



## The Case of Cali Ciliwung in Jakarta

# The Landscape Challenge

Text by Christophe Giroit and Jörg Rekittke  
Images as credited

Ciliwung means "turbid water" in local Javanese language; one regrettably notes that the river still lives up to its old name.

It is our belief that landscape architecture can play a pioneer role in situations of environmental degradation in urban areas. By defining a mode of action on the site and acting simultaneously on the overall watershed system, it can construct a better knowledge of fundamentals.

A group of ETH (Swiss Federal Institute of Technology Zurich) doctoral researchers from the Future Cities Laboratory and design research students from the National University of Singapore-Masters of Landscape Architecture (NUS-MLA) programme are looking at questions of landscape and ecology on environmentally degraded sites along Cali Ciliwung in Jakarta. Combined site investigations led by both students and doctoral researchers looked at the scale of the whole watershed, as well as at a smaller scale of study at three locations. A three-step scaled approach to terrain analysis, showing the entire watershed, the river corridor, and three specific sites, was deployed using remote sensing techniques and a blend of open-source material enhanced by punctual terrestrial and aerial reconnaissance to create the basis of a geographically informed three-dimensional model. The investigations will be developed and combined over the next three years consolidating information about site conditions and informing the research team on the possible options and choices towards a concerted mode of intervention, but

the definition of a set of new skills in remedial landscape design does not stop at the level of a complex site analysis. It must also develop a transformative understanding of the site that is both culturally respectful of traditions and ecologically congruent. This concerns not only the study of environmental problems pertaining to the river system as such but also the understanding of cultural traditions and current social sensitivities. With the help of advanced remote sensing methods deployed, some solid hydrological modelling can be produced, but there is also a need for a strong cultural dialogue and better understanding of the ethno-botanic potential of the river. There is further the need for a definition of a long-term vision of the Ciliwung river, which could eventually be restored to a strong natural corridor for Jakarta.

Several approaches to the involvement of people are possible, including working locally with inhabitants living in the adjacent neighbourhoods to better understand their relationship to this river through an ecosystem services approach. This will allow for a more general appreciation of the river's inherent potential for the inhabitants. More formally, work with government agencies in Jakarta is also possible and could pave the way towards a more comprehensive discussion about policy pertaining to the river. Cali Ciliwung has a long history of use

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and misuse, and its present condition is not natural. The river, which had always been the prime supply of water for the inhabitants, can no longer be considered a water source. Because of this lack of water supply, excessive groundwater extraction has had a tremendous impact on the water table and geological substrate, and as a result the city is subsiding through compaction. Could Cali Ciliwung become yet once more a supply of potable water for Jakarta? From the landscape architectural and engineering perspective, this is possible. However, it is important to deliver the appropriate know-how, not only in the form of technical solutions but also in terms of culturally meaningful and effective propositions.

