

***Concept and Practice of the Cultural Heritage Conservation under Flood Disaster:
A Case Study of Ayutthaya, Thailand.***

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Abstract

In this paper, the past flood in 2011, the historical monument sites of Ayutthaya were also affected and damaged, the threat posed to cultural heritage by flood disaster analysed for six zones in Ayutthaya, Thailand. The vulnerability of 84 historical monument sites has been evaluated through a conservation calculation based on the approach conducted is based on previous study and application of Geographic information system (GIS) techniques for identifying the disaster vulnerability areas and the priorities conservation. For the present study, this adapted approach was chosen because it allows the non-experts in the field of urban cultural heritage or architecture conservation, to perform survey on the step of conservation. Moreover, the results of GIS can be verified with the field survey to deliver priorities of intervention based on the vulnerability of the historical monument sites, physical factor that are considered important for the occurrence of flood disaster have been used to generate a susceptibility map. A qualitative risk assessment was carried out by combining susceptible area and historical monument sites. As there were very limited historical damage data available on the occurrence of flood disaster, a combination of local and expert knowledge has been used to extract information on both historical monument sites. Finally, some recommendations are given related to the analysis of the impact of natural hazards on historical monument sites and assets for evaluate the risk factors of integrating hazard risk aspects of cultural heritage sites into the conservation plans.

Keywords: community based, conservation, cultural heritage, damage, flood disaster, priority.

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Introduction

This study is based on cultural heritage conservation under flood disaster in Ayutthaya, in a group of local people adults living in an area of “Ko Mueang” or Ayutthaya City Island and around areas which was severely affected in 2011 by the flood.

The Historic City of Ayutthaya, founded in ca.1350, was registered as a world heritage site on 1991 (Office of Fine Art Department, 1994). World Heritage Properties are important for national and community proud and for social cohesion, under the World Heritage Convention, the States Parties sign up to the obligation of preserving World Heritage properties for future generations. Disasters do happen therefore it is best to be prepared to manage these unavoidable events (UNESCO, 2010).

Thailand is regarded as highly vulnerable to natural disasters caused by hydro-meteorological phenomena (floods, landslides, storms, droughts, etc.). Moreover it is also ranked as the seventh most flood prone country in the world. The flood occur almost annually, and they are by far the most devastating disaster in the country. Official statistics from 2002–2008 show that the country floods average was approximately 10 times per year (The World Bank, 2012).

Ayutthaya has a long history of flood cycles in seasonal variance. Ayutthaya’s river flooding problems long time ago. In the past, the local people solved this problem by digging canals (The World Bank, 2009). As current situations change, canal digging is no longer an appropriate way for the city flood protection. The past flood in 2011, has its results to the physical, economic, social and environment damages (UNDP, 2004). The important cultural property of Ayutthaya were also affected and damaged.

Methodology

Research site.

The study was conducted in Ayutthaya, Thailand. More precisely, we selected all the six zones include, Ayutthaya Historical City, In areas outside the Ayutthaya Historical City, The Eastern areas outside the Ayutthaya Island, The Western areas outside the Ayutthaya Island, The Northern areas outside the Ayutthaya Island, The Southern areas the Ayutthaya Island. Ayutthaya is a province in middle of Thailand, located 75 km. from Bangkok, the capital city. The elevation of these areas ranges from 1.00-2.00 m. and the total area is approximately 3,000 rai (4.80 Sq.km.) (Office of Fine Art Department, 1994) (The World Bank, 2009).

