

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

### Final Workshop Barcelona Case Study Barcelona, 19<sup>th</sup> May 2014

#### Workshop Agenda

1. Reception of the participants
2. Welcome and introduction
  - 2.1. Workshop introduction - Beniamino Russo
  - 2.2. The CORFU project - Slobodan Djordjevic
  - 2.3. The CORFU movie
3. Barcelona case study within the CORFU project
  - 3.1. Flood risk assessment through a coupled 1D/2D model – Beniamino Russo
  - 3.2. Flood damage assessment and estimation of flood resilience indexes – Marc Velasco
  - 3.3. Flood and risk forecasting using innovative tools – Xavi Llord
4. COFFEE BREAK
5. UN-Habitat's City Resilience Prolifing Programme – Faraj El-Awar
6. Insurance and floods in Spain – Alfonso Nájera
7. Round table: flood resilience in urban areas. Assessment of current state and future steps
  - 7.1. Manuel Gómez
  - 7.2. Ares Gabàs
  - 7.3. Pere Malgrat
  - 7.4. Slobodan Djordjevic
  - 7.5. Natasa Manojlovic
  - 7.6. Jordi Cabot
8. Closing: Wrap-up and conclusions of the workshop – Marc Velasco
9. LUNCH

<b>Purpose</b>	<b>Workshop Barcelona case study presentation</b>	
<b>Date &amp; Venue</b>	<b>19 May 2014, CETaqua, Barcelona, Spain</b>	
<b>Participants</b>	Slobodan Djordevic (SD) Beniamino Russo (BR) Marc Velasco (MV) Xavier Llord (XL) Pere Malgrat (PM) Faraj El-Awar (FE) Alfonso Nájera (AN) Manuel Gómez (MG) Ares Gabàs (AG) Natasa Manojlovic	UoE Aqualogy - AIRCUD CETaqua HYDS Aqualogy Urban Drainage Direction UN Habitat GWOP Consorcio de Compensación de Seguros UPC – CETaqua Barcelona Municipality TUHH
<b>Attendees</b>	Please check the list in the annex.	

**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>BR starts his speech welcoming all attenders and remarking the honor of presenting this workshop after four years of hard work. He explains that 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 Barcelona Case Study during the workshop. Finally the meeting agenda is presented.</p>	
2.2	<p><b>The CORFU project</b></p> <p>SD gives a brief overview about the project, pointing out aspects such as what can be understood by CORFU project, its budget, scope and other general issues. Project aims are listed; among those four can be underlined:</p> <ul style="list-style-type: none"> <li>○ Assessment of flood impacts for future scenarios</li> <li>○ Evaluation of resilience measures and strategies</li> <li>○ Sharing learning between Europe and Asia</li> <li>○ Improvement of resilience</li> </ul> <p>Also important drivers and their evolution such as population growth and urbanization are mentioned due to their affection to vulnerability and therefore to 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 are explained in a few words by SD. At the end, he remarks 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. Barcelona case study is mentioned because of the great contribution provided to CORFU project.</p> <p>Regarding questions, BR asked SD: What are the main limitations that might difficult the implementation of measures to increase resilience in urban areas, since there is a clear difference in terms of economy and development between Asia and Europe? SD concludes that mainly money is the main constrain, there is no money to make cities completely bullet-protected so the biggest decision and the most difficult is to decide where money should be invested. What are the lessons that European partners have learnt during the project? That it is always necessary to look at the whole cycle, to look into future conditions and needs and then analyze.</p>	
2.3	<p><b>The CORFU movie</b></p> <p>Such movie was created 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>	
3.	<b>Barcelona case study within the CORFU project</b>	
3.1	<b>Flood risk assessment through a coupled 1D/2D model</b>	

