City Climate Scan Challenge

Cebu City

October 9-15 2017

Organizing Partners:

Rotterdam University of Applied Sciences

University of San Carlos

Hanze University of Applied Sciences

Ramon Aboitiz Foundation Inc.

City of Cebu

Contents

1. Introduction

The City Scan Challenge Cebu City, is a collaboration between Dutch, Philippine and Taiwanese universities, NGO's (RAFI, VHC) and the City of Cebu . The purpose of the event, is to investigate actual urban problems related to water and waste management and come up with innovative solutions during a 5 days challenge. The solutions should be feasible, contribute to the city's resilience against urban and climatic pressures and contribute to the Mega Cebu Vision 2050 (www.megacebu.org). Each solution will be presented to representatives of the city. 10 Dutch, 10 Philippine and 2 Taiwanese students will work together in 5 groups of five students. Each group will work on a specific challenge. Site visits, interviews with residents, location and stakeholders analysis, expert consultation, measuring techniques and workshops are part of the program. Students will work together intensively in an intercultural setting. In addition to this a floating island / floating helofytenfilter made of waste materials will be constructed, which enhances the public awareness of waste and water management.

The program starts with a getting to know event on Sunday evening. The program starts Monday morning with a kick-off at the city hall, where (city hall) experts will present the context of the problem that Cebu city encounters. On Thursday the students and lecturers will built a floating island of waste materials. On Friday 13, the last day, students will present their findings and innovative solutions to the experts and a jury at the city hall. Students will prepare a digital poster, which will be printed on a standing banner. Students will give a 2 minutes pitch to the jury of their solution.

Students of Rotterdam University of Applied Sciences, University of San Carlos, Hanze University of Applied Sciences and National Cheng Kung University will collaborate on the resilience scan of Cebu city in October 2017. The resilience scan provides the city council of Cebu City and Ramon Aboitiz Foundation crucial information to identify vulnerabilities and practical data to improve the quality of urban watersystems in Cebu City.

Students will measure environmental parameters within different fields:

1. Assignment Urban Water Quality;
2. Assignment Urban Plastic Waste Pollution;
3. Assignment Web-based mapping, Climatescan;
4. Assignment construction of temporary floating island / floating helofytefilter made of waste materials.
5. Assignment design and construction of Floating island

2. Challenges

The City of Cebu has formulated 5 specific challenges.

Challenge 1: Water Quality Challenge, macro pollutants (plastics). Inayawan
Challenge: What is the plastic pollution situation in terms of intensity and composition, and how can we get these out of the water system. Based on the OSPAR protocol we will test and assess methodologies for monitoring macro plastics in Inayawan, Quadelupe & Butuan river. These rivers discharge plastic into the ocean, cause environmental and health risks in watersheds and can cause discharge problems.
Step 1: measure the amount and composition of plastic, using OSPAR method. Step 2 design, formulate, prototype to design a waste trap, between Inayawan and SRP, that prevents the waste from entering the sea.
→ What concrete solutions can be formulated to collect the plastic waste and formulate a business case for preventing plastic waste in the water system?

Challenge 2: Water Quality, micro pollutants (nitrate, heavy metals, PAHs). Quadelupe river Challenge: What is the quality of the river water (using the Akvo app methods) and how can we map the micro-pollution and water quality in both Inayawan, Quadelupe & Butuan rivers with an innovative app and put the data on an open source map (climate scan).

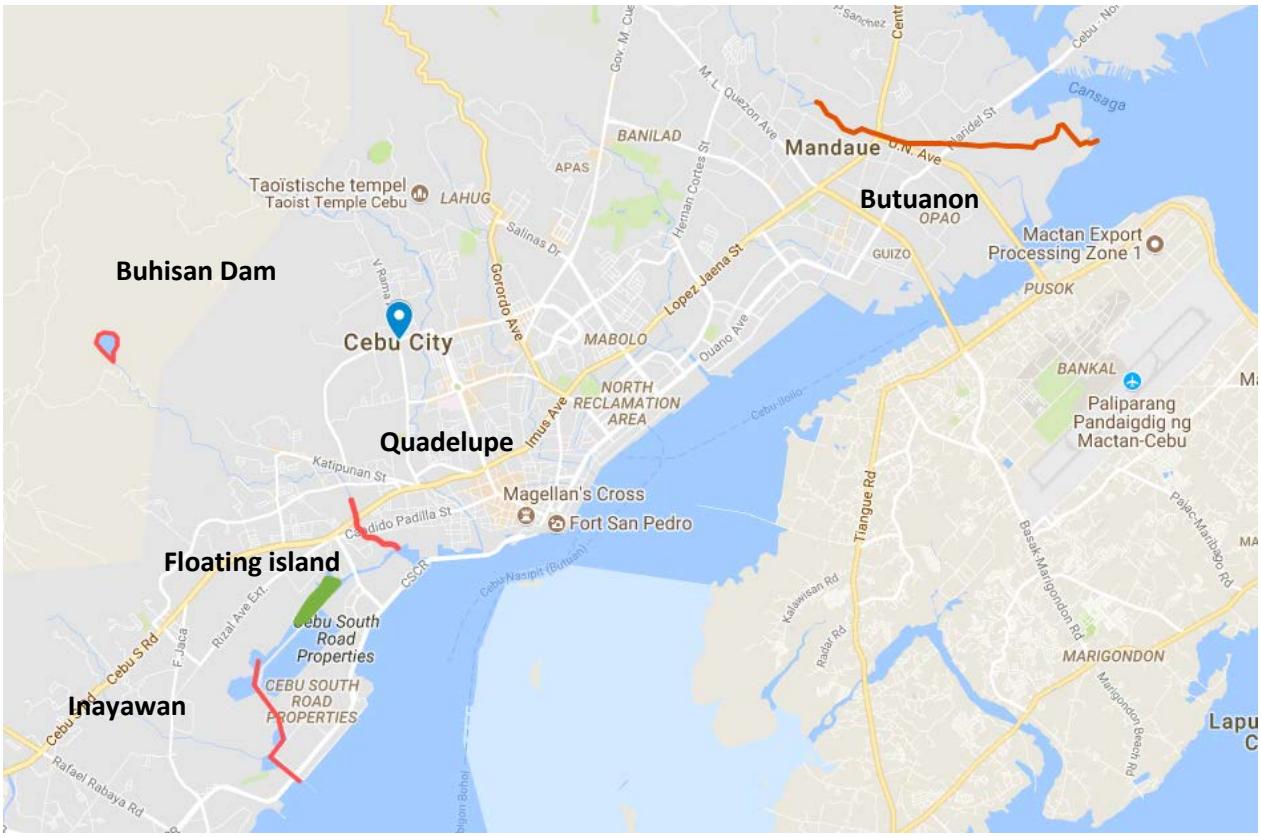
→ Identify along the rivers the main sources of pollution and formulate a feasible solution to reduce the micro pollution in these rivers.

