

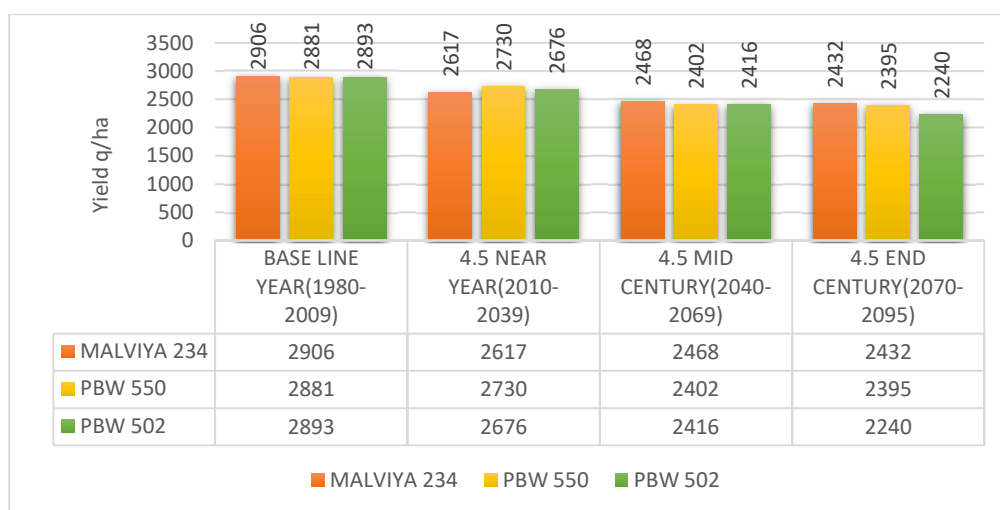


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SPECIAL ISSUE



Simulated Wheat Yield of three Cultivars during observed period, NT (Near Term), MC (Mid Century) and EC (End Century) under RCP 4.5 Simulations



One-day Workshop on “National Information system for Climate and Environment Studies (NICES) & its activities” at IITM Pune, 8th January 2020, sponsored by NRSC (ISRO) Hyderabad & IMSP.

“Prof. P. R. Pisharoty distinguished lecture” by Shri Ashish Lahiri, at IITM Pune on 6th March 2020.

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ASSESSMENT OF CLIMATE CHANGE IMPACT ON WHEAT CROP USING MARKSIM GCM IN PRAYAGRAJ, UTTAR PRADESH, INDIA

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ABSTRACT:

GFLD-CM3 model was used to generate weather data under RCP scenarios 4.5 & 8.5, for the Near-term (2010-2039), Mid-century (2040-2069) and End-century (2070-2095) for Prayagraj, Uttar Pradesh. The generated data were used to assess the impact of climate change on phenology and yield of Wheat crop using CERES-Wheat model, with Malviya 234 variety sown on 22/11/1980, PBW 550 on 25/11/1980 and PBW 502 sown on 02/12/1980. Seasonal analysis tool was used and weather man tool was used where weather data from 1980-2010 was imported to run the model.

The results revealed that the impact of climate change hastened reproductive stages (anthesis, maturity) and decreased yield in both scenarios. The impact was more and the highest under RCP 8.5. Days to anthesis and days to maturity were projected to reduce. For Malviya 234 cv. days to anthesis reduced from 86 to 69 days, from 87 to 70 for PBW 550 cv., and for December sown cultivar PBW 502 it reduced from 76 days to 69 days, whereas days to maturity also reduced. For Malviya 234 cv. days to maturity reduced from 123 to 104 days, from 117 to 102 for PBW 550 cv., and for December sown cultivar PBW 502 it reduced from 121 days to 109 days, respectively in End-century, whereas grain yield decreased by the highest amount under RCP 8.5 scenario. For Malviya 234 it reduced from 2906 kg/ha in baseline period to 2353 kg/ha, for cv. PBW 550 baseline yield 2881 kg/ha, it reduced to 2280 kg/ha, and for December sown cultivar PBW 502 it reduced from 2893 kg/ha of baseline period yield to 2165 kg/ha during End-century. [**Key words:** MARKSIM GCM, RCP, DSSAT-CERES, climate change, Near-term, Mid-century, End-century and Wheat crop]

INTRODUCTION:

Wheat is a cereal grass of the Graminae (Poaceae) family and of the genus Triticum, is the world's largest cereal crop. It has been described as the "King of Cereals" because of the acreage it occupies, high productivity and the prominent position. Wheat ranks first among the world food crops, in terms of cultivated area (223.813 million ha), production (733.144 million tonnes) and with productivity of (3280 kg ha⁻¹) (USDA 2016). It can be grown from below sea level to 5000m altitude and in areas where rainfall ranges between 300 – 1130 mm. Wheat contributes more calories (20%) and more protein to the world's diet than any other food crop and is staple food in at least 43 countries. The availability of wheat has increased from about 79 gm capita⁻¹ day⁻¹ to more than 185 gm capita⁻¹ day⁻¹ despite the doubling the population since 1961(Bhardwaj., 2010). According to FAOSTAT, world wheat production has

increased by 21.9% from 585 million tonnes in 1985 to 713 million tonnes in 2014. In India, wheat is the second most important cereal crop next only to rice and a key crop of the green revolution and post green revolution era. India stands second among wheat producing countries after China.

