

Climate Change, Disaster Risk and Vulnerability: An Assessment of Climate Change, Vulnerability and Floods in Jammu and Kashmir since 2014

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ABSTRACT

Crisis is an exigent aspect of the present world. The present world is hampered by food crisis, livelihood crisis, employment crisis and environmental crisis. Climate change is a critical issue at the present time and is believed to have altered the global climate in a very negative way in last few decades. It is projected to alter precipitation patterns, increase the frequency and intensity of major storm events, and increase risks of floods throughout the world. Climate change, coupled with unprecedented rates of rapid urbanization, makes the potential impacts of disasters much worse. The frequency and intensity of climate-related disasters have quadrupled in the past two decades. Over the past two decades, evidence has mounted that the global climate is changing, and that anthropogenic greenhouse gas emissions are largely to blame. While changes in average conditions can have serious consequences by themselves, the main impacts of global climate change are felt due to changes in climate variability and weather extremes like floods. In many cases, the potential increases in extreme events due to climate change come on top of alarming rises in vulnerability. There has been resurgence of climate-skepticism: denying the reality of climate change as being based on poor science, or as part of a conspiracy but the reality is that climate change is very much real. Climate change played an important role in occurrence of floods in Jammu and Kashmir since 2014, which resulted into excessive and prolonged rainfall in J & K. It caused a major flood in J & K in 2014, which was followed by some minor floods in the state in 2015, 2016, and 2017. The 2014 flood led to the death of about 300 people and heavy loss to environment, economic and social set up, which resulted into diseases and poverty in J & K. Some studies have revealed that due to climate change the average rainfall in Himalayan region, including J & K, has increased in last some years which caused increasing floods in the whole region. The present paper highlights the effect of climate change on increasing floods and also dry spells in Jammu and Kashmir since 2014 and also provides an overview of current knowledge of climate change and its effects on climate variability and extreme weather that could lead to disasters, paying particular attention to the potential to apply the information to disaster risk reduction.

Key Words: Environmental crisis, climate change, global warming, environmental degradation, floods, vulnerability.

