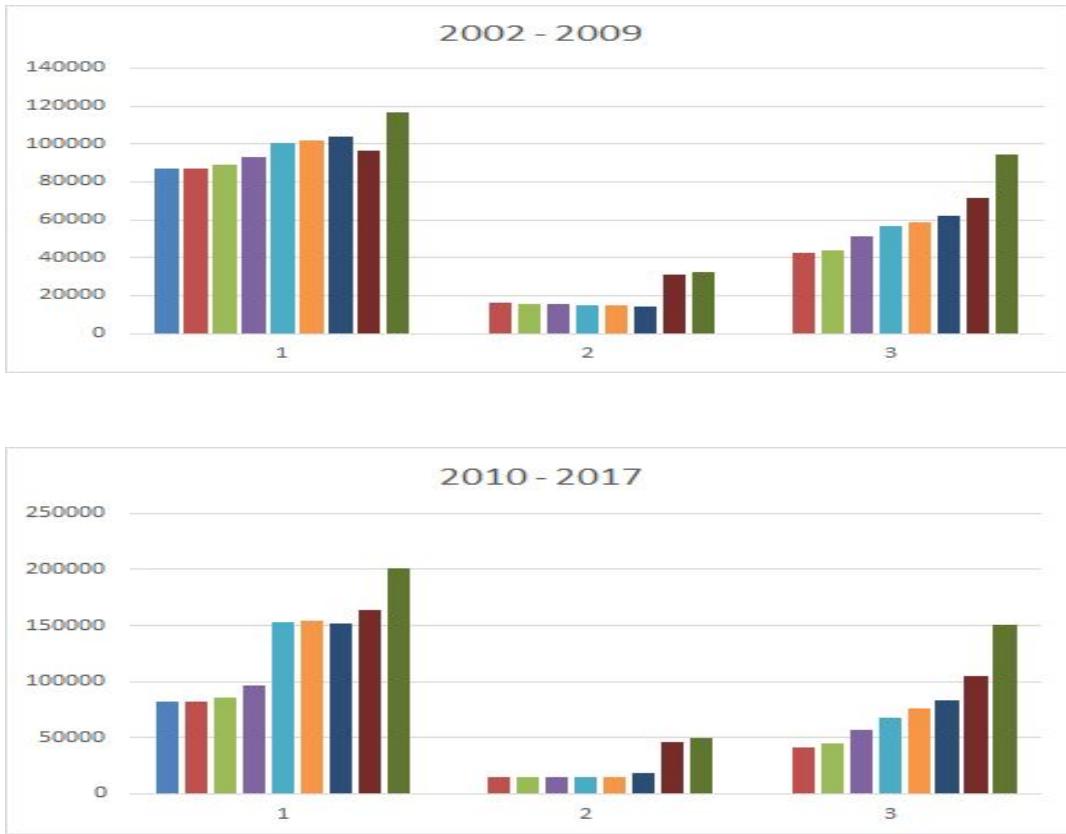


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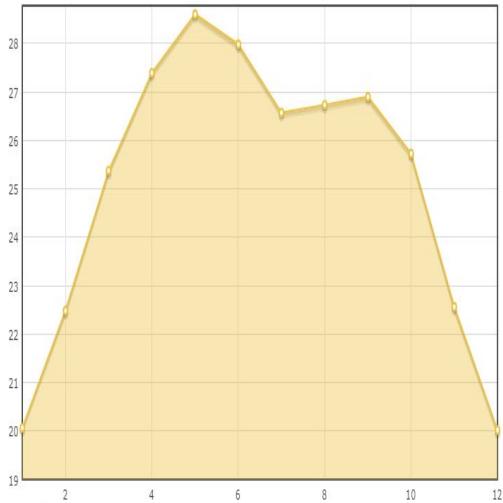


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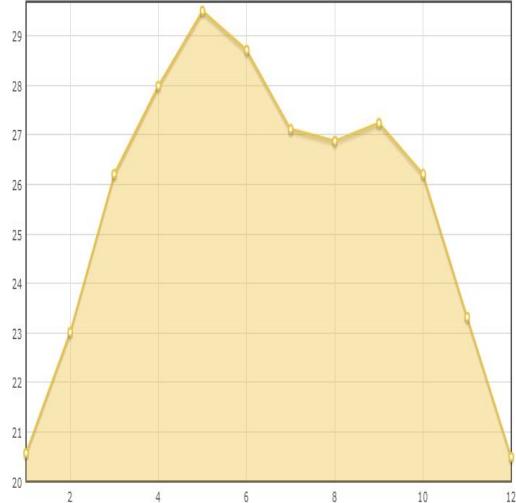


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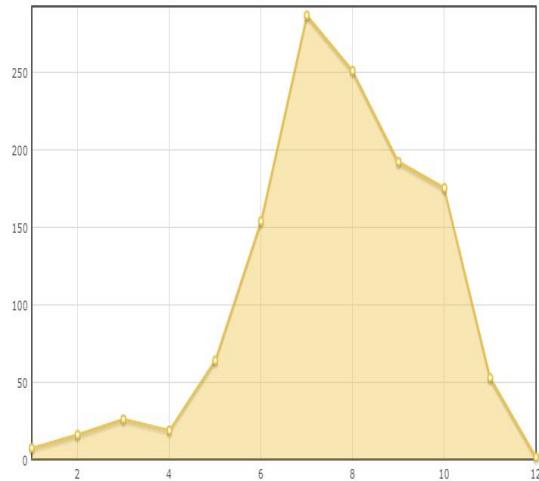


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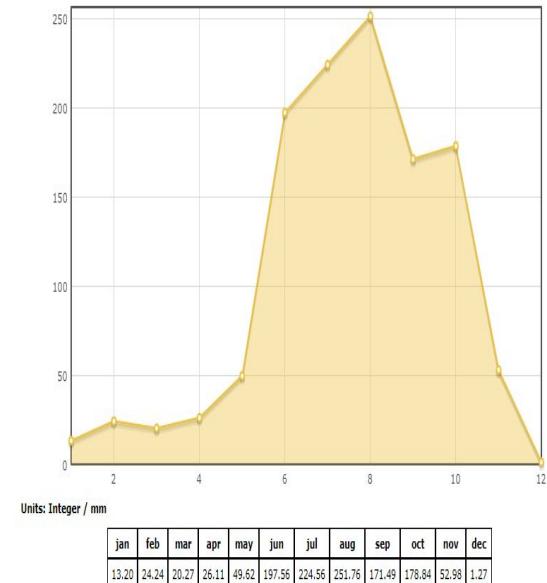


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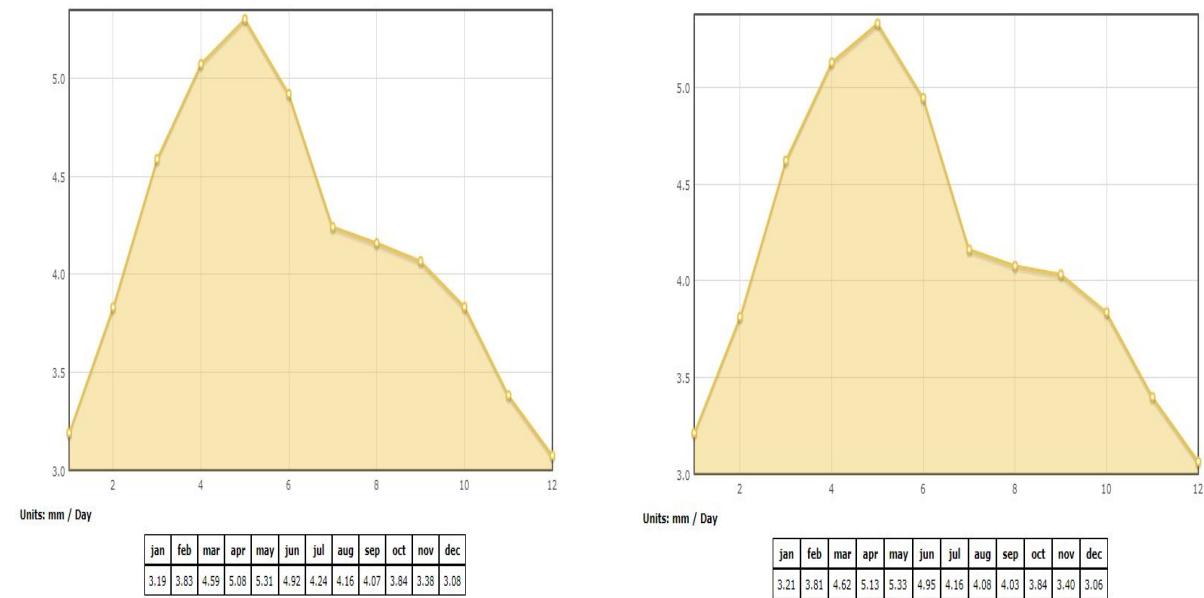


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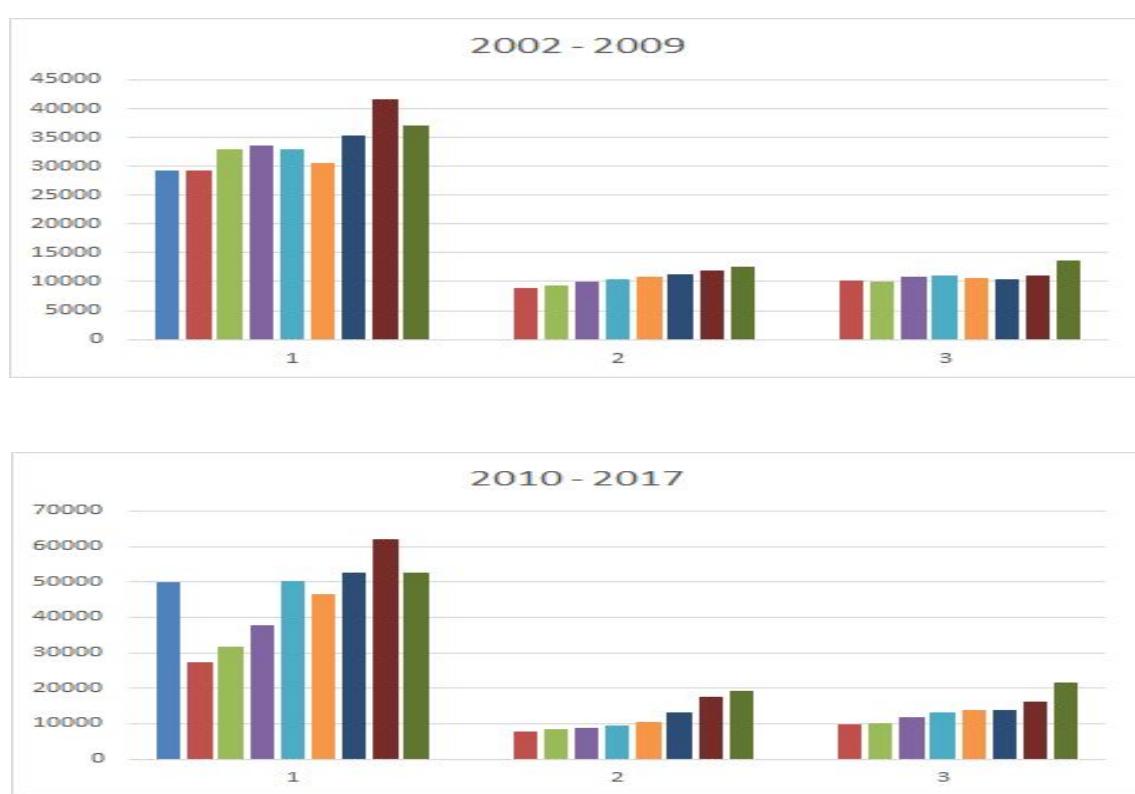


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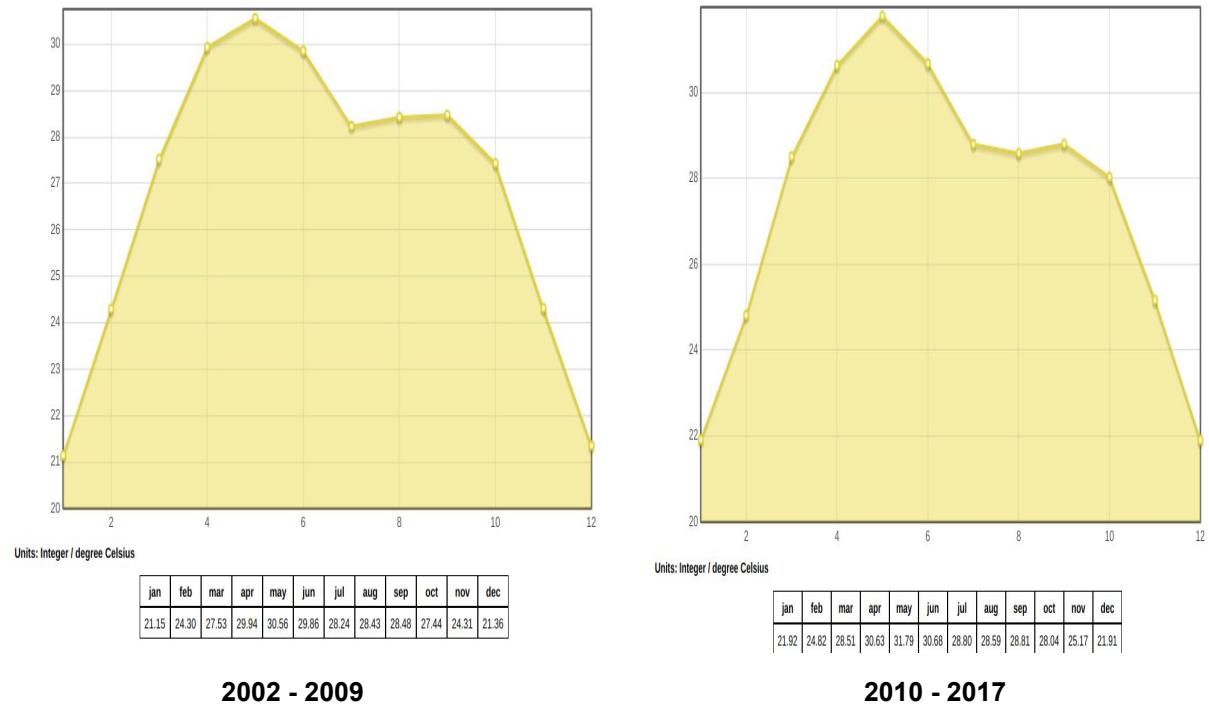


