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**Published by:**  
 Panel on Tropical cyclones Secretariat, India  
 Meteorological Department, India

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# WMO/ESCAP PANEL ON TROPICAL CYCLONES (PTC)

## NEWS LETTER

### 50 YEARS OF PTC



-  Bangladesh Meteorological Department (BMD)
-  India Meteorological Department (IMD)
-  Islamic Republic of Iran Meteorological Organisation (IRIMO)
-  Maldives Meteorological Organisation
-  Department of Meteorology & Hydrology, Myanmar
-  Civil Aviation Authority, Sultanate of Oman
-  Pakistan Meteorological Department
-  Qatar Meteorology Department
-  National Center of Meteorology, Saudi Arabia
-  DEPARTMENT OF METEOROLOGY SRI LANKA
-  กรมอุตุนิยมวิทยา Thai Meteorological Department
-  National Center of Meteorology, UAE
-  Civil Aviation & Meteorological Authority Yemen

This News Letter is a Special Issue on various activities initiated by Regional Specialised Meteorological Centre New Delhi, United Nations Economic & Social Commission for Asia Pacific (UN-ESCAP), PTC Member Countries including Bangladesh, India, Iran, Maldives, Myanmar, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Sultanate of Oman, Thailand, United Arab Emirates and Yemen.

## December 2024

## Chapter-1: Historical Perspectives

On the backdrop of the death of 300,000 people due to a severe cyclone hitting Bangladesh coast near Bhola Island, way back in 1970 and 10,000 people dying in Andhra Pradesh and Odisha each due to severe cyclone in 1970 & 1971, World Meteorological Organisation and United Nations Economic & Social Commission for Asia & the Pacific (WMO and UNESCAP) came together to establish a Panel of countries affected by the tropical cyclones (TCs) in North Indian Ocean (NIO) for developing/improving the cyclone warning system in the region. The first meeting of the Panel was held in 1972 and WMO/ESCAP Panel on Tropical Cyclones (WMO/ESCAP PTC) was established consisting of six countries namely Bangladesh, India, Myanmar, Pakistan, Sri Lanka and Thailand. The first Session of WMO/ESCAP PTC was held in Bangkok in 1973. Gradually, the role and responsibility of the PTC increased over the years and more countries affected by tropical cyclones joined the Panel (Maldives in 1982, Sultanate of Oman in 1997, Yemen in 2016, United Arab Emirates, Saudi Arabia, Qatar and Iran in 2018).

The Panel is one of the five regional tropical cyclone bodies established as part of the WMO Tropical Cyclone Programme (TCP) which aims at promoting and coordinating the planning and implementation of measures to mitigate tropical cyclone disasters on a worldwide basis. The main objective of the WMO/ESCAP Panel on Tropical Cyclones is to promote measures to improve tropical cyclone warning systems in the Bay of Bengal and the Arabian Sea. The basic purpose of the operational plan is to facilitate the most effective tropical cyclone warning system for the region with existing facilities. The plan records the agreed arrangements for standardization of operational procedures, efficient exchange of various data related to tropical cyclone warnings, issue of cyclone advisories from a central location having the required facilities for this purpose, archival of data and issue of a tropical weather outlook and tropical cyclone advisories as agreed by consensus at the WMO as part of the World Weather Watch for the benefit of the region. For this purpose, there are Regional Specialized Meteorological Centre (RSMC)- Tropical cyclone and Tropical Cyclone Warning Centres (TCWC) for different regions

The functions of the PTC include:

- ❖ To review regularly the progress in various fields of tropical cyclone damage prevention;
- ❖ To recommend plans and measures for improvement of community preparedness and disaster prevention;
- ❖ To promote, prepare and submit to member countries plans for co-ordination of research programmes and activities on tropical cyclones;
- ❖ To facilitate training of personnel from member countries in tropical cyclone forecasting
- ❖ To plan for co-ordination of research programmes and activities concerning cyclones
- ❖ To prepare and submit, at the request and on behalf of the member countries requests for technical, financial and other assistance offered under United Nations Development Programme (UNDP) and by other organisations and contributors and
- ❖ To consider, upon request, possible sources of financial and technical support for such plans and programmes.