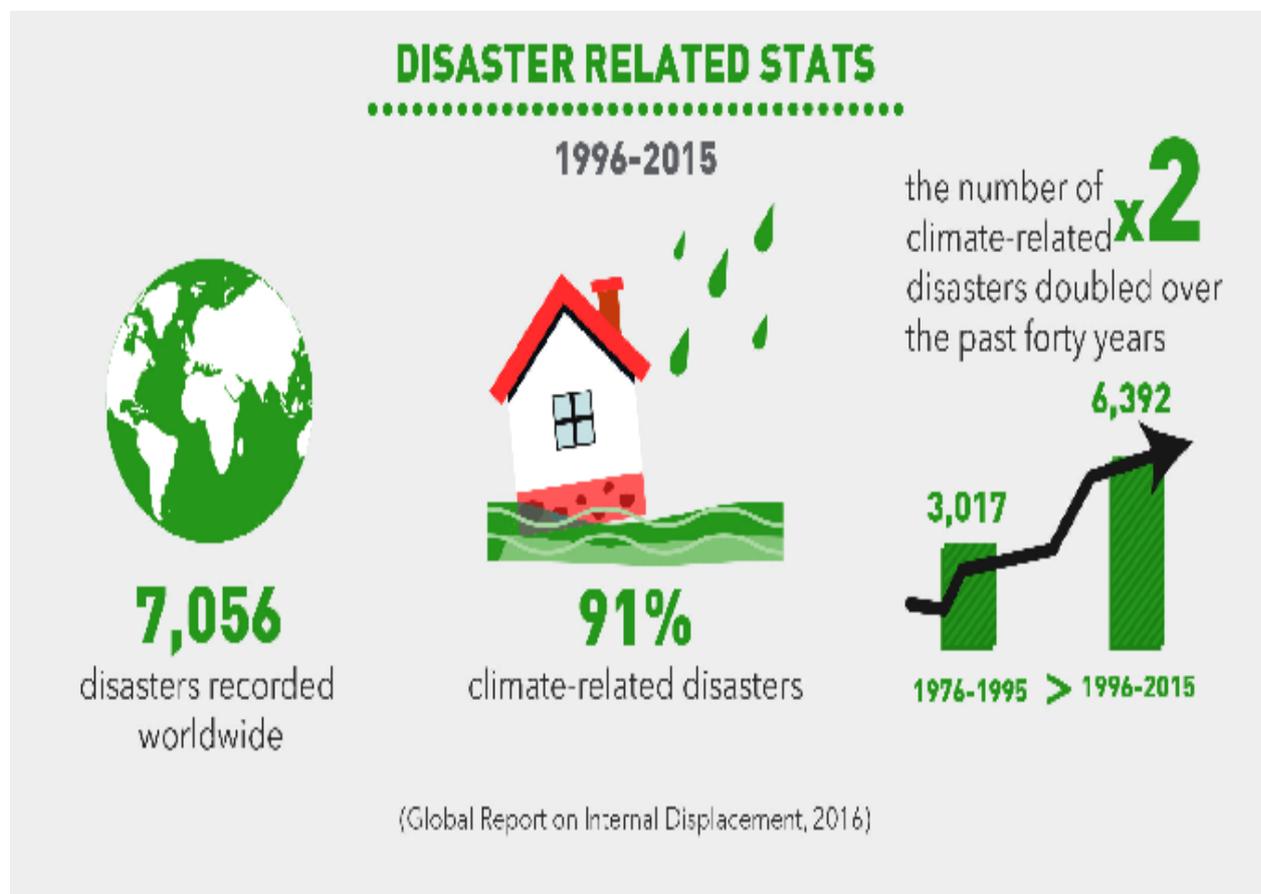
I INTRODUCTION

In Engel's address at the graveside of Karl Marx, he said "Marx discovered the law of development of human history: the simple fact, hitherto concealed by an overgrowth of ideology, that mankind must first of all eat, drink, have shelter and clothing, before it can pursue politics, science, art, religion, etc." Another pertinent quote is that according to the labour theory of value, "all value comes from nature altered by human labour." Climate change and other environmental challenges are forcing us to look to the other part of the nature from which all value is derived. If there are insufficient resources to feed, clothe, and house humanity, to provide the natural resources which are acted upon by production and technology, that will have fundamental effects on what kind of society we have. The society we are living in right now is plagued by many problems ranging from malnutrition, diseases, poverty, hunger, disasters like floods, droughts to environmental degradation and capitalism. The human greed has depleted the resources and thus has rendered humanity to a great loss in terms of human lives and environment. We live in the age of global environmental crisis where global warming and subsequent climate change are just the latest manifestation of the environmental crisis of capitalism, a crisis of such enormity that the web of life of the entire planet is at risk of fundamental degradation and with it human civilization itself. Climate change is a burning issue at the present time and is believed to have altered the global climate in a very negative way in last some decades. It is projected to alter precipitation patterns, increase the frequency and intensity of major storm events, and increase risks of floods throughout the world. Environmental degradation is an alarming concern these days. Over the past two decades, evidence has mounted that the global climate is changing, and that anthropogenic greenhouse gas emissions are largely to blame. While changes in average conditions can have serious consequences by themselves, the main impacts of global climate change are felt due to changes in climate variability and weather extremes like floods. In many cases, the potential increases in extreme events due to climate change come on top of alarming rises in vulnerability.

There has been resurgence of climate-skepticism: denying the reality of climate change as being based on poor science, or as part of a conspiracy but the reality is that climate change is very much real. At a 2007 UN Security Council discussion on climate change impacts, UN Secretary-General Ban Ki-moon noted that climate change has implications for peace and security, as well as serious environmental, social and economic implications, especially in vulnerable regions that face multiple stresses at the same time, such as weak institutions, pre-existing conflicts, poverty and unequal access to resources, food insecurity, and high incidence of diseases such as HIV/AIDS. Furthermore, he outlined 'alarming, though not alarmist' scenarios, including limited or threatened access to energy increasing the risk of conflict, a scarcity of food and water transforming peaceful competition into violence, and floods and droughts sparking massive human migrations, polarizing societies and weakening the ability of countries to resolve conflicts peacefully.

Climate Change, Disaster Risk, Vulnerability and Floods in Jammu and Kashmir since 2014:

In order to understand the discourse of climate change and disaster risk in Jammu and Kashmir, it is important to first discuss the discourse of climate change and disaster risk in the world scenario. It is also important to explain the conceptual and theoretical aspects of climate change and disasters. As the effects of climate change and its adverse water impacts increase – often in politically charged areas – conflicts are likely to intensify, requiring new and rapid adaptive security strategies. Sudden changes in hydrological conditions that may occur as a result of climate change amplify the risk of major national and international security threats, especially in unstable areas. Adverse changes in internal, inter-jurisdictional and transboundary waters can put food, social, health, economic, political and military security at risk. Current IPCC projections of rising temperatures and sea levels, and increased intensity of droughts and storms, suggest that substantial migration will take place within the next 30–50 years, particularly from coastal zones.