It is likely that climate change can have a substantial impact on crop productivity and food security, which is considered as a major challenge and priority among the scientists (Aggarwal and Mall 2002; Mall et al. 2006; Lobell and Gourdji 2012; Srivastava and Rai 2012; Swaminathan and Bhavani 2013; Shrivastava et al. 2016, Ramachandran et al. 2017; Mall et al. 2018; Singh et al. 2018b; Rao 2018; Misra et al. 2019; Kalra and Kumar 2019; Gao et al. 2019). Natural internal or external processes and persistent anthropogenic changes in the atmosphere or land use are causing the changes reported by Intergovernmental Panel on Climate Change (IPCC, 2001). Release of 'greenhouse' gases into atmosphere causes global warming and climate change. Accumulation of greenhouse gases in the atmosphere is causing the increased effect of radiative forcing, resulting in a warming of the atmosphere. An increase in greenhouse gases is causing a rise in heat from the sun that causes atmosphere heat. The climate change issue is part of the greater challenge of sustainable development. According to the latest scientific findings, since the pre-industrial era the earth's climate system has changed on both global and regional scales. Climate change is one of the burning global environmental challenges faced by humankind with implications for natural ecosystems, food production, health condition, etc. Climate change impacts are multi-dimensional and multi fold, that is the reason for developing and implementing sufficient adaptation measures, which are very complex (Barnett et al., 2005 Vergara et al., 2007).

The earth's climate is projected to undergo marked changes over the 21st century due to natural processes and anthropogenic factors (IPCC, 2014). The climate change impacts on wheat production have broad and national repercussions on food security. Global climate change modelers have been developing likely scenarios and storylines of how nations might follow growth paths. There are different Global Climate Models (GCMs) with different growth and limit assumptions and accordingly different Representative Concentration Pathways (RCPs). Recent efforts have been targeting the comparison of the range of RCPs and building an ensemble of ranges for major global change parameters. Climate models are necessary to generate the weather parameters for the future climate and for each location which are required for the crop data integration to get the climate change impacts. Global circulation models and process-based crop models such as CERES-wheat have been used in different studies assessing the potential impacts of climate change on crop production. MarkSim DSSAT Weather File Generator, a software that not only downscales but also generates daily weather from general circulation models is used to overcome the coarse resolution of general circulation models (Jones and Thornton, 2013). The generated daily weather data characteristic of future climate scenarios was used to drive the CERES-wheat model.

MATERIALS AND METHODS

The daily weather data (Rainfall, maximum and minimum temperature and solar radiation) were generated from MarkSim DSSAT weather generator (<http://gisweb.ciat.cgiar.org/MarkSimGCM/>) for Prayagraj region from 2010-2095 (Jones and Thornton, 2013); average data of 99 replications of GFLD-CM3 model, with a spatial resolution of 1.2587×2.5 (latitude by longitude) was selected. Data were downloaded in DSSAT friendly format for RCP 4.5 and 8.5 for Near-term (2010-2039), Mid-century

(2040-2069) and End-century (2070-2095). The generated weather data of the baseline years (1980-2009) with RCP 4.5 and 8.5 were chosen as baseline for assessment of climate change impact in future years (near-term, mid-century and end-century). The impact assessment was done at Prayagraj of Uttar Pradesh using historical baseline period (1980–2010) and future period (2010–2095) climate projections from MarkSim DSSAT weather generator GFLD-CM3 climate model (under RCP4.5 and RCP8.5). Model outputs were then analysed and summarized in order to address the objectives of the study. The daily-observed long-term weather data (maximum and minimum temperature, rainfall) of Prayagraj (25°44'53" north latitude, 81°8'25" east longitude and 90 meter above mean sea level) from 1980 to 2010 were obtained from the India Meteorological Department (IMD), New Delhi. The CERES-wheat model embedded in DSSATv4.7 was used to assess climate change impact on yields of wheat crop of Prayagraj, Uttar Pradesh state, India. Calibrated and validated genetic coefficients for cultivar Malviya 234 by Singh *et al.*, (2010) and for cv. PBW 550 by Jaswinder kumar *et al.*, (2013) and for cultivar PBW 502 by Vinay *et al.*, (2019) has been adopted for simulation. The model input requires daily weather parameters (maximum and minimum temperatures, solar radiation and rainfall), soil physical properties (pH, EC, bulk density, organic carbon, etc.), and phenological information (date of planting, emergence, flowering and maturity, cane yield, biomass, sucrose percent, cane number, etc.) and genetic trait parameters specific for the cultivar.

RESULTS AND DISCUSSION:

(A) Climate change and variability at Prayagraj:

For assessment of climate change and variability, 30 years (1980 to 2009) weather data of Prayagraj was analysed and projected for years i.e. Near-term (2010-2039), Mid-century (2040-2069) and End-century (2070-2095) (**Table 1, 2, 3, and 4**). The maximum temperature was found to increase from 32.1°C to 35.7°C in RCP 4.5 and 37.4°C during End-century in both RCPs whereas, minimum temperature increased from 18.9°C to 22.6°C during RCP 4.5 and to 24.8°C under RCP 8.5. Rainfall was projected to increase from 860.2 mm to 1385.6 mm during RCP 4.5 whereas during RCP 8.5 it increased to 1416.9 mm, respectively.