## Chapter 2: Milestones of PTC

Major milestones of WMO/ESCAP PTC include:

- 1737: Storm surge of height 13m due to cyclone inundated West Bengal
- 1876: Storm tide of height 12.5 m inundated Bangladesh (Bakerganj Cyclone)
- 1970: Bhola Cyclone killed 300,000 people in Bangladesh
- 1971: 10,000 deaths in Odisha due to cyclone that crossed Paradip
- 1971: 6<sup>th</sup> Congress of WMO appointed a Committee of Experts under the Chairmanship of Dr P Koteswaram, Director General India Meteorological Department, to draw up the Tropical Cyclone Plan for the World.
- 1971: World Cyclone Project was approved by the UN General Assembly.
- 1972: Constitution of Panel on Tropical Cyclones (PTC) with Six Members (Bangladesh, India, Myanmar, Pakistan, Sri Lanka and Thailand).
- 1973: 1st Session of PTC in January, 1973 at Bangkok, Thailand
- 1973: 1<sup>st</sup> PTC Secretariat was hosted in Bangkok, Thailand
- 1973: India Meteorological Department (IMD) was designated to act as Regional Meteorological Centre (RMC) for Tropical Cyclones, New Delhi
- 1974: Introduction of severe cyclonic storm with core of hurricane wind (later very severe cyclonic storm) category, geostationary satellite product.
- 1980: Tropical Cyclone Programme (TCP) was established.
- 1982: Maldives joined PTC
- 1982: Introduction of INSAT series of satellite products
- 1988: RMC New Delhi redesignated as Regional Specialized Meteorological Centre (RSMC) Tropical Cyclones, New Delhi
- 1990: Cyclone Warning Directorate established at New Delhi to co-ordinate cyclone warning work and act as RSMC-Tropical Cyclones, New Delhi.
- 1997: Sultanate of Oman joined PTC
- 1999: Introduction of super cyclonic storm category
- 1999: Introduction of scatterometer based sea surface wind
- 1999: Introduction of CLIPER model for track forecast
- 2003: IMD to act as Tropical Cyclone Advisory Centre (TCAC), New Delhi
- 2004: Introduction of naming of cyclones over north Indian Ocean commencing from TC ONIL.
- 2005: Bii-weekly training for cyclone forecasters from WMO/ESCAP member Countries
- 2008: Objective track, intensity, cone of uncertainty forecast upto 3 days for RSMC region commencing from TC hitting Sri Lanka
- 2008: Introduction of real time Verification of Track, Intensity & Landfall forecast errors, TC Atlas
- 2009: Introduction of storm surge guidance for RSMC region commencing from Bijli (Bangladesh)
- 2010: Objective quadrant wind radii forecast upto 3 days from TC, Giri hitting Myanmar

- 2013: Extension of TC forecast upto 5 days from TC 'VIYARU'**
- 2014: Introduction of TC track on GIS platform,**
- 2014: Launching of a dedicated website for RSMC, New Delhi,**
- 2014: Probabilistic genesis forecast and Digitisation of RSMC Report since 1990.**
- 2015: Introduction of Extremely severe cyclonic storm category. 2016: Severe weather forecasting project for South Asia.**
- 2016: Yemen joined PTC**
- 2018: United Arab Emirates, Saudi Arabia, Qatar and Iran joined PTC**
- 2018: Introduction of Extended range outlook upto two weeks**
- 2018: Introduction of Fishermen Warnings for next 5 days for entire Bay of Bengal and Arabian Sea**
- 2020: New list of names of cyclones released with representation from 13 Panel member countries**
- 2022: Introduction of pre-genesis track, intensity, quadrant wind forecast upto 3 days in low pressure area stage**
- 2023: Introduction of colour coded Impact based forecast of severe weather over SWFP-South Asia and NIO region**
- 2024: IMD elected to host WMO/ESCAP PTC Secretariat at New Delhi**

# Chapter 3: Activities Commemorating 50 years of PTC

## 10 Point Action Plan

As per the recommendations of 49<sup>th</sup> Session of PTC held online, it was decided to commemorate 50<sup>th</sup> years of PTC. Accordingly, RSMC New Delhi organised first online Meeting on 20th July with participation from WMO, ESCAP and all member countries, WMO and ESCAP under the Chairmanship of Dr. Mrutyunjay Mohapatra, Director General of Meteorology, PR of India to WMO and 3<sup>rd</sup> Vice President of WMO to discuss the actions needed to be carried out based on the recommendation of last PTC meeting to commemorate 50th anniversary of WMO/ESCAP PTC. Following delegates participated in the meeting:

1. Dr. Mrutyunjay Mohapatra, PR of India
2. Dr. T Peng, Chief TCP, WMO
3. Dr. Sanjay Kumar Srivastava, Chief DRR, ESCAP
4. Ms. Chalalai Jamphon, Thailand Met Deptt
5. Mr. Somkuan Tonjan, Thailand Met Deptt
6. Mr. Chaichan Sitthiworanan, Thailand Met Deptt.
7. Mr. Hla Tun, Myanmar Met Deptt.
8. Dr. Tin Mar Htay, Myanmar Met Deptt.
9. Mr. Md. Aziz-ur Rehman, PR Bangladesh Met Deptt and his team
10. Dr. Ali Shareef, PR Maldives and his team
11. Dr. Athula Kumarnayake, PR Sri Lanka
12. Dr. Sarfaraz, Pakistan Met Deptt.
13. Dr. Rashed Al Areqi, Yemen Met Deptt.
14. Dr. R. K. Jenamani, Head RSMC New Delhi
15. Dr. A K Das, RSMC New Delhi
16. Mrs. Monica Sharma, RSMC New Delhi

Members from Iran, Qatar, UAE and Saudi Arabia could not participate in the meeting due to preoccupation.

It was agreed that PTC-50 anniversary should be celebrated with an objective to showcase the achievements of PTC to the world and also to carry forward WMO's agenda "Early Warning & Early Action for All". Meeting commenced with establishment of following task team to accomplish this task.

(i) Dr. Mrutyunjay Mohapatra, PR of India, Chair

(ii) Dr. Ayman Salem Ghulam, Chairman PTC & PR of Saudi Arabia as Co-Chair

(ii) Dr. Taoyong Peng, WMO, Member

**(iii) Dr. Sanjay Kumar Srivastava, ESCAP, Member**

**(iv) PR of All Member Countries or their nominees, Member**

**(v) Mrs. Monica Sharma, RSMC New Delhi, Member Secretary**

**Discussions and deliberations during the meeting led to formulation of 10 Point Action Plan to popularise the activities of PTC as per details below:**

- 1. Organisation of international workshop, and national workshop in each country**
- 2. Organisation of an online Quiz on PTC and Tropical Cyclones**
- 3. Preparation of video films**
- 4. To release a special edition of a Journal with special articles from all expert speakers who presented the special lectures in the 3 months long lecture series organised.**
- 5. RSMC New Delhi and WMO to initiate necessary actions**
- 6. Designing of PTC logo**
- 7. Organization of technical conference prior to the next Panel session–PTC-50. RSMC New Delhi to prepare the concept paper and Brochure for this purpose**
- 8. To make outreach through interviews to press & electronic media, blogs, articles on social media.**
- 9. Organization of lecture series by eminent scientists during August to December.**
- 10. Development of vision or goal statement of PTC for next 10 years**

## Chapter 4: Workshops/Conferences commemorating 50 years of PTC

Member countries including Islamic Republic of Iran Meteorological Organisation (IRIMO), Pakistan Meteorological Department (PMD), India Meteorological Department (IMD), Civil Aviation Authority (CAA), Sultanate of Oman, National Centre of Meteorology (NCM), Saudi Arabia organised workshops and conferences to commemorate 50 years of PTC. Details are presented in this Chapter.

### 4.1. Islamic Republic of Iran Meteorological Organisation (IRIMO)

Islamic Republic of Iran Meteorological Organisation (IRIMO) organised 2 days International Conference on “Indian Ocean Tropical Cyclones and Climate Change” Early Warning for All during 9-10 October at Tehran, Iran.