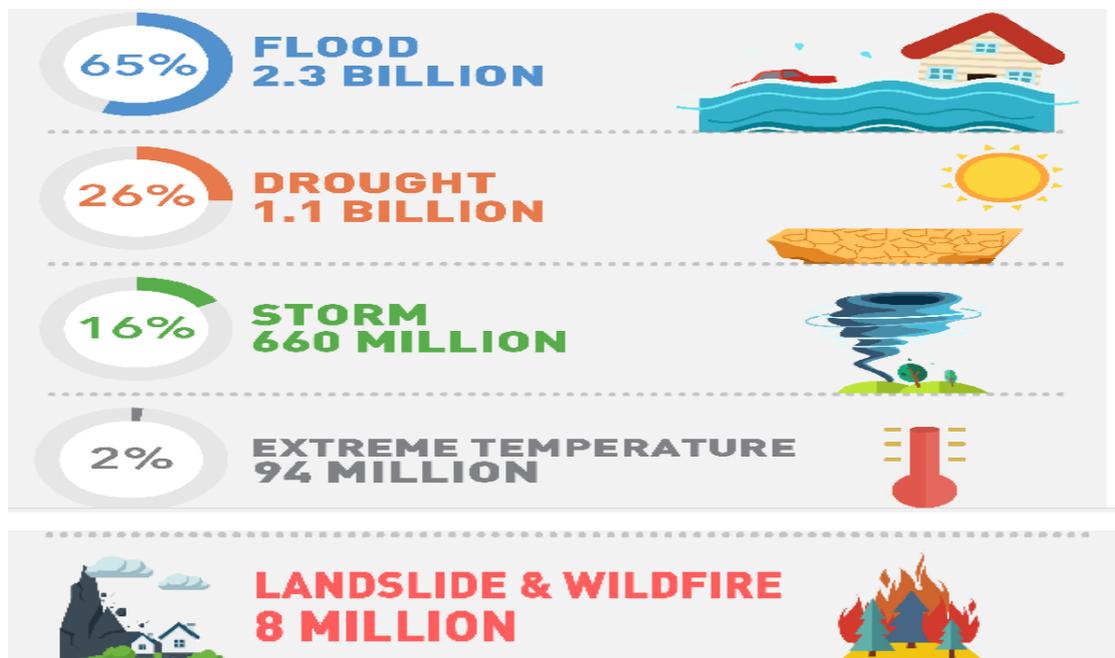


NUMBER OF DISASTERS

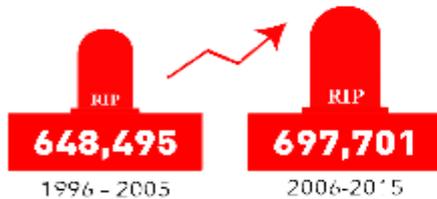


II HUMAN IMPACT

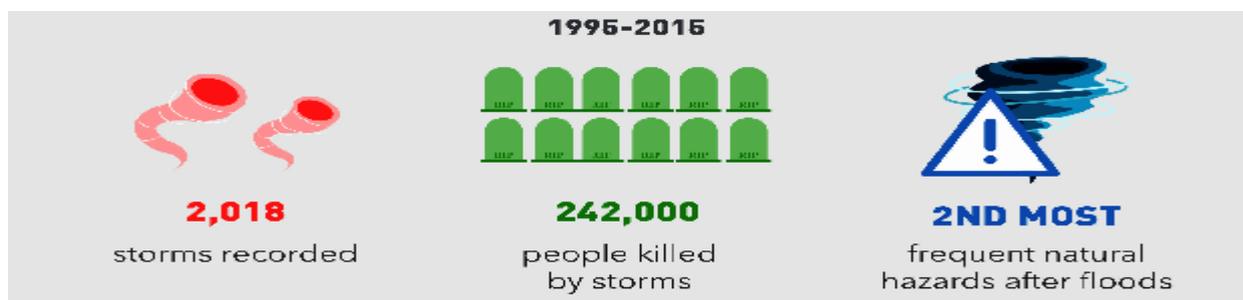
No. of People affected by Weather related Disasters (1995-2015)