Challenge 3: Sedimentation: dredging watercourses and basins. Buhisan
Challenge: how can we cost effectively maintain the Buhisan dam reservoir? How can we cost effectively collect the sediment in the reservoir and how can we reuse the sediment?
→ How can we make a business case to link tourism with a cable cart to Buhisan Dam and use the cable car to transport sediment from the Buhisan dam downhill?

Challenge 4: Water quantity: flooding. Butuanon river
Challenge: Could a polder-like system, with retention area and pumping stations be a feasible solution to reduce the impacts of floods in Cebu and Mandaue?
→ Which climate adaptation measures, as used in the city of Rotterdam for example, could be feasible solutions in the Cebu / Mandaue context to reduce the vulnerability and increase water safety?

Challenge 5: Floating island
Challenge: construct a floating island of waste materials. The floating island is built on waste materials and the idea is to use the cleaning capacity of plants to clean the water. This concept has been tested in other locations, and it would be an opportunity to see if this a feasible solutions.

→ How can a floating helophyte filter help to clean the water bodies of Cebu, and how could be implemented on a larger scale?



*Map SEQ Map * ARABIC 1 Locations of assignments*

3. Final Assignment

The City of Cebu has some pressing problems with waste, water quality and floods in the city and wants to inform the public about the negative impacts of urban pressure and climate change in the city, such as the effects on water quality and the quality of the urban environment in general. The assignment was formulated to create awareness and support for realization of the Mega Cebu Vision 2050 (www.megacebu.org).

The assignment of each team is to make pictures of the water bodies and measure different variables in the city, such as, urban water quality and plastic waste pollution (see challenges). You must make an account in the website climate scan and upload all data to the (open source) website www.climatescan.nl.

Each team must visualize a solution for his/her challenge on standing banner , understandable for the general public. **You must upload your assignment and pictures on google drive in the folder of your team AND on the climate scan website.**
Google Drive: https://drive.google.com/drive/folders/0B_moKlvsvSXcak9obUxTTlNlTlE?usp=sharing

Banner and pitch to be judged by jury
The city council is interested in innovative solutions to address the 5 challenges. The poster and presentation will be judged by the jury (made up of experts) based on the following assessment criteria:

Assessment criteria for the poster and pitch **Team number: ……..**		**Grade (0,1,2,3,4)** **0 not present** **1 insufficient** **2 sufficient** **3 good** **4 outstanding**
A picture of the team with the poster/banner is uploaded in the google drive	General requirement	-
The poster is uploaded in google drive	General requirement	-
The duration of the pitch is max 2 minutes	To be assessed by the jury	
The pitch is clear and concise with a clear message	To be assessed by the jury	
The poster/banner and pitch give an answer to the question: What are the **threats** for Cebu city for future development, concerning your specific assignment / topic?	To be assessed by the jury	
The poster/banner and pitch give an answer the question: What **solution** do you propose for this threat and how does this contribute to the city's resilience and the Mega Cebu Vision 2050?	To be assessed by the jury	
Visual and communicative value of the poster	To be assessed by the jury	
Special bonus points for innovative or creative aspects in pitch or in the poster	To be assessed by the jury	

4. Detailed Program

Sunday October 8 ***Tentative***

Kick-off dinner professors and students, USC and RUAS **Location:**		
17:00	Departure from hotel	
18:00	Meet at venue	

Monday October 9 ***Tentative***

Location: Cebu City Social Hall -		
Moderator: Christine Marie I. Gohetia, ManE		
8:00	Departure at Montebello	
9:00	Coffee and tea	
9:30	Key note & opening	City of Cebu
9:40	Presentation 1	City of Cebu
9:50	Presentation 2	RAFI
10.00	Presentation 3	USC
10.20	Coffee break	
10:40	Presentation: Water Quality Monitoring, water quality apps, constructed wetlands	Dr. Floris Boogaard, Water quality monitoring expert, Hanze University of Applied Sciences.
	Presentation: Global Plastic Waste Impacts	Mr. Tijmen den Oudendammer, Rotterdam University of Applied Sciences
11.15	Presentation: Design thinking, floating islands & circulair economy	Mr. Bart van Bueren, National Cheng Kung University
11.45	Presentation	USC?
12.10	Explanation of programme of the week	Mr, Rick Heikoop, Living Labs Coordinator, Rotterdam University of Applied Sciences.
12.30	Lunch	Hosted by the City of Cebu
13.00	Guided visit to: 1: Inayawan dumpside and the waterfront between Alaska Mambaling and SRP area.	
14.30	Guided visit to Butuanon river mouth.	Field work. Water quality Akvo app measuring in Butuanon river mouth.

