

Advisory Committee Meeting 2021

18 March 2021, 10:30 am-1:15 pm (IST)

Agenda

Link to join the Meeting (MS Teams): Meeting Link		
Time (IST)		Program
From	To	
10:30 am	10:40 am	Welcome and Introduction Prof. M S Mohan Kumar, IISc, Bangalore.
10:40 am	11:00 am	Preliminary Remarks Members of the Advisory Committee.
11:00 am	11:40 am	Presentations <ul style="list-style-type: none"> Prof. P P Mujumdar, IISc, Bangalore. Dr. Manoj Rajan, IFS, Commissioner, KSDMA and Director, KSNDMC, Bangalore.
11:40 am	12:15 pm	Open Discussion.
12:15 pm	1:15 pm	Suggestions from the Advisory Committee Shri. S V Ranganath, IAS, Former Chief Secretary, Govt of Karnataka, Bangalore. Shri. N Manjunath Prasad, IAS, Commissioner, BBMP, Bangalore. Dr. R K Dave, RESPECT; Ex-Sr. Specialist NDMA, New Delhi. Dr. Veena Srinivasan, ATREE, Bangalore. Shri. S Vishwanath, Biome Solutions, Bangalore. Prof. B S Murty, IIT Madras, Chennai.
1:15 pm		Vote of Thanks Prof. M S Mohan Kumar, IISc, Bangalore.

Sponsor:



Partners:



Urban Flood Model for Bangalore

PROJECT CONSORTIUM

- 1) **P.I.: Prof. P P Mujumdar**, Professor, IISc, Bangalore. **(PPM)**
- 2) **Co-P.I.: Prof. M S Mohan Kumar**, Retd. Professor, IISc, Bangalore. **(MSM)**
- 3) **Co-P.I.: Dr. Manoj Rajan**, IFS, Director, Karnataka State Natural Disaster Monitoring Center (KSNDMC) Bangalore **(MR)**

ADVISORY COMMITTEE

- 1) **Shri S V Ranganath IAS** – Vice Chairman, Karnataka State Higher Educational Council (Current), Former. Chief Secretary, Government of Karnataka, Bangalore. **(SVR)**
- 2) **Shri N Manjunath Prasad, IAS** –Commissioner, BBMP, Bangalore. **(NMP)**
- 3) **Dr. R K Dave** – Founder, RESPECT, Ex-Sr. Specialist (Policy and Plans), NDMA, New Delhi. **(RKD)**
- 4) **Dr. Veena Srinivasan** – Senior Fellow, Director, Centre for Social and Environmental Innovation, Ashoka Trust for Research in Ecology and the Environment (ATREE). **(VS)**
- 5) **Prof. B S Murty** – Professor, IIT Madras, Chennai. **(BSM)**
- 6) **Shri S Vishwanath** – Water Conservation Expert, Founder and Director, Biome solutions., Bangalore. **(SV)**

Minutes of the Advisory Committee Meeting

Urban Flood Model for Bangalore

18 March 2021

The third annual Advisory Committee (AC) Meeting of the ongoing project, “Urban Flood Model for Bangalore” was held online on the 18th of March, 2021 from 10: 30 am -1:15 pm. The meeting was chaired by Shri S V Ranganath and was attended by the esteemed Advisory Committee of the project, senior academicians and officials from IISC, project stakeholder organizations and project partners. The minutes of the meeting are briefed as below.

The meeting began with Prof. M.S. Mohan Kumar welcoming all attendees and introducing the members of Advisory Committee. He briefly described their contributions in areas related to water research, policy making and administrative work.

Initial Remarks by AC members

Shri SVR

- A clear cut plan should be produced and forwarded to the BBMP officials.
- Successful implementation will make it a role model for the entire country as no other model has been generated to tackle the issue of Urban Flooding, that has been a pertinent problem in the major cities every year.
- With research inputs from Prof. PPM, Prof MSM, Prof BSM, Dr. Dave and with ground level expertise from SV and VS, the plan may be successfully implemented.
- Administrative support and approach to GoK for proper implementation would be given by SVR himself.

Dr. RKD agreed to the above comments and suggested that:

- Any missing links from the pilot project for implementation should be addressed,
- The solution suggested needs to be implementable to be replicated for other parts of the country.

Prof. MSM requested Prof. PPM and Dr. MR, to present the overview of the output of the project progress so far.

Project Presentations

Prof. P.P. Mujumdar detailed about the objectives, data procurement and results of the flood modelling and its validation with field data. He briefed about the porous concrete and pavement experimentation being carried out and its application for flood mitigation. He concluded with details about information dissemination systems from KSNDMC through apps and trainings.