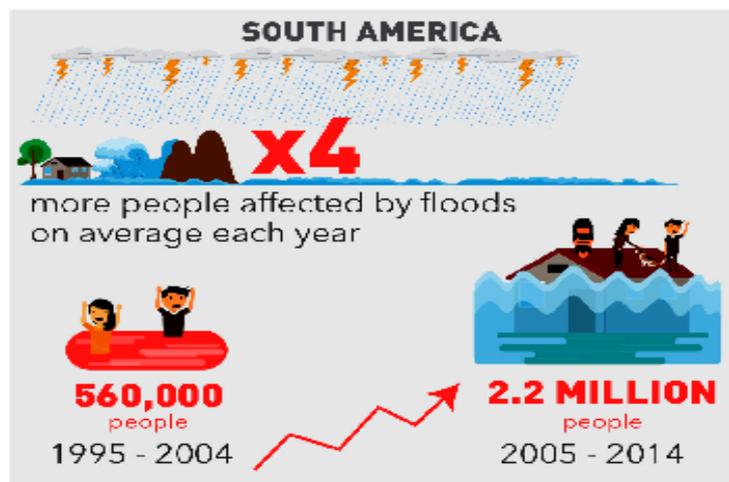
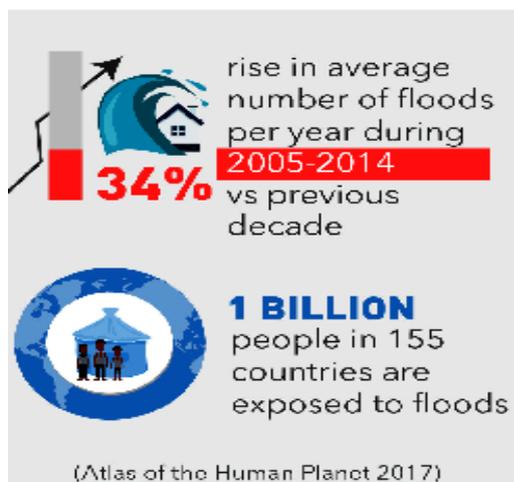
People killed per year for all types of natural disasters (UNISDR, 2016)



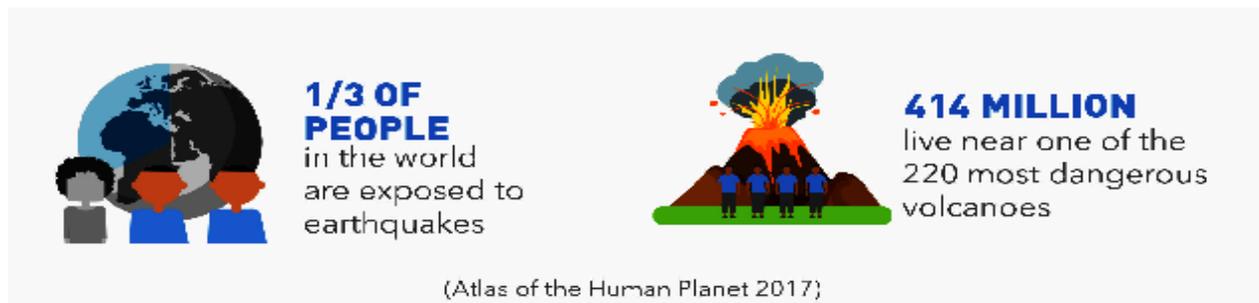
% of lives lost to natural hazards (storms, extreme temperatures, flood, drought, landslides and wildfires)



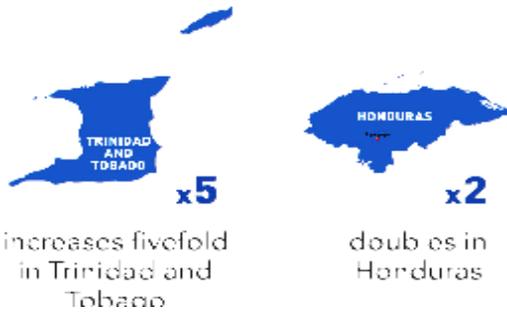
FLOODS



EXPOSURE TO HAZARDS



INCREASE IN RISK WITH CLIMATE CHANGE



CITIES BY EXPOSURE TO NATURAL CATASTROPHES



Source: Global Disaster Relief and Development Summit (2017).

In Africa alone, between 75 million and 250 million people may be exposed to increased water stress by 2020 due to climate change. Increased water demand is likely to intensify water-related problems. While the impacts of climate change are predominantly felt locally, the forces at work are global in scale; the aggregate result of the behaviour of all countries. Responding to these forces will require international cooperation and coordination, as well as careful decisions and actions at the national level (Water and Climate Dialogue, UNESCO, 2011).

Climate change impacts are not gender-neutral. Factors such as gendered divisions of labour, differences in access to and control of natural resources, different knowledge and skills, and different levels of participation in decision- and policy-making expose women and men to specific and different risks and opportunities. In many contexts, women are more vulnerable than men to the effects of climate change. Historic disadvantages that women often still face – such as limited access to resources, restricted rights and a muted voice in shaping decisions – can make them especially susceptible to many impacts of climate change.

The United Nations Development Fund for Women has published the following facts and figures:

- In Africa, the proportion of women affected by climate related crop changes could range from 73 per cent in the Congo to 48 per cent in Burkina Faso.