17:00	Drop off in Montebello or mall	
17:00	End of program	

Tuesday October 10 *Tentative*

Excursion		
6:00	Departure at Montebello	
7:00	Arrival Buhisan dam and reservoir	
11.00	Lunch at location	
12.00 – 13.00	Travel time to USC Talamban	
13.00 – 13.30 Room xxx, USC Talamban	Lecture OSPAR method	Mr. Tijmen den Oudendammer
13.30 – 14.00 Room xxx, USC Talamban	Lecture Water Management Cebu city	USC professor
14.00 – 14.30 Room xxx, USC Talamban	Lecture water quality mapping	Mr. Floris Boogaard
14.30 – 15.00 Room xxx, USC Talamban	Lecture construction of design thinking and floating islands	Mr. Bart van Bueren
15.00 – 15.15 Room xxx, USC Talamban	Explanation for program next day	Mr. Rick Heikoop
15.15 – 17.00 Room xxx, USC Talamban	Teams work independently on measurement plan / Plan of action for the coming days.	- How to upload pictures of location and data to www.climatescan.nl - Poster presentation on Friday - Design of floating island
17.00	Submit digital Plan of Action of each group for the coming days (1 page)	
17.00	End of program	

Wednesday October 11 ***Tentative***

Fieldwork		
7:00	Departure at Montebello	
8:00	Arrival Guadelupe river mouth	
8:00 - 11.00	Field work demonstration OSPAR method (plastic assessment method)	Mr. Tijmen den Oudendammer, All teams and lecturers
	Field work method water quality mapping	Mr. Floris Boogaard All teams and lecturers
11.00 – 13.00	Lunch time / free time with group	
13.00 – 15.00	Inayawan river mouth Water quality mapping and OSPAR method	**Team 1 and 2** Mr. Tijmen den Oudendammer, Mr. Bart van Bueren, and USC lecturers
	Butuanon river mouth Water quality mapping and OSPAR method	**Team 3 and 4** Mr. Floris Boogaard, MR. Rick Heikoop, and USC lecturers
15.00 -17.00	Teams gather in Montebello	Working on: - Upload pictures of location and data to www.climatescan.nl - Poster presentation on Friday - Design of floating island
17.00	End of program	

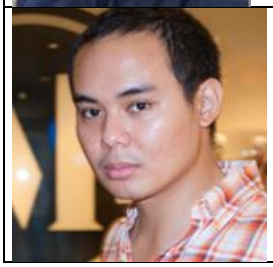
Thursday October 12 ***Tentative***

Physical construction of showcase		
7:00	Departure at Montebello	All
7:00 – 8:00	Travel time to waterfront between Alaska Mambaling and SRP area.	
8:00 – 15.00	Construction of temporary floating island and / or floating helophyte-filter made of waste materials.	All students and lectures
15:00 - 16:00	Official opening / picture taking / press	
16:00 – 17:00	Travel to Montebello	
17.00 – 19.00	Dinner & working on poster	
20.00	Submit digital poster file to	Google drive

Friday October 13 ***Tentative***

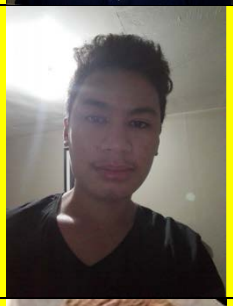
Pitches and Forum discussion		
8.00	Departure at Montebello	
8.30	Coffee	
9.00	Kick-off at RAFI by moderator	Moderator:
9:15	Key note speech	
9.30	Introduction jury	
9.30 – 10.30	4 pitches / presentations	Student TEAM 1 – 4
11.00	Announcement of winning team	
11.30	Official closing	
12.00	Lunch	
13.00 – 16.00	Open forum discussion	Mr. Tijmen den Oudendammer Mr. Floris Boogaard Mr. Bart van Bueren Mr. Rick Heikoop Mr. Sean Ligtvoet Other speakers
17.00	End of Program	

5. Professors and Lecturers

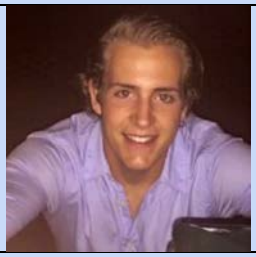
	Engr. Aure Flo Oraya Civil Engineering Department University of San Carlos	+639177790388
	Engr. Kathrina Marie Borgonia Assistant Instructor Department of Civil Engineering University of San Carlos	+63336653861
	Engr. Michael Angelo Barriga Faculty Department of Civil Engineering University of San Carlos	
	Engr.Kristoffer John Ducay University of San Carlos-Civil Engineering department	

	Senior Lecturer Rick Heikoop, MURP, MEMR Climate adaptation, international collaboration Rotterdam University of Applied Sciences, Netherlands	+31649610646
	Professor Dr. Floris van den Boogaard Spatial transformation and climate adaptation Rotterdam University of Applied Sciences, Netherlands	+31651556826
	Senior Lecturer Tijmen den Oudendammer Plastic waste and water management Rotterdam University of Applied Sciences, Netherlands	+31626132179
	Senior Lecturer Bart van Bueren 白汎埔 Circular Economy Visiting Expert NCKU // Waterarchitect National Cheng Kung University, Tainan, Taiwan	+886 987772440

6. Teams and student participants

	Team number	Full name	Phone number	Photo
Team 1, Inayawan (see map 3)				
1		Delos Santos, Christian Ray	+639153185706	
2		Abas, John Rolly	+639774923293	
3		Amores, Kurt Daniel L	+63 917 126 5878	
4		Kuijer, Duco	+316 17385808	

5	November Shine Ang	09228472518	
6	Angelika L. Alcantara	+639173067552	
7	USC Professor, Engr. Aure Flo Oraya	+639177790388	
Team 2, Quadelupe (see map 6)			
1	Yu, Lexie Joy	+63 917 621 2618	

2	Delgado, Maria Ellen	+639452188008	
3	Kruiswijk, Branco	+316 4039953	
4	Hereijgers, Martijn	+31634984944	
5	Joshua Tahanlangit (ECE)		
6	USC professor, Engr. Kathrina Marie Borgonia	+63336653861	

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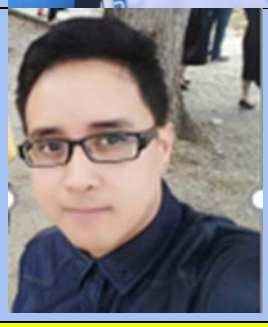
RAFI
RAMON ABOITIZ FOUNDATION INC
NATIONAL CHENG KUNG UNIVERSITY 1931
akvo.org
Hanzehogeschool Groningen
University of Applied Sciences