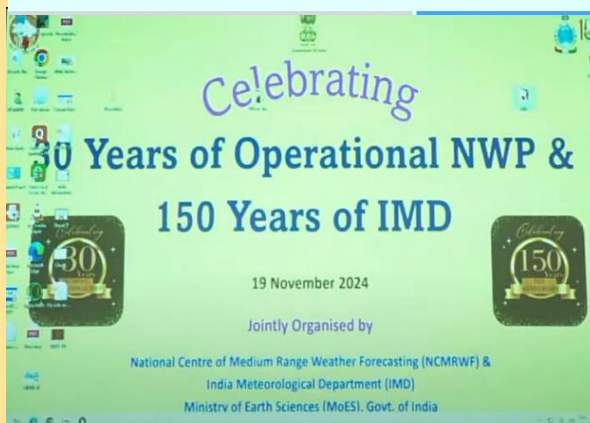


## 4.2. India Meteorological Department

IMD organised National Stakeholders Meetings countrywide (all 26 Meteorological Centres in India) popularising the evolution of IMD since 1875 and services provided by IMD for various sectors including disaster risk reduction and in particular highlighting the paradigm shift in cyclone warning services. IMD also organised International Conference and Workshops.



### 14th Asia-Oceania Meteorological Satellite Users' Conference 02-07 December 2024, New Delhi, India



<https://mausam.imd.gov.in/event/>



### 4.3. Pakistan Meteorological Department (PMD)

Pakistan Meteorological Department, Karachi organised 1 day Seminar on Tropical Cyclone and Tsunami threat to Pakistan Coast and Preparedness on 13th December, 2023



### 4.4. Civil Aviation Authority, Sultanate of Oman

WMO PTC/ GCC Workshop on Impact-based Forecast and Warning Services was held in Muscat, Sultanate of Oman, 05-09 November 2023, with its purpose of building the capacity of the NMHSs in implementing IBFWS, making this implementation sustainable by integrating IBFWS into standard operating procedures (SOPs), and promoting its value for other relevant hazards, with disaster management authority (DMAs), public and private stakeholders.






### 4.5. National Centre of Meteorology, Saudi Arabia:

- (i) The Climate Change Centre organised a 5-day training course entitled “Modeling the Atmosphere and Oceans and the Exchange Between Them,” which included items on tropical cyclone formation and monitoring in November 2024.
- (ii) The National Centre of Meteorology in Saudi Arabia monitored several tropical cases during the year 2024 and issued several reports regarding these tropical cases. These reports included monitoring and predicting the intensity of hurricanes according to their classification by their movement using the Saudi numerical model.
- (iii) The National Centre of Meteorology in Saudi Arabia published media updates on tropical cyclones, accompanying impacts, and initial indicator reports during the year 2024 via social media with the aim of raising community awareness and reducing the risks of tropical cyclones.


## Chapter-5: Popular Lecture Series commemorating 50 years of PTC

RSMC New Delhi organised 3 months long lecture series to popularise the activities of PTC & RSMC New Delhi and create awareness among the masses in the region to effectively mitigate disaster associated with Tropical cyclones. Following experts from WMO, ESCAP and PTC member countries delivered the popular talk:

1. Dr Mrutyunjay Mohapatra, PR of India to WMO, 3<sup>rd</sup> VP of WMO and Secretary PTC
2. Dr Sanjay K Srivastava, Chief DRR, ESCAP
3. Dr Taoyong Peng, Chief TCP Division, WMO
4. Mr Somkuan Tonjan, Chief Forecaster, Thailand Meteorological Department
5. Dr Kyaw Moe Oo, PR of Myanmar to WMO (4<sup>th</sup> September, 2023)
6. Mr. Abdullah Rashid Nasser AL KHADOURI, PR of Oman to WMO
7. Dr Samrendra Karmakar, Former DG Bangladesh Meteorological Department
8. Mr Md. Aziz Ur Rahman, PR of Bangladesh to WMO
9. Mr. Mahr Sahibzad Khan, PR of Pakistan to WMO
10. Mr Behzad Layeghi, VP IRIMO, Iran
11. Mr. Ibrahim Al Abdulsalam, Expert from Oman
12. Concluding Session by Mrs. Monica Sharma, Expert RSMC New Delhi