- Gathering and transporting water typically falls to women and children in developing countries. This seriously limits their available time for education or other economic and political activities. Collecting water is expected to become increasingly burdensome with global warming.
- Shortages of firewood or other bio-fuels due to floods or drought, which are expected to increase with higher temperatures, add to women's workloads where they are responsible for its collection. Worldwide, girls already make up the majority of children who do not attend school.
- In hurricanes and floods it is a well-attested fact that women have a higher death rate than men, due to social inhibitions, lack of survival skills, and the fact that they often care for children, the sick and the elderly and may place themselves at higher risk to do so.
- The wide variation in estimates of the costs of climate change is due to different assumptions about future greenhouse gas emissions, mitigation measures, anthropogenic climate change itself, and how effectively countries will adapt to it. With these qualifications, the scale of economic impact is illustrated below:
- An estimated 40 per cent of development investments are currently at risk, according to analyses by the Organisation for Economic Co-operation and Development (OECD). These analyses indicate that while many development efforts contribute to reducing vulnerability to climate variability and change, climate risks are seldom explicitly factored into development projects and programmes.
- The Stern Review in 2006 concluded that by 2050, extreme weather could reduce global gross domestic product (GDP) by 1 per cent and that, unabated, climate change could cost at least 5 per cent of global GDP each year. If even more dramatic predictions eventuate, the cost could rise to more than 20 per cent of GDP (Water and Climate Dialogue, UNESCO, 2011).

The earth's climate is changing at a rate that has exceeded most scientific forecasts. Some families and communities have suffered from disasters and the consequences of climate change, and forced them to leave their homes in search of a new beginning and new prospects. The consequences of climate change are enormous. Scarce natural resources such as drinking water are likely to become even more limited. Many crops and some livestock are unlikely to survive in certain locations if conditions become too hot and dry, or too cold and wet. Food security, already a concern, will become even more challenging. People try to adapt to this situation, but for many this will mean a conscious move to another place to survive. Such moves, or the effects of climate change on natural resources, may spark conflict with other communities, as an increasing number of people compete for decreasing amount of resources.

Since 2009, an estimated one person every second has been displaced by a disaster, with an average of 22.5 million people displaced by climate- or weather-related events since 2008 (IDMC 2015). As climate change continues, it would likely lead to more frequent and severe disasters. The impact will be heavy. Climate change causes poverty and food shortages, and forces even higher numbers of people to flee their homes. Several reports suggest that on an average, 26 million people are displaced by disasters such as floods and storms every year. That's one person forced to flee every second.



Fig. 1: Survivors of 2008 Cyclone Nargis shelter in the ruins of their destroyed home in War Chaun, a village in Myanmar's Ayeyarwaddy Division. (UNHCR/Taw Naw Htoo).



Fig. 2: Somali refugees flee flooding in Dadaab, Kenya. The Dadaab refugee camps are situated in areas prone to both drought and flooding, making life for the refugees and delivery of assistance by UNHCR challenging (UNHCR / B. Bannon).

In the nearly twenty years between 1996 and 2015, there were 7,056 disasters recorded worldwide, which is double the number of disasters that happened during the previous two decades from 1976-1995. According to

the info graphic by the Aid & International Development Forum (AIDF), 91% of these disasters were attributable to climate or weather-related events. This also coincides with the dramatic increase in annual average temperatures marking previous decades. This trend has resulted in 2015 being the hottest year on record during the twenty years evaluated. As a result of high global temperatures, twice as many major droughts occurred during 2015 in comparison to the annual average of 16 between the period of 2006 and 2015.