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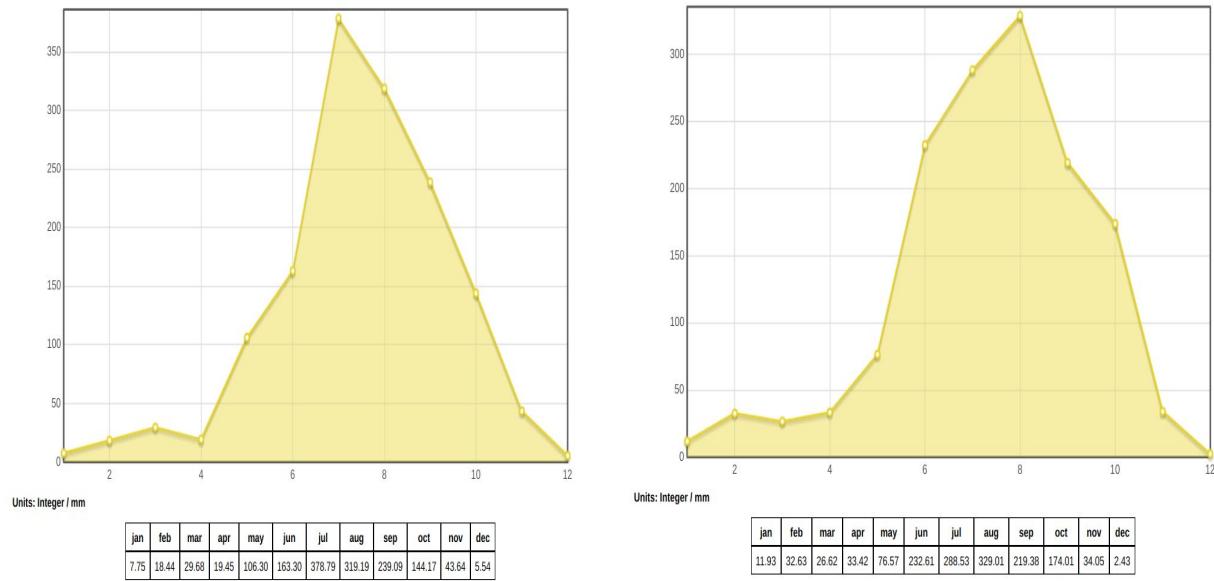


JAJPUR and KANDHAMAL

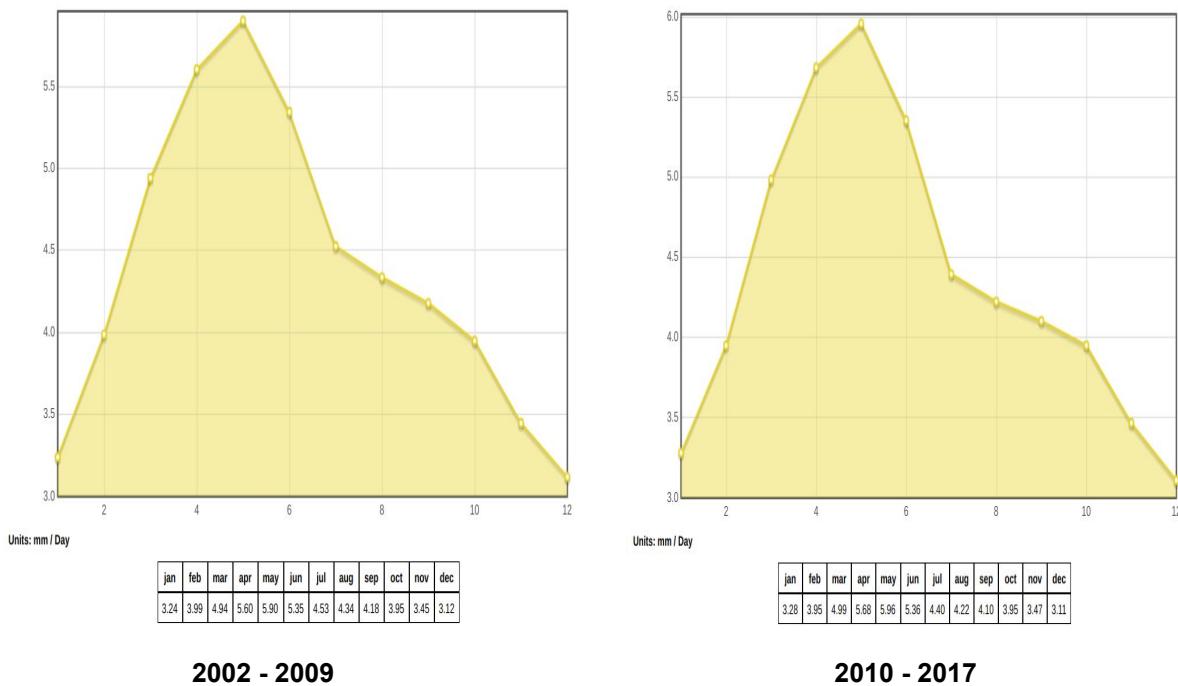
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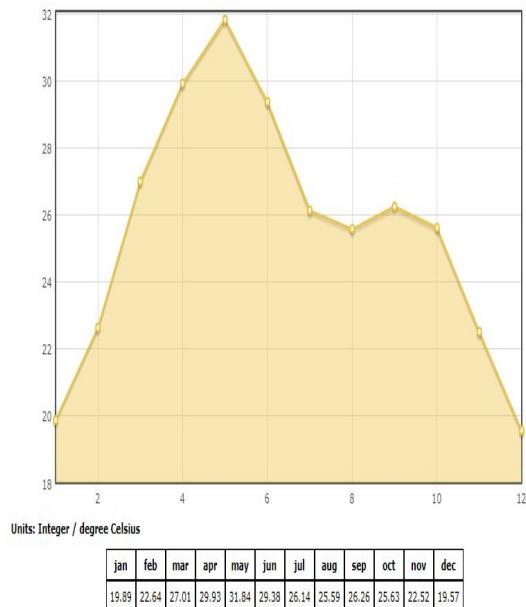
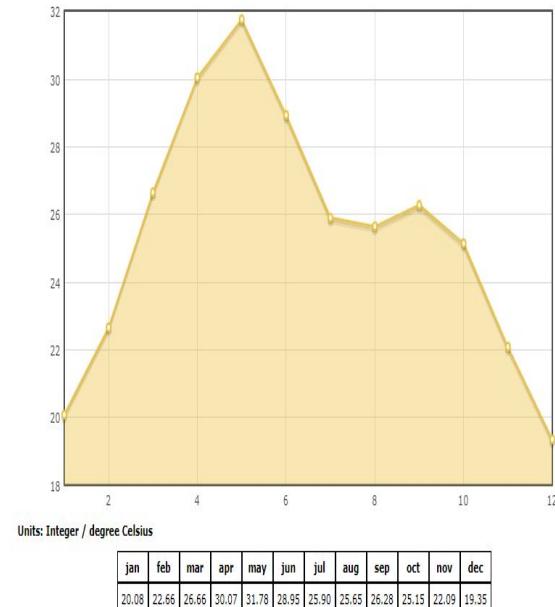


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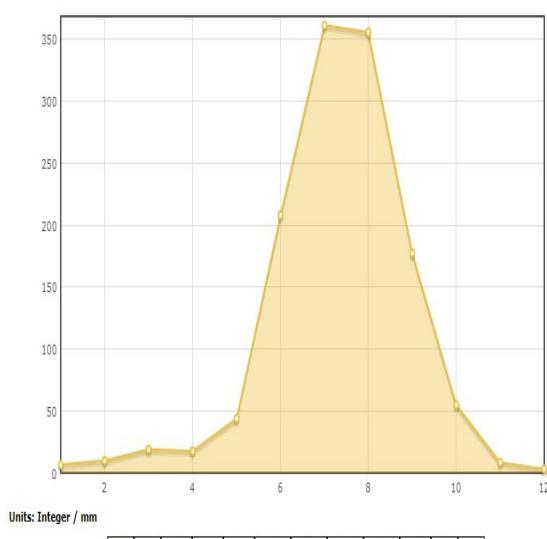


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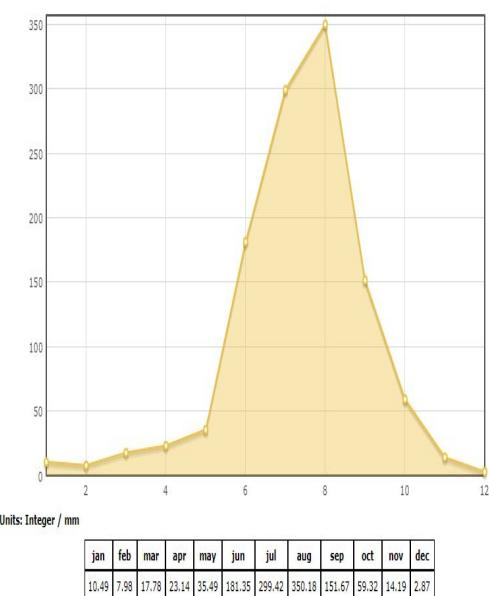
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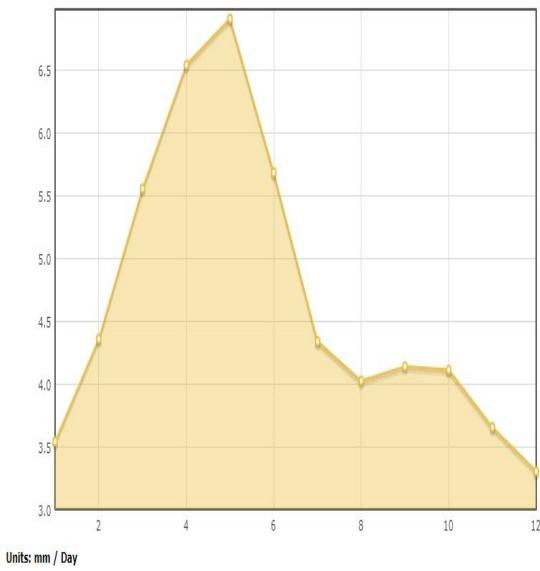


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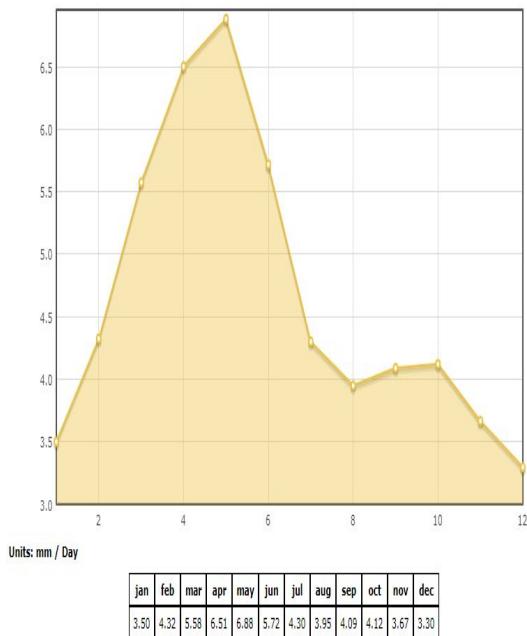


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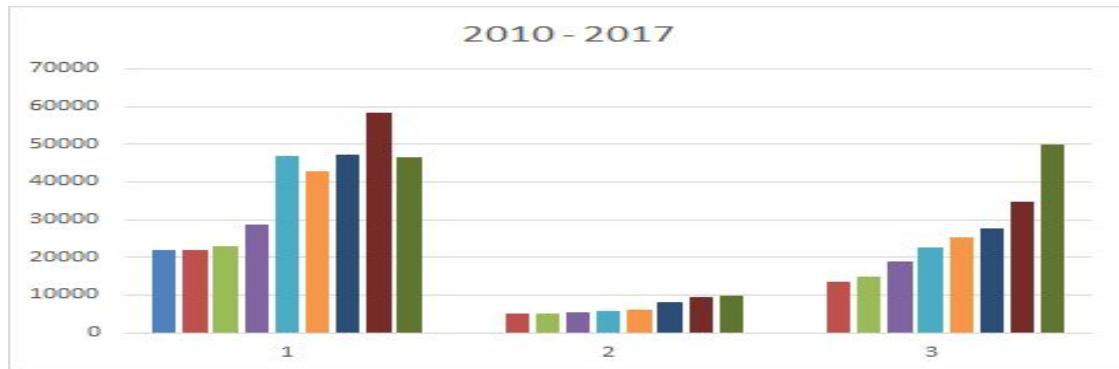
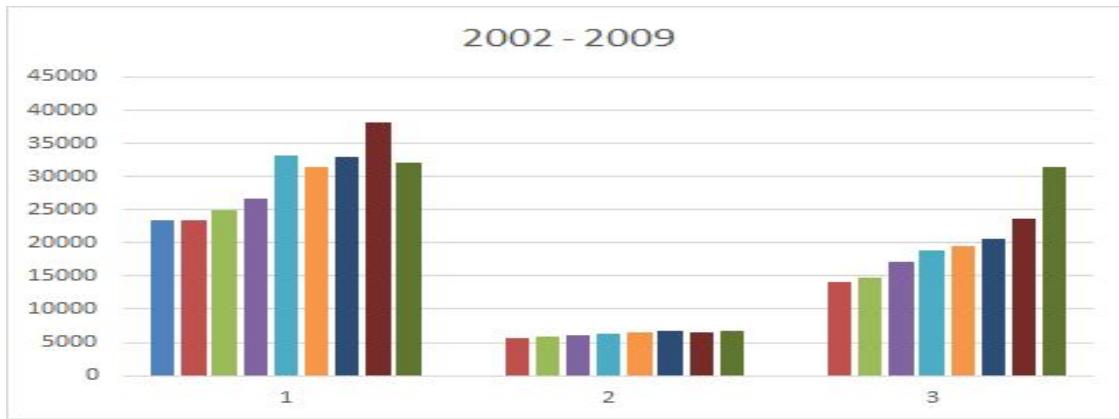