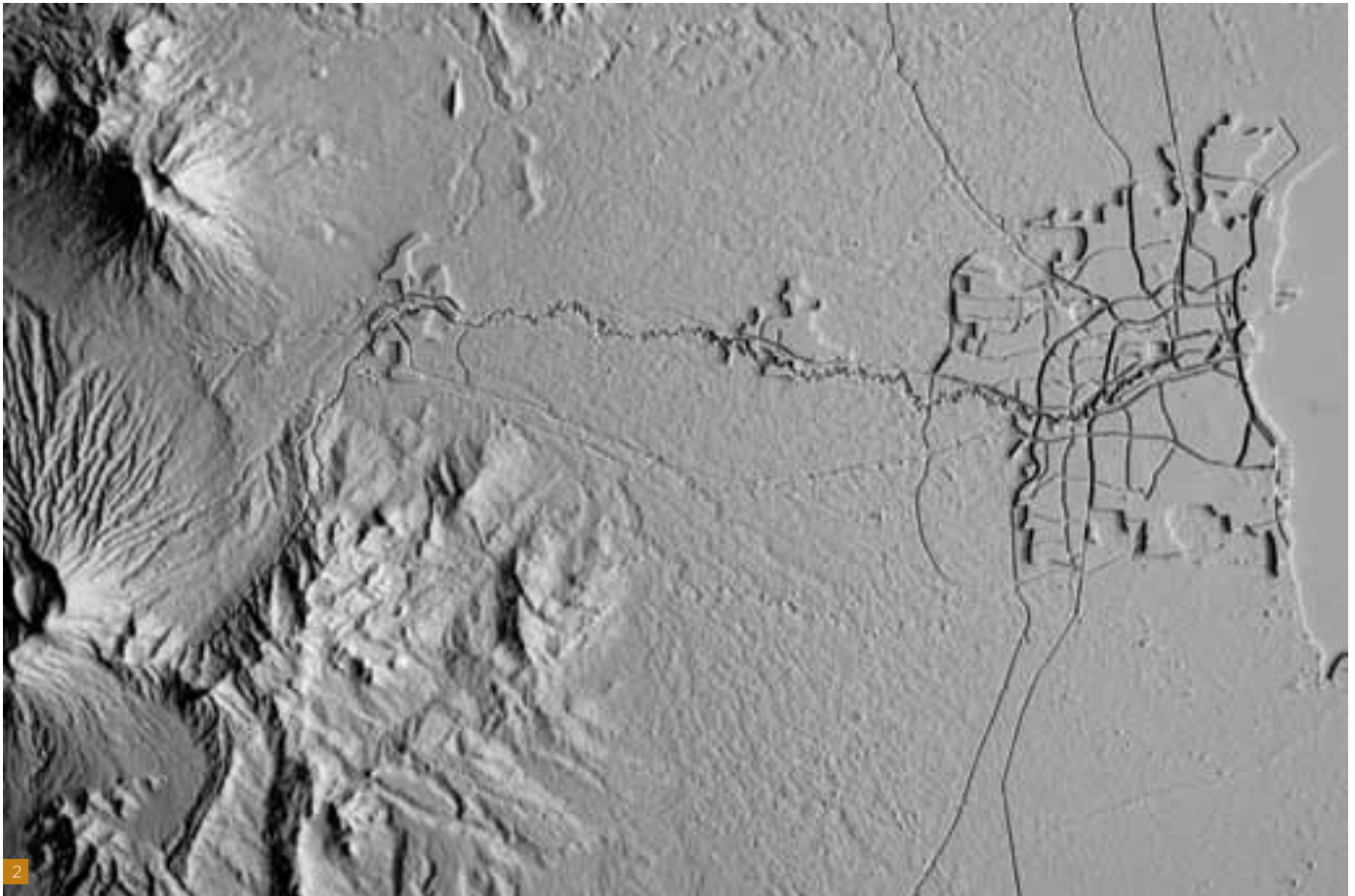
From its source on the slopes of Mount Mandala Wangi, Cali Ciliwung runs 100 kilometres through a relatively small 500-square-kilometre catchment area comprising parts of Bogor, Depok, and Jakarta before merging with the sea (Fig. 2). Prone to repetitive flash floods of cataclysmic proportions, particularly the recent flood of 2007, certain neighbourhoods of Jakarta point the problem of Cali Ciliwung to the upstream city of Bogor. The situation has become far worse in the last decade, with the dumping of wastes into the river provoking the appearance of a new semi impermeable “geological” layer, posing health and environmental problems for Jakarta.

Ciliwung means “turbid water” in local Javanese language; one regrettably notes that the river still lives up to its old name. The sediment comes from upstream erosion, in areas that have been cleared of vegetation for further urban development. What best practices can be applied in such a situation? Two diametrically opposed approaches are indeed possible. One could push for a forced clean-up of the entire river bed and informal settlements along the river banks; however such an approach may result in an urban design that is oblivious to existing settlement patterns. The alternative could be concerted action with the informal settlers and

local population along the river in order to develop a sustainable concept, cleaning up the banks and accepting the fluctuations of the river as an inherent part of the settlement’s characteristics. These two diametrically opposed approaches would ultimately result in different ecologies—the question is which to choose?

Investigative research on Cali Ciliwung, carried out by Module VII of the Singapore ETH Future Cities Laboratory (see webpage [www.future-cities.ethz.ch](http://www.future-cities.ethz.ch)), has started at two levels: first, with a Design Research Studio (DRS) at the Masters Level, meant to provide precious field-work on specific urban areas as well as initial design concepts (Fig. 3); and second, with specifically focused investigations by doctoral students using the help of students from local Indonesian universities. The DRS on Cali Ciliwung in Jakarta involves a dozen NUS-MLA students in their final semester under the direction of NUS Professor Jörg Rekittke and ETH Professor Christophe Girot.