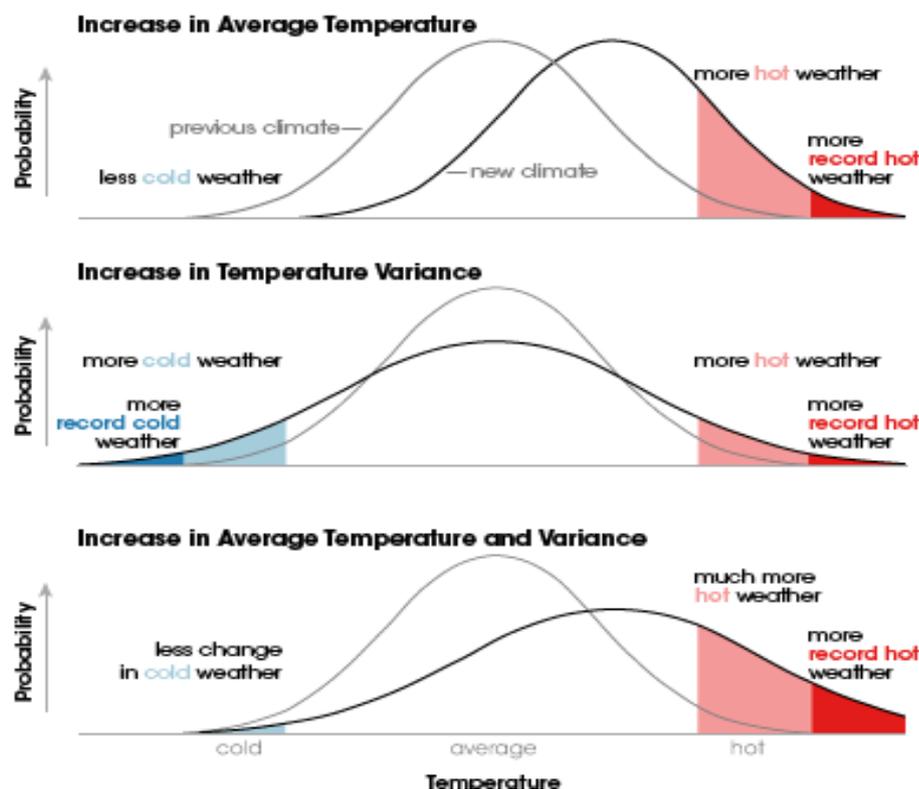


Fig.3: Change in Temperature.

Source: *Climate Change 2001: The Scientific Basis.*

The PRECIS run for 2030's indicate that annual rainfall in the Himalayan region is likely to increase in 2030s with respect to 1970s range from 5% to 13% with some areas of Jammu and Kashmir showing an increase up to 50% (SAPCC, 2013). Potential climate changes are expected to cause a rise in the frequency as well as the intensity of rainfall, which may lead to more widespread and severe natural disasters (IPCC, 2007).

Climate change played an important role in occurrence of floods in Jammu and Kashmir since 2014, which resulted into excessive and prolonged rainfall in Jammu and Kashmir in last few years. It caused a major flood in Jammu and Kashmir in 2014, which was followed by some minor floods in the state in 2015 and minor flash floods in 2016 and 2017. It resulted into the death of about 300 people and heavy loss to economic,

environmental and social set up, which resulted into destruction, diseases, environmental degradation and poverty in Jammu and Kashmir. Some studies have revealed that due to climate change the average rainfall in Himalayan region, including J & K, has increased in last some years which caused increasing floods in the whole region.

Jammu & Kashmir experienced one of the worst floods of the century during first week of September 2014, due to unprecedented and intense rains. Incessant rains in the first week of September led to massive floods in the valley as well as in Jammu region. The Jhelum River and its tributaries were in spate and caused extensive flooding in the region. The valley of Kashmir has an intrinsic genetic relationship with the complex of mountain systems which splay out of the Pamir Knot in different directions of the valley clearly defining the watersheds and basins. The general aspect of the valley is that of a basin, bounded on every side by lofty mountains, and in the middle is a huge alluvial tract, intersected by the Jhelum River and its numerous tributaries which flow down from the mountains and are fed by the abundant snow and rainfall in those elevated regions. The flat alluvial basin measures 150 kms from south-east to north-west and 42 kms from south-west to north-east. In altitude the flat plain varies from 1500 to 1800 m above the sea level and the grain of the land is from south-east to north-west.

In 2014, Jammu and Kashmir witnessed a devastating flood which caused socio-economic and environmental problems throughout the state. It caused the death of almost 300 people. The environment was severely affected which resulted into;

- i) soil erosion
- ii) deforestation
- iii) silting of Jhelum river and its tributaries
- iv) breaching of bunds
- v) loss of infrastructure
- vi) Wetland erosion.

The environmental consequences affected the tourist places which in turn affected the influx of tourists in Jammu and Kashmir in years 2014 and 2015, which caused huge loss to economy. The 2014 flood resulted in tremendous amount of loss to agriculture especially to horticulture sector in Kashmir Valley. It resulted into the increase of poverty in the Valley and caused great suffering to people particularly the lower class as most of their property was damaged due to the 2014 flood. The impact of 2014 flood on Kashmir Valley was devastating.

Several reports reveal that 2014 flood in Jammu and Kashmir was the result of high rainfall in the catchment areas in short period of time, which was not less than cloud bursts. It was also caused due to combined effect of the extreme event because of climate change and less capacity of drainage system that failed to hold the quantum of water and it overflowed, which ultimately led to the devastating flood.