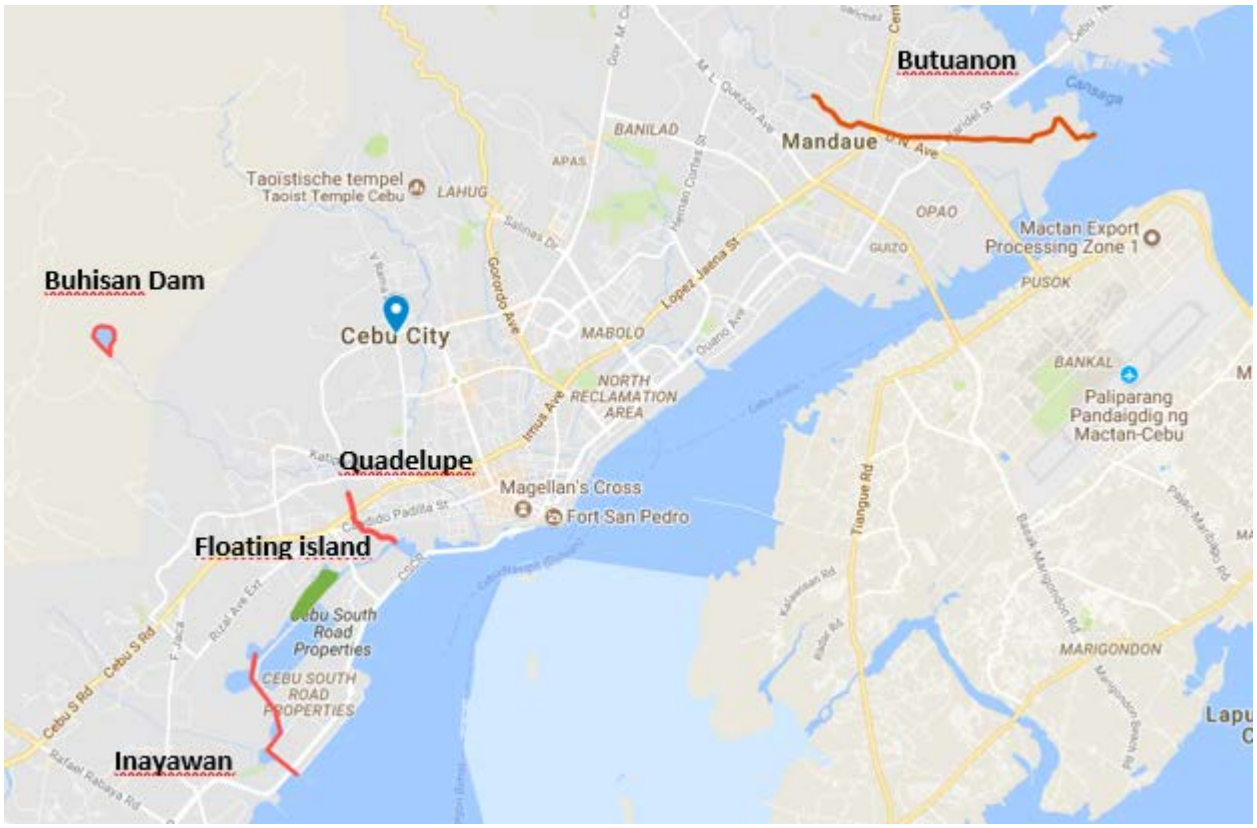
Team 3 Buhisan (see map 4)			
1	Zambo, Kreisha	+639279341193	
2	Abella, Davy Jean	+639568764743	
3	Anouk de Koning	+316 39621487	
4	KUAN WEI CHEN陳冠維 (Wayne)	+886 975206371	
5	Saskia Schmöle	+49 1757007788	

6	Engr.Kristoffer John Ducay University of San Carlos-Civil Engineering department		
Team 4, Butuanon (see map 5)			
1	Anne Sophie van Ooosterom	+31 6 57938821	
2	Steven Wielemaker	+31638331451	
3	Mikhael Glen Lataza (EE)		
4	Engr. Sheila Jungco		
5	Jodivine Navarosa	+639394226056	

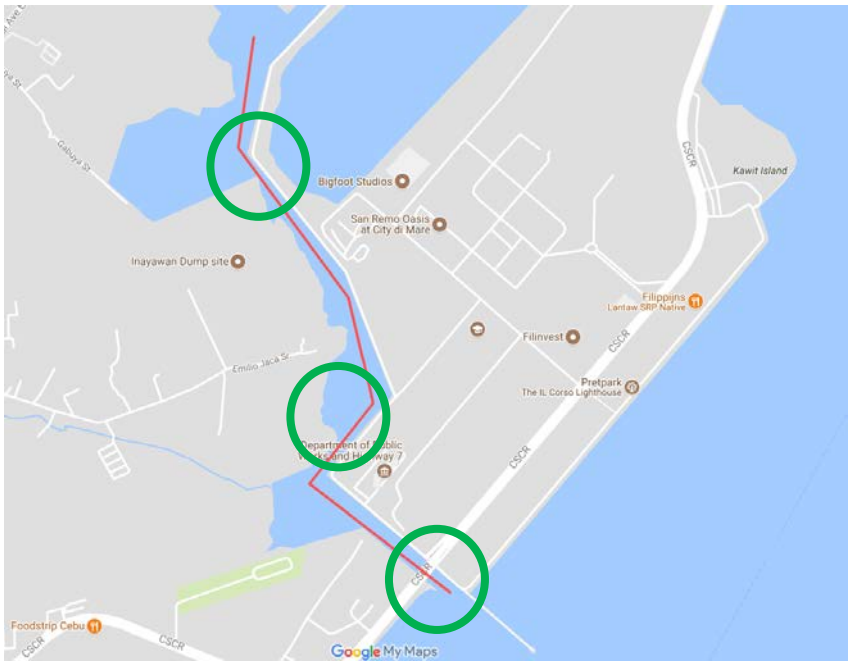
6	Brian John Sarno, PhD Assistant Professor USC Chemistry Dept./UP Cebu Science Cluster	:+63925-847-2169	
7	USC Professor, Engr. Michael Angelo Barriga		
Team5, Floating Island (see map 7)			
1	Max Donck	+31618576434	
2	Loran Koster	+31634292323	
3	TUNG YANG LAI 賴東暘(Tony)	+886 963460520	