	<p>After the conclusion of BR's presentation: the following questions are formulated by assistants:</p> <ul style="list-style-type: none"> <li>• Jordi Oriol from BCASA asks: How the canalization of green roofs is managed, is it directly connected to the network? On the other hand, how green roofs might affect retention capacity? BR answered that there are two types of green roofs according to their altitude, those which are at the top of buildings are connected directly to the network and those situated at "zero level" enter into the system such as surface runoff. With respect to retention capacity, green roofs improve retention capacity actuating as source control elements. ...</li> <li>• Alex Gracia from ACA exposes some reflections about the presentation and finally asks: Does all the information gathered during the project going to be public and accessible to population online? BR and SD answer that, in this moment, all information (reports) generated is available at the website shared among partners of the CORFU project, but in the coming months, all the information will be available for all.</li> <li>• Asif Zaman from the Institute of Water Modelling asks to BR about the Barcelona study case: You mentioned that one of the problems at Raval area is generated upstream. Do you have a feel of how extend is the scope of the problem and do you think that applying measures upstream of the catchment you will have positive effects downstream? BR answers that some upstream measures (green roofs and several infrastructures) were tested in different scenarios and their benefits were assessed in the Raval, although their impacts have a more extense domain.</li> </ul>	
<p>3.2</p>	<p><b>Flood damage assessment and estimation of flood resilience indexes</b></p> <p>The discussion generated after the speech of MV includes the following points:</p> <p>Maria Del Carmen Llasat from University of Barcelona asks a few questions to MV:</p> <ul style="list-style-type: none"> <li>• Has any paper been published in any scientific journal? MV: Well, in fact there are two papers in revision phase waiting to be approved; however that is a slow process. Moreover, two more papers are planned to be submitted.</li> <li>• I am impressed by such a negative approach of future scenarios, is it because of future variability of precipitation? MV: Case study do not only considers climate changes but also the evolution and variation of socioeconomic variables such as increment of prizes.</li> <li>• Is it possible the application of developed tools to past cases that have affected to Barcelona? Well, the model here developed represents current conditions of the sewage network, for this reason in order to assess past situations the model should be adapted to former network configuration in order to be realistic; on the other side, it is also important data availability, in case of available data of past events and the consideration mentioned just above, it will be possible to construct and calibrate the model.</li> </ul>	

3.3	<p><b>Flood and risk forecasting using innovative tools</b></p> <ul style="list-style-type: none"> <li>• First question to XL: Do you know if the convectivity of precipitations is included by the system? XL: This tool forecast uses observed data, thus if convection core cannot be detected before the forecasting is not possible.. Anyway every 6 minutes observed data and prediction is updated by the system.</li> <li>• Blanca Aznar from BCASA asks: Do you use rain gauge data to calibrate RADAR? XL: No, RADAR data is calibrated periodically but not with real time rain gauge data since it might cause fluctuations.</li> </ul>	
4.	<p><b>COFFEE BREAK</b></p>	
5.	<p><b>UN-Habitat’s City Resilience Profiling Programme</b></p> <p>BR introduced FEA.</p> <p>FEA starts his presentation talking about the origin of the UN-Habitat program in Nairobi and its later move to St. Pau complex in BCN thanks to an agreement between the Spanish Government, the City of Barcelona and the private sector (AGBAR among other companies).</p> <p>After this, he defines “Urban Resilience” as the ability of an urban system to absorb and recover quickly from the impact of any possible hazard”. He highlights that CRPP includes natural and socioeconomic hazards.</p> <p>Regarding the resilience, he reminds it is about people, assets and processes of the urban system. He explained that the CRPP tries to measure and give and overall index of the organizational, spatial, physical and functional hazards.</p> <p>He stresses that flood events are related to climate change, and claimed that much more investment must be done in infrastructure.</p> <p>FEA also talks about the key flood loss drivers (increase of population not planned, aging infrastructure and changing climate conditions) as well as how to change the cities through mitigation and protection measures in order to build resilience.</p> <p>To end his presentation, FEA points out who the target audience of the CRPP is (municipalities and urban population) and talks again about the main functions of the Resilience Institute in St. Pau.</p> <p><b>QUESTIONS</b></p> <p>Mari Carmen Llasat, University of Barcelona (UB), asked:</p> <ol style="list-style-type: none"> <li>1. If I’m not wrong, Barcelona has been considered a reference city in the resilience field. Could you explain briefly the strengths that turn Barcelona into a global reference?</li> <li>2. Could Barcelona be used in the future as an experiment to find out resilience indicators?</li> </ol> <p>FEA answers:</p> <p>Barcelona is considered a model on several fronts in integral urban development. Last week, in a urban security meeting, Barcelona was presented as a model to be propagated due to the extraordinary changes the city have suffered from the late 80’s to nowadays, changes that contemplated several security and protective measures.</p> <p>Regarding the second question, FEA said that he was not a resilience expert and suggested that BR could give a more exhaustive answer.</p>	