Table 1: Average Annual climate of Prayagraj of Base line period (1980-2010):

TEMPERATURE(°C)	BASE LINE PERIOD (1980-2010)
Tmax	32.1
Tmin	18.9
Mean	25.5
Rain	860.2

Table 2 : Average monthly weather data of Base line period (1980-2010) of Prayagraj

Months	TMAX(°C)	TMIN(°C)	Rain
JAN	23	8.5	11.5
FEB	26.6	11.2	13.9
MAR	33	15.9	4.4
APR	38.6	21.4	3.7
MAY	40.4	25.3	10.3
JUN	38.2	26.6	92.1
JUL	33.4	25.3	249.3
AUG	32.4	24.9	244.2
SEP	35.5	24	193.9
OCT	32.4	19.7	28.7
NOV	29.1	13.7	3.3
DEC	24.9	9.4	4.9

Table 3: Average annual climate of Prayagraj under RCP 4.5 for observed, Near term, Mid-century and End century period

TEMPERATURE (°C)	BASE LINE PERIOD (1980-2009)	NEAR TERM (2010-2039)	MID CENTURY (2040-2069)	END CENTURY (2070-2095)
Tmax	32.1	33.5	34.7	35.7
Tmin	18.9	20.9	21.8	22.6
Mean	25.5	27.2	28.7	29.1
Rain	860.2	1127.6	1348.9	1385.6

Table 4: Average annual climate of Prayagraj under RCP 8.5 for observed, Near term, Mid-century and End century period

TEMPERATURE (°C)	BASE LINE PERIOD (1980-2009)	NEAR TERM 2010-2039)	MID CENTURY (2040-2069)	END CENTURY (2070-2095)
Tmax	32.1	33.2	35.3	37.4
Tmin	18.9	20.4	22.5	24.8
Mean	25.5	26.6	28.9	31.1
Rain	860.2	1187.3	1243.1	1416.9

(B) Impact of climate change on phenology of wheat crop:

The days to anthesis and days to maturity simulated by the CERES-Wheat model under different RCP scenario in different terms i.e. Near-term, Mid-century and End-century presented in **Fig. 1, 2, 3 and 4** revealed that the duration would shorten under both scenarios (RCP 4.5 and 8.5) and also with years. Up to Near-term, there is no much difference, but there after sharp decline in duration of both days to anthesis and maturity is observed under RCP 6.0 and RCP 8.5. The highest decrease was under RCP 8.5 in 2095 (end-century). In both scenarios, increased maximum and minimum temperature will have hastening impact on anthesis and maturity, thereby decreasing the length of the life cycle which shorten the reproductive period resulting in lower grain yield (Menzel et al., 2006).

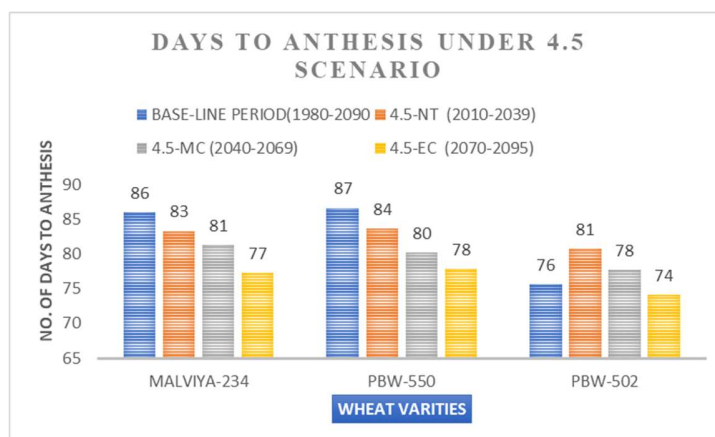


Figure 1: Days to anthesis of three wheat varieties for near-term (NT), mid-century (MC) and end-century (EC) under 4.5 scenario

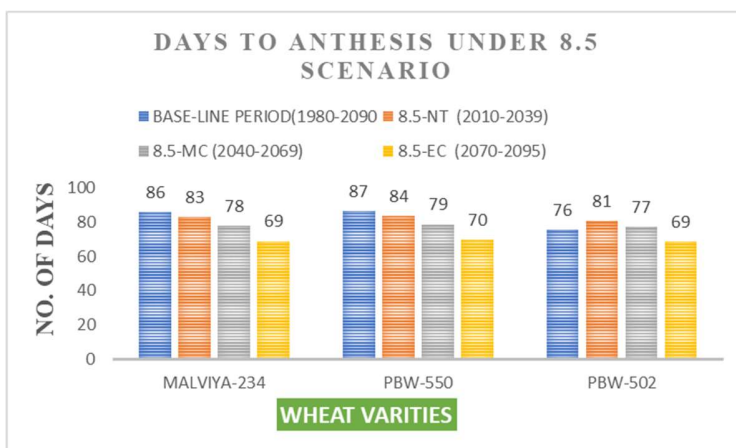


Figure 2: Days to anthesis under 8.5 scenario for near-term (NT), mid-century (MC) and end-century (EC) compared with Base-line period

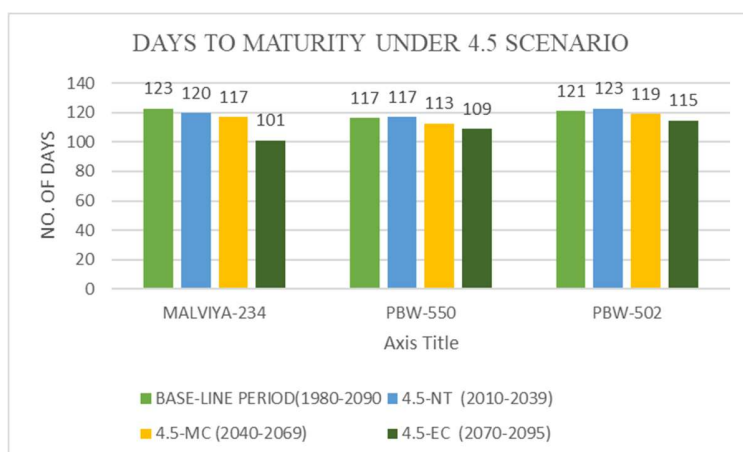


Figure 3: Days to physiological maturity of three wheat varieties during observed period, NT, MC and EC under 4.5 scenario.