4	Joshua Villaver (ECE)		
5	Denzyl Marie A. Yangco	+63-917-303-6708	
6	Ruselen Grace Angel Ellorda	+63-977-064-8637	
7	NCKU Professor, Bart van Bueren	+886 987772440	

7. Locations

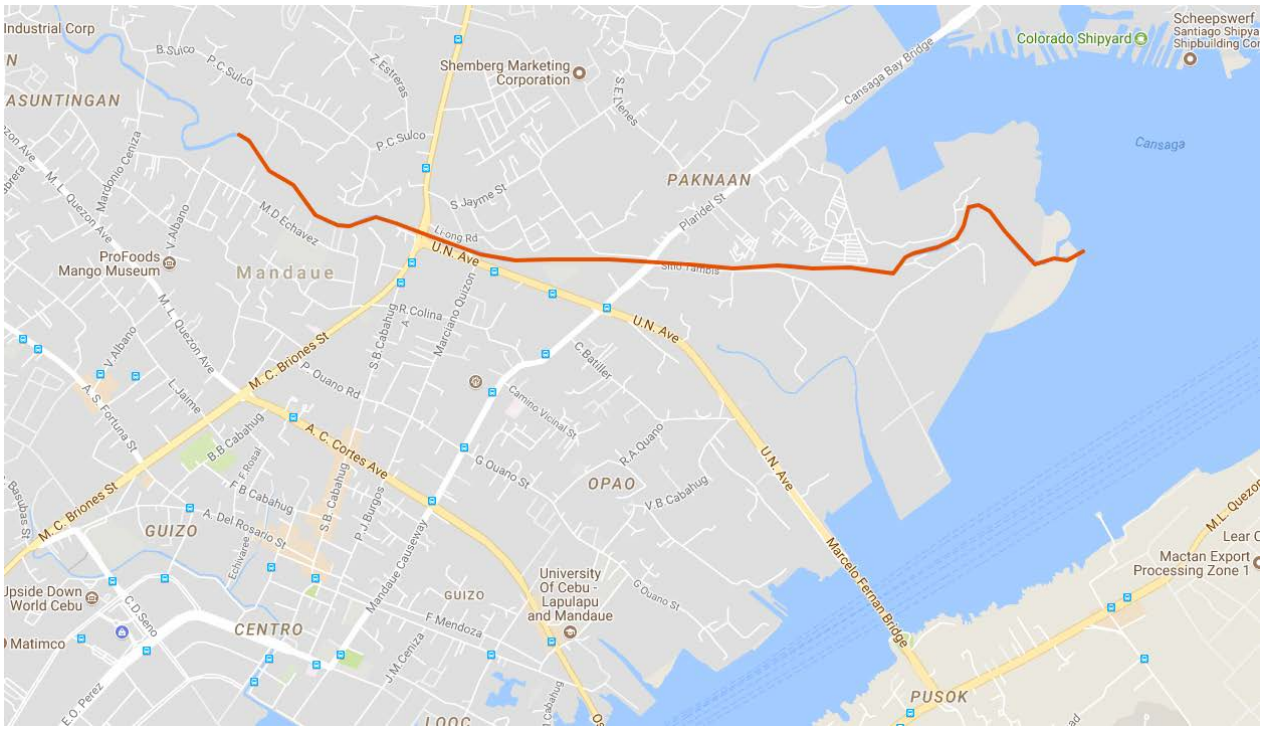


Map 2: Overview of locations

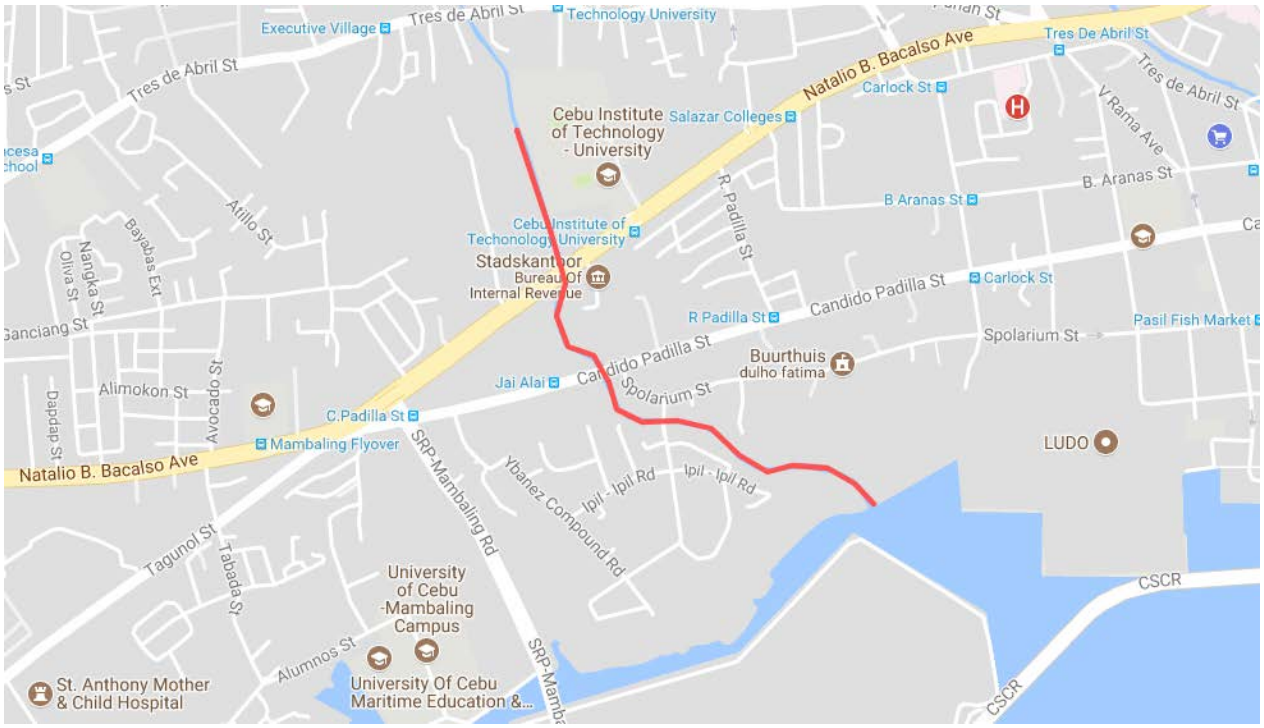


Map 3: Location Inayawan and possible locations of litter trap

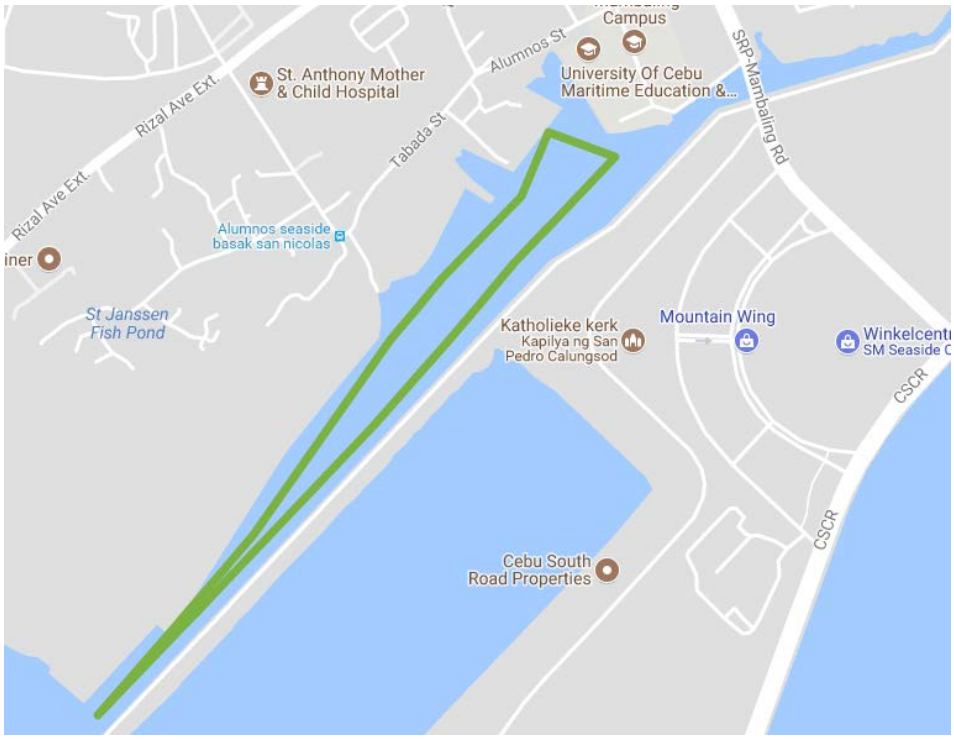
Map 4: Location Buhisan Dam



Map 5: Location Butuanon River



Map 6: Location Quadelupe River



Map 7: Location show Case Temporary Floating Island

1. Assignment Urban Water Quality

Coordinator: Floris Boogaard

Arranged by Hanze University of Applied Science (HUAS)

Introduction

In coastal and low-lying vulnerable delta cities, such as the barangays of Cebu located along the coastline, there has been an increase in vulnerability of urban flooding and water quality problems. New approaches address the current and future effects of climate change and increase urban quality, reduce vulnerability and increase water quality.

Measurement description

The teams will take samples of the waterquality at several places in Cebu using apps on smartphones and being mapped on open source maps. All the results are geolocated on a map and more results can be uploaded, accessible by anyone with the smartphone application.

In the near future, more test results and parameters will be analysed and uploaded real time with the smartphone application. In a fieldworkshop, measurements with apps and grap samples (by waterauthority) can be simulatiniously taken.