Dr. Manoj Rajan started by highlighting the three major deliverables were setting-up sensor, web portal and mobile app were successfully done by KSNDMC with support of IISc. He mentioned the future plan of action with the following salient points:

- Identification of new sites in Bangalore to install 100 more water level sensor by IISc, KSNDMC and BBMP together.
- Outcome of the deliverables should be taken up by BBMP for implementation of rainwater harvesting in the city.
- Information dissemination through conferences and workshops by inviting people from different fields to implement the different methods for recharge of groundwater using this flood water in different BBMP parks, in pov of: Use of flood as resource.
- Plan to install new radar for more accurate forecasting features available at their disposal (Through C-band and X-band radars) under the preparedness and capacity building of SDRF and further augmentation of KSNDMC system through radar information
- LIDAR data for detailed study about watershed to infuse preparedness and rapidness in the model.
- New MOU between KSNDMC and IISc (Prof VVS) on impact assessment of climate and land use land cover changes in storm water drainage in Bengaluru, with performance indicators and proceeding analysis for every storm water drain, redesign and retrofitting steps to mitigate flood related impacts from storm water drain

Dr. Shubha Avinash gave an overview of the contribution of KSNDMC to the project and discussed dissemination of flood information and the flood application developed at KSNDMC in detail.

The presentations were followed by an open discussion session with participation from the project members and the attendees.

Open Discussion.

- Shri SVR suggested to formulate a clear cut plan of action for correct implementation by the end of September, 2021.
- RKD gave the following initial suggestions
 - Establish an optimal model resolution to guide the model for best results and replicability.
 - Emphasis to be given on impact based flood warning system
 - Detailing of the optimal/necessary data requirement with concrete guidelines/clear recommendations regarding,
 - Density of sensor network
 - Data types (for eg Lidar/DEM/Contours)
 - Data sources (sensor based/global datasets)
 - Model types (Hec-RAS/ MIKE/ PCSWMM)
 - The Flood Damage Reduction Analysis (HEC-FDA) model needs to be explored to study the flood damage assessment.
 - Emphasis needs to be given more on the Flood information with sufficient lead time rather than rainfall and non-structural measures need to be taken in addition to structural measures.
- PPM responded to RKD with clarification as,
 - Although the fine resolution data is available at 20cm, the models maybe incapable to assimilate such fine data.
- VS enquired about the spatial drift in the WRF outputs from IISc in comparison with the observed rainfall.
- PPM indicated that the boundary conditions adapted change on global and local scale and the NCEP boundary conditions are at a global scale. The parameters are to be fine tuned to suit the scale of the model and the global boundaries.
- BSM added for a need clarification on the simulation of floods as huge fluctuation was encountered on a smaller time scale. He also suggested for bias correcting for the peaks in spite of a good trend.
- PPM responded that,

- Although the sensors are capable of recording values every minute, the outcome is extremely undulating and is hence averaged over 15 minutes.
- The presence of lateral inflows like sewage and debris are not accounted for by the sensor data and hence the peaks are sometimes underestimated by the models.
- A dual drainage model is being attempted for to account for the sewage intrusion in the SWD network.
- A bias correction was also performed on the model as a part of the calibration
- Sensors are also being technologically updated to address calibration and accuracy issues.
- SV suggested for distinction of three valleys since they are different in terms of hydrologic and topographical overview.
- PPM agreed and mentioned that the land use and topography of these basins are different and can be used to derive basin signatures
- Dr G S Sreenivasa Reddy, former Director, KSNDMC made some salient remarks with reference to the project as below.
 - Emphasis needs to be given on plans of flood management in future.
 - A number of funding agencies like the State disaster relief fund and National and state disaster mitigation authorities have dedicated budgets for the disaster mitigation for states, especially for Bangalore.
 - Based on the project outcomes, guidelines/action plans need to be given to BBMP and Karnataka state disaster management authority.
- PPM emphasized that
 - the analysis of smaller stretches in the city needs to be done in coherence and in cognizance of the big picture of the urban hydrology of the city.
 - Location and impact assessment of the flood inundation needs to be done in this project.
 - The inflow of sewage is seen to reduce the efficiency of the SWDs and these are hard to be quantified even with high levels of research unless aided by on-ground organizations, in this case BBMP and KSNDMC.
- MR detailed that, the sensor technology is being improved with Doppler RADAR sensors being deployed for water level sensors, updating the current ultrasonic sensors.