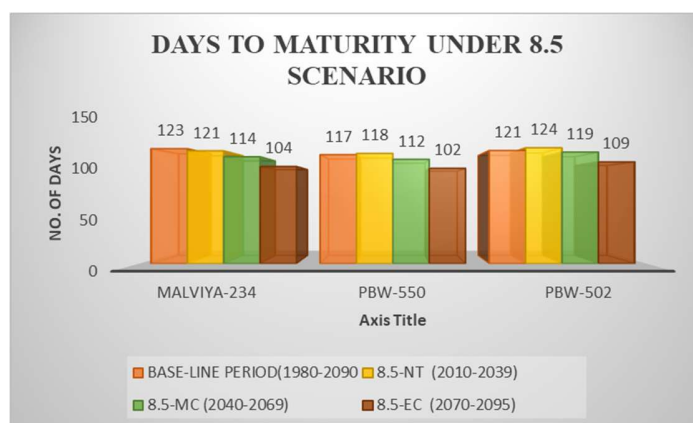


Figure 4: Days to physiological maturity of three wheat varieties during observed period, NT, MC and EC under RCP 8.5

(C) Impact of climate change on wheat yield:

Changes in grain yield of wheat were evaluated by comparing the future wheat yields to the baseline yields (1980-2010) of projected year with its scenario, and then by stating the change. The effect of climate change on wheat production were studied for projected years i.e. 2010-2039 (near-term), 2040-2069 (mid-century) and 2070-2095 (end-century), under climate RCP 4.5 and 8.5 scenarios and were compared with that simulated for 1980-2010. The maximum yield decrease was observed in the scenario RCP 8.5, which ranged from 2906 kg/ha to 2353 kg/ha for Malviya 234 cultivar and for cultivar PBW 550 yield reduced from 2881 kg/ha to 2280 kg/ha, whereas December sown ccv. PBW 502 ranged from 2893 kg/ha to 2165 kg/ha (decreased), as shown from **Fig. 5 and 6**. These results show RCP 8.5 as the most resilient scenario. Projected Near-term (2010-2039) was the least vulnerable and on (2070-2095) end-century the most vulnerable under the all emission scenario (Welikhe et al.,2016). Yadav *et al.*, (2015) also reported decrease in wheat grain yield with increase in temperature.

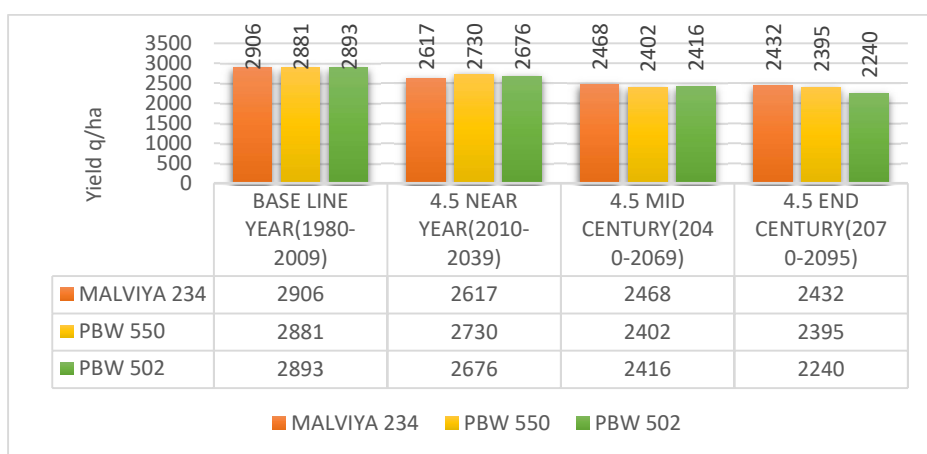


Figure 5: Simulated Wheat Yield of three Cultivars during observed period, NT (Near Term), MC (Mid Century) and EC (End Century) under RCP 4.5

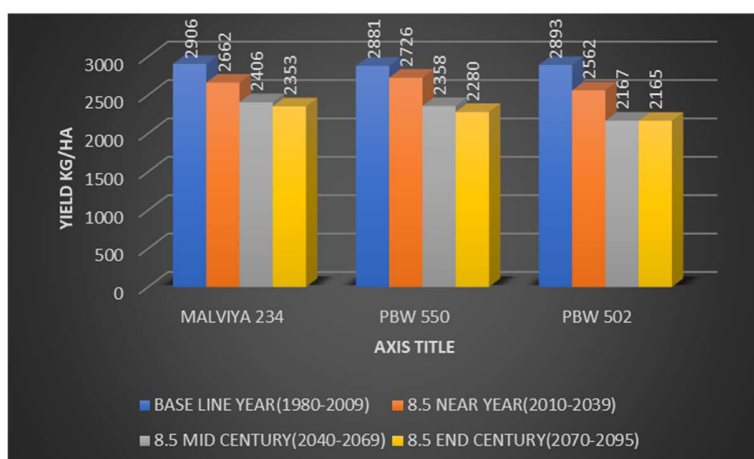


Figure 6: Simulated Wheat Yield of three Cultivars during observed period, NT (Near Term), MC (Mid Century) and EC (End Century) under RCP 8.5.

