

## Collaborative Research on Flood Resilience in Urban Areas (CORFU)

### Final Workshop Mumbai Case Study Mumbai, 30<sup>th</sup> May 2014

#### Workshop Agenda

1. Reception of the participants
2. Welcome and introduction
  - 2.1. Workshop introduction - Kapil Gupta
  - 2.2. Welcome by Prof. Ravi Sinha, Dean (Alumni and Corporate Relations)
3. COFFEE BREAK
  - 3.1. The CORFU project - Slobodan Djordjevic
  - 3.2. The CORFU movie
4. Mumbai case study: Mithi River Catchment within the CORFU project
  - 4.1. Initiatives taken by Municipal Corporation of Mumbai
  - 4.2. Mithi River Case study - Modeling and Flood Risk Assessment – Vinay Nikam
  - 4.3. Resilience Measures – Kapil Gupta
5. Overview of 8 cities case studies and mitigation measures taken and best management practices- Barcelona (Spain), Beijing (China), Dhaka (Bangla Desh), Hamburg (Germany), Mumbai (India) , Nice (France), Taipei (Taiwan), Seoul (Korea) - Slobodan Djordjevic
6. Round table: Flood resilience in urban areas. Assessment of current state and future steps
  - 6.1. list of participants
7. Closing: Wrap-up and conclusions of the workshop – Kapil Gupta

#### Site visit by SJ, MJH, KG, VSN on 31st May 2014

<b>Purpose</b>	<b>Workshop Mumbai case study presentation</b>	
<b>Date &amp; Venue</b>	<b>30 May 2014, IIT Bombay, Mumbai, India</b>	
<b>Participants</b>	Slobodan Djordevic (SD) Michael Hammond (MH)	UoE UoE
<b>Attendees</b>	In Annexure	

**Minutes**

<b>Item</b>	<b>Minute</b>	<b>Action</b>
1.	<b>Reception of the participants</b>	
2.	<b>Welcome and introduction</b>	
2.1	<p><b>Workshop introduction</b></p> <p>KG welcomed all officers and participants and mentioned that the workshop would present the results of four years of collaborative work by 18 international partners from countries of West- UK, France, Germany, Spain, and Denmark and India, Bangla Desh, China, Taiwan and Taipei from East. He explained that the final results of the project will be presented, going through the methodology that was applied to the case studies in Europe and Asia with the main aim of studying flood events to improve resilience in urban areas. Special attention will be dedicated to Mumbai Case Study during the workshop.</p> <p>Prof Ravi Sinha, Dean, Alumni and Corporate Relations welcomed the participants of the workshop and highlighted the role of IIT Bombay in Disaster Management at the International, National and City level, especially with reference to flooding in Mumbai.</p>	
	<b>HIGH TEA</b>	
2.2	<p><b>The CORFU project</b></p> <p>SD gives a brief overview about the CORFU project, highlighting various aspects of the CORFU project, its budget, scope and key features.</p> <p>The aims of the project were listed as follows:</p> <ol style="list-style-type: none"> <li>1. Assessment of flood impacts for future scenarios</li> <li>2. Evaluation of resilience measures and strategies</li> <li>3. Sharing learning between Europe and Asia</li> <li>4. Improvement of resilience</li> </ol> <p>The significant drivers such as population growth and urbanization were mentioned as the main factors affecting the vulnerability and therefore influencing resilience. The flood impact methodology (direct, indirect, tangible and intangible), development of Flood Damage Assessment Tool to include health impacts and the Flood Resilience Index were explained by SD. He said that the main objective of the workshop is not only to present results but also to see which of these results will be taken forward and how research will affect policies. Mumbai case study is mentioned because of the demonstration of successful resilience measures in the major Mithi River Catchment through the study of flood modeling and economic studies provided to CORFU project.</p>	
2.3	<p><b>The CORFU movie</b></p> <p>The CORFU movie was produced by the École Polytech'Nice-Sophia, which director Phillippe Gourbesville could not attend the workshop.</p> <p>The film showed the importance of flood management and the catastrophic effects that it is able to cause in poor areas. The video was focused principally on Bangkok (Thailand) and New Jersey (the U.S.) areas.</p>	
2.4	<p><b>Initiatives by Municipal Corporation of Greater Mumbai</b></p> <p>KG presented the major initiatives taken by the MCGM, after the 26 July 2005</p>	