- V S commented if,
 - The RADAR sensors will be capable of recording on-road flooding?
 - Can the App be equipped with a feedback option?
- Dr. Shubha Avinash from KSNDMC responded that,
 - Some of the Flood vulnerable areas (FVAs) will be covered with RADAR mapping
 - The feedback by citizens option is available on the Varunamitra web portal.
- S V suggested the inclusion of real-time peizometric monitoring of the groundwater levels and calibration of the field sensors for better accuracy and maintenance.
- Dr Shubha responded that the sensors are regularly monitored for errors in observation.
- Dr. K.S. Nanjunda Rao from IISc Bangalore raised a few issues and suggestions regarding the local flooding in Bangalore.
 - In certain localities, the region gets flooded at a very fast rate upon receiving short span rains too.
 - Creation of local buffers may help in handling the flood scenarios.
 - Buffers like wells or recharge zones in the SWDs may help in reducing floods.
- PPM clarified as,
 - The Time of concentration (t_c) is the factor that is responsible for determining the flooding in local areas.
 - The urban scenarios have decreased the t_c drastically and this causes the immediate runoff generation and flooding.
 - The solutions suggested such as diversion of flood waters, recharging etc. for the handling of such flooding scenarios should be approached in an integrated manner, keeping in mind the bigger picture and not distorting the hydrological balance in the region.
 - Use of porous pavement for flood mitigation in the SWDs
- Mr Thirumalai from CSTEP and MR had a brief remark regarding the procurement of LiDAR data for hydrological modeling.

Suggestions from the Advisory Committee

Shri S.V. Ranganath congratulated the teams involved for the work carried out which was indicative of the enormous research that had been put in. He suggested few points to be emphasized while going forward with the project.

- KSNDMC needs to formulate a special action plan for BBMP and BDA by the end of May.
- A record consisting list of areas vulnerable to flash floods identified during past year and mostly September 2020 and the relief brought about needs to be made.
- KSNDMC may formulate the findings of the project to an action plan by mid-May and present it for around half an hour to the stakeholders.

Dr. R.K. Dave

- A separate proposal, standardized based on the current study may be given to the governmental bodies.
- Suggestion for a plan to be given to DST using the available non-structural output.
- The research results be solidified into a capsule for proper scaling up.

Dr. Veena Sreenivasan

- Existing contradictions between the CPHEEO and ideals of the urban flood mitigation like creation of sponge cities needs to be looked into.
- Clarification on the usage of LIDs formally, so as to add it to the guidelines.
- Suggested for modifying the guidelines by further discussing the procedure for doing so.
- Financing the projects with LID options and seeing its feasibility.

Shri S Vishwanath began by complimenting the excitement the presentations brought about. He mentioned that Megha sandesha was path-breaking. He said that the K100 SWD model was one of a kind and added that it should not be criticized. A few other salient points suggested were,

- Creation of a small storm water drain design manual for the BBMP/BDA on the basis of the project results.
- Increase the citizen participation for implementation of rain water harvesting, which in turn dampens the flooding, through utilization of small areas. (Examples given were

Cubbon park and Lalbagh, where wells were re-activated and nos. were increased as well to bring about a zero rainwater discharge scenario).

- After achieving this scenario, the involved aquifers of the ground water recharge should be extracted too.
- He suggested to fine tune the rain water harvesting bye-laws by involving the engineers and architects.
- He suggested to include sluice gates and/or weirs near the lakes to make them buffers for flood conditions.
- Pick up micro-watersheds to demonstrate by nonstructural approaches that the flooding can be reduced by proper water management.

Prof. B S Murty

- Map out the LIDs with respect to the local ground water, soil and local hydrogeological conditions. This procedure would be useful for giving future guidance for storm water management.
- Using WaterBOTs might be inconclusive as it could not be inferred that the incoming data was due to heavy rainfall or blockages.
- Find out the best places to deploy sensors so that they would not be redundant information.
- Identification of critical drains was necessary and they should always be checked upon. He also told to classify the depths of inundation and map them accordingly for a flood risk map.
- Suggested for integration of design between water harvesting and storm water drain system.

Concluding remarks /discussion

- VS suggested to examine the 400,000 bore wells as recharge units by using the ground water bye-laws.
- PPM indicated that Prof Shekhar from IISc along with Prof MSM have made extensive studies about the GW monitoring in Bangalore.
- MSM suggested that the recharge failure rate was indeed high and this needs to be looked into to make it useful.

- BSM also suggested to look into the quality of rainfall/water used for recharge as polluting GW is very critical.
- SV also suggested to incentivize GW recharge and close the loop of recharge by making residents use the purified water.
- Dr. K S Nanjunda Rao in further details said that as porous concrete may not be used over a large area, the optimal way to recharge was to use precast PC units and remove them to clean the clogging and place them as before.

Prof. P.P. Mujumdar thanked the Advisory Committee and the attendees for their valuable suggestions and thanked everyone for making the meeting a success with lots of inputs to implement.

Prof. M.S. Mohan Kumar concluded the meeting by thanking the advisory committee members and all the attendees.

Annexures:

1. Agenda for AC meeting for UFM 2021
2. Project consortium and Advisory Committee for UFM project