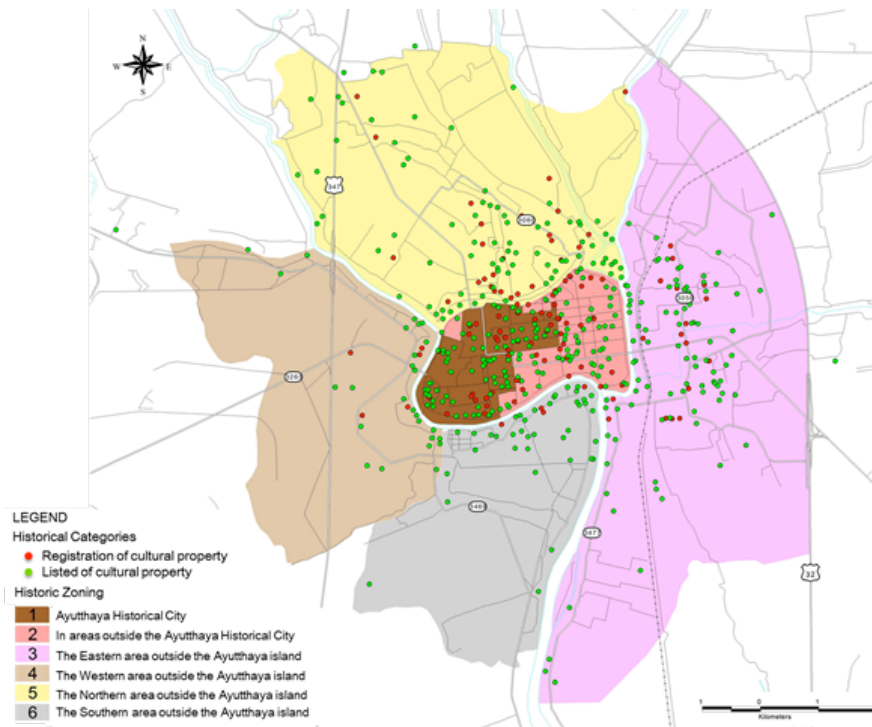


Figure 1: The Distribution of Cultural Heritage Sites around Ayutthaya Historical City Coordinated by the Global Positioning System.

Table 1. The Distribution of Cultural Heritage Sites in Ayutthaya.

Cultural Heritage	Registered	Listed	Grand total
Zone 1	30	75	105
Zone 2	30	64	94
Zone 3	18	90	108
Zone 4	5	26	31
Zone 5	27	79	106
Zone 6	5	40	45
Total	115	374	489

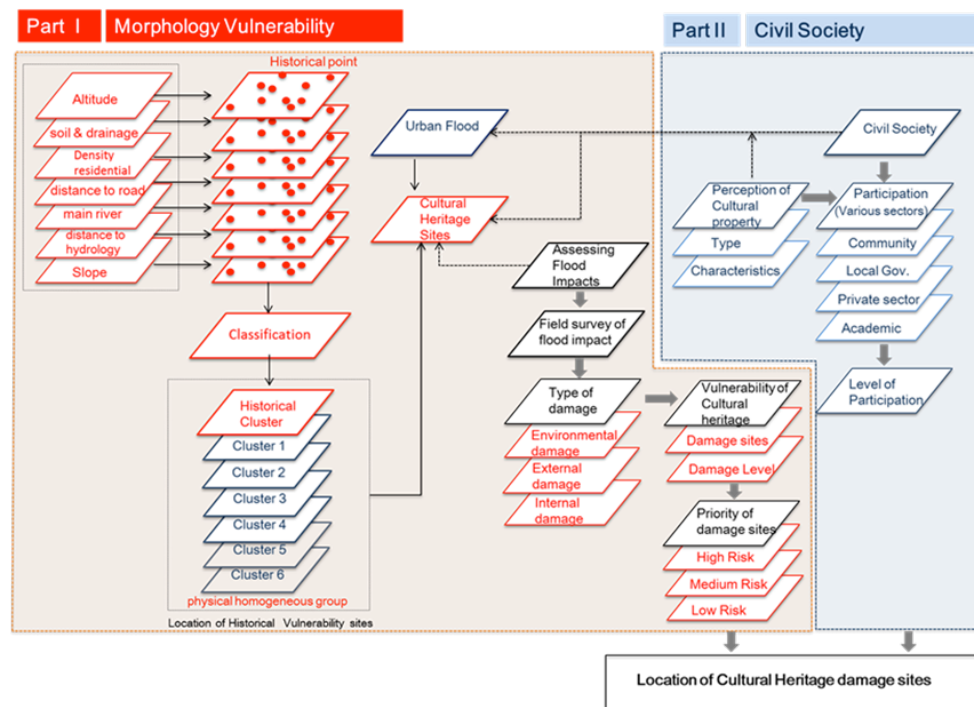


Figure.2: Methodological Framework for Urban Morphology Types.

