

# CLIMATE CHANGE AND SUSTAINABLE LIVELIHOOD: LESSONS FROM CYCLONE OCKHI ON THE COAST OF KERALA

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## Abstract

India's fishery sector is endowed with wide variety of marine resources which sustain large fisheries dependent sectors and livelihood of a large number of populations. India has a coastline of 8118 km with a vast variety of resources and an exclusive economic zone. 21<sup>st</sup> century an era of climate change; in the era of climate change most vulnerable section of the society is fisher folk. There is growing evidence that in the perception fisher folk community, climate change has been influencing the viability of fishing operations. Climate change need to be understood as adding a new dimension to the crisis already faced in the fishery sector. It is also quite clear that while climate change is a global process it is aggravated by local process and practices. This paper highlights the key areas relating to climate change that have an impact upon the lives and livelihood of fisher folk which adversely affect the sustainability of coastal livelihood in general. This paper in particularly quoting the consequences and threats happened to the Kerala coast from Ockhi Cyclone. Cyclone Ockhi was the ninth strongest depression and third strongest storm of the 2017 north Indian Ocean cyclone season. It was the most intense tropical cyclone in the Arabian since cyclone Megh in 2015.

**Key Words:** Climate change, sustainable livelihood, tropical cyclones, cyclone Ockhi, etc.

## 1. Introduction

21<sup>st</sup> century an "Era of Climate Change" is the change in the state or conditions of climate, that can be measurable through analyzing the alteration of its properties like temperature, wind pattern, sea level changes and which persist for a long and extended period for example decades or more than that. United Nations Framework Convention on Climate Change Article I define climate change as a change of climate which attributed directly or indirectly to human activity that alters the composition of global atmosphere, which is in addition to the natural climate variability. Natural factors that change the climate are continental drift, plate tectonic, volcanic eruption, etc. On the other and more important side, the external forces or mainly the anthropogenic activity that alters the earth balance. All these factors together create threats to human and non-human things in the universe. The concept of sustainable livelihood is an attempt to go beyond the common or conventional definition and approach to poverty estimation. In social sciences, the concept of sustainable livelihood extends to include social and cultural norms. Impacts of climate change related extremes include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, human morbidity and mortality and consequences for mental health and human well-being.

## 2. Climate change and livelihood sustainability

Kerala's extended 590 km coastline contribute significantly to employment, income generation, export earnings and human nutrient support, livelihood of inland and marine fisher folk. Fishing sector provides occupation to about 3.86 lakhs people directly and indirectly making it a significant sector of the state. Coast of Kerala has been facing frequent tragedies such as tsunami, cyclones and changes in monsoon, etc. These climatic shocks and stresses affect the normal life and livelihood of the community. Fisher folk community is completely depends on sea resources. Thus, climate change may bring different consequences and impact on these people. Impact can be: impact on physical capital; impact on social capital; impact on natural capital; impact on financial capital; and impact of human capital.

## 3. Climate change and cyclone frequency inter relation

Climate change, understood as the change in the earth's atmosphere as a result of greenhouse gases and sulphur aerosols accumulation caused by human activity has had far reaching consequences on the lives and livelihood of coastal community. Ocean warming has been gradually changed composition of fisheries resources by disrupting habitats or redistributing fish production. Fishing communities have themselves noted changes in the composition of catch partly due to variation in temperature and acidification, shoreline changes as a result of sea level rise and unpredictable wind and rainfall. Cyclone disasters present additional changes to these stresses already felt by the coastal communities. They threaten the lives and safety of fishers at sea and adversely affect the livelihood of all actors in the fishery value chain, in addition to impacting the health and nutrition of population around the world. Among the coastal disaster tropical cyclones followed by storm surges are one of the catastrophic natural disasters occurring in India.

## 4. Ockhi on Kerala coast - An analysis

The tropical cyclone Ockhi was the most intense cyclone since 2015. Cyclone Ockhi comes under the category of very severe cyclone category because its speed in kraal accounts 175 kmph. The deep depression in the south of Kanyakumari and west of Sri Lanka intensified and resulted into cyclonic form. It travelled along the coast of Tamil Nadu, and Kerala towards the Lakshadweep Island. Further, it took a north easterly turn towards the Maharashtra and Gujarat coastlines where cyclones in this area are not a common phenomenon water temperature of at least 26.5 degree Celsius and rapid cooling with height which allows the release of the heat of condensation that powers a tropical cyclones .The name Ockhi was given by Bangladesh which in Bengali means eyes. The world meteorological department and United Nations Economic and Social Commission for Asia and the Pacific started the tropical cyclone naming system, with an intension to inform between forecasters and common people.