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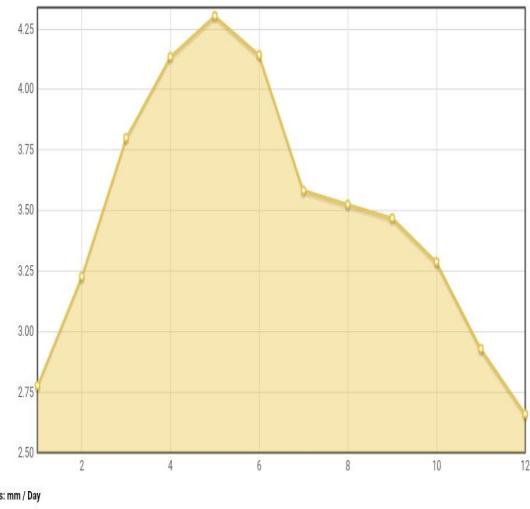
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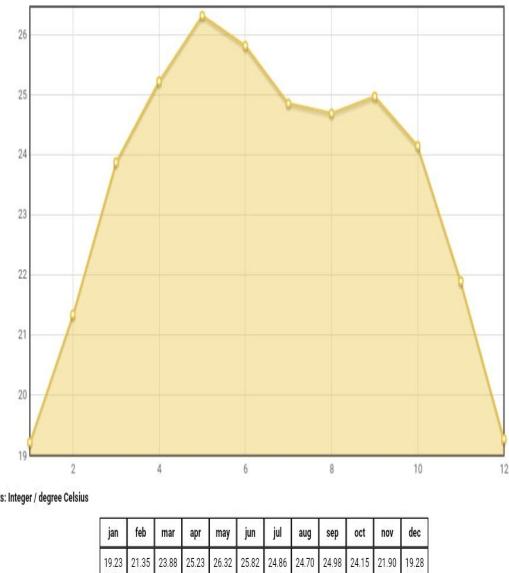


PURI and JAGATSINGHPUR

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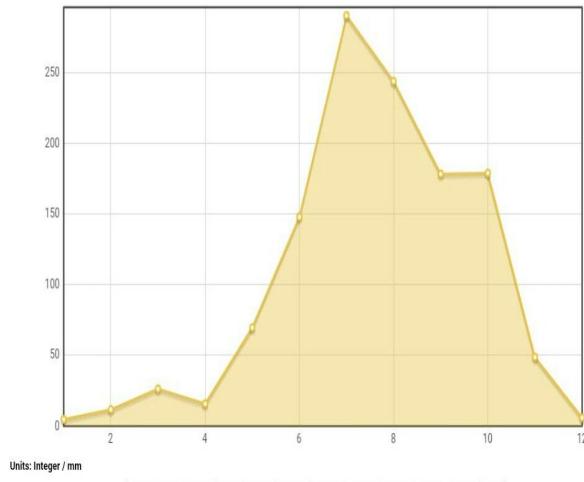


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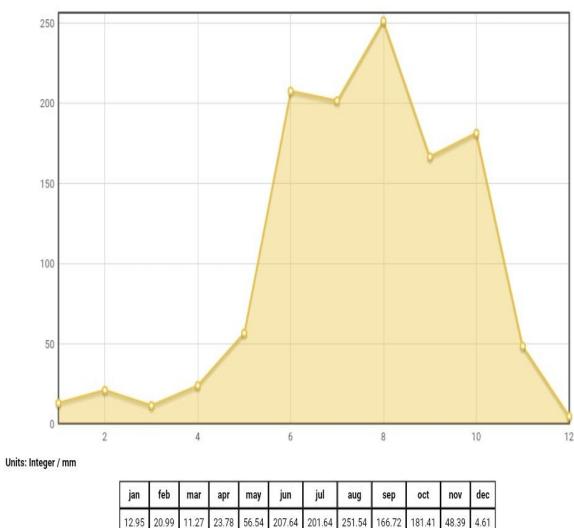


2010 - 2017

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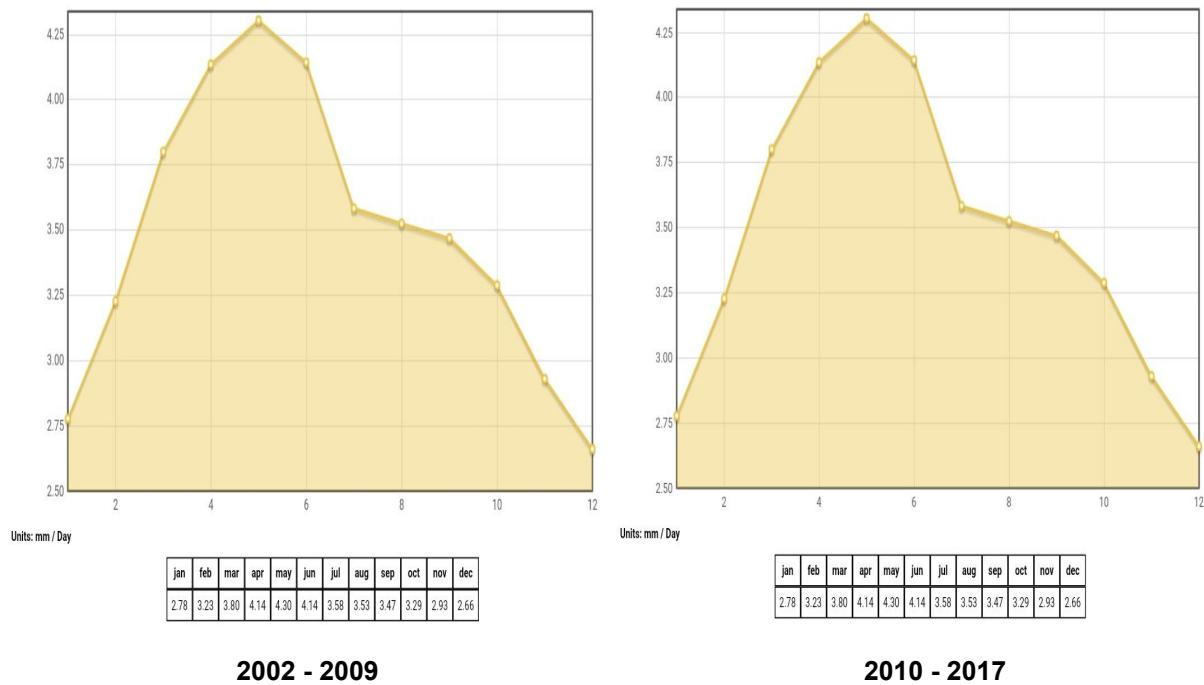


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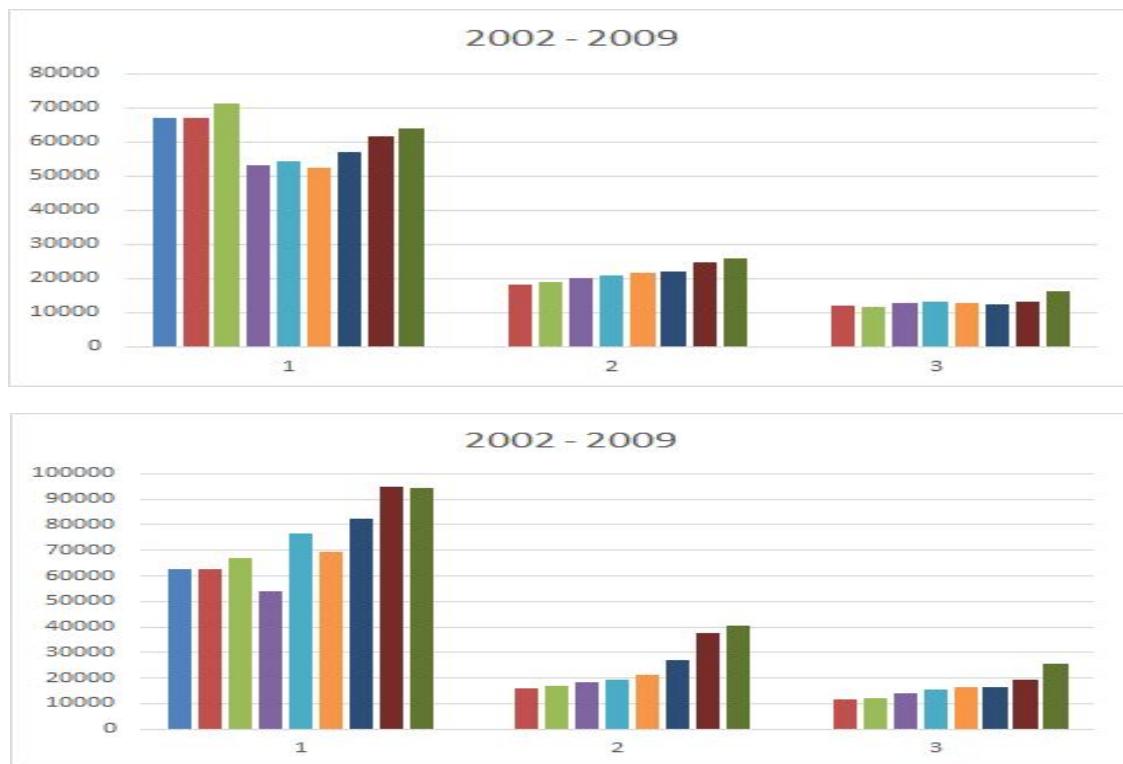


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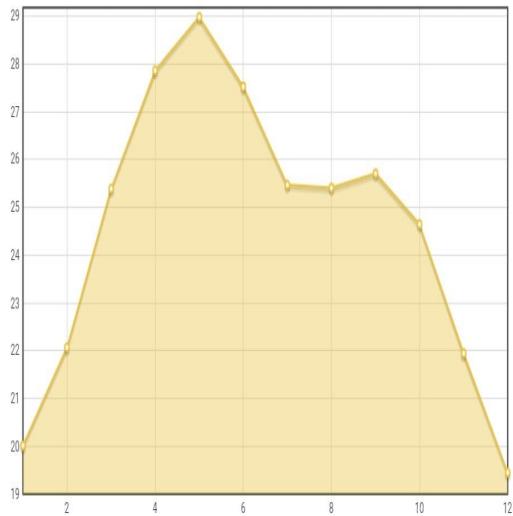


NET DISTRICT DOMESTIC PRODUCT

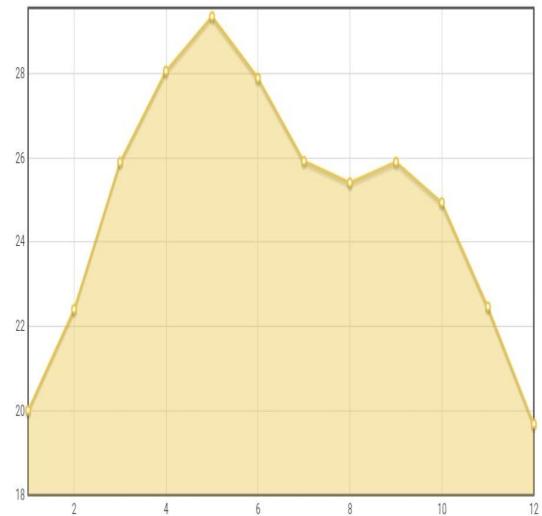


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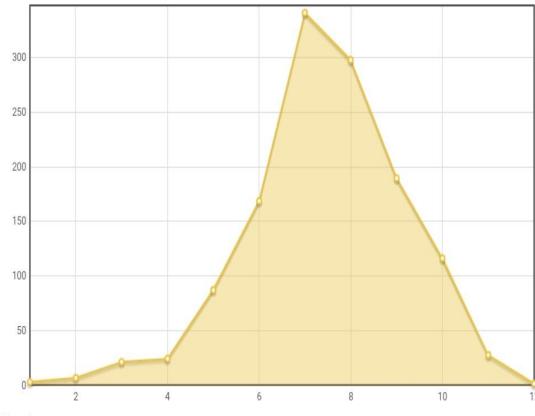


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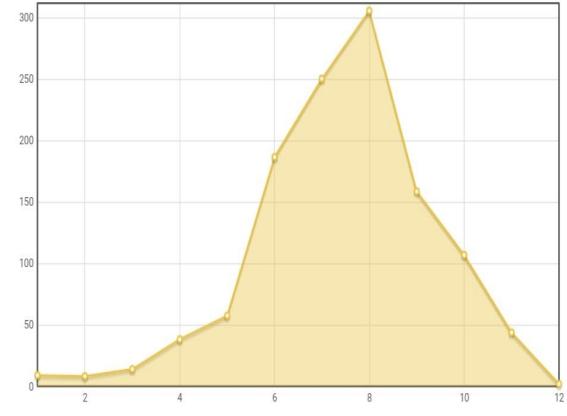