Result and Discussion

Concept of assessing impact and value.

It is important to assess the damages in terms of environmental damage, external damage and internal damage. The levels of damage; high risk, medium risk and low risk respectively, are also assigned. Furthermore, the CHS values are ranked as high (Ayutthaya historical city), medium (registered) and low values (on the list) (Office of Fine Art Department, 2010). These two factors are employed as indicators for setting the priorities of CHS conservation.

GIS-mapping and analysis of disaster risk is in two layers: Layer 1 is a degree of risks at the site (high risk, medium risk, low risk) Layer 2 is the values of the site (high value, medium value, low value). Analysis is done in order to develop recommendations for management action which will put the high priority on historical sites of high value and high risk (Figure 3)

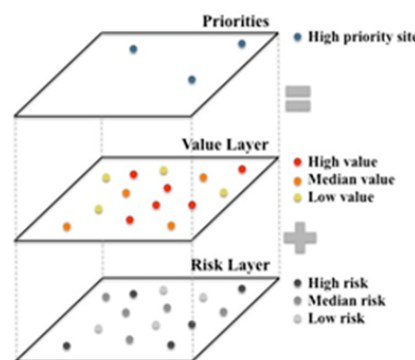


Figure 3: The Concept of Assessing Impact and Value
[Source: Wittya Daungthima and Kazunori Hokao, 2013].

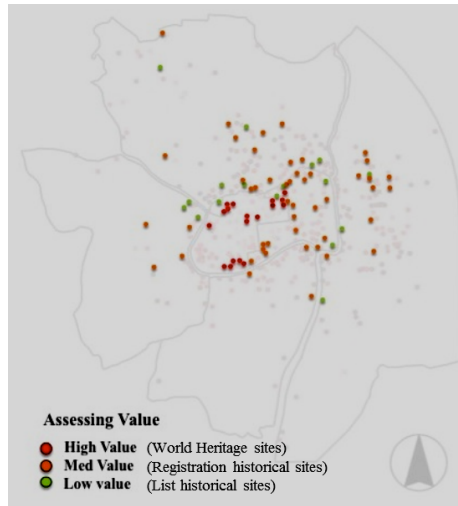


Figure.4: The Value of Cultural Heritage [Source: Wittaya Daungthima and Kazunori Hokao, 2013].

Assessing the flood impacts.

CHS plays a significant role in the Ayutthaya historical city identity and is important to conserve. The 2011 floods have greatly affected a large number of CHS assets including museums, temples, archaeological sites, cultural landscapes, and historic landmarks within and around the Ayutthaya city. Assessing damage and losses to CHS assets is a site-specific exercise. Their diversity requires site-by-site assessments.

Type of damage.

The survey of CHS damage sites in Ayutthaya is based on the types of damage which are: 1) Environmental damage consists of areas at risk from flood, ground cracks, landscape damages, pit on ground or subsidence, surface water flow paths, vulnerable communities and critical infrastructure. 2) External damage which are light damage (wall or decorative aspects) and structural damage 3) Internal damage includes interior of affected building (wall, decoration and ceiling). From the surveys, it was found that, at present there are 3 groups in Ayutthaya CHS damage (Wittaya Daungthima, Kazunori Hokao, 2013).

Field survey and damage assessment.

The field survey on previous flood impacts studies. To studies the details of the data store to the field and the type of damage by the description of CHS include the Name of cultural heritage, Type of cultural heritage (registration historical sites and list historical sites), Coordinate by GIS and GPS, Address of cultural heritage, Zone of cultural heritage, Description compound size and construction, Photo number, Date and time for the operators to explore and records data corruption CHS. Type of damage include 1) Environmental damage: areas at risk from flood, ground cracks, landscape damage, ground of the pit or subsidence, surface water flow paths and critical infrastructure. 2) External damage: light damage (wall, decorative aspects), structural damage. 3) Internal damage: interior of building affected (wall, decoration, ceiling) to find characteristic of the damage sites and level of the damage.