 <p>Commemorating 50<sup>th</sup> Anniversary of WMO/ESCAP Panel on Tropical Cyclones and Regional Specialised Meteorological Centre- New Delhi</p> <p>Evolution of Tropical Cyclones Monitoring &amp; Forecasting over North Indian Ocean</p> <p><b>Dr. Mrutyunjay Mohapatra</b> Director General of Meteorology India Meteorological Department</p> <p>भारत मौसम विज्ञान विभाग INDIA METEOROLOGICAL DEPARTMENT</p>	 <p>50th year of WMO/ESCAP Panel on Tropical Cyclones</p> <p>Transformations in Disaster Risk Reduction Policies while responding to Tropical Cyclones</p> <p><b>Dr. Sanjay Srivastava</b> Chief Disaster Risk Reduction, ESCAP</p> <p>14<sup>th</sup> August 2023</p>
 <p>Introduction to WMO Tropical Cyclone Programme (TCP)</p> <p><b>Taoyong Peng</b> Head, DTD Division, DMPS Branch, Services Department, World Meteorological Organization 0830-0930 UTC, 21 August 2023</p> 	 <p>“Commemorating 50<sup>th</sup> Anniversary of WMO/ESCAP Panel on Tropical Cyclones”</p> <p>Evolution of Early Warning System, DMH</p> <p><b>Kyaw Moe Oo-PhD</b> Director General Myanmar</p> <p>4<sup>th</sup> September 2023</p>

# Chapter-5: Popular Lecture Series commemorating 50 years of PTC

 <p><b>50<sup>th</sup> Anniversary of Panel on Tropical Cyclone</b></p>  <p><b>Predictability of WRF-ARW Model for the Track and Intensity Forecast of Cyclones in the Bay of Bengal</b></p> <p>Md. Azizur Rahman Director Bangladesh Meteorological Department(BMD) Email: <a href="mailto:info@bmd.gov.bd">info@bmd.gov.bd</a></p>	<p>The 50th anniversary celebration of the WMO/ESCAP Panel on Tropical Cyclones (PTC)</p> <p><b>Importance and Contribution of the WMO/ ESCAP Panel on Tropical Cyclone over the Bay of Bengal Region</b></p> <p>Dr. Samarendra Karmakar Former Director of Bangladesh Meteorological Department, Dhaka, Bangladesh Former Permanent Representative of Bangladesh with WMO Former Director of SAARC Meteorological Research Centre (SMRC), Dhaka, Bangladesh &amp; Former Chairman of National Oceanographic and Maritime Institute (NOAMI) Dhaka, Bangladesh</p>
 <p><b>50<sup>th</sup> Anniversary of Panel on Tropical Cyclones</b></p> <p><b>"PTC- 50 Years and TMD's services in response to Tropical Cyclones and Natural Disasters Thailand Report</b></p> <p>Speaker : <b>Somkuan Tonjan</b> Director of Meteorological Observation Division</p> <p>28 August 2023</p>  <p>Thai Meteorological Department Ministry of Digital Economy and Society</p> 	<p><b>Celebrating PTC's 50th Anniversary –</b></p> <p><b>PMD Hydromet Services &amp; EWS</b></p> <p>Mahr Sahibzad Khan DG-PMD, Islamabad</p>
 <p><b>Early Warning center in Sultanate of Oman</b></p> <p>Presented by Abdullah Alkhadouri Director General of Oman Meteorology</p>	<p>Presentation by Mr. Ibrahim Al Abdulsalam, Expert from Oman</p> <p>In the Eye of the Cyclone - Arabian Sea SST, Ocean Heat Content, and Tropical Cyclones History</p> 
 <p><b>National activity in the field of Indian Ocean's tropical cyclone warning</b></p> <p>Behzad Layeghi, Vice President of IRIMO, PTC-50 Lecture series, 30 October 2023</p>	 <p><b>Regional Specialised Meteorological Centre, New Delhi</b></p> <p><b>Commemorating 50th Anniversary of PTC &amp; 50th Anniversary of RSMC New Delhi</b></p> <p>Concluding Presentation Monica Sharma</p> <p><b>भारत मौसम विज्ञान विभाग INDIA METEOROLOGICAL DEPARTMENT</b></p>