CONCLUSIONS:

It can be concluded that climate change could potentially result not only in shortening the duration of wheat crop but also in decreasing wheat yields in Prayagraj region. Maximum grain yields were projected to decrease under RCP 8.5 in all years(terms) with extreme being observed at the end of the century.

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FORTRAN Melody

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You have to learn to pace yourself **FORTRAN**

You're just like anybody else **FORTRAN**

But you will come to a day

When only things that count

Are the Peta Flops on a Cray

You'll have to deal with **FORTRAN**

You used to call me paranoid **FORTRAN**

Even you cannot avoid **FORTRAN**

You swore ENTRY's a sure road to ruin

Now here you are with an old code

Your COMMON blocks are misaligned

Assigned GOTOs disturb your mind

And you cannot handle **FORTRAN**

What does it all mean?

FORTRAN Oh FORTRAN

Don't ask me for help you're all alone **FORTRAN**

You'll have to code it on your own **FORTRAN**

I'm sure you'll have some cosmic rationale

And write all your codes in **FORTRAN**

Some important duties and qualities of a “Rapporteur” for reporting a Scientific event

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A “**rapporteur**” is a person, who is appointed by an organization to report on the proceedings of its meetings, this term being a French-derived word (Wikipedia). The meeting can be for political, administrative, scientific or any other forum. The rapporteur can be a member of the European Parliament, made responsible for handling a legislative proposal, drawn up by the European Commission; a rapporteur in the United Nations (UN) who is a member of the dais; or a person selected or nominated to prepare report on the proceedings of an administrative or scientific meeting. For preparation of report on the proceedings of an event, like workshop/conference/symposium, a suitable person can be given the duty of a rapporteur.

For scientific events, like high level scientific meeting or scientific workshop or conference or symposium, a rapporteur is generally nominated to perform the duties of taking down notes on important points during the event and then prepare a draft report of the proceedings. The draft report is then finalized through consultations with some senior persons and then making necessary modifications for finalizing it. For a high-level scientific meeting or a meeting of a scientific society, the rapporteur prepares the “**Minutes of the meeting**” by following the agenda of the meeting. Examples are, Minutes of the SRMC (Scientific Review & Monitoring Committee) of Monsoon Mission project, Minutes of the Executive Council meeting of IMS Pune Chapter, etc. The minutes should include the name of the meeting; the names of Committee members who are present & absent in the meeting, and invited persons (if any); the main agenda points; discussions and decisions on the agenda points & any additional point with the permission of the Chair (Chairperson/President), any recent result/ proposal/ innovative idea/outcome useful for future discourses; concluding remarks of the Chairperson/President, etc. For scientific Workshop/Conference/Symposium, the rapporteur’s report can be very useful for preparation of the “**Proceedings of the Workshop/Conference/ Symposium**” and it should include brief information about the name & importance of the workshop/conference/Symposium, the venue & duration, the main Sponsors, Chief guest (s), the inaugural session, themes of various sessions, names of speakers and important points of their presentations in various sessions, brief of poster presentations (if any), the concluding session and major outcomes, etc. Several such events are organized at Pune, e.g., Annual Monsoon Workshops of IMSP, National Conferences on various topics, the Sixth International Conference on Climate Services (ICCS-6), etc.

For various academic purposes, we generally prepare a scientific report with the structure referred to as “AIMRAD”, consisting of **A**bstract, **I**ntroduction, **M**ethod, and **R**esults **A**nd **D**iscussion, followed by Conclusions, Future plans and References. A project report generally includes an Executive summary in the beginning. Detailed Project Report (DPR) of a project, for receiving funding from an organization or authority, will generally include the background & need of the study/work, definite objectives, methodology, timeline of work elements, deliverables, proposed budget (financial aspects), etc. An academic project report can include the following sections: Title page, Table of contents, Abstract or Executive summary, Introduction, Literature survey, Data & Methodology, Results & Discussion, Conclusion, Recommendations & Future plans, Acknowledgements and References. The Purpose of Reports is to communicate information which has been compiled as a result of research and analysis of data and of other issues. Reports can cover a wide range of topics, but usually focus on transmitting information with a clear purpose, to a specific target audience, e.g. researchers of a particular field. Here, the writer writes about own work, findings and views. On the other hand, a rapporteur listens to the expressions & discussions of a group of persons carefully, understands their views and ideas but expresses those in his/her own writing skills, keeping the essence of discussions, to make it understandable and useful for others. Rapporteur requires a good listening habit, lot of cool mind (even under pressure), an excellent writing skill and use of soft words. For example, during a meeting if there is an intense debate with lot of disagreement amongst the members and cross talking, the rapporteur should not write “the members were fighting (quarrelling) vigorously with each other on that point”, rather can write “the members had some difference of opinions on that point, and afterwards they yielded to a consensus” to have a soft version of the above incidence.