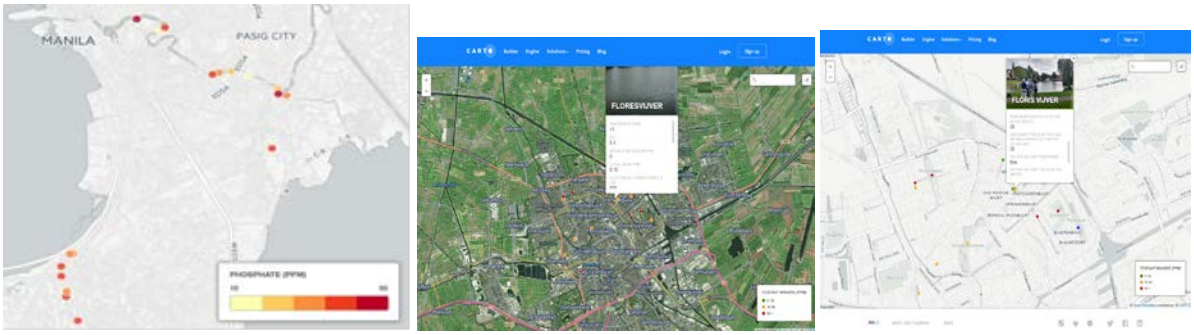
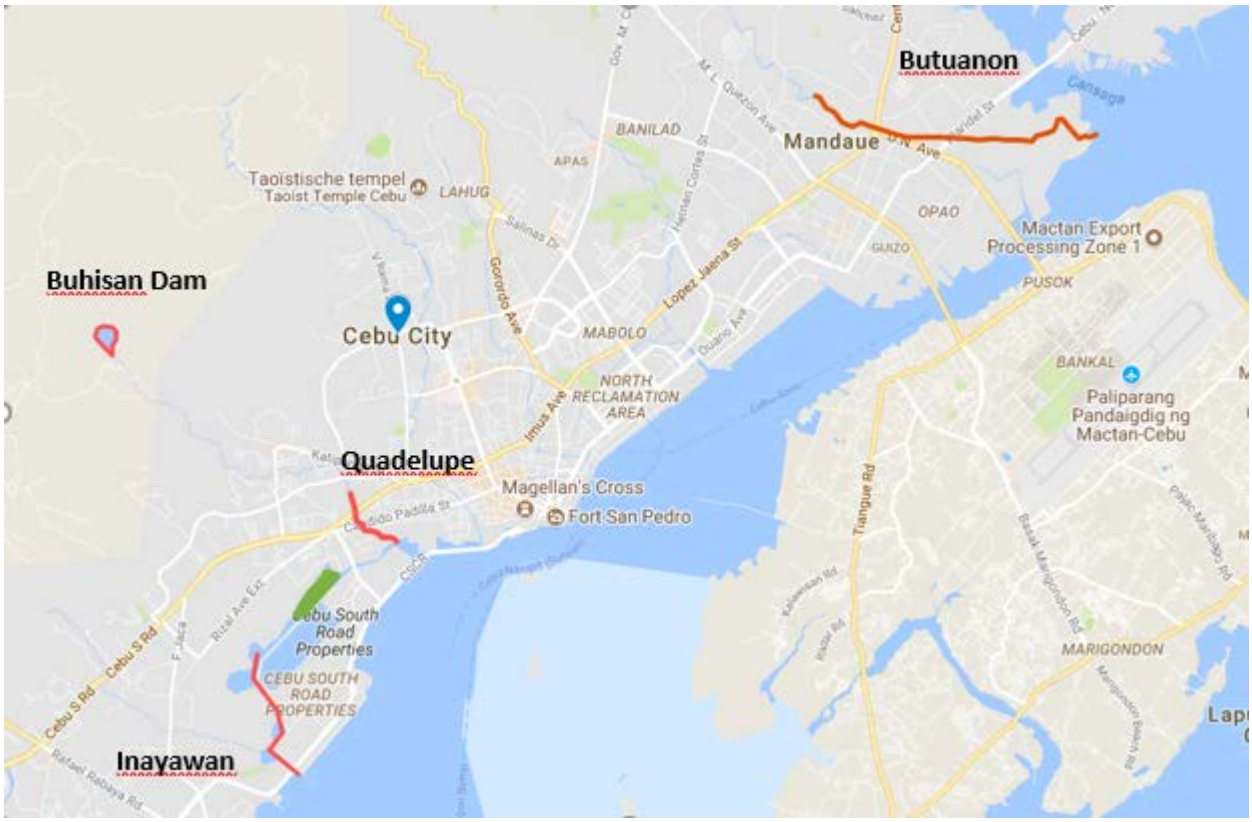


Figure 1: Example of water quality measurements

Location

Students measure the water quality of local water systems by transects. The transects are given in map 3,5 and 6.



Map 8: Experimental Transects (locations Inayawan, Quadelupe and Butuanon

Data collection protocol & methodology

Fieldwork form water quality

Water quality app

Literature

Boogaard F., de Boer E., Heikoop R, Palsma M., Effective international knowledge exchange to rehabilitate rivers in urban delta's: case study Metropolitan Manilla, ICSEWR, Melaka. Malaysia December 2016.

Schampers W., Boogaard F., 3D Scan geeft dynamisch inzicht waterkwaliteit vijvers Groningen, vakblad riolering oktober 2016.

Assignment Urban Plastic Waste Pollution

Coordinator: Tijmen den Oudendammer

Introduction

Plastic pollution in the world's oceans and seas is under growing attention and the environmental impact of plastics in the environment is only recently been studied. It is however known that much of this plastic pollution comes from urban areas, where disposed plastics are discharged through rivers and streams to finally end up in the oceans (Jambeck, et al, 2015).

How much plastics are actually discharged through rivers is debatable because uniform monitoring data is lacking. The discharge can be measured by surface measurements (visual camera registration of floating items), river body monitoring (actual sampling in the water column using nets and filtration systems) and riverbank monitoring (monitoring of plastic litter deposited on river banks) (Gonzáles-Fernández & Hanke, 2017 and Hanke, et al, 2016) . The latter seems the most practical method to get quick indicative results on types and numbers of litter transported by rivers, since it does not involve technical tools and logistics such as nets, boats and cameras.

Since there is a strong variation in river morphology and amount of plastic discharged as well between rivers as within a river basin, a standardized method is needed to be able to validate recorded data on plastic riverine litter. For marine litter the OSPAR beach monitoring method is long standing (OSPAR, 2010). An adapted methodology for rivers has been developed to be able to compare marine and riverine results.

The goal of your measurements is two-fold:

1) Monitor the amount of plastic riverine litter in several (urban) locations;
2) Test and validate 3 methods based on OSPAR monitoring for riverine litter monitoring.

Measurement description

Method 1: standard OSPAR riverbank monitoring

For the length of a 50 m transect parallel to the waterline you will monitor all items found on the riverbank, using the OSPAR monitoring form (see appendix 1). You will do this for all litter (that is visible while standing), up to 5 m from the waterline (or up to the landward edge of the riverbank) (based on Earll, et al, 2000).

Method 2: randomized OSPAR riverbank monitoring

For the length of 50 m transect parallel to the waterline you will measure all items (visible while standing) within a 1m x 1m quadrat at 10 random locations. You will randomly select 10 quadrat locations every 5 meters along the transect by throwing a dice. With the numbers on the dice corresponding to the relative distance to the waterline (see figure x).

Method 3: High water level mark monitoring

At 5 randomly picked spots along the high water level mark you will sample a 50 x 50 cm grid (You can use www.randomizer.org to generate 5 unique random distances between 0 – 50 m). At these spots you will collect all non-organic material, and categorize found materials using OSPAR form.