2010 - 2017

PRECIPITATION

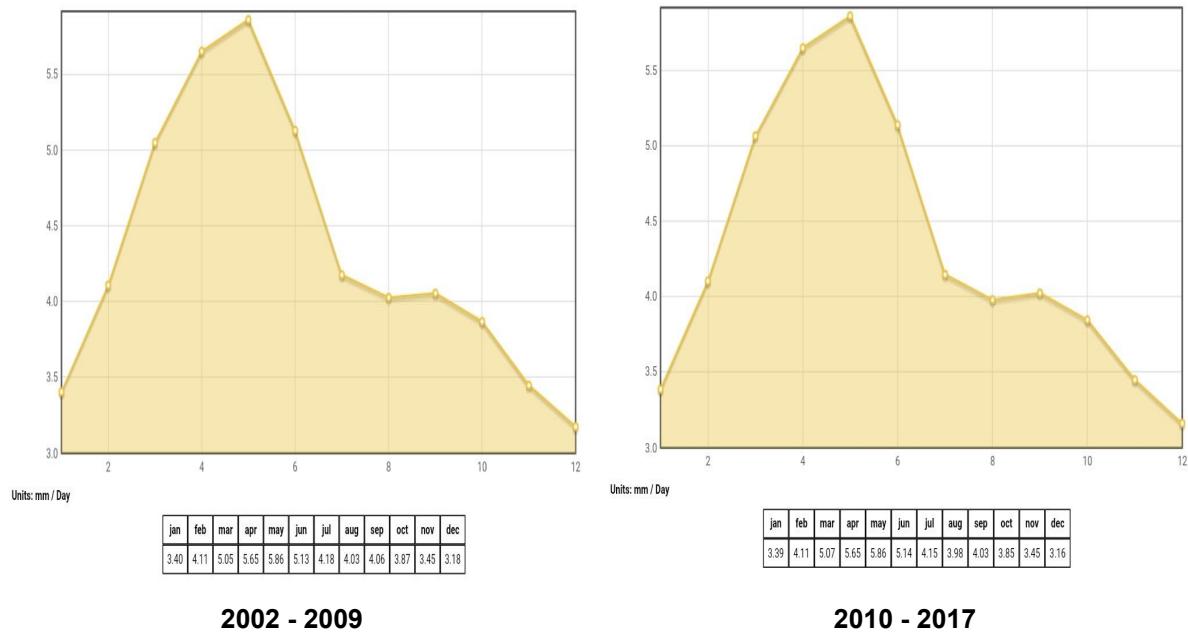


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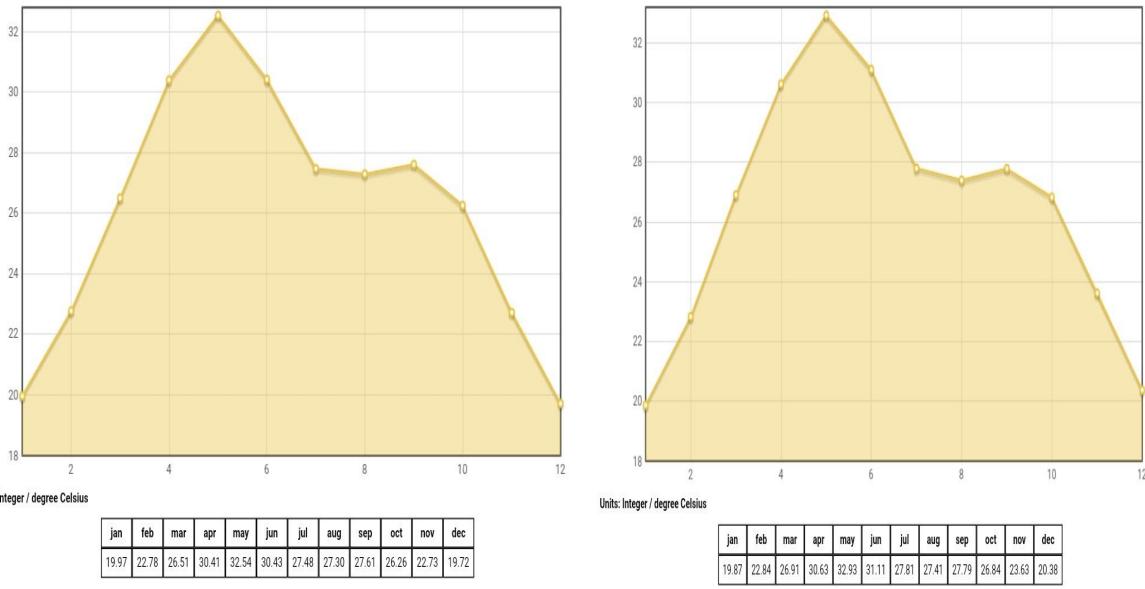


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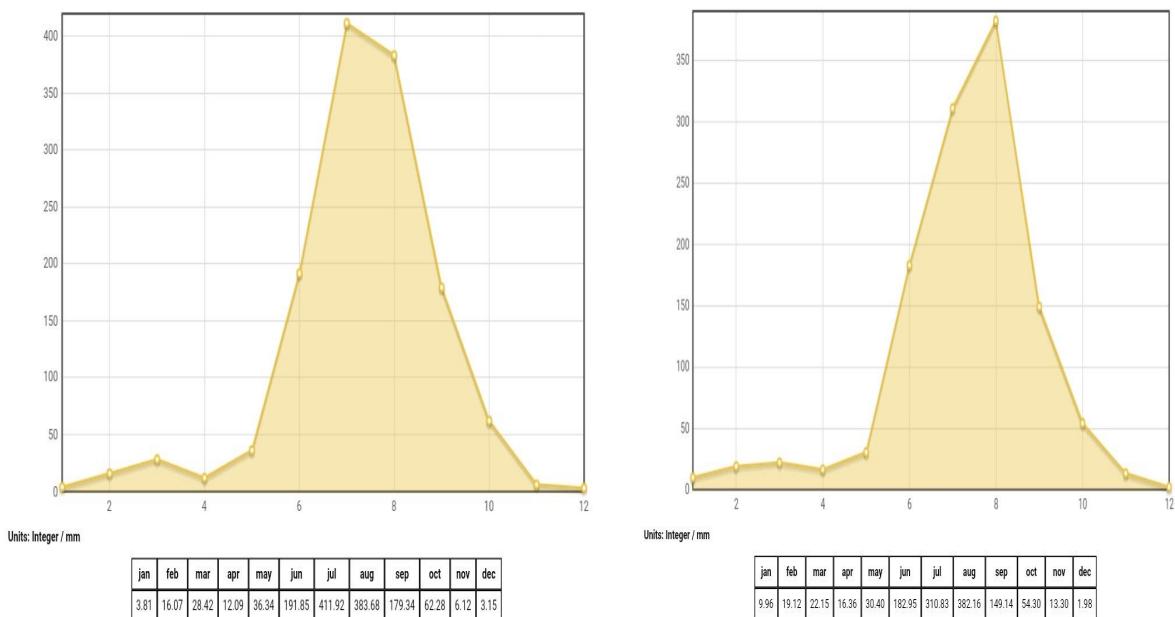


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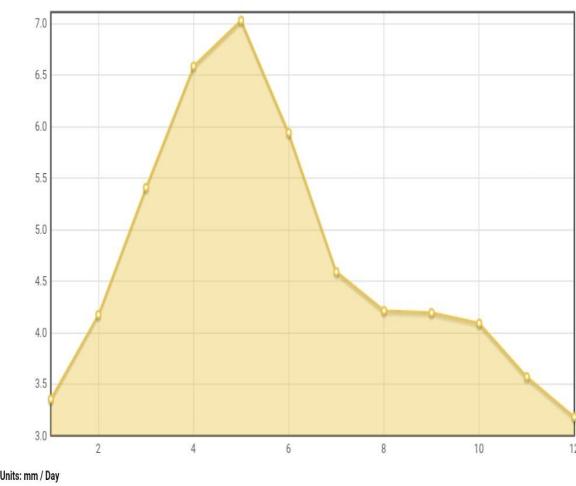
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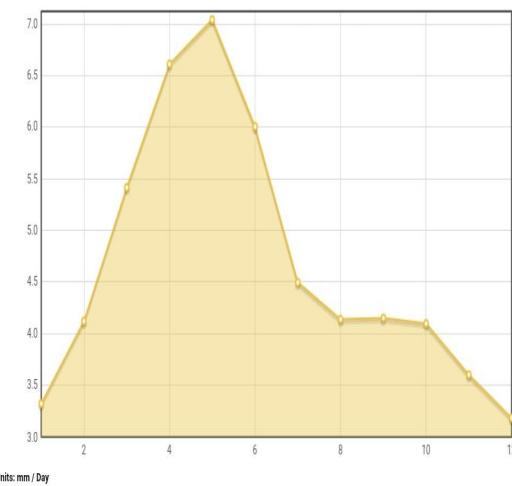
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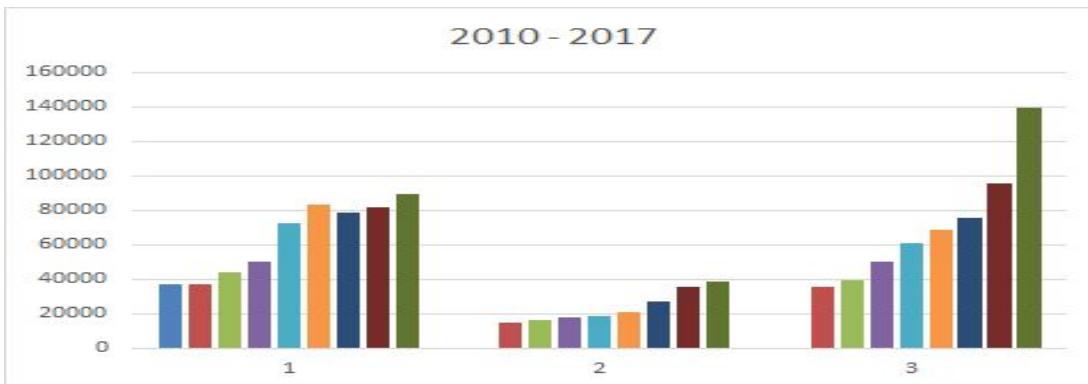
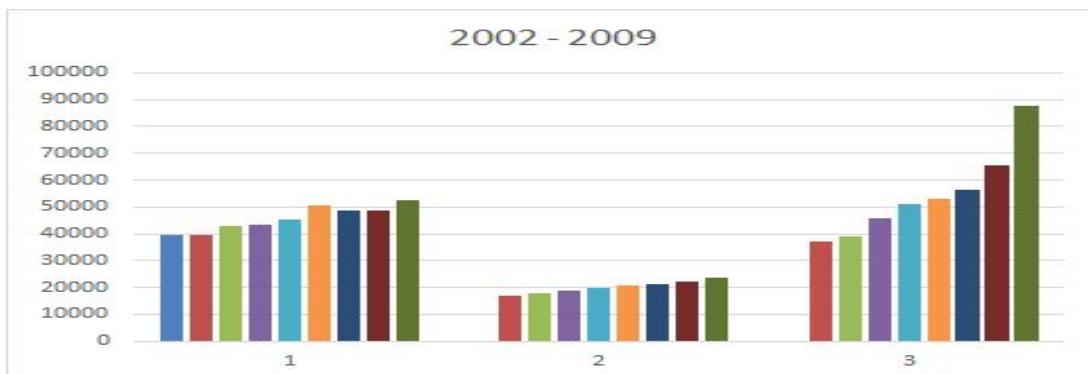


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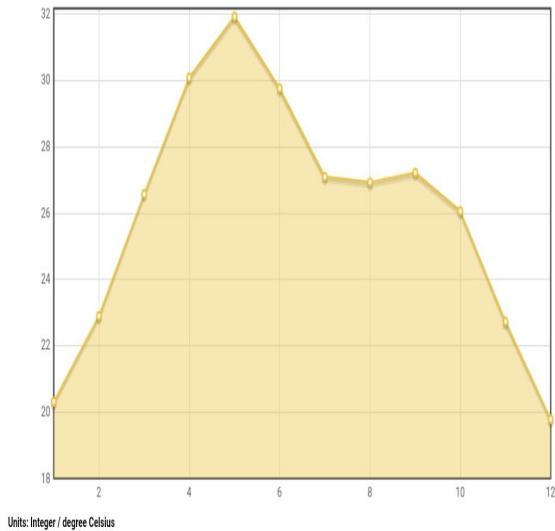
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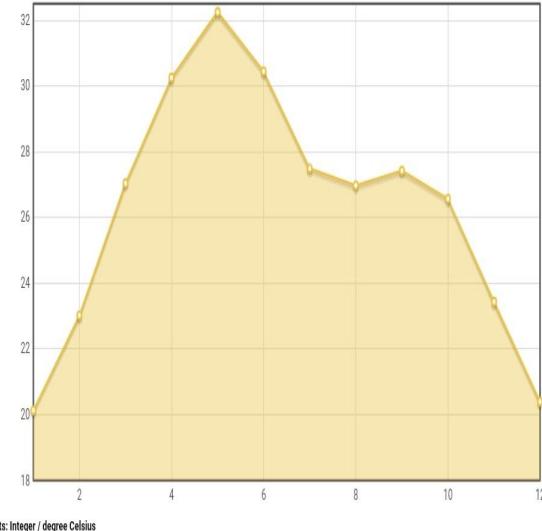


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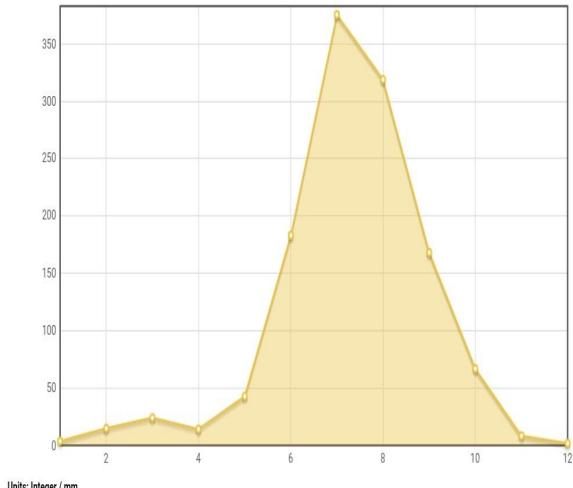


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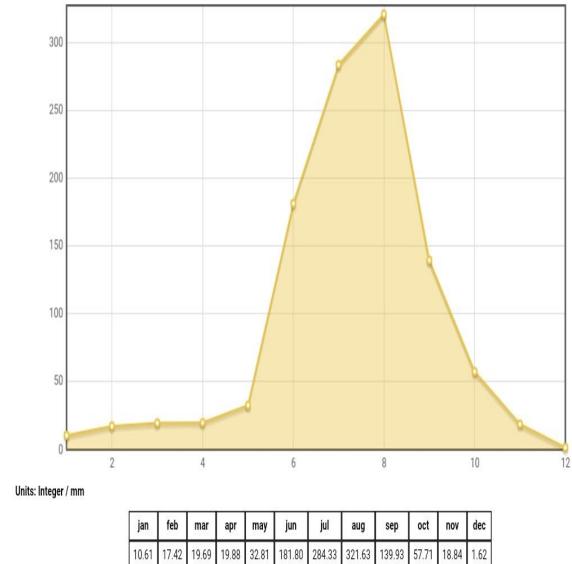