	<p>Diego Restrepo, civil engineer asks:</p> <ol style="list-style-type: none"> <li>1. I am an Erasmus exchange student and I have been in different European universities. I have noticed that the resilience concept is different in each country. I would like to know what has been done in order to unify the concept.</li> </ol> <p>FEA replies:        There's no doubt that resilience in a place like Netherlands which is mostly below sea level will definitely be different from the specific indicators of, for example, a dry region. Since the hazards used as inputs for the damage predictions are not the same in each place, the resilience concept may vary a bit.</p> <p>SD replies:        We've got a document with the use of resilience in different domains available for the partners that can be sent to you [Diego] if you want.</p> <p>BR thanks FEA for his presentation.</p>	
6.	<p><b>Insurance and floods in Spain</b>        BR introduces AN.        AN starts his presentation mentioning a book about flood risks management as a consequence of the overflow of the Seine River in Île (France). After that, he explains some flood cases in Spain (Valencia, Basque Country) and he points out that the most important losses during de 60's-70's were human lives. He also adds that not all available data from the economic damage is reliable.        Mr. AN defined the insurance as a financial tool that facilitates the recovery after a damage through economical investments and he also highlights the importance of the insurance to ease the management of natural disasters.        He tells the attenders which was the origin of the CCS, going back to the Spanish Civil War and explains its financial mechanisms (mainly costumers and investments).        AN shows some examples of floods costs and compared them with other issues in order to emphasize its economic impact.        To end his presentation, he explains the principles of the CCS (solidarity, cooperation, affordable prices, etc).</p> <p>QUESTIONS</p> <p>MV asks:</p> <ol style="list-style-type: none"> <li>1. In some countries, the insurance policy can be reduced depending on the protection measures the insured has installed. As far as I know, this is not usual in Spain. Is the CSS, somehow, trying to promote the personal security?</li> </ol> <p>AN answers:        Well, is it true that in other places they have different policies depending on the area where the insured lives, because each area has different hazards and risks. This is really hard to do, even more if we talk about natural disasters, which affect a lot of victims. I worked with a German team some years ago, and they</p>	

	emphasized the relevance of the governance through the public administrations. We are not in this point yet, we are trying to collect several data, and we are also trying to acquire knowledge and experience to manage risks.	
7.	<b>Round table: flood resilience in urban areas. Assessment of current state and future steps</b>	
7.1	<b>Manuel Gómez</b> <ul style="list-style-type: none"> <li>• At the beginning (80's &amp; 90's) designing pipes for free surface flow was enough, no one considered what happened in the surface.</li> <li>• Need of better topographic resolution in the urban surface. Although this project considered 1 m x 1m, the error is 0.15 m. Resolutions of 0.10 m x 0.10 m are obtainable nowadays.</li> <li>• Need to characterize what happens when it rains in urban areas, how is the interaction between the surface runoff and pipes conveyance.</li> <li>• Need to account for the risk of contamination.</li> <li>• Be aware that urban drainage is not only the sewers network but also surface runoff.</li> </ul>	
7.2	<b>Ares Gabàs</b> <ul style="list-style-type: none"> <li>• Her department leads Barcelona's resilience strategy.</li> <li>• One of the roles is to coordinate all the projects in the city and working groups as there are interactions and overlapping between them.</li> <li>• Presentation of the "Situation Room" platform. Is not for incidence management but to give the necessary information to decision makers.</li> <li>• There is a venture with UN-Habitat to study the Resilience Index.</li> </ul>	
7.3	<b>Pere Malgrat</b> <ul style="list-style-type: none"> <li>• Holistic view of the problem</li> <li>• Need to reduce in a half the environmental impact</li> <li>• Barcelona GADU methodology being referenced in the UK White Report (which involve major water enterprises in that country)</li> <li>• Integrated Planning. Cities like Madrid, Sevilla are doing it just now.</li> <li>• Real-Time control. Few cities have already adapted this kind of approach.</li> <li>• Environment</li> </ul>	
7.4	<b>Slobodan Djordjevic</b> What to focus on? <ul style="list-style-type: none"> <li>• Some people said human life is the most important thing, then we should focus on Health. On the other hand sometimes people do not want to be evacuated, hence the problem is more social or psychological.</li> <li>• Are results from research applied by practitioners? The design approach in Beijing, China follows CORFU project recommendations.</li> <li>• It is important to consider that a small change in the return period from 1 to 5 years on the design of new developments in China, which might be of two millions of people, this change means tens of millions of dollars of difference of construction budget.</li> </ul>	
7.5	<b>Natasa Manojlovic</b> <ul style="list-style-type: none"> <li>• Hamburg has costal, fluvial and pluvial floods. Therefore they have a system with four levels of security, the first one is automatic and the others manual. In December 2013 there was a failure in the automatic one, hence they needed to apply the fourth level of security. The conclusion or recommendation is do not only rely on the highest</li> </ul>	