## 5. How powerful was Ockhi?

It is categorized as very severe cyclonic storm. It has caused destructions not only on land but in the near shore areas of the seabed and long stretches of the shorelines along the coast of Thiruvananthapuram. Excessive damages to the mussel beds that harbor the rich marine biodiversity of the region. The intense wave activity triggered by the storm has ravaged large areas of the underwater ecosystem. The cyclone storm brought heavy to very heavy rains and some areas suffered extensive crop damages due to strong wind that uprooted coconut tree and other plantation crops. Strong winds damaged houses; especially those located along the shorelines. The strong wind and storm surge resulted in the destruction of property and natural environment, public infrastructure, human capital loss, etc.

**TABLE 1**  
**Ockhi Affected Villages in Thiruvananthapuram**

Village	Population	Active fishermen	Dead/missing	Craft wise causality
Poonthura	8,871	1,584	35	32(obm, 3 mechanized)
Vizhinjam	17,000	4,445	39	30(obm, 9 mechanized)

As far as Kerala is concerned, 75 people were died. Out of this 51 deaths were reported from the Thiruvananthapuram district itself. In Thiruvananthapuram district, craft casualties were reported as the loss of 75, out of that 62 are outboard motors 12 are mechanized. While analyzing the loss of Kerala as a whole total 75 people are died. 208 people reported as missing. As far as infrastructure casualties are taken in to account 221 houses were fully collapsed, and severely damaged are 3,253. 384 boats were fully damaged, 41 km of roads collapsed. In Kerala, total cropped area loss and destruction were reported 7817.43 hectares.

S. No.	items	Loss /causalities
1	Number of districts affected	10
2	Population affected	33012
3	Human lives lost	75
4	Number of injured	234
5	Number of missing	208*
6	Total cropped area affected	7817.43hectre

7	Boats damaged Houses damaged	384(Fully damaged) 221(fully damaged) 3253(partially severely damaged)
8	Loss of road (km)	41
9	Damaged pumps	180
10	Damaged supply of tanks	430

Source: Ministry of Home Affairs (Disaster Management Division)

## 6. Measures taken by the central and state government

**Measures taken by the Central Government:** The Ministry of Home Affairs in close coordination with Ministry of Defense and other central ministries/departments extended all necessary assistance to Kerala during the search and rescue.

**Measures taken by Kerala Government:** The revenue, police and fire rescue services marine enforcement, fisheries departments and coastal police of the state were engaged in the rescue operations. Fishery department officials were deputed to Gujarat, Maharashtra, Goa and Karnataka to support their fishermen who had reached the coast of these states in the aftermath of cyclone. All seriously injured individuals were extended Rs. 5 lakhs as assistance. State government declared equal compensation for both boats and net lost. Children from the families of the deceased are to get free education and training in alternative livelihood.

## 7. Lessons from Ockhi Cyclone on Kerala coast

**Threats on land vs. vulnerabilities at sea:** Information is sparse because of the lack of monitoring system, a disaggregation of data from previous disasters can shed some light on the actual number of people affect by cyclones at sea. Slow response from meteorologist and disaster management to Ockhi was the primary focus on disaster risk management planning on risk to life and property on land to the exclusion at sea risk faced by fishermen.

**Flow of emergency information:** Cyclone Ockhi highlighted the need to streamline emergency communication, so that disaster warning reaches the community and timely responses would be initiated

**Last mile communication:** Although IMD bulletin reach state control rooms and district collectors are informed via SMS and mail, coastal districts don't have 24\*7 emergency communication systems. At present, taluk control rooms in Kerala are only active during the monsoon season.

**Role of fisheries dept in disaster management:** Fishery department are mandated to create sea safety plan and mass messaging facility for fishers. Better cooperation between revenue and home affairs and disaster management authorities should be maintained.

## 8. Suggestions

- Timely dissemination of IMD warning
- Cyclone preparedness at sea
- Disaster management training
- Reliable data on fishing operation
- Integrating micro and macro level management planning
- Community based disaster management approach

## 9. Conclusion

Climate change has close connection with the coastal livelihood sustainability. The climate change impact on coastal livelihood can be summarized here as income uncertainties, employment uncertainties, income disorganization, equipment damages and loss along with psycho-social problems. No regularity of income is one of the adverse consequences of climate change, which gets reflected in family particularly through education of children, health and hygiene, psychology of family and other related problems. Even though a number of policies and programs are mounting the practical side of these policies is still a dream.

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