❖ **Role and some important duties of a “Rapporteur”:**

The role of the rapporteur is powerless in the sense that you can't bring your own agenda into the room to overtly shape the discussions; yet, in another sense, **it is a very powerful role in that whoever has draft control shapes the outcome document to a large extent** (reference: www.fao.org). Role of the Rapporteur is to play an important role in the successful follow up of the working group sessions, aimed to ensure that the proceedings and outcomes of the session are clearly recorded so that the discussions can then be of genuine practical value for the meeting outcome (reference: www.fao.org). **Main duty of the Rapporteur is to prepare the report of the proceedings of the event**, but in certain specified meetings/events, he/she may be involved in organization or coordination, e.g., to sit, listen, take notes & ask probing questions for clarification of proposed language, and gradually shape the outcome document. It is, at once, the most powerful role (as mentioned above) or sometimes relatively less powerful role in the outcome room, e.g., the duties can be mostly procedural, such as taking roll call (attendance), counting votes, keeping watch over caucus time, and other administrative items like organizing working papers and adding names to a Speakers' List. Thus, the role can be of an allrounder type, depending on the situation. Sometimes, the rapporteur may be asked to prepare a written report for immediate delivery during the workshop or in some other case, the report is to be made on the Working Group Report form. The report should generally consist of a bullet point list of issues and actions.

❖ **Some expected qualities of a good Rapporteur for an event:**

A good rapporteur should have certain inherent qualities, which enhance with more experience. Some of the expected qualities of a good Rapporteur are listed below:

- Should have an excellent writing skill and very good communication skills, preferably accompanied with a very calm & cool mind and good decisive power.
- Should have proper expertise, or at least an overall idea, about the subject matter/content of the event (meeting/workshop/conference/symposium/any other event).
- Should have thorough knowledge regarding the event, like name, venue, timing, etc.
- Should be punctual for the event, for which he/she has to report upon.
- Should be capable of catching important points and note down those, especially the keywords.
- Should have good command on the language, so as to frame the sentences properly. In case, he/she does not properly understand the accent of some speakers (possibly from different regions, having different types of accents of the language), some audio-recording device may be utilized so that the content may be rechecked afterwards. If such systems are not available, he/she can get the point clarified through the speaker or some senior person (during the session or during the break periods).
- Should have an overall knowledge of members/key speakers for the discussion in the meeting, or the various speakers/guests of the workshop/conference/symposium.
- Should have good listening habit and practice of using soft words wherever required.
- Should hear the proceedings very sincerely and make notes of the vital points.
- Should use own wisdom & knowledge to select appropriate words in the content of the report, avoiding controversial statements and harsh words.
- Should make the report informative & interesting to convey the important points in proper sequence. A draft report may be initially made and that can be finalized later on.
- Should maintain the flow of proceedings in the final report. If necessary, some seniors with proper experience may be consulted for finalizing the report. Personal experience of performing such duties matters significantly in this matter.

❖ **How to proceed the job of a rapporteur for an event?**

A rapporteur can remember the following points, while proceeding for the job:

- The rapporteur should be **well prepared for doing the reporting job** and should have the **agenda** of the meeting/ **the program schedule** of the event (workshop/conference /symposium/any other event), well in advance to have proper knowledge of the event.
- Should have general awareness about the members/invited persons, who will take part in the discussions of the meeting or the various speakers, who will deliver lectures during the event.
- Should reach the venue well in advance and take seat at an appropriate position to cover the proceedings in a proper manner. (Should check the audio recording system, if available, and keep it ready for the job).

- Should listen to the discussions/proceedings/lectures very carefully and note down the relevant information/important points. During reporting on the presentations, he/she should be very alert in the first slide (title slide), which generally shows the topic of the presentation, the name & affiliation of the speaker, etc. He/she can note down the relevant information & check with the program schedule/agenda. Thus, focus should be given on the starting slide. Then, notes can be taken for important contents of other slides of the presentation.
- Should make brief notes on each presentation/discussion through proper understanding of the content. The Conclusion slide, giving concluding remarks, should be noted.
- An initial draft report may be prepared by compiling important and vital points of the proceedings. The contents should be stitched in a proper manner by making a proper natural flow and making it interesting for the user. Good knowledge of the subject matter, command in the language and good writing skill generally help in this matter.
- If the report is required within a short interval, say required for the panel discussion on the same day, then the initial draft may be made properly understandable (may be prepared in bullet points), so that it can be useful for the user/panel members.
- Later on, the draft report may be modified for its finalization, through proper compilation of the noted points (in the initial draft) in a systematic and interesting manner. For this, necessary advice & suggestions/remarks (if any) may be taken from the relevant senior persons for finalization of the draft report.
- The final report may be communicated to the relevant persons/users.

