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Reducing Flood Risk in a Megacity: Using Mobile Application and Value Capture for Flood Risk Prevention and Risk Reduction Financing

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Abstract : The megacity of Abidjan is a coastal urban area where the number of floods reported and the associated impacts are on a rapid increase due to climate change, an uncontrolled urbanization, a rapid population increase, a lack of flood disaster mitigation and citizens' awareness. The objective of this research is to reduce in the short and long term period, the human and socio-economic impact of the flood. Hydrological simulation is applied on free of charge global spatial data (digital elevation model, satellite-based rainfall estimate, landuse) to identify the flood-prone area and to map the risk of flood. A direct interview to a sample residents is used to validate the simulation results. Then a mobile application (Flood Locator) is prototyped to disseminate the risk information to the citizen. In addition, a value capture strategy is proposed to mobilize financial resource for disaster risk reduction (DRRf) to reduce the impact of the flood. The town of Cocody in Abidjan is selected as a case study area to implement this research. The mapping of the flood risk reveals that population living in the study area is highly vulnerable. For a 5-year flood, more than 60% of the floodplain is affected by a water depth of at least 0.5 meters; and more than 1000 ha with at least 5000 buildings are directly exposed. The risk becomes higher for a 50 and 100-year floods. Also, the interview reveals that the majority of the citizen are not aware of the risk and severity of flooding in their community. This shortage of information is overcome by the Flood Locator and by an urban flood database we prototype for accumulate flood data. Flood Locator App allows the users to view floodplain and depth on a digital map; the user can activate the GPS sensor of the mobile to visualize his location on the map. Some more important additional features allow the citizen user to capture flood events and damage information that they can send remotely to the database. Also, the disclosure of the risk information could result to a decrement (-14%) of the value of properties locate inside floodplain and an increment (+19%) of the value of property in the suburb area. The tax increment due to the higher tax increment in the safer area should be captured to constitute the DRRf. The fund should be allocated to the reduction of flood risk for the benefit of people living in flood-prone areas. The flood prevention system discusses in this research will minimize in the short and long term the direct damages in the risky area due to effective awareness of citizen and the availability of DRRf. It will also contribute to the growth of the urban area in the safer zone and reduce human settlement in the risky area in the long term. Data accumulated in the urban flood database through the warning app will contribute to regenerate Abidjan towards the more resilient city by means of risk avoidable landuse in the master plan.

Keywords : abidjan, database, flood, geospatial techniques, risk communication, smartphone, value capture
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