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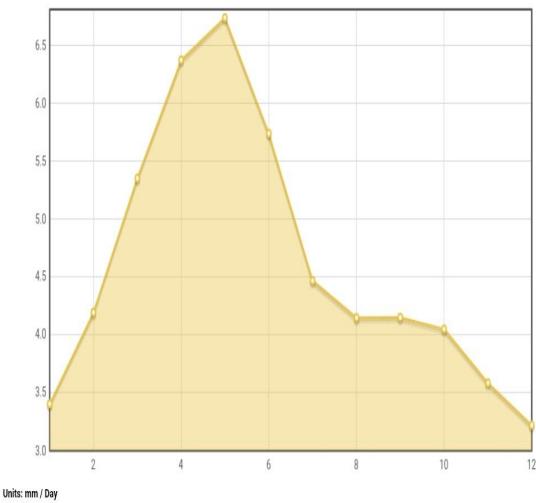


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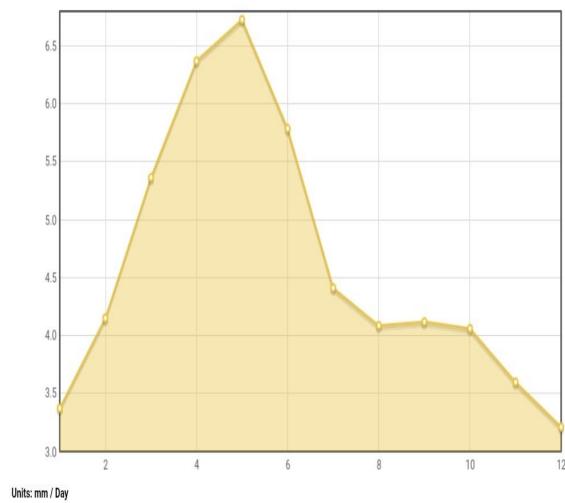


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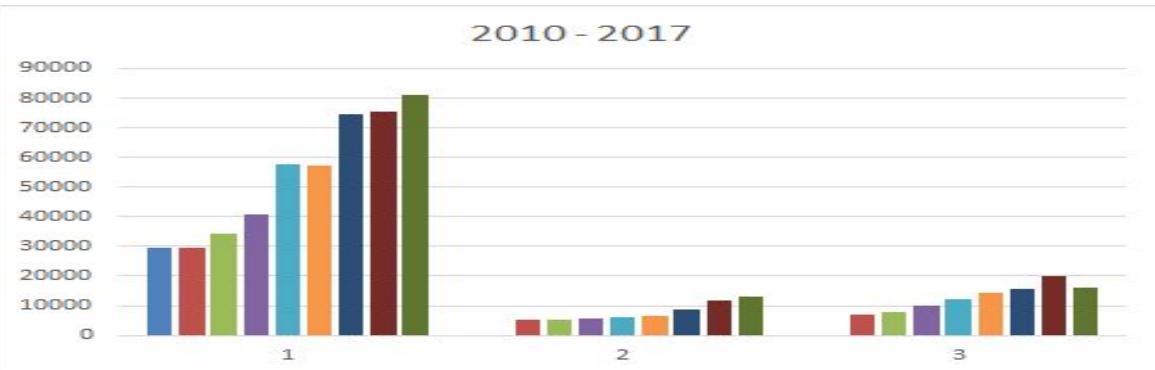
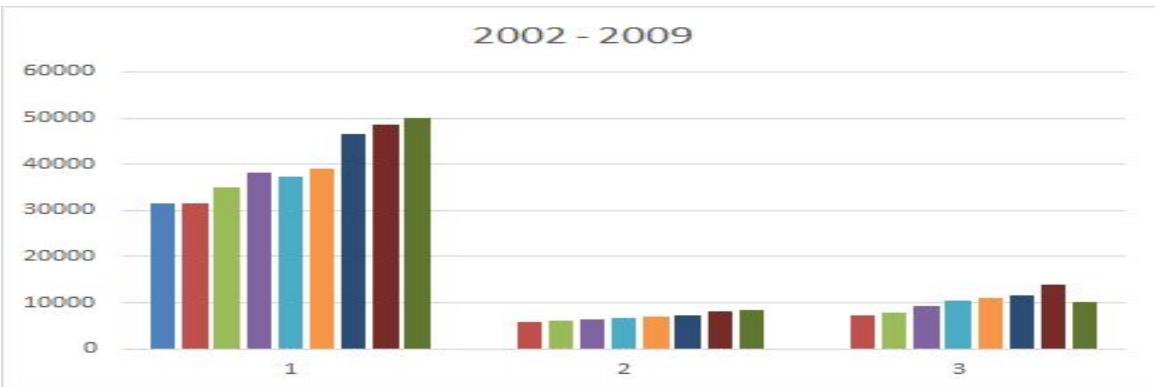


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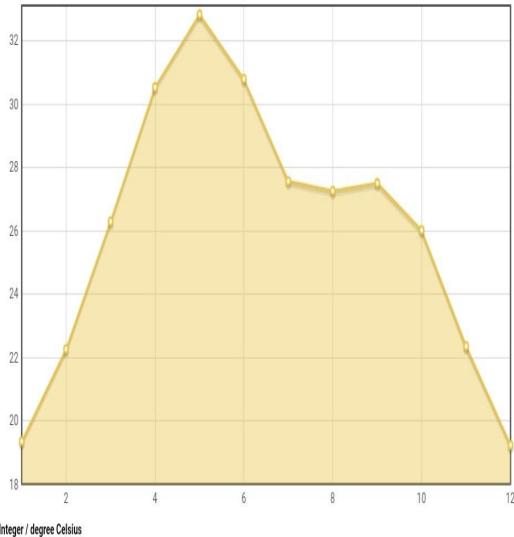
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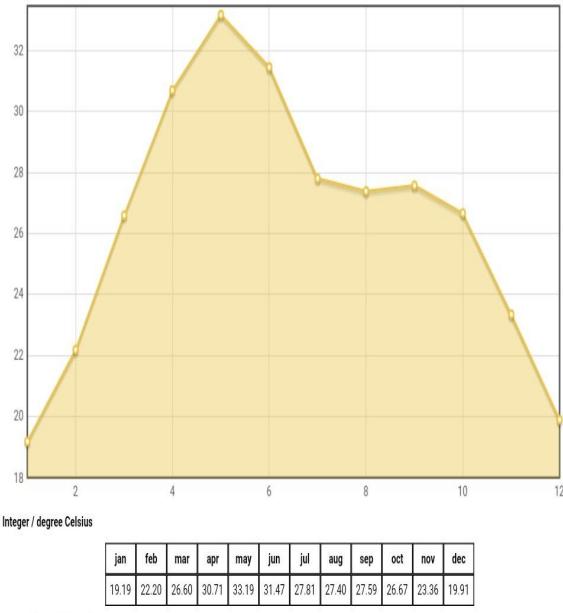


SUNDARGARH and BALANGIR

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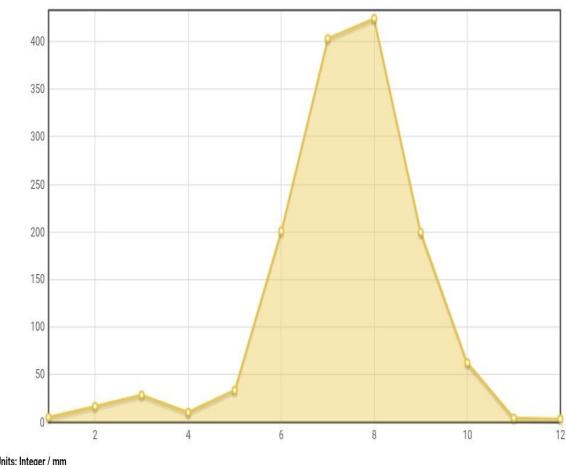


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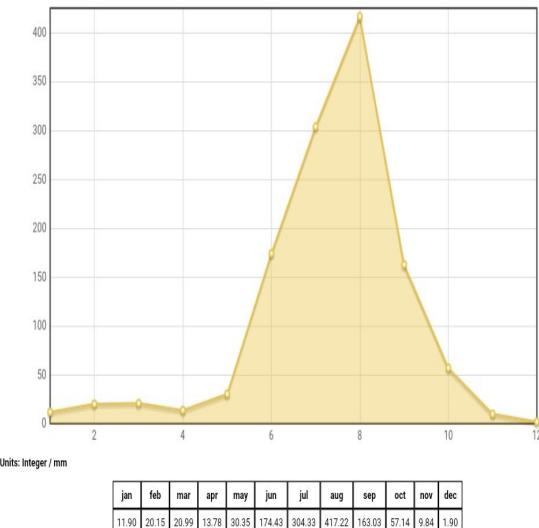


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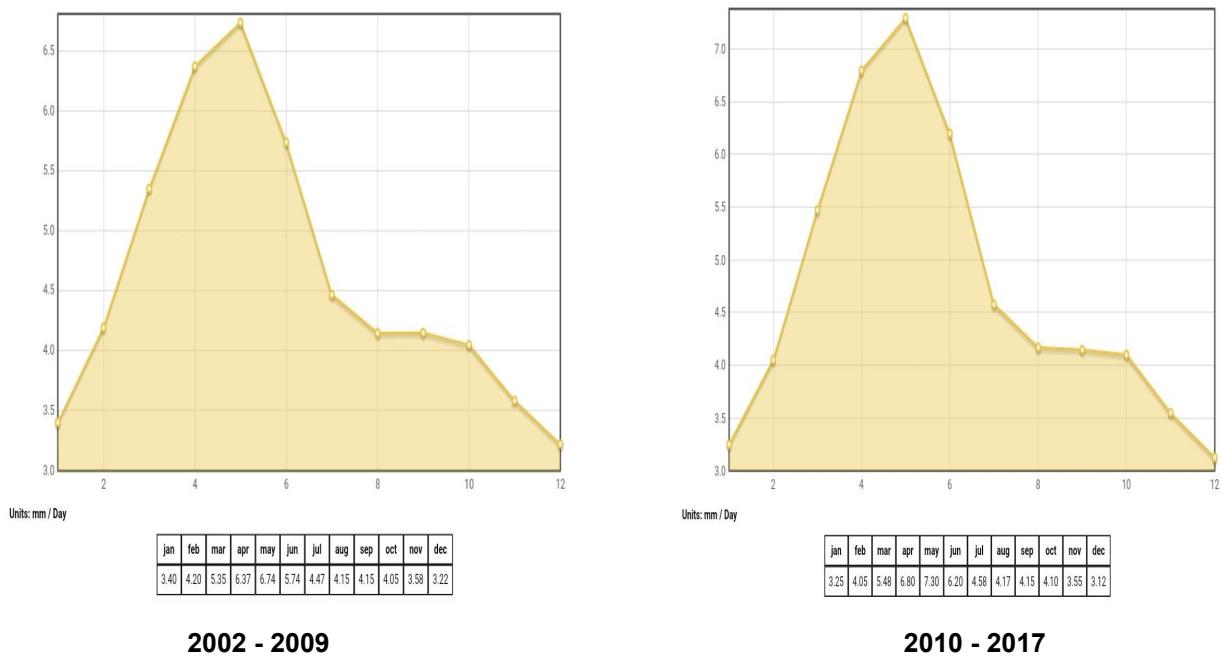


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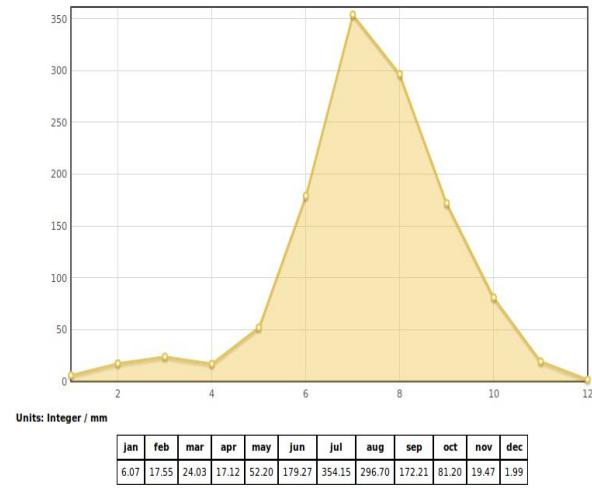


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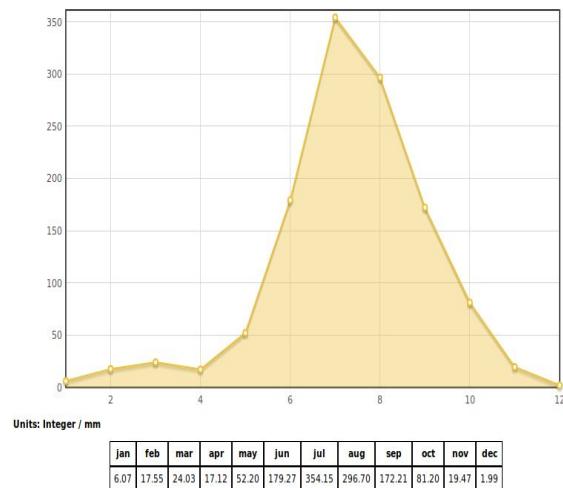


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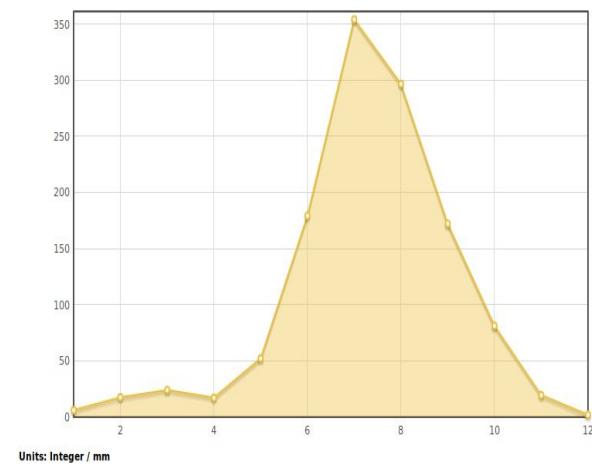