❖ **Personal Experience:**

I have got several opportunities to perform the duty of a rapporteur on several occasions, e.g. for reporting various high level meetings of Monsoon Mission, Phase-1 project of IITM Pune; many meetings of Indian Meteorological Society, Pune Chapter (IMSP) including Executive Council meetings; preparing reports for Annual Monsoon Workshop and National Symposium, organized by IMSP; few meetings of International CLIVAR Monsoon Project Office (ICMPO) at IITM Pune, India, etc. This has enhanced my knowledge and confidence. Recently, the Academic cell of IITM Pune introduced a new subject “Scientific writing” in the one-year training course for the new Research Scholars, i.e., Junior Research Fellows (JRFs), joining IITM for Ph.D. programs. I was invited for delivering some lectures on “Scientific writing and reporting” to the JRF Batch of 2019-2020, consisting of 19 JRFs. In this series of lectures, I utilized 2 lectures for explaining these JRFs about the job of a rapporteur. These lectures made us very comfortable with each other. Later on, the Academic cell of IITM, led by Dr. Vinu Valsala and Dr. Bipin Kumar proposed a practical assignment for these 19 JRFs to prepare “Rapporteur’s Report” individually for an International event. During that time, the Sixth International Conference on Climate Services (ICCS-6), was being organized at IITM Pune, India, during February 11-13, 2020. Dr. Rupa Kumar Kolli sir, Executive Director, ICMPO and the DESK, IITM Pune had important roles in its organization. Dr. Vinu Valsala and Dr. Bipin Kumar asked the above JRFs to prepare “Rapporteur’s Report” for ICCS-6 and requested me to coordinate this and assess their reports. Since, JRFs were also involved in other aspects of organization of this international event, I suitably divided them into 3 groups

and assigned each group to prepare “Rapporteur’s Report” for a particular day during 11-13 February, 2020 and submit their reports to me for assessment. They performed their job very nicely and submitted their reports in time. While assessing their reports, I found that they have done a great job, even though many speakers (coming from various Asian, African and American countries) had different kind of accents for speaking English. This was really a nice experience for me and I feel that it was very good experience for the JRFs as well.

References:

1. Food and Agricultural Organization (**FAO**) of the United Nations (**UN**): GUIDELINES for moderators, rapporteurs and working groups (<http://www.fao.org/home/search/en/?q=Rapporteur>)
 2. International CLIVAR Monsoon Project Office (**ICMPO**) at IITM Pune, India (<https://icmpo.tropmet.res.in/>)
 3. International Conference on Climate Services - 6 (**ICCS-6**), February 11-13, 2020 Pune, India. (<https://climate-services.org/iccs/iccs-6/>)
 4. Wikipedia: (<https://en.wikipedia.org/wiki/Rapporteur>)
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IMSP News: Activities of IMSP during January-March 2020

- (1) In association with NRSC-ISRO Hyderabad and IITM Pune, IMSP organized one-day workshop on “National Information system for Climate and Environment Studies (NICES) and its activities” at Meghdoot Complex of IITM Pune on 8th January 2020. The workshop was sponsored by NRSC (ISRO) Hyderabad and was jointly organized by NRSC, IMS Pune Chapter (IMSP) and IITM. The workshop had been a grand success. About 400 participants attended the workshop. Lectures were delivered by 3 NRSC (ISRO) Scientists (Faculty: Dr. Hareef Baba Shaeb, Dr. S. S. Prijith and Dr. S. Rajesh) and 3 IITM Scientists (Mr. Mata Mahakur, Mr. Somnath Mahapatra and Dr. Amita Prabhu) and were highly appreciated by the audience. The event was coordinated by Dr. Dibyendu Dutta, Dr. M.V.R. Seshasai and Dr. Hareef Baba Shaeb from NRSC side and Mr. S. Mahapatra, Dr. J. R. Kulkarni and Dr. G. Pandithurai from IMSP side. IMSP received great support from Director IITM and IITM administration for organization of this event.



(2) In association with IITM Pune, IMSP organized a **Colloquium talk by Dr. Francesco Doblas Reyes, Director, Earth Sciences Department, Barcelona Super Computing Center**, (Centro Nacional de Supercomputacion, BSC), Barcelona (Spain) at Varahamihira Hall of IITM Pune on **22nd February 2020** (Saturday), during 14.30 to 15.30 Hrs. IST. Topic of the talk was "**From the Byte To the Service: Trans-Disciplinary Climate Research**". The lecture was attended by a large number of participants and was highly appreciated.



[Dr. Francesco Doblas Reyes]

(3) In association with IITM, IMSP organized a **Special Lecture by Dr. Eng Lim Goh, Senior Vice President of Hewlett Packard Enterprises (HPE) USA**, delivered at Meghdoot Auditorium of IITM Pune on **2nd March 2020**. The Title of the talk was "**From IoT to Machine Learning, Simulation and Exa-scale**". Dr. Eng Lim Goh is Senior Vice president and Chief Technology Officer for Artificial Intelligence at Hewlett Packard Enterprise (HPE) and has vast experience in Artificial Intelligence. The lecture was attended by about 250 participants and was highly appreciated.



[Dr. Eng Lim Goh]

- (4) In association with IITM, IMSP organized “Prof. P. R. Pisharoty distinguished lecture” by Shri Ashish Lahiri, famous writer and Lexicographer from Kolkata, held at Meghdoot Auditorium of IITM Pune on 6th March 2020. The title of the lecture was “Life and works of Sri Radhanath Sikdar: a Pioneer Indian Meteorologist of 19th Century, who measured the height of Mt. Everest”. The above lecture was preceded by an introductory address and short lecture by Dr. R. R. Kelkar sir, Former DGM, IMD. The event was attended by about 250 persons and was highly appreciated by the audience.



