



Annexure E – Course syllabus

Module 4: Climate change and Urban Water Cycle Management

Module 4: Climate Change and Urban Water Cycle Management		
General Data	Module Number	Module 4
	Semester weeks (duration)	1 Week / 6 hours
Description	Description of module / key content	<p>This module, Climate Change and Urban Water Cycle, is divided into two sub-modules. The first sub-module discusses basics of climate change, provides an overview of the urban water cycle, water sources related to the urban water cycle and impacts of climate change on urban water cycle and urban water infrastructure. Also featured are adaptive urban water and the technological aspect of urban storm water management. Sub-module two looks at climate change, land use planning and integrated urban water management. Themes covered include climate change and urban water governance, integrated urban water management, land use and strategic planning; and the roles of Governments, utility companies and local communities in the wake of climate change and urban water cycle management. Case studies are considered from the less developed countries (Africa, South America/Caribbean and Asia) on cities particularly vulnerable to climate change, cities with serious water needs and cities at the coast or deltas. Suggestions are provided on student-led learning and practical work.</p>

	<p>Rationale for the module</p>	<p>Climate change is inevitable as supported by numerous research and scientific evidence (Houghton et al., 2001; Lambeck, 2010; UNEP & UNFCCC, 2002). Predictions that the climate may change further in the future is impacting not only on different ecosystems but different aspects of societal life is particularly of great concern to town planners and city managers. Cities continue to expand in population, together with accompanying development putting pressure on service delivery including sustainable water supply among others. These pressures are compounded by the looming climate change, necessitating pro-active measures towards adaptation. Among these measures are research, training and the dissemination of information to different target groups to strengthen their preparedness. Institutions of learning and organizations have to play a great role in such knowledge production and training. This is one of six modules initiated by the Cities and Climate Change Academy, all aimed at mainstreaming climate change in urban education and town planning practice.</p> <p>The module provides basic information on urban water cycle management (including sanitation) accompanied with illustrations/examples of documented climate change impacts. It also has a scientific component which would be of relevance particularly to the technical/experts that have to find solutions to the challenges and issues of climate change; and to students/professionals in the built environment whose training previously did not include direct engagement with climate change whether at the theoretical or practical level. The student- led approach proposed is expected to provide the basic skills necessary for understanding of climate change and empirical evidence sought through field trips will expose the target learners to real life situations and to bring in their experiences within the context of climate change. At the theoretical/laboratory level, target learners will increase their spatial analysis skills (applied GIS); knowledge base & ability to appreciate climate change impacts (through gaming, scenarios; role playing; modeling etc.). The module can however, be used in part as modified accordingly by the trainer(s) to non-professionals which may include decision makers such as municipal officials (mayors, councilors, economists, housing officials); insurance & banking institutions; targeted NGOs engaged in various activities (housing, agriculture, environment); disaster management officials</p>
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		<p>(firefighters; emergency services etc.); and health officials. The module delivery will have to be modified accordingly depending on the expected learning outcomes for the targeted learners. The module is intended to inform educators and city managers on the impact of climate change on the urban water cycle management and to provide the necessary skills and approaches for managing climate change impacts. The module also targets lectures specifically in urban & regional planning schools/institutions that are expected to play a critical role in the production informed and skilled planners whose are conscious and aware of the direct impact of climate change on space. In addition, the lecturers have to understand climate change in order to enable its direct inclusion in the planning curriculums taught as a result of their increased knowledge base on climate change and experiences from field trips & practical learner-led sessions suggested by the module.</p>
	<p>Module objective(s)</p>	<ul style="list-style-type: none"> i. To provide an overview of the impact of climate change on the whole water cycle, urban sustainability and public health. ii. To help participants learn methods and tools of assessing the impacts of predicted climate change on their water resources and the urban cycle. iii. To provide an inventory of mitigatory and adaptive measures (including structural and non-structural measures) related to climate change and urban water management. iv. To help participants learn how to integrate mitigatory & adaptive methods in spatial planning decisions. v. To inspire the learners to work at the local level and promote community participation
	<p>Learning objectives</p>	<ul style="list-style-type: none"> i. Participants would be able to acquire proper understanding of different components of the urban water cycle. ii. Understand the impacts and assess the outcome of projected climate change on the urban water cycle. iii. Participants to be able to discuss how climate change affects water demand and supply under different spatial and temporal scenarios’.

		iv. Understand integrated climate change urban water management techniques and approaches available to different stakeholders (local & national governments; utility companies & local communities).
	Key ideas of student led learning	Group discussions, field trips, studios, scenario planning, role playing and debates. The student led-learning activities will be guided by the region specific context but in general there are common/basic principles which will be applicable to all regions. It is proposed that after the lecture has been given appropriate topics for debates/group discussions to be formulated by the facilitator/lecturer based on the expected learning outcome (s). It could be for instance to test the learners understanding of the basic principles of climate change and significance to spatial planning and sustainability of settlements. Field trips are also recommended to enable learners to observe key issues and facilities that are likely to be affected by climate change and to identify the challenges specific to their regions. In addition the learners will be expected to come up with solutions. Role playing will be based on demonstrating how institutions respond to the different/dynamic climatic scenarios. Some of these can be undertaken in studio/class rooms or council meeting chambers depending on the region's institutional set up or structure. Technical skills and techniques to be taught in GIS laboratory sessions. Scenario planning within the context of varying conditions (e.g. impact of increasing aridity; floods; health implications as a result of changing climatic situations. The discretion is to be left to the instructors to determine what is most relevant with the aim of challenging the learners (planners) to be both reflective and innovative.
	Class hours	6 hours
	Student led learning hours	46 hours (2 field trips and 10 practical sessions for the two sub-modules).
	Expected hours of individual study	15 hours (excluding non-professionals such as politicians and general policy makers).

	Target Learners (Related fields of study/compatible specializations/associated programs) (incl. year and degree level)	University students in town planning and housing, architecture, engineering, government departments (health, water, town and regional planning), utility companies and the built environment.
	Use of local case studies (to be developed by users)	Cases of special water needs, flood vulnerability, aridity, and projects related to adaptations, sanitation, and storm water management.
	(Suggestions) of Collaboration	With international agencies (WHO, UN-Habitat, etc.); NGOs, utility companies, local authorities and state departments.
	Means of assessment	Compilation of a report, group presentations
Annexes	Lecture (PowerPoint presentation)	Two PowerPoint presentations on 1) Climate Change and Water Resources (39 slides) and 2) Climate Change, Land-use Planning and Integrated Urban Water Management (34 slides).
	Lecture notes	Both sub-modules are supplemented by lecture notes in PDF.
	Reading list	Includes 5 key readings for each sub-module and further references
	Case studies from different regions	<ol style="list-style-type: none"> 1. Cities with special water needs -Latin America and the Caribbean(Mexico City) 2. Cities Particularly Vulnerable to Climate Change, the Case of Singapore 3. Coastal Cities and Cities in River Deltas, the case of Douala, Cameroon 4. St Louis (Senegal) 5. Dar es Salaam (Tanzania) 6. Durban (South Africa)