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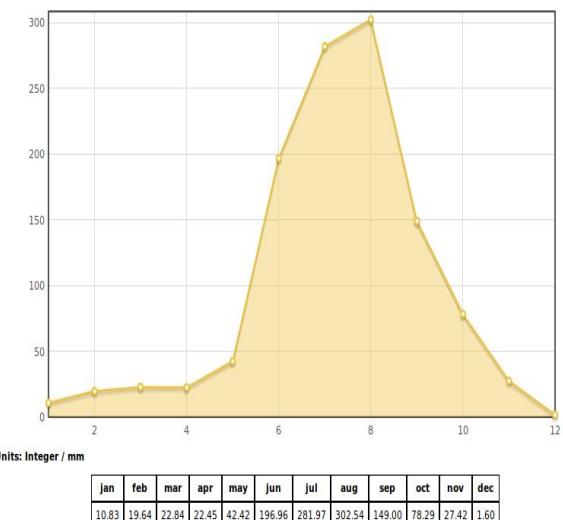


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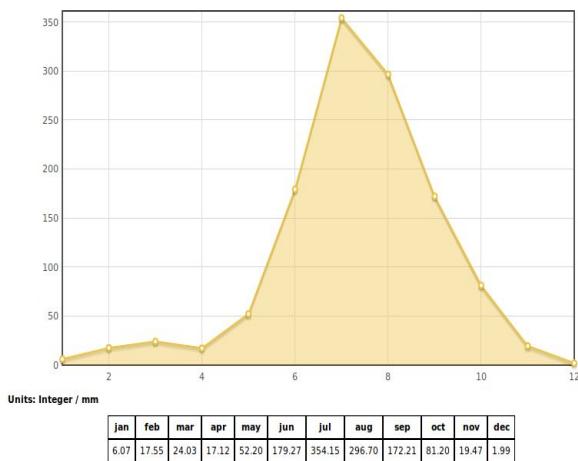


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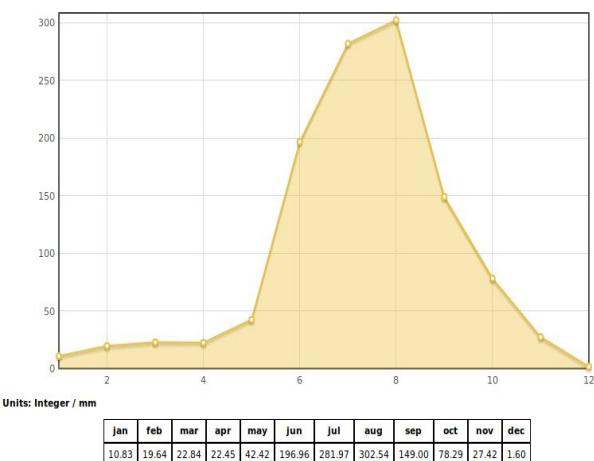


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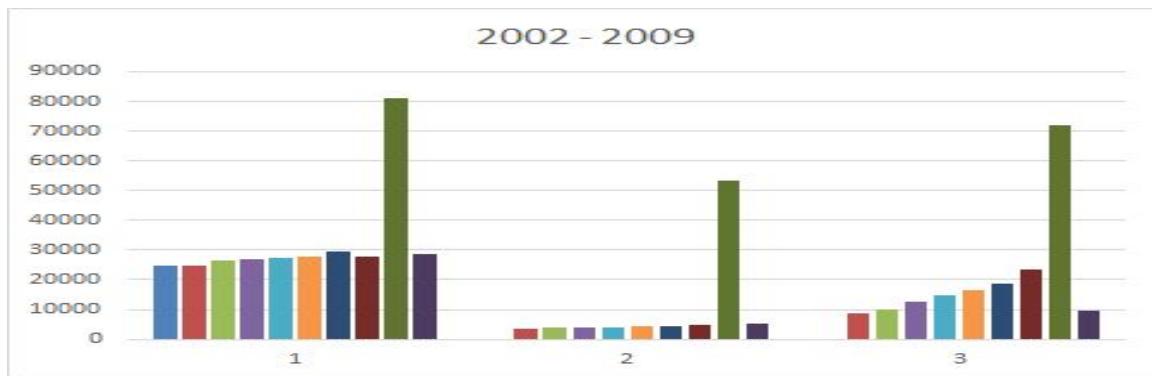


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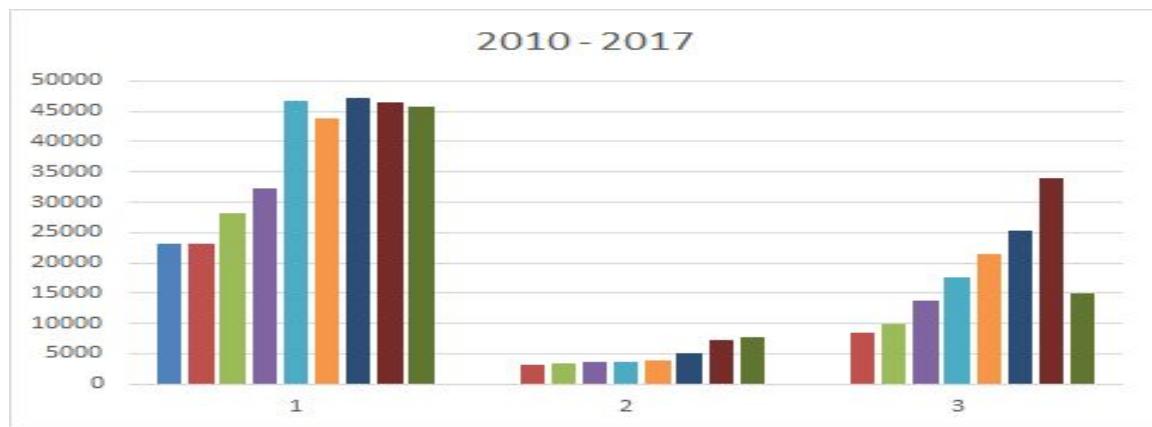


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NET DISTRICT DOMESTIC PRODUCT

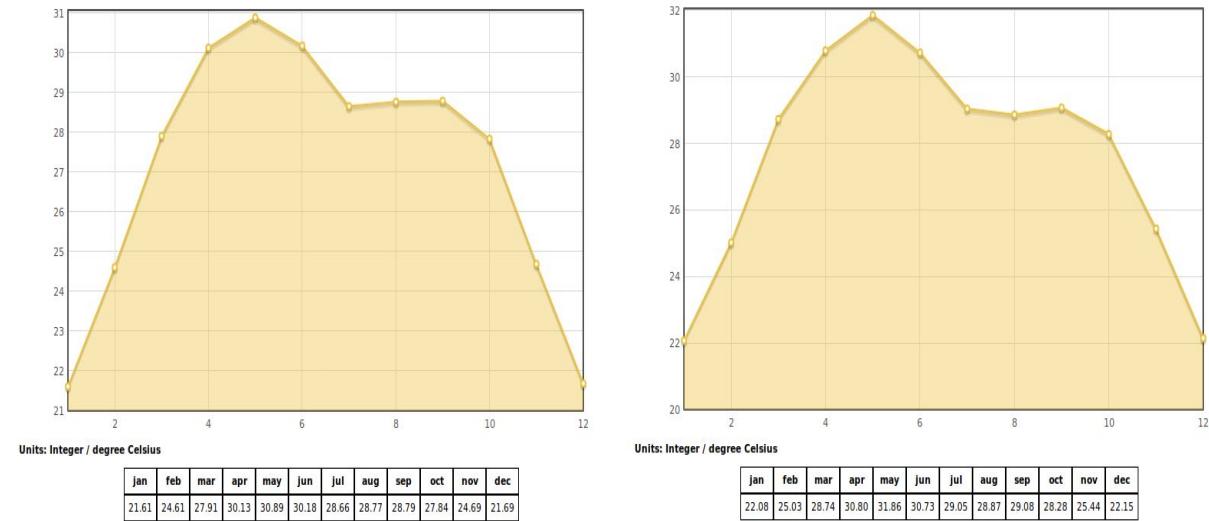


2002 - 2009



BHADRAK and ANGUL

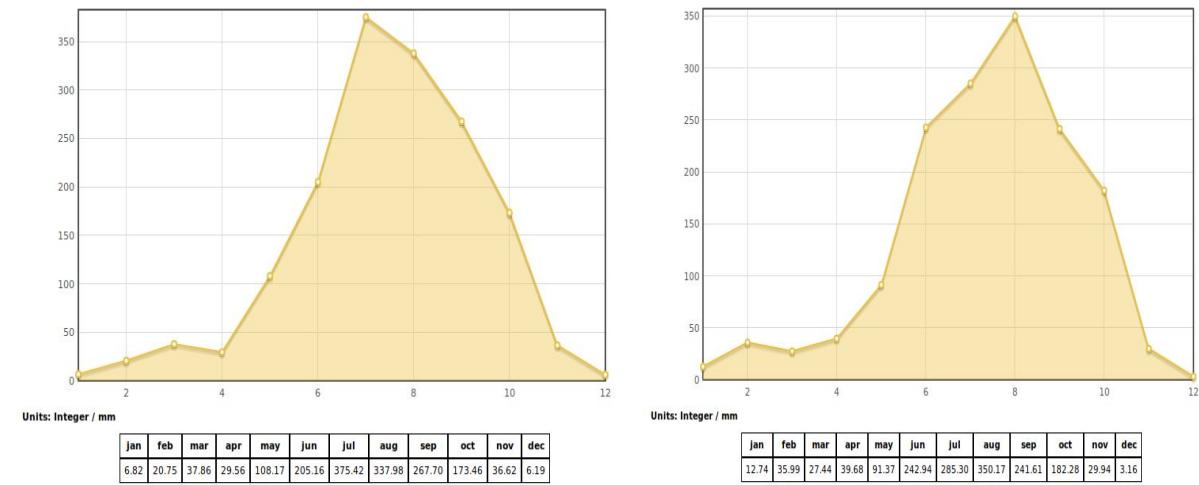
AVERAGE TEMPERATURE



2002 - 2009

2010 - 2017

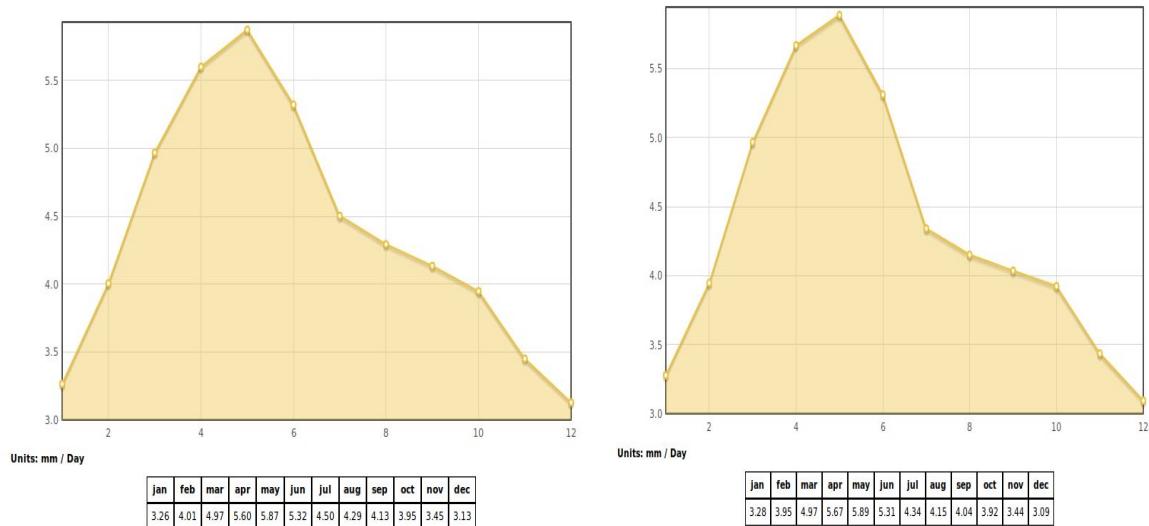
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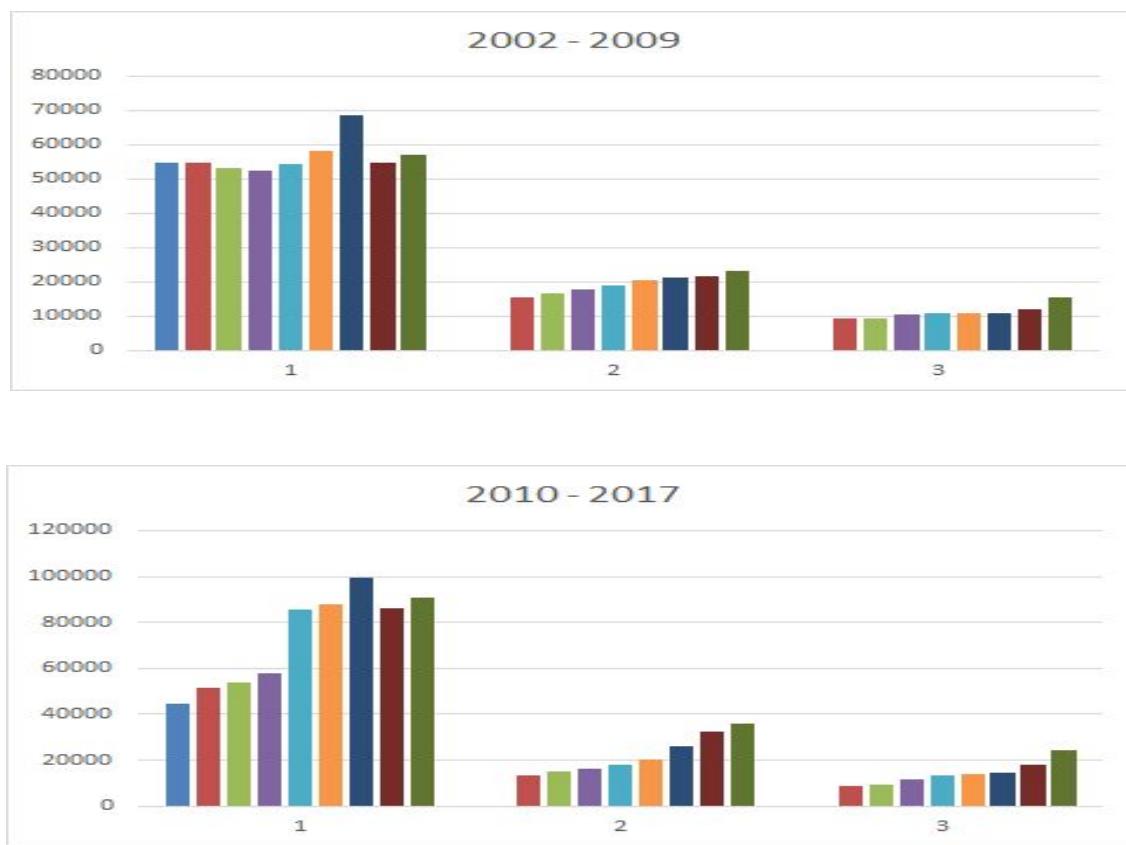
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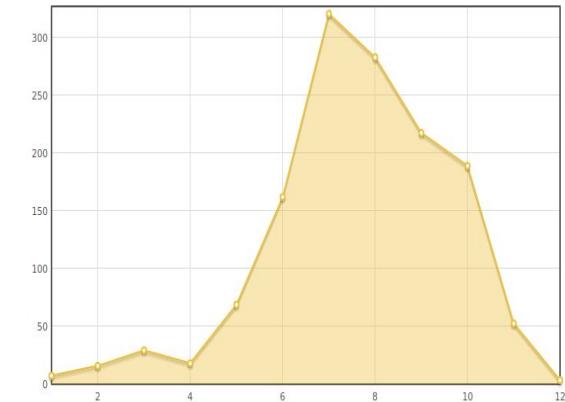