	<p>technology.</p> <ul style="list-style-type: none"> <li>• Green Roofs do help as part of a solution as they are design for a small threshold.</li> <li>• These problems require multidisciplinary approaches.</li> <li>• Unfortunately the recording is not clear enough.</li> </ul>	
7.6	<p><b>Jordi Cabot</b></p> <ul style="list-style-type: none"> <li>• The focus should be Governance. Without adequate governance little could be achieved. The need of Institutional Leadership.</li> <li>• The need to consider the economic dimension, especially when it is not considered since the beginning. In some cases financial support for the service of urban drainage does not exist. UN-Habitat was ordered to consider Urban Drainage as a basic service. In many municipalities is not consider as such.</li> </ul>	
8.	<p><b>Closing: Wrap-up and conclusions of the workshop</b></p> <p>MV says that governance and technical knowledge are important, and asked how to close the science – policy gap?</p> <p>SD: We need meetings like this one, with great level of attendance of interested people in order to transfer the knowledge obtained during research.</p> <p>PM: Bring the example of Saint Denis in France, which is one of the poorest municipalities in France but with the best urban drainage management system. Hence, financial support is not a critical things but the political willingness to do it.</p> <p>BR: This gap is filled by creating the necessity. Science already has the necessity, but as SD said, events like this one help to supply the necessity to the policy or decision makers.</p> <p>Question from a Blanca Aznar (BCASA) who is in charge of issuing the flood alerts in BCASA:.</p> <ol style="list-style-type: none"> <li>1. As a result of the research is it possible to give alerts not to the entire city but just for some major problematic spots?</li> <li>2. Have you got governance collaboration on the other cities?</li> <li>3. Is this project going to continue?</li> </ol> <p>SD replied:</p> <ol style="list-style-type: none"> <li>2. In Beijing they took the guidelines, in other cities is yet to be seen.</li> <li>3. Research projects are not like Spiderman, where if the first one is good then you get the next ones. Unfortunately is not that easy, but most of the CORFU team will continue on the PEARL project.</li> </ol> <p>NM replies:</p> <ol style="list-style-type: none"> <li>3. Horizon 2020 will be pretty much about the application and involvement of private partners. In Hamburg you can observe the impact.</li> </ol> <p>PM replied:</p> <ol style="list-style-type: none"> <li>2. Spain has done or is working a lot on the legislative level like the new “Real Decreto”. Care must be taken with loopholes.</li> </ol> <p>Asif Zaman from Institute of Water Modelling (IWA) in Dhaka, Bangladesh comments that in their case these issues in the past were address like fire</p>	

	<p>fighters, trying to solve the problems as they appear. This project happened at a nice time and was successful thanks to passionate engineers and their leadership. Not only drainage and sewage Master Plans were done but more important there is an increment on the confidence on what the Institute can offer. It is all about relations building.</p> <p>Question from Alex Gracia Tarragona from ACA:        Importance of focusing on the quality of the data on the technical level, and asked about the possibility to research the result of the damage curves in a higher scale or less resolution, as sometimes in the day to day operation there are not enough resources to apply this resolution and/or models?</p> <p>MV replies that the study was done at the Raval district scale because it everything was done in fine detailed as goldsmith work, therefore there was not enough time to consider larger areas.</p> <p>Alex asks about using 2 m x 2 m resolution instead of 1 m x 1 m.</p> <p>BR answers that in the 1D / 2D model we cannot work with less resolution if we want to get the interaction between underground sewers and the surface runoff. In the Asian cases they used less resolution in the models because they did not have enough information and they concern river flooding</p> <p>PM adds that these issues are worth to study on detail and high resolutions as the value of the needed construction works are very high. He gave the examples of Madrid where 28 retention tanks with a cost of 500 million euros without knowing the exact result, and London tunnel worth 5,500 million euros.</p> <p>Finally MV does the acknowledgement and closure of the workshop, reminds everyone to be careful not to make the concept of Resilience the new Sustainable concept, as the latter has been overused and therefore misused.</p>	
9.	<b>LUNCH</b>	

## Annex

### List of attendees

Nº	Surname	Name	Organization
1	Armengol Santacreu	Xavier	Aqualogy
2	Aznar Soler	Blanca	BCASA
3	Balseiro	Catalina	ADN
4	Balsells	Mireia	UMONS & EIVP
5	Barquero Pérez	Juan Pablo	Ministerio de Agricultura, Alimentación y Medio Ambiente