	<p>megaflood due to 944 mm of rainfall in 24 hours. He described the conditions before and after the resilience measures- the main highlight being the construction of the 3-8 m high flood wall which has prevented the flooding of adjacent catchments due to overflow from the Mithi River. However, local flooding in the catchment due to local works are possible anywhere in the world.</p>	
3.	<p><b>Mumbai case study within the CORFU project</b></p> <p>VN presented the flood resilience study for Mithi River catchment. <i>One of the main objectives of the Mumbai case study in the context of CORFU project was to provide simulation of the flooding for various rainfall intensities and impact assessment for various scenarios in the Mithi River catchment. The hydraulic simulations have been carried out and water depths have been computed for various rainfall intensities corresponding to the return period of 1 in 1, 1 in 10 and 1 in 100 years. Subsequently, depth damage curves have been developed based on site visits and interviews with people living in the flood prone areas. These curves have been developed for different types of land-use/ building typology. With the development of depth-damage curves for the case study area, damage assessment has been carried out for these scenarios. Flood spread and damage maps allow identifying such areas in which special focus should be put in order to be prepared to the possible flood events that may occur. The detailed analysis carried out in this study has enabled the formulation of a methodology to determine the water levels, flood spread and depth, depth damage curve, vulnerability and flood damage .</i></p>	
4.	<p><b>LUNCH BREAK</b></p>	
5.	<p>Overview of 8 cities case studies and mitigation measures taken and best management practices- Barcelona (Spain), Beijing (China), Dhaka (Bangla Desh), Hamburg (Germany), Mumbai (India) , Nice (France), Taipei (Taiwan), Seoul (Korea)</p> <p>SDJ</p> <p>SDJ presented the various studies carried out under the CORFU project. He described the various studies undertaken for each of the cities under the CORFU project. He highlighted each cities special features and the resilience measures in each of the eight cities.</p>	
6.	<p><b>Round table: Flood resilience in urban areas. Assessment of current state and future steps</b></p>	
6.1	<p><b>Ghag Sambhaji L (Drainage Engineer) from Municipal Corporation of Greater Mumbai</b></p> <p>mentioned Mumbai having area of approx 437 sq km has a population of over 12 million. Due to shortage of space and high cost of land, poor migrants are living in the low lying areas and they are affected by flooding ever year. He suggested that alternate neighbouring urban centres should be developed to divert the influx of migrants.</p>	
6.2	<p>Khandeparkar Kiran (Planning Department) Municipal Corporation of Greater Mumbai</p> <ul style="list-style-type: none"> <li>• He mentioned that the planning department coordinates all the projects in the city and working groups as there are interactions and overlapping between them.</li> <li>• However, due to local pressure groups it sometimes becomes difficult to prevent migrants from occupying low lying areas.</li> </ul>	
6.3	<p>Patil Shailesh Primove Infrastructure, Pune</p> <ul style="list-style-type: none"> <li>• He mentioned that the presentations of the CORFU workshop provided him with an opportunity to learn about the practices in other cities of the world from international experts.</li> </ul>	

7.	<p><b>Closing: Wrap-up and conclusions of the workshop</b></p> <p>Finally KG thanked all the participants of the workshop and invited the participants for the field visit the following day.</p>	
8.	<p><b>High Tea</b></p>	
	<p><b>31st May 2014</b></p>	
9	<p><b>SD,MJH, KG and VN went for the field visit in the Mithi River catchment and showed SD, MJH the significant improvements to the Mithi River flood wall and holding pond as resilience measures.</b></p>	

## Annex

### List of attendees

Nº	Surname	Name	Organization
1	Ghag	Sambhaji L	Municipal Corporation of Greater Mumbai
2	Yamgar	Shivaji	Municipal Corporation of Greater Mumbai
3	Khandeparkar	Kiran	Municipal Corporation of Greater Mumbai
4	Patil	Shailesh	Primove Infrastructure, Pune
5	Kalaskar	Ashish	Graduate Student, IIT Bombay
6	C S	Amrutha	Graduate Student, IIT Bombay
7	Sebastian	Dawn Emil	Graduate Student, IIT Bombay
8	N	Devika	Graduate Student, IIT Bombay
9	K	Ashwin	Graduate Student, IIT Bombay
10	Joseph	Joseph	Graduate Student, IIT Bombay
11	Ramavamsikrishna	Rimmalapudi	Graduate Student, IIT Bombay
12	Narasimhulu	Degala	Graduate Student, IIT Bombay
13	N	Rajkumar	Graduate Student, IIT Bombay
14	Singh	Gagandeep	Graduate Student, IIT Bombay
15	Singh	Ramandeep	Graduate Student, IIT Bombay
16	<b>Djordjevic</b>	<b>Slobodan</b>	Professor, University of Exeter, Exeter, UK
17	Hammond	Michael	Researcher, University of Exeter, Exeter, UK
18	Nikam	Vinay	IIT Bombay
19	Sinha	Ravi	Dean, Alumni and Corporate Relns, IIT Bombay
20	Gupta	Kapil	IIT Bombay