NET DISTRICT DOMESTIC PRODUCT

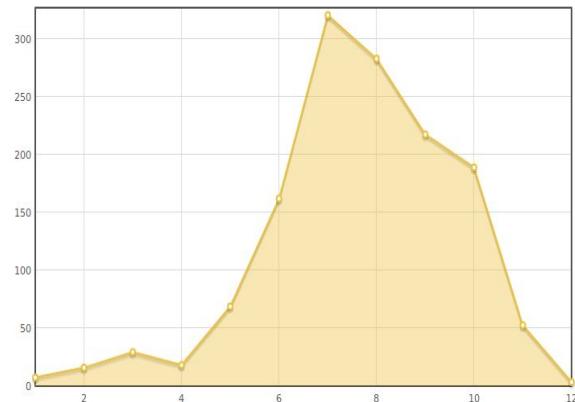


CUTTACK and BALESHWAR

AVERAGE TEMPERATURE

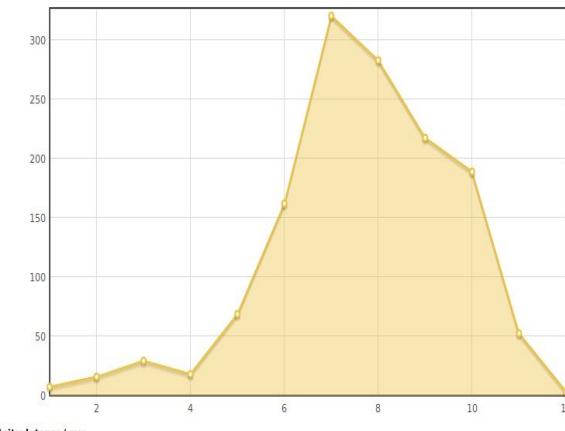


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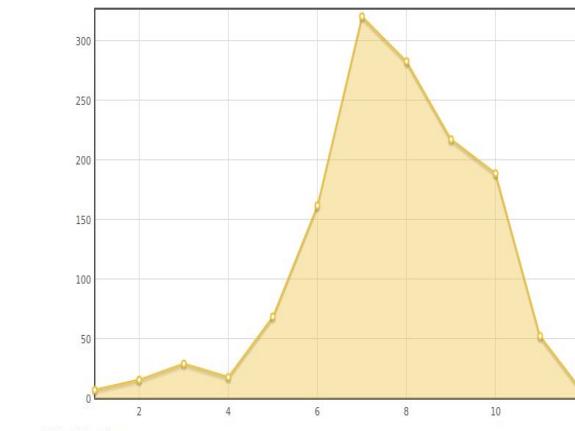


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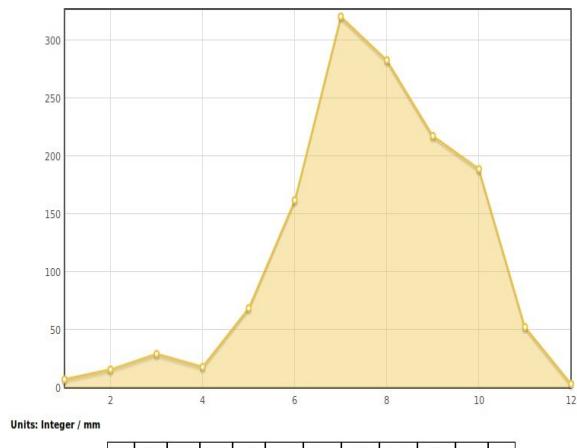


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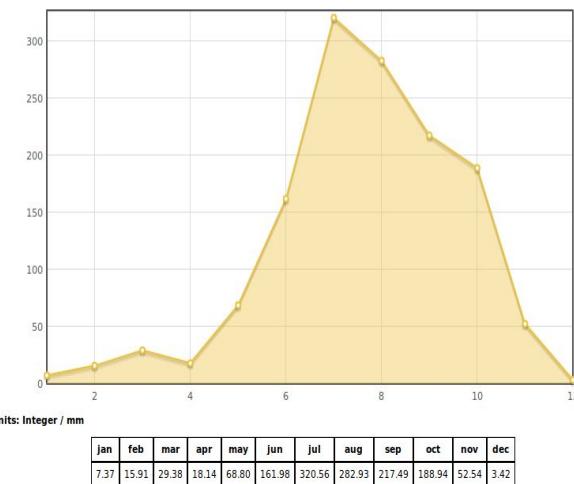


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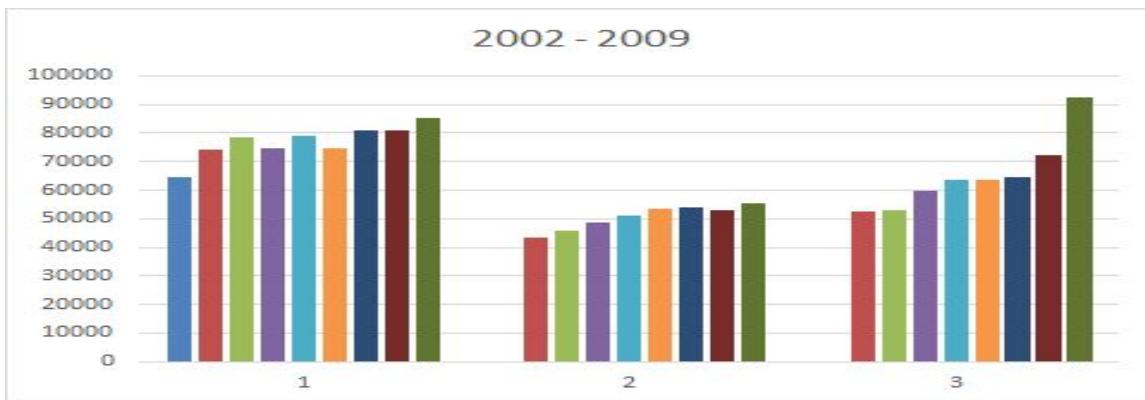


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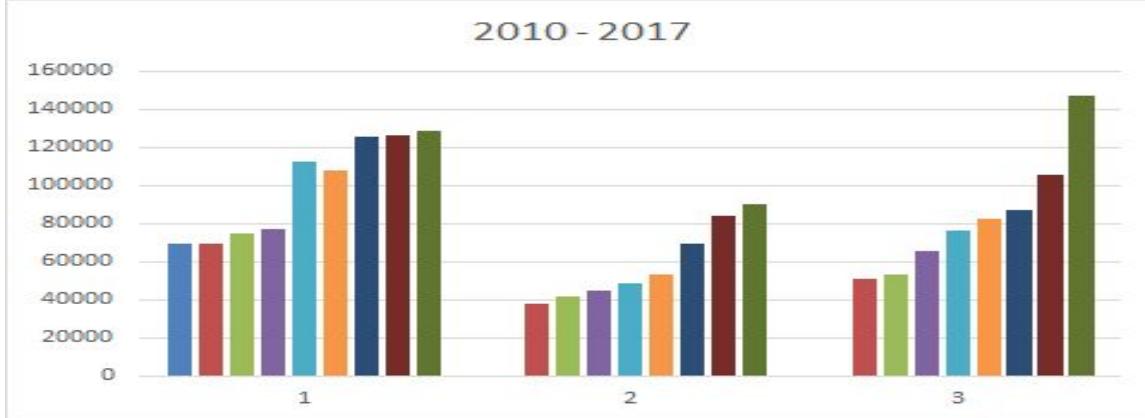


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NET DISTRICT DOMESTIC PRODUCT

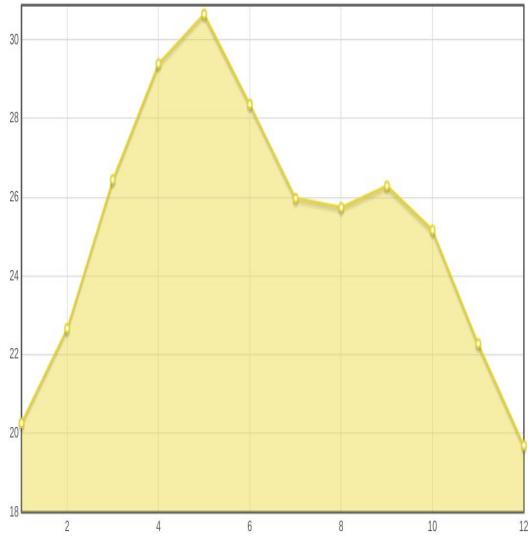


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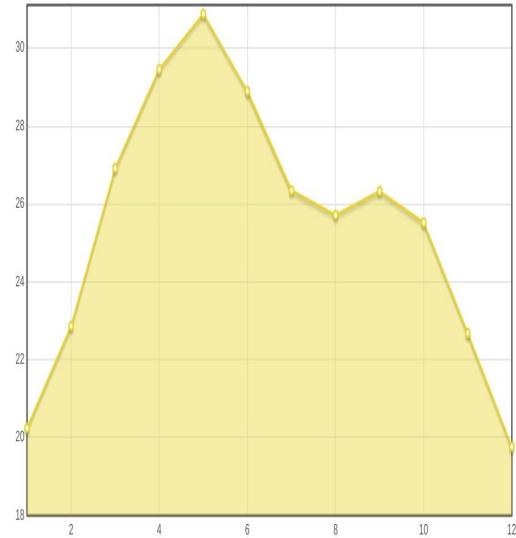


KALAHANDI and BARGARH

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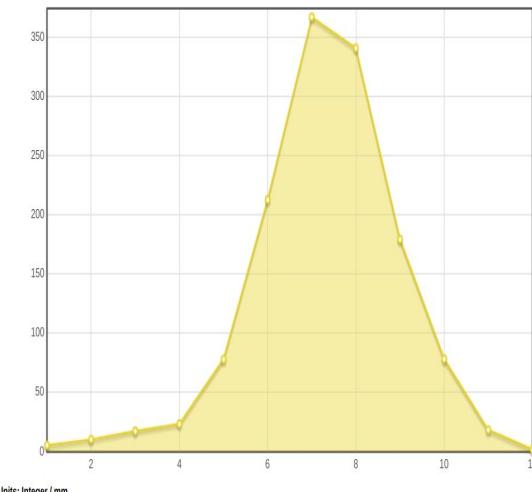


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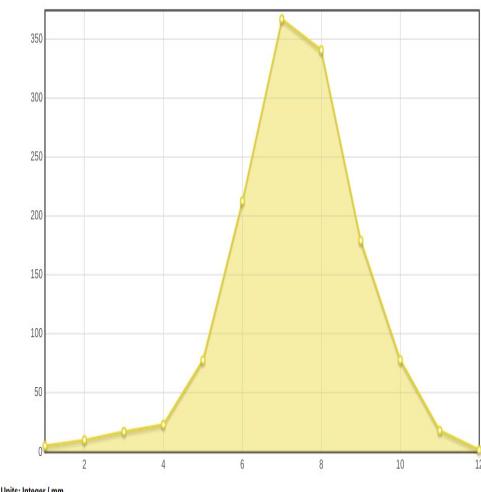


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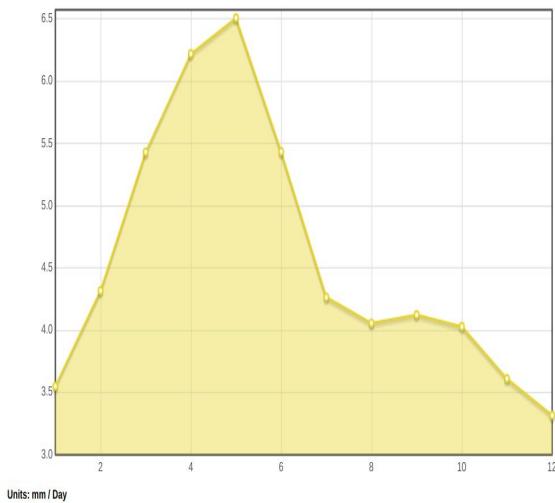


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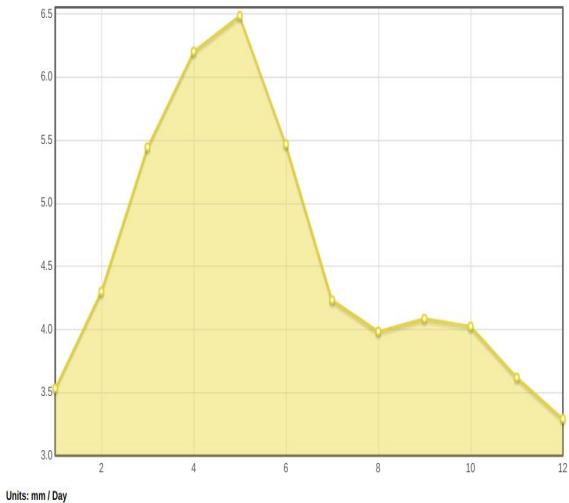