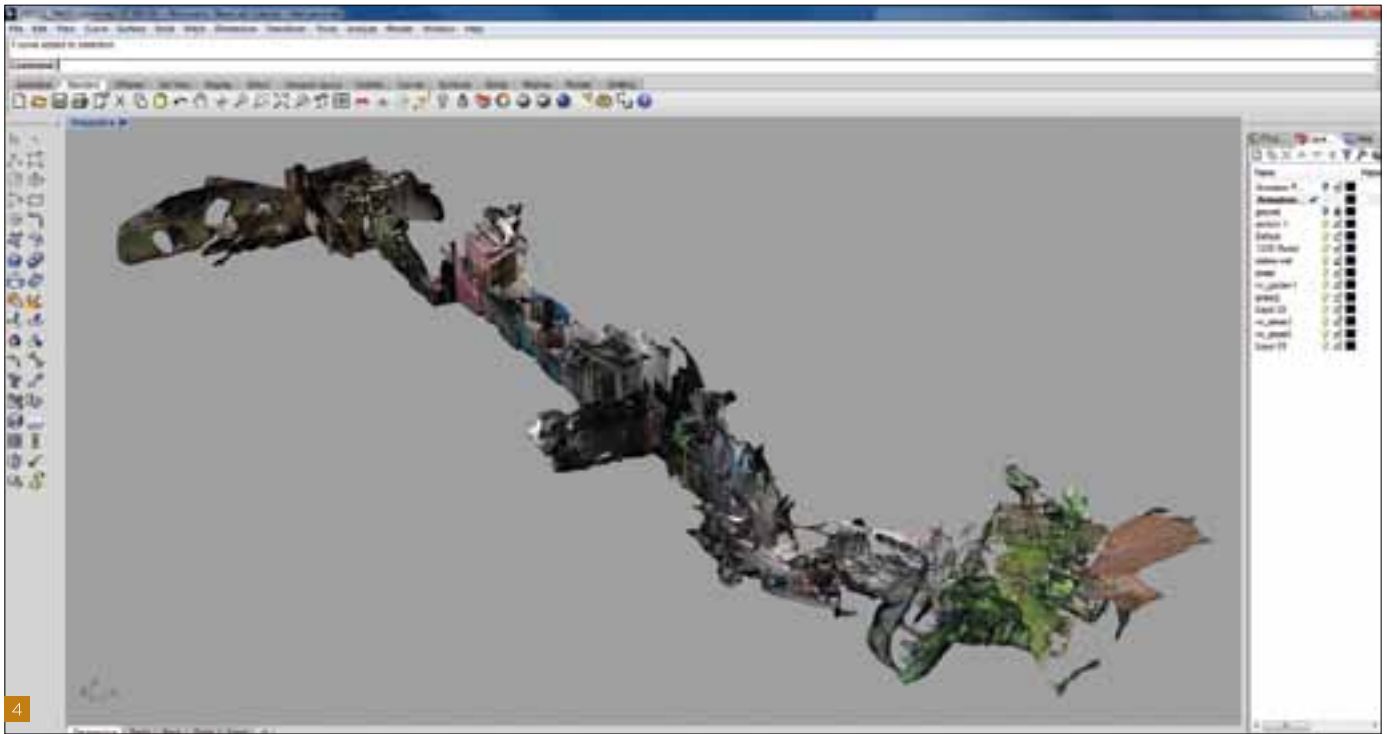
Three internal workshops, taught respectively by Alexandre Kapellos from the ETH in Rhino modelling and CNC milling, James Melsom from the ETH in landscape visualising and UAV drone operations, and Philip Paar from Berlin in field reconnaissance and geo-data mining in Jakarta, have set the operational framework and methodology of the studio. Work has focused on the river as it crosses the flood-prone Kampung Melayu and Bukit Duri neighbourhoods of Jakarta, where countless informal settlements abut the river. The studio has yielded a set of extremely precise GIS-located cross sections of the river. This has enabled experimentation with detailed three-dimensional modelling of certain river sections under study (Fig. 4), which can then be inserted into the larger geo-referenced urban models produced by Module VII. The goal of this pilot studio has been to develop a new set of design tools and methodologies capable of dealing with the physical and spatial complexity of degraded landscape environments. It results in