# Chapter-6: Outreach Activities commemorating 50 years of PTC

## (a) Quiz on Cyclones by RSMC New Delhi

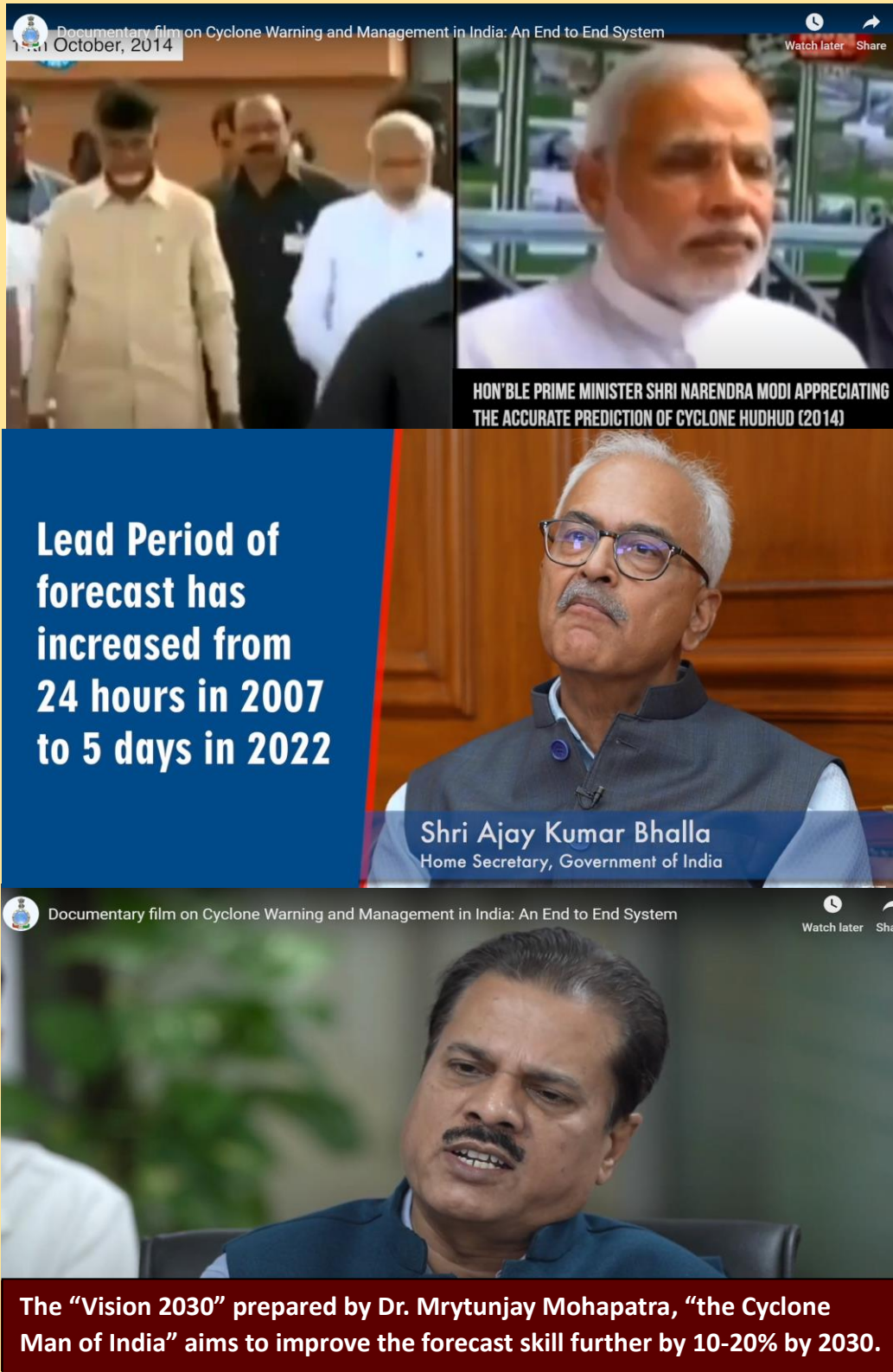
RSMC New Delhi organised Quiz on Tropical Cyclones during September to November to popularise the role of PTC, RSMC New Delhi and create awareness among common man.



## Chapter-6: Outreach Activities commemorating 50 years of PTC

### (b) Documentary film by RSMC New Delhi

RSMC New Delhi prepared a documentary film on “Cyclone Warning System in India: An End to End System” (Available at <https://youtu.be/ET68Nozu2fo>). The film was screened during 19<sup>th</sup> Session of WMO Congress at Geneva in 2023.