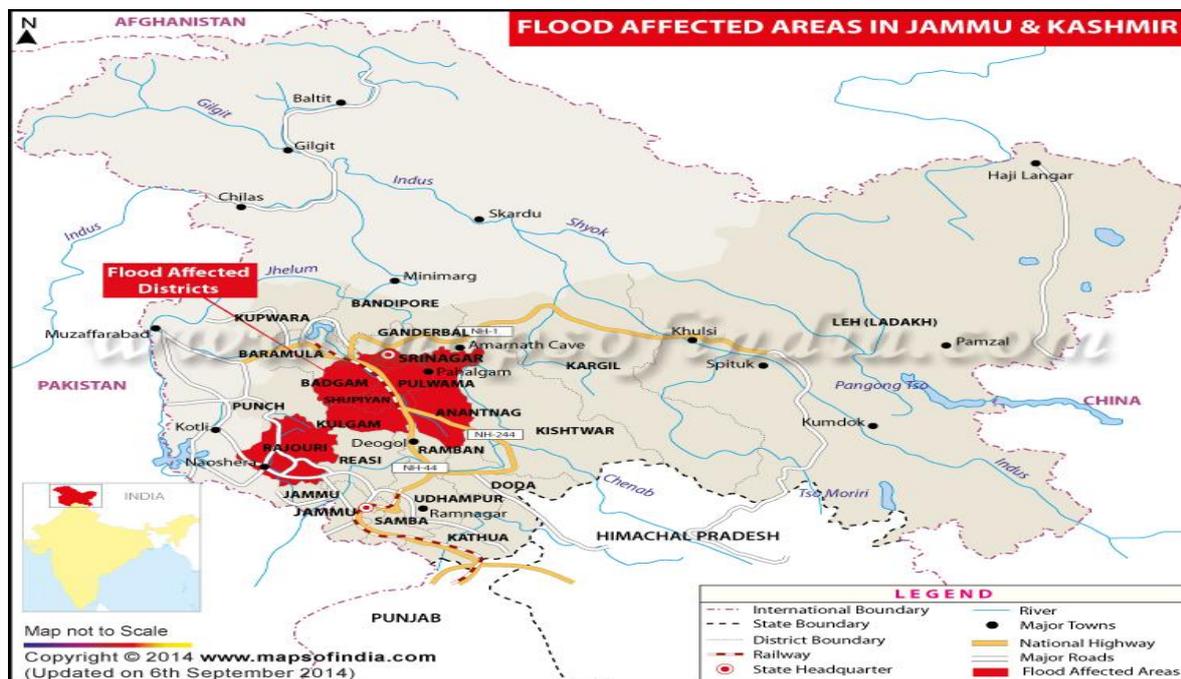


Fig.4: Flood affected areas in September 2014 in Jammu and Kashmir.

Source: Internet.

Jammu and Kashmir has a very peculiar geography and climate. Most of the Kashmir valley is fed by rivers like Jhelum, Indus and Chenab. Low-lying areas of the Kashmir Valley, especially Srinagar, along with parts of Jammu, are prone to floods that occur due to heavy rainfall in upper catchment areas. Recent heavy rains, in September 2014, caused devastating floods that claimed at least 300 lives, and stranded hundreds of thousands of residents. This recent flood in the state is unprecedented in nature, where the most part of the Kashmir valley has received very high rainfall. Weekly total rainfall for most of the stations for the period Sept 2 to Sept 8, 2014 was more than 200 mm. This is very high for a terrain like Jammu and Kashmir.

J & K received heavy rain in the month of September 2014, which led to widespread devastation across the Kashmir Valley. All the aspects of life were affected and people suffered a great loss. According to Global Catastrophe Recap, September 2014, flooding in J & K and Pakistan became the costliest weather event of 2014. It resulted into loss of about 1 trillion rupees. The agriculture was badly hurt especially horticulture sector. According to The Associated Chambers of Commerce & Industry (ASSOCHAM) India, 2014, the 2014 flood in J&K resulted into damage of 3,00,000 hectares of crops which accounts for Rs.3,674 crore loss and Rs 1,000 crore to the apple crop in Kashmir.