6	Bella Piñeiro	Ramón	Aqualogy
7	Blázquez Aguirre	David	Urbis Up
8	Bosch Lladó	Eduard	Aigües de Barcelona, EMGCIA
9	Cabot Ple	Jordi	Aigües de Barcelona, Sanejament
10	Calabuig Aracil	David	Ajuntament de Cornellà de Llobregat
11	Campos Callao	Carlos	SE - CIRSEE
12	Campos Ferre	Joan	Secomsa Aigües
13	Carreño Tibaduiza	Martha Liliana	CIMNE - Centro Internacional de Métodos Numéricos en Ingeniería
14	Casanova Gràcia	Marta	EMATSA
15	Casas	Ana	Aqualogy
16	Castan	Salvador	Agencia Pericial
17	Celma Esteve	Myriam	ABA Congress
18	Chen	Albert	University of Exeter
19	de Fuentes	Fco. Javier	Aigües de Barcelona
20	Djordjevic	Slobodan	University of Exeter
21	Domínguez	Manel	Ajuntament de Barcelona
22	Faraj	El-Awar	UN Habitat GWOP
23	Esbrí Gras	Oscar	BCASA
24	Gabàs Masip	Ares	Ajuntament de Barcelona
25	Giraldo Vera	Manel	Aigües de Barcelona, EMGCIA
26	Gómez Valentin	Manuel	UPC - CETaqua
27	González Vidal	Daniel	CETaqua
28	Gracia Tarragona	Alex	ACA
29	Grima Gómez	Jordi Oriol	BCASA
30	Gutiérrez Diez	Enrique	Aqualogy
31	Hammond	Michael	University of Exeter
32	Lagunas i Calpe	Carles	CETaqua
33	Lamora	Emili	TYPSA
34	Lastra de la Rubia	Antonio	Canal de Isabel II Gestión, S.A.

35	Ledo Seco	Josep	Ajuntament de Badalona
36	Llasat Botija	Maria Carmen	Universitat de Barcelona
37	Llort	Xavier	HYDS
38	Lorente Gámez	Adrián	ABA Congress
39	Malgrat	Pere	Aqualogy Urban Drainage Direction
40	Manojlovic	Natasa	TUHH
41	Martí	Ferran	Photographer
42	Martin	Rocio	CETaqua
43	Martinez	Eduardo	IW
44	Martínez Fernández	Pablo	Aquatec
45	Martínez Gomariz	Eduardo	Flumen
46	Martinez Puentes	Montse	Aqualogy
47	Masia	Vincent	CETaqua
48	Mc Ennis	Suzy	Aqualogy
49	Michel	Tomas	CETaqua
50	Miñano Brea	Miguel	ACSA - SORIGUÉ
51	Mirats Tur	Josep M.	CETaqua
52	Molina	José	EMATSA
53	Mut i Bosque	Clara	CETaqua
54	Nájera Ibáñez	Alfonso	Consortio de Compensación de Seguros
55	Owen	Herbert	BSC
56	Pawlak	Malgorzata	Universidad Politécnica de Cataluña
57	Peláez Barrao	Carlos	CETaqua
58	Pieras Ramis	Rosa Maria	CETaqua
59	Pouget	Laurent	CETaqua
60	Restrepo Zambrano	Diego Fernando	UPC
61	Roca Artola	Xavier	CETaqua
62	Rodríguez Madroño	Pablo	Adasa

63	Roldán Díaz	Tamara	CETaqua
64	Rovira Pérez	Bernat	Aigües de Barcelona, EMGCIA
65	Rubio Heredia	Marina	Aqualogy Conocimiento
66	Russo	Beniamino	Aqualogy Urban Drainage Direction
67	Sala Sanguino	Josep Lluís	Giswater Association
68	Sánchez-Diezma	Rafael	HYDS
69	Sinojmeri	Fationa	UPC
70	Solà Camins	Àngels	BCASA
71	Suárez Albi	Esther	AMB - Àrea Metropolitana de Barcelona
72	Symonds Robaina	Santiago	CETaqua
73	Tellez Alvarez	Jackson	Instituto Flumen - UPC
74	Traveria Sáez	Lluís	Ajuntament de L'Hospitalet
75	Túnica Guasch	José	Aigües de Barcelona
76	Vázquez Garcia	Mery	OptiCits
77	Vegué González	Pere Ll.	Ajuntament de Badalona
78	Vela	Salvador	CETaqua
79	Velasco Dominguez	Maria José	BCASA
80	Velasco i Droguet	Marc	CETaqua
81	Ventura Termes	Laura	CETaqua
82	Villanueva Blasco	Angel	Aqualogy Drenatge Urbà
83	Walsh	Daniel	UPC Erasmus Mundus FRM
84	Zaragoza	Eduard	ADN