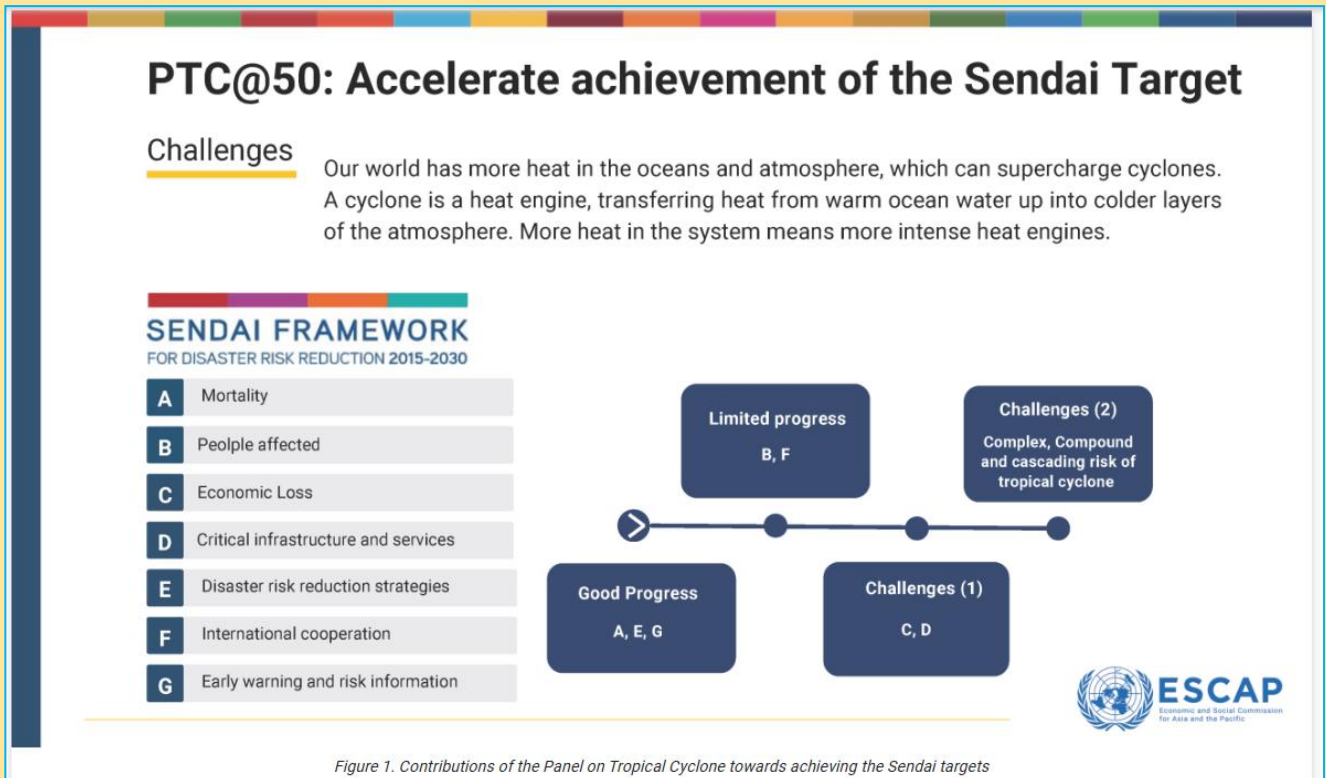


## Chapter-6: Outreach Activities commemorating 50 years of PTC

### (c) Blog by ESCAP

#### A journey from Risk to Resilience: Blog by ESCAP

<https://www.unescap.org/blog/journey-risk-resilience-50-years-wmoescap-panel-tropical-cyclone>



#### Excerpt of Blog:

As the panel celebrates 50 years of its journey this month, five key imperatives are flagged for discussion:

First, riskier times ahead: [Our world has more heat in the oceans and atmosphere](#), which can supercharge cyclones.

Two, rapid intensification of tropical cyclones: Cyclones that intensify rapidly are difficult to forecast and can lead to forecasting errors.

Three, impact-based forecasting (IBF) narrows the gaps that exist between forecasters and the end-users.

Fourth, cyclone early warnings for all: The effectiveness of multi-hazard early warning systems relies on each pillar and needs to be supported by policy, plans and financial mechanisms to enable its availability and accessibility. PTC@50 can take forward cyclone early warnings for all its members.