3 Initial Design Concepts on the Coexistence of Urban Settlements and Ciliwung River

2. Physical model of the Ciliwung River from the source to the mouth (Photo: A. Kapellos, ETH Zurich).


3. (Image: NUS-MLA students).



a set of comprehensive landscape design proposals for the melioration of Cali Ciliwung in Jakarta. The underlying thesis of this studio is that landscape architecture can take the lead in restoring the ecology of this river within a complex informal urban context. With a healthy dose of heuristic terrain analysis, the team has tried to develop a first foothold on Cali Ciliwung in the neighbourhoods of Jakarta. Further DRSs will consolidate such know-how that may then serve the design and management of other tropical watersheds within dense urban agglomerations. The goal of the DRS has been to set clear topological rules with hydrologists, landscape architects, and planners to define the soundest way of restructuring the river not only ecologically but also culturally in response to the reality of flooding.

The doctoral research team under the direction of ETH Professor Christophe Girot (PI), ETH Professor Paolo Burlando, ETH Professor Adrienne Grêt Regamey, NUS Professor Jörg Rekittke, and NUS Professor Liang Shie Yui is comprised of seven doctoral candidates and one post doctoral candidate working at different scales of territorial intervention. Both landscape architects and environmental engineers will work at the scale of the entire watershed ecosystem and catchment, providing precious information on the river's overall behaviour in terms of rainfall and discharge. Elaborate three-dimensional landscape models will be deployed that can in return inform work on sediment transport, flooding, and water quality at the intermediate scale of the river corridor. The compiled hydrological information will be integrated in a potential environmental landscape

model along the entire Cali Ciliwung corridor. Finally research on the three key sites along the watershed, upstream in Ciawi, midstream in Tanjung Barat, and downstream in Kampung Melayu, will develop specific operational tools in appropriate landscape design and topology. These will also inform ecosystem services and surface to groundwater hydrogeology.

The goal of this investigative research in remedial landscape architecture for the polluted and flood-prone informal settlements of Jakarta is to offer an alternative approach to urban renewal. It is our firm belief that with precise tools of topology, we will be able to develop some alternative low-cost solutions to the severe problems at hand. This will also make a lasting difference to the quality of life of the inhabitants and hopefully change their inherent lack of respect for the environment (Fig. 5). It is only by joining the symbolic with the scientific that a new meaning and respect for nature can be achieved. Research on Cali Ciliwung within the framework of the Future Cities Laboratory will conclude in June 2015. Let us hope by then that it will mark the beginning of a new approach towards landscape architecture and ecology and its vital role to play in tropical megacities. 

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## FCL Modle VII Doctoral Programme 2011-2015

### Professors

ETH Professor Christophe Girot (PI)  
 ETH Professor Dr. Paulo Burlando  
 ETH Professor Dr. Adrienne Grêt Regamey  
 NUS Professor Dr. Jörg Rekittke  
 NUS Professor Dr. Liong Shie Yui

### Post Doctoral Researcher

Dr. Senthil Gurusamy ETH

### Doctoral Candidates

Michaela Prescott ETH  
 Nikolaos Theodoratos ETH  
 Kashif Shaad ETH  
 Derek Volmer ETH  
 Diogo da Costa NUS

## NUS MLA/FCL Module VII DRS Ciliwung Studio 2012

### Professors

ETH Professor Christophe Girot  
 NUS Professor Dr. Jörg Rekittke

### Module Instructors

Philip Paar, Berlin  
 James Melsom, ETH Zürich  
 Alexandre Kapellos, ETH Zürich

### Students

Lehana Guo  
 Neha Metha  
 Rachel Teo  
 Gauri Bharihoke  
 Ayus Hou  
 Soh Han Jie  
 Becky Sng  
 Syuhada Limat Nur  
 Ervine Lin\*  
 Nur Syafiqah Nahadi  
 Yazid Ninsalam\*

\*Will join the FCL doctoral programme in the  
 Summer of 2012



4. Detailed experimental digital three-dimensional model of a terrain section perpendicular to Ciliwung River (Image: Y. Ninsalam, NUS).

5. Fishing in the Ciliwung (Photo: Jörg Rekittke).