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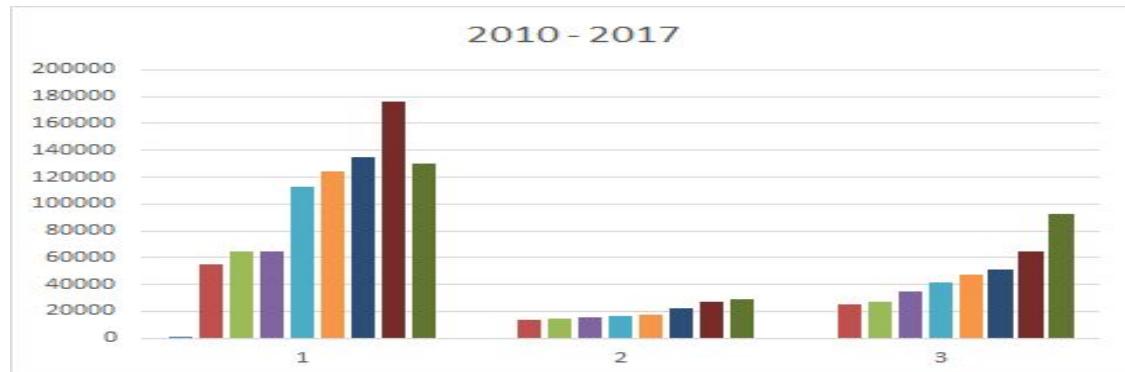
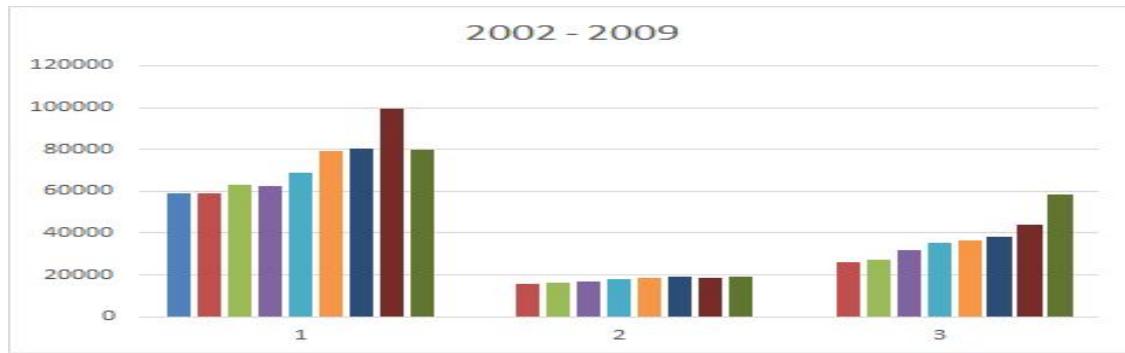


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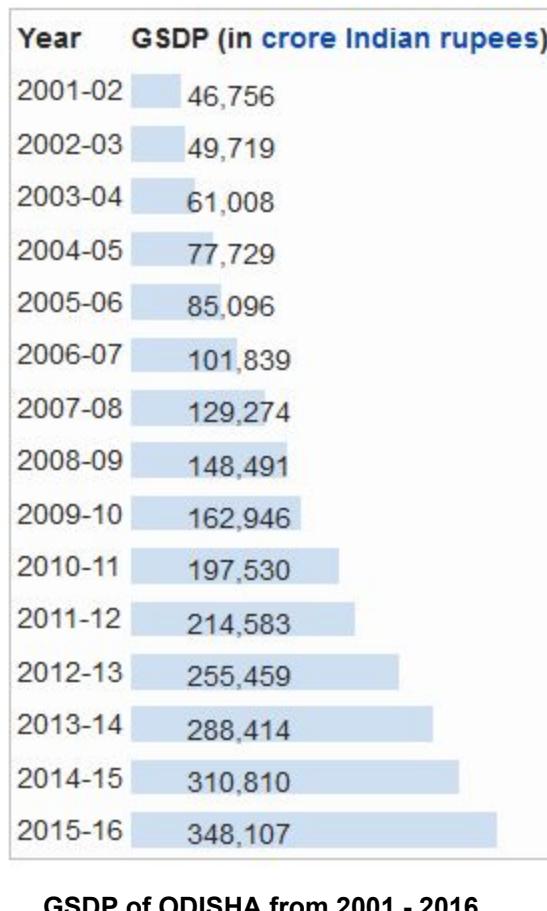
2010 - 2017

NET DISTRICT DOMESTIC PRODUCT



RESULT

The economy of Odisha is one of the fastest growing state economies in India. According to 2014-15 economic survey, Odisha's gross state domestic product (GSDP) was expected to grow at 8.78%.¹ Odisha has an agriculture-based economy which is in transition towards an industry and service-based economy. According to recent estimates, the size of Odisha's economy has increased by 22.27 per cent during the last six years in terms of the gross state domestic product (GSDP). Thereby, Odisha achieved an annual average growth rate of 6.23 per cent during that period. Odisha is also one of the top FDI destinations in India. In the fiscal year 2011-12, Odisha received investment proposals worth ₹49,527 crore (US\$9.296 billion). According to the Reserve Bank of India, It received ₹53,000 crore (US\$8.33 billion) worth of new FDI commitments in the 2012-13 fiscal year.



In 2013-14, the GSDP growth rate dropped to 2.21%. This slow down was attributed to the Phailin cyclone, which caused a negative growth of 9.78% in the agricultural sector and also affected several other sectors. According to the 2011 Census of India, Odisha has a working population of 17,541,589, among them 61% are main workers and rest are marginal workers. 33.9% of the total working female population are main workers. As of June 2014, Odisha has 10,95,151 people registered in various employment exchanges of the state. Of them, 10,42,826 reported themselves educated. Odisha had a rural unemployment rate of 8.7% and an urban unemployment rate 5.8% calculated based on the current daily status basis in the 68th National Sample Survey (2011-2012). The per capita income of the state was ₹98,983 (US\$1,531) in 2013-14. The state has a public debt of ₹38,666 crore (US\$6.34 billion), which is ₹8,909 per capita (US\$146), at the end of 2013-14.

According to ASSOCHAM, in the fiscal year 2011-12, Odisha received investment proposals worth ₹49,527 crore (US\$9.296 billion). According to the Reserve Bank of India, Odisha received new FDI proposals worth Rs 53,000 crore (8.333 billion USD) in the 2012-13 fiscal year. In 2012-13, ₹125 crore (US\$19.66 million) worth of foreign aid was received by NGOs in the state.

Sectors

Agriculture and Livestock

According to the 2011 Census of India, 61.8% of the working population are engaged in agricultural activities. However, the agricultural contribution to the GSDP was 16.3% in the fiscal year 2013-14 and it was estimated to be 15.4% in 2014-15. The area under cultivation was 5,691 hectares in 2005-06 and it dropped to 5,424 hectares in 2013-14. Rice is the dominant crop in Odisha. It is grown on 77% of the area under cultivation. Odisha produced 8,360 metric tonnes of rice in 2013-14, a drop from 10,210 metric tonnes due to the cyclone Phailin. Given below is a table of 2015 national output share of select agricultural crops and allied segments in Odisha based on 2011 prices.

During 2013-14, the state exported 4.13 lakh tonnes and ₹1,800 crore worth of seafood. In 2014-15, the value of exports rose by 26% to ₹2,300 crore with 4.67 tonnes being exported. Odisha is the fourth largest shrimp producing state in India. On 22 November 2017, Odisha government decided to launch "Nabakrushna Choudhury Seccha Unnayan Yojana" to provide irrigation facility to about 55,000 hectare of agricultural land across Odisha. The scheme would be implemented with an outlay of Rs 635 crore over a period of three years. Under the scheme, 46,296 hectare command area of 14 major and medium irrigations and 284 minor irrigation projects will be revived.

The agricultural crop year in Odisha is from July to June. The cropping season is classified into two main seasons: Kharif season and Rabi season. The Kharif cropping season is from July-October during the southwest monsoon. In the Kharif season the planting, growing and harvesting stages occur in April, July and October respectively. The Rabi season starts with the onset of north-east monsoon in October. The planting, growing and harvesting stages in Rabi season occur in October, January and April respectively. The

Kharif crops include paddy, maize, ragi, groundnut (oilseeds), etc. The Rabi crops include wheat, greengram, blackgram, horsegram, mustard, etc. The estimated results of the pooled regression analysis for the climate coefficients and the control variables have been shown in the following table.

Variable	Coefficient	Variable	Coefficient
January temperature	-26.42	October rainfall	-0.15
January temperature square	3.67**	October rainfall square	-0.002*
April temperature	-23.23*	January temperature x January rainfall	0.173
April temperature square	-2.20*	April temperature x April rainfall	-0.01
July temperature	837.104**	July temperature x July rainfall	-0.05*
July temperature square	-14.37***	October temperature x October rainfall	0.04
October temperature	382.22*	Population density	0.22*
October temperature square	-16.87***	Adult literacy rate	-4.09**
January rainfall	3.65*	Cultivators per hectare	38.89*
January rainfall square	-0.01	Tractors per hectare	512.96***
April rainfall	3.47*	Bullocks per hectare	-15.02
April rainfall square	0.002*	Proportion of area under HYV	3.11*
July rainfall	0.82*	Proportion of area under irrigation	32.55*
July rainfall square	-0.001***		
Constant	-1302.43**		
Prob>chi 2	0.0000		

Note: * denotes 10% level of significance, ** denote 5% level of significance and *** denote 1% level of significance.

The findings of the study reveal that rainfall of seasons January and April have positive effect on the net revenue. This is because January rain is beneficial for the Rabi crops which are generally heat sensitive and requires soil moisture for their growth. April rain helps in seeding process of the Kharif crop and also helps the seeds in their germination. But rise in temperature in this period is harmful because it reduces the soils moisture retaining capacity. Thus, temperature rise in April has a negative effect on the net revenue. During July monsoon rain helps the Kharif crops to grow. Both July rainfall and July temperature have positive effect on net revenue. This may be because both temperature and rainfall are needed at this time for the Kharif crops to grow. October season which is the harvesting period for Kharif crops and planting period for Rabi crops requires less water. This could be a possible reason behind the negative

coefficient for the season October rainfall. During this time temperature has a positive effect on net revenue. This result might have come for the possible reason that temperature rise during this period helps the Rabi crops like blackgram, greengram, etc from the insect attacks and also helps the Kharif crops in the ripening process. Among the control variables population density, number of cultivators per hectare, number of tractors per hectare, proportion of area under irrigation are positively and significantly influence farm revenue per hectare. Adult literacy rate shares a negative relationship with farm level net revenue because with increased education people prefer more non agricultural activities to farming. Finally, we relate the estimated 30 years average trend of climate variables with this result. The trend for January rainfall is estimated to be negative (-0.31) and the trend for July rainfall is revealed to be positive (2.02). The results for other two seasons (for rainfall) do not have a significant trend. On the other hand, the trend of temperature for all the seasons are showing increasing trend.

Industry

The primary industries in Odisha are manufacturing; mining and quarrying; electricity, gas and water supply and construction. The industrial sector's contribution to the state's GSDP was estimated at 33.45% in 2014-15. Most of Odisha's industries are mineral-based. Odisha has 25% of India's iron reserves. It has 10% of India's production capacity in steel. Odisha is the top aluminium producing state in India. Two of the largest aluminium plants in India are in Odisha, NALCO and Vedanta Resources. Mining contributed an estimated 6.31% to the GSDP.

Service

The service sector contributed an estimated 51% to the GSDP in 2014-15. The primary sub-sectors are: community, social and personal services, which contributed 13.45% to the GSDP; trade, hotels and restaurants, which contributed 13.09%; financial and insurance services, which contributed 13.64%; and transport, storage and communication, which contributed 10.99%. The state has a well-developed banking network compared to many states of India. There is one bank branch for every 12,000 people. 90% of the branches are in the rural region.

CONCLUSION

To conclude, the estimated regression coefficients of rainfall of January, April and July have positively influenced the net revenue. It is also found from the study that the coefficients of the January temperature and April temperature are negative whereas July temperature and October temperature share positive relation with net revenue. The relation between the estimated 15 years trend of the seasonal climate variables and the coefficients of regression analysis reveals that the negative trend of January rainfall for the region might adversely affect farm level net revenue, which calls for a greater investment in irrigation in this period. July rainfall is beneficial to farming activity in Odisha. On the other-hand, the increasing trends of temperature for all the seasons might have adverse impact on the health of agriculture sector of coastal Odisha.

SUGGESTIONS

This project can be further extended to whole of India. The economy of India is a developing mixed economy. It is the world's sixth-largest economy by nominal GDP and the third-largest by purchasing power parity (PPP). The country ranks 139th in per capita GDP (nominal) with \$2,134 and 122nd in per capita GDP (PPP) with \$7,783 as of 2018. After the 1991 economic liberalisation, India achieved 6-7% average GDP growth annually. In FY 2015 and 2018 India's economy became the world's fastest growing major economy, surpassing China.

Further Improvements in Data Collection for better results:

1. The *Weather Conditions* can include Cloud Cover, Vapour Pressure, Wet Day Frequency, Diurnal Temperature Range, Ground Frost Frequency, Potential Evapotranspiration.
2. The *Economic Factors* can include Mining & Quarrying, Electricity, Gas & Water supply, Trade, Hotel & Restaurant, Railway, Transport by Other means, Storage, Communication, Banking & Insurance, Public Administration and Other Services.

The long-term growth prospective of the Indian economy is positive due to its young population, corresponding low dependency ratio, healthy savings and investment rates, and increasing integration into the global economy. India topped the World Bank's growth outlook for the first time in fiscal year 2015–16, during which the economy grew 7.6%. Despite previous reforms, economic growth is still significantly slowed by bureaucracy, poor infrastructure, and inflexible labor laws (especially the inability to lay off workers in a business slowdown).

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