Mr. Ashish Lahiri has been a famous writer, translator, lexicographer & a researcher in History of Science, specializing in Science-culture; Visiting Faculty IISER, Kolkata and Member Pavlov Institute, Kolkata. **His visit was coordinated by Dr. P. Mukhopadhyay & Mr. Kumar Roy. Mr. S. M. Jamadar, Mr. S. Mahapatra and Mr. Sahadat Sarkar volunteered to popularize this lecture in Pune city.**

- (5) IMSP has made online publication of several issues of “**Bulletin of IMS Pune Chapter (BIMSP)**”. In 2019, IMSP had published BIMSP issues of January 2019 issue, Vol. 18, No. 1; February 2019 issue, Vol. 18, No. 2; “BIMSP, Vol. 18 (No. 3), March 2019 Special issue”, “BIMSP April 2019 issue, Vol. 18, No. 4”, and “BIMSP May 2019 issue, Vol. 18, No. 5”. In 2020, IMSP published **Bulletin of IMSP (BIMSP), Vol.18, No. 6-9, June-September 2019 Special issue; Bulletin of IMSP (BIMSP), Vol.18, No. 10-12, October-December 2019 Special issue; Bulletin of IMSP (BIMSP), Vol.19, No. 1-3, January-March 2020 Special issue; and Bulletin of IMSP (BIMSP), Vol.19, No. 4-6, April-June 2020 Special issue.** These issues of BIMSP were uploaded in IMSP website. **Mr. S. Mahapatra contributed for editing & preparation of these issues of BIMSP and Mr. Sanjay Sonporate contributed for uploading these at IMSP website.**

- (6) **IMSP has been maintaining a WhatsApp group “IMS Pune Chapter” since 2019** for communication and information sharing (on scientific matters, especially related to Earth Sciences) among the IMSP Life members. This group has more than 170 members (including some members from IMS NC also). **Mr. Sikandar Jamadar**, NEC Member, IMS NC has been very active in coordinating and administrating this WhatsApp group and **Dr. J. R. Kulkarni, Chairman IMSP** has been very active in explaining various science questions in the group.
- (7) There were **some new Life Members from IMS Pune Chapter**, who received memberships through communication between IMSP and IMS NC (HQ), New Delhi. **During 2018-2020, more than 30 new Life members have joined IMSP.**
- (8) In association with **IITM and Co-organizers S. P. Pune University, IMSP Executive Council** made lot of efforts for organization of **“Annual Monsoon Workshop (AMW-2019) and National Symposium on Cloud and precipitation processes”** (which was scheduled during 12-14 March 2020, but had to be postponed later on due to Covid-19 pandemic). There were several Executive Council (EC) meetings of IMSP EC in this regard, with consultations from Dr. A. K. Sahai, Vice President, IMS NC, Mr. Sikandar Jamadar, NEC Member, IMS NC, Prof. Anand Karipot (Head, DASS) and Dr. Aditi Deshpande of DASS, S. P. Pune University organizing team. For the National Symposium, a **large number of abstracts (92)** were received by IMSP and the Scientific Programme Committee (SPC) had a meeting to divide these into oral & poster presentations for the proposed 4 themes. **Dr. Sagarika Chandra** and **Dr. Sumedha Gupta** contributed for compiling these abstracts. These abstracts have been included in **BIMSP, Vol.19, No. 1-3, January-March 2020 Special issue.** **All members of EC**, especially **Dr. Devendraa Singh**, Joint Secretary and **Mr. Samuel Jose**, Treasurer had contributed a lot towards planning and execution for organization of this event, in coordination with Co-Chairs, Secretary and Mr. S. M. Jamadar. **However, the event was postponed.** The decision to postpone the event was taken **in view of Corona (Covid-19) virus outbreak and corresponding Government advisories** in the interest of the nation. The decision was communicated to IMSP members and other stakeholders immediately on **9th March 2020.**
- (9) IMSP made necessary communications for the **IMS NEC Election for the term 2020-2022** and **IMSP EC Elections for the term 2020-22** for the process of electing new Executive Council members of the Indian Meteorological Society, NC (National Council) and its Pune Chapter (IMSP). **Dr. Milind Mujumdar**, Scientist-E IITM Pune performed the duty of **Returning Officer** and **Mr. Manish Ranalkar**, Scientist-E, IMD Pune performed the duty of **Asst. Returning Officer** for **IMSP EC Elections** for the term 2020-22. **Dr. A. K. Sahai**, Vice Chairman, IMS NC also contributed in this regard. **The Election process was completed in June 2020 and the results were declared on 6th July 2020** by the Returning officer. The newly elected **IMSP Executive Council (for 2020-2022 term)** includes **Dr. C. Gnanaseelan** as Chairman, **Ms. Latha Sridhar** as Secretary, **Mr. Sahadat Sarkar** as Jt. Secretary, **Mr. Jose Samuel** as Treasurer, and **4 EC Members: Ms. Smitha A. Nair, Dr. Shirish Khedikar, Ms. Smrati Gupta and Dr. Madhuchandra Reddy Kalapureddy** - all have been **Elected Unopposed.** We sincerely thank **Dr. Milind Mujumdar** and **Mr. Manish Ranalkar** for conducting the election and **Dr. Sahai sir** for his kind support. We **warmly congratulate and welcome all of the elected members of the new IMSP Executive Council** (for 2020-2022 term). We are **confident that the new team will further enhance the reputation of IMSP** through various activities & events and new initiatives for popularisation of various aspects of Earth & Atmospheric Sciences (especially Meteorology) and dissemination of important & useful information to the general public.



IMSP

**INDIAN METEOROLOGICAL SOCIETY,
PUNE CHAPTER**

(A Scientific Society registered under Govt. of India, New Delhi)

WEBSITE: <http://www.imdpune.gov.in/imsp>