Finally, strengthening PTC architecture: The secretariat of the PTC should be strengthened to ensure that the panel is fully owned, funded, administered, and governed by its members. The 50th celebration provides an opportunity to rejuvenate PTC ready to manage complex cyclones in riskier times

## Chapter-6: Outreach Activities commemorating 50 years of PTC

### (d) Logo of 50 years of PTC

During the preparatory meeting held on 26<sup>th</sup> July, 2023, it was decided that a logo representing the WMO, RSMC & PTC collaboration may be finalised and implemented for promoting visibility and publicity of PTC.

It was proposed that RSMC New Delhi and all members will share 2 sample logos each by 15th August. The Selection committee will have following members:

Dr. Mrutyunjay Mohapatra, PR of India

Dr. Ayman Salem Ghulam, Chairman PTC & PR of Saudi Arabia

Dr. Sanjay Kumar Srivastava, ESCAP, Member

Dr. Taoyong Peng, WMO, Member

Dr Ananda Kumar Das, RSMC, New Delhi, Rapporteur

Mrs Monica Sharma, RSMC, New Delhi, Co-Rapporteur

Sample logos from India and Pakistan were received. During the PTC-50 meeting held at Bahrain during 19-23 December, all members decided following logo to represent 50 years of PTC.



# Chapter-7: Commemorating 50 Years of PTC: Trainings

## 20<sup>th</sup> Annual Attachment Training for Tropical Cyclones Forecasters

(19-30 August, New Delhi)

RSMC New Delhi organized 20th Annual Training for Cyclone Forecasters during 19-30 August, 2024 in hybrid mode. There were a total of 43 international participants with 9 joining in -person and 34 joining online apart from the participants from India. The training included practical sessions on monitoring and predicting tropical cyclones with specific cases studies. Assessment test was conducted twice during the training programme and participants were awarded certificates on successful completion of the training.





# Chapter-7: Commemorating 50 Years of PTC: Trainings

## 1<sup>st</sup> Training on Multi-hazard Early Warning System

### Interoperability Implementation (09-13 December, New Delhi)

1<sup>st</sup> Training on Multi-hazard Interoperability Implementation was held at New Delhi during 09-13 December under WMO's Severe Weather Forecasting Programme. The training aimed at enabling all the member countries to judiciously utilise resources, avoiding duplication of work and developing an interoperable environment to develop various kinds of advisories in a single package. The Inaugural ceremony of the training was held at Ministry of Earth Sciences (MoES) on 9<sup>th</sup> December. Dr. M Ravichandran, Secretary Ministry of Earth Science inaugurated the training programme.



# 1<sup>st</sup> Training on Multi-hazard Early Warning System

Interoperability Implementation (09-13 December, New Delhi)



## Chapter-8: 50<sup>th</sup> Session of PTC-50 at Bahrain Memoirs (19-23 Dec)

The 50th Session of WMO/ESCAP PTC was organised during 19-23 December in the Kingdom of Bahrain with participants from Member countries, WMO and UNESCAP. The PTC Session was inaugurated on 19th December by Mr. Mohammed Bin Thamer Al Kaabai, the Hon'ble Minister of Transport and Telecommunications. Kingdom of Bahrain. In his inaugural address the Hon'ble Minister appreciated the cyclone warning services in the region enabling disaster managers to effectively minimize death toll to double digit in recent years .



Dr Al Mandous, President of WMO and PR of Saudi Arabia to WMO and Dr Mrutyunjay Mohapatra, Vice President of WMO and PR of India to WMO addressing the delegates during the Inaugural ceremony on 19<sup>th</sup> December at Bahrain



**Delegates of PTC-50 Session at Bahrain**

# Chapter-9: Major Publications during 2023-24

1. Report on Cyclonic Disturbances during 2023
2. Standard Operation Procedure: Cyclone Warning
3. Tropical Cyclone Operation Plan (TCP-21: Edition 2023)
4. Tropical Cyclone Operation Plan (TCP-21: Edition 2024)
5. Souvenir on Severe Weather Forecast Programme-South Asia
6. Souvenir on Tropical Cyclones Monitoring and Prediction
7. Poster on Cyclone Warning Services
8. Vision 2047: Cyclone warning Services
9. Vision 2047: Marine Weather Services