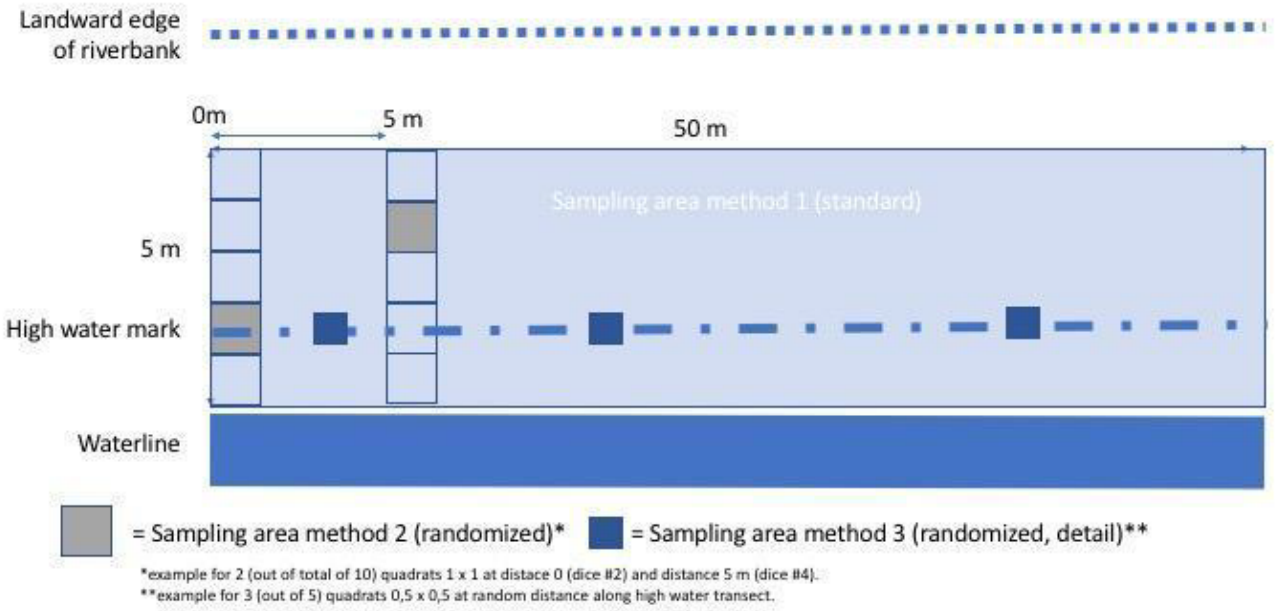


Figure 2 Different Sampling methods. 1) Sampling of total surface over 50m transect, up to 5m from waterline; 2) Sampling of 5 randomly chosen grids of 1 x 1m; 3) Detailed sampling of 5 randomly chosen grids of 0,5 x 0,5 m at the high waterline.

Locations

Map 9: Inayawan Plastic waste measurement locations

Map 10: Butuanon measurement locations

Data collection protocol & methodology

Tools needed:

- Ruler
- Measure tape
- Camera (smartphone)
- Quadrat 1x1
- Quadrat 0,5 x 0,5
- OSPAR form and guide.
- Dice

- Bin Bags

For both methods items are counted and registered according to the different categories and types given in the monitoring form.

For each type of litter found a photograph must be taken, with a size indicator visible (e.g. ruler). This to be able to determine abundance (nr. items) and relative abundance (size ratio).

Fieldwork form plastic soup

See handout for the fieldwork form and photo guide with examples per category.

Literature

Earll, R.C., Williams, A.T., Simmons, S.L., Tudor, D.T. 2000. Aquatic litter, management and prevention – the role of measurement. Journal of Coastal Conservation 6: 67-78.

González – Fernández, D., Hanke, G.2017. Toward a Harmonized Approach for Monitoring of Riverine Floating Macro Litter Inputs to the Marine Environment. Frontiers in Marine Science. 4. . 10.3389/fmars.2017.00086.

Hanke, G., González Fernández, D., Tweehuysen, G., Bellert, B., Holzhauer, M., Palatinus, A., Hohenblum, P., Oosterbaan, L. (2017). Riverine Litter Monitoring - Options and Recommendations. . 10.2788/461233.

Jambeck, J. R., Geyer, R., Wilcox, Siegler, T.R., Perryman, M., Andrady, A., Narayan, R., Law, K.L. 2015 Plastic waste inputs from land into the ocean. Science, 13 february 2015; vol 347 Issue 6223.

OSPAR. 2010. Guideline for monitoring marine litter on the beaches in the OSPAR maritime area. OSPAR Commission Agreement number 2010-02 ISBN 90 3631 973.

2. Assignment Web-based mapping, Climatescan

Introduction

There is a wide diversity of projects undertaken to address urban resilience and climate proofing in the world. International knowledge exchange tools are evaluated with result: stakeholders demand tools that are interactive, open source and provide more detailed information (location, free photo and film material). This abstract details the outcomes of an interactive web-based map application for international knowledge exchange on 'blue-green' projects around the globe. Climatescan.nl has proven to be a successful tool with over 5000 users and more than 2000 international projects. The tool is used in several international workshops and serves the needs of different stakeholders.

Measurement description

Register on www.climatescan.nl (open source so you can directly start). Download the app 'climatescan' from sotution (only for android). Use the app to locate gps and choose category. Give a name and short description and upload photos. Press upload and all info is immediately placed on the website www.climatescan.nl. You can add websites, articles, videos links to the website when ever you want.

Location

See maps

literature

Tipping, J., Boogaard F., Jaeger R., Duffy A., Klomp T., Manenschijn M., Climatescan.nl: the development of a web-based map application to encourage knowledge-sharing of climate-proofing and urban resilient projects, International waterweek 2015, 3 November 2015, Amsterdam.

F. Boogaard , J. Tipping , T. Muthanna , A. Duffy , B. Bendall , J. Kluck ., Web-based international knowledge exchange tool on urban resilience and climate proofing cities: climatescan, 14th IWA/IAHR international conference on urban drainage (ICUD), 10-15 September 2017, Prague.