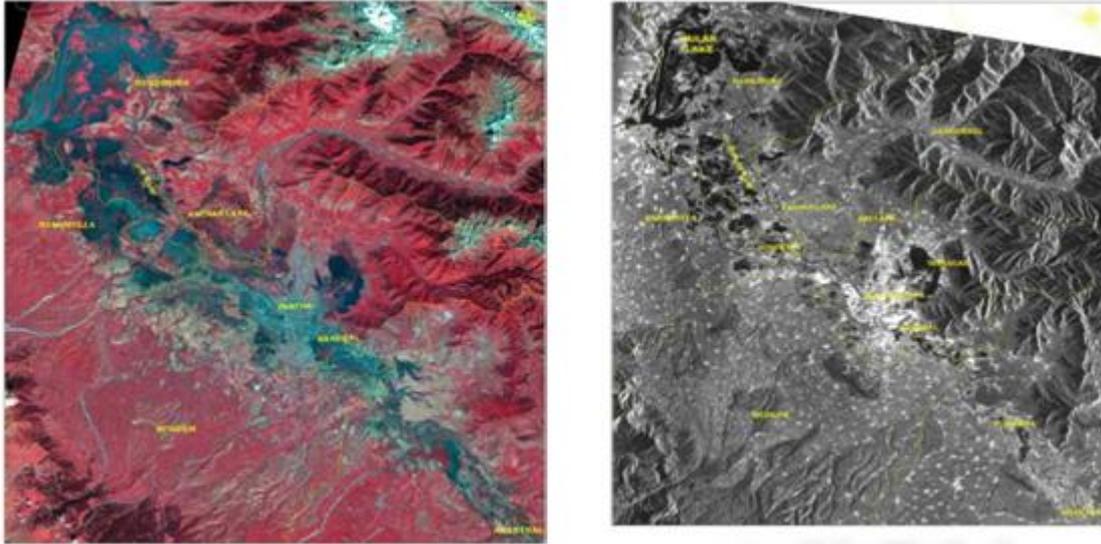


Fig.5: RESOURCESAT-2 L4-MX Satellite Image showing Floods as on 19 September, 2014

RISAT-1 Satellite Image showing Floods as on 21 September, 2014

The earlier recorded floods on the Jhelum were almost 100,000 cusecs of discharge recorded at Sangam and about 80,000 cusecs recorded during the 1928 floods. There are no reliable discharge statistics available for the 1959 floods though some reports suggest that the discharge was almost 100, 000 cusecs at Sangam. While as, during the recent flood of 2014 discharge at Sangam was highest ever recorded on 6th September 1,35,000 cusecs. This figure doesn't include the breaches/cuts (reportedly-84) of river Jehlum (Irrigation and Flood Control Department, J&K).

The flood inflow was more than the combined carrying capacity of Jehlum and flood channel despite the natural breaches of huge size at Kandizal, Chursu, Lelhar, Marwal, Khadermoh, etc. The data clearly reveals the magnitude of September 2014 floods. The carrying capacity of Jehlum in Srinagar city is about 35,000 cusecs and another 15,000 in the supplementary channel. Unless the flood basins which stand encroached upon are restored to cater to the surplus flow besides taking some other measures, the city of Srinagar will continue to be under the threat during the major floods.

Table showing extent of inundation from 8th -25th September, 2014

S.NO.	DATE	AREA (km ²)
1	8 TH September 2014	370.6
2	9 TH September 2014	361.2
3	10 TH September 2014	358.6
4	12 TH September 2014	338.6
5	15 TH September 2014	312.3
6	17 TH September 2014	291.7
7	19 TH September 2014	282.9
8	21 ST September 2014	271.3
9	25 TH September 2014	251.9

Source: DEERS, J&K (2014).





Fig.6: Images of 2014 Flood in Jammu and Kashmir.

Source: Internet

The 2014 flood in Jammu and Kashmir was followed by some minor floods in 2015, 2016 and 2017. Between the years of 2015 and 2017, mostly flash floods occurred in the hilly regions of the state. They caused damage to crops and environment.

The effect of climate change in Jammu and Kashmir can be felt from the fact that it did not snow till the ending of January 2018 in the plain areas of Kashmir valley, as it is a temperate region and experiences snowfall every winter season. The climate change caused a dry spell in Kashmir valley in the winter of 2018.

There is a dire need to dig up an alternate flood spill channel for Jehlum that can lower the burden of water in the river. De-siltation of the Jhelum River should be done scientifically so that the effects of floods can be reduced in the Kashmir valley in coming times.

III CONCLUSION



The science of attributing extreme weather and climate events has progressed in recent years to enable an analysis of the role of human causes while an event is still in the media. However, there is still widespread confusion about the linkages between human-induced climate change and extreme weather, not only among the public, but also among some meteorologists and others in the scientific community. This is an issue of communication as well as of science. Many people have received the erroneous message that individual extreme weather events cannot be linked to human-induced climate change. A changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events. With increasing global surface temperatures the possibility

of more droughts and increased intensity of storms will likely occur. As more water vapour is evaporated into the atmosphere it becomes fuel for more powerful storms to develop. More heat in the atmosphere and warmer ocean surface temperatures can lead to increased wind speeds in tropical storms. Rising sea levels expose higher locations not usually subjected to the power of the sea and to the erosive forces of waves and currents. There is a need to check the human activities so that millions of lives and environment can be saved and thus the number of disasters can be reduced. The sustainable development approach should be used to cope with disasters.

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