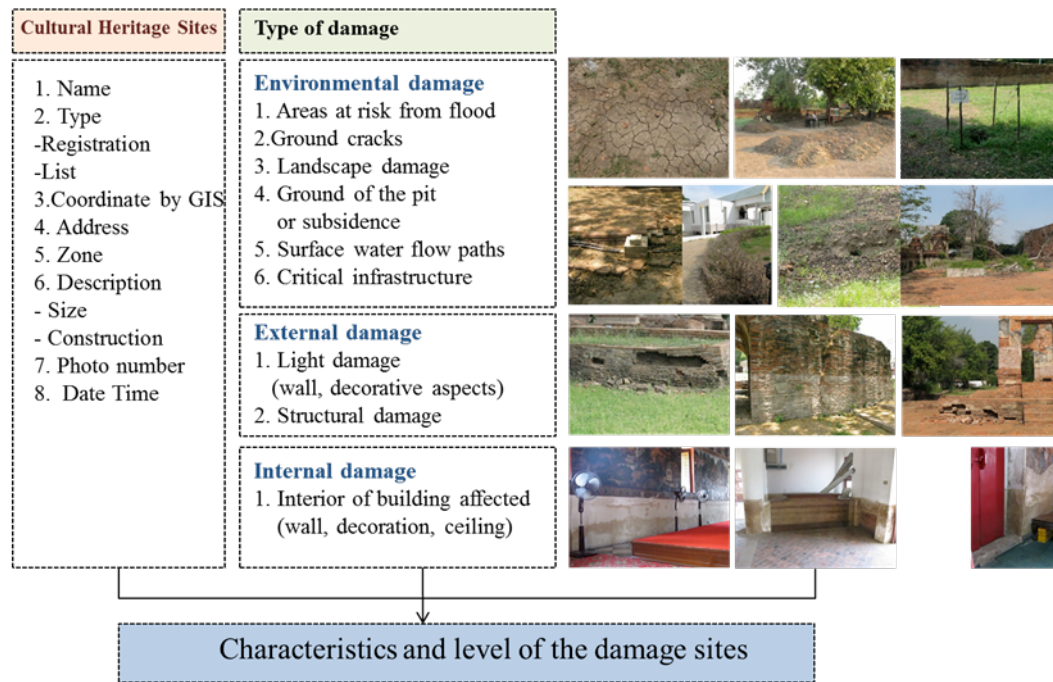


Figure 5: Characteristic and Level of the Damaged Sites [Source: Author, 2013].

The studies of field survey on April – May, 2012 the flood impacts and the CHS vulnerabilities the result show that the previous flood has damaged the CHS in Ayutthaya. To conserve those CHS, it is important to assess the damages in terms of environmental damage, external damage and internal damage. Environmental damage, high risk found 6 CHS, medium risk found 37 CHS and low risk found 41 CHS. In UMT 2 the most Environmental damage, UMT 3 and UMT 1 respective (see in Figure 6). External damage, high risk found 11 CHS, medium risk found 23 CHS and low risk found 50 CHS. In UMT 2 the most External damage, UMT 3 and UMT 1 respective (see in Figure 7). Internal damage, high risk found 10 CHS, medium risk found 18 CHS and low risk found 56 CHS. In UMT2 the most Internal damage, UMT 1 and UMT 3 respective (see in Figure 8).

The levels of damage; high risk, medium risk and low risk respectively, are also assigned. The results are shown in Table 5. Assessing impact of flood high risk found 11 CHS, medium risk found 30 CHS and low risk found 43 CHS. In this study found 84 CHS in study area were assessed as damage by flood in 2011 is shown in figure 9 for the remaining 405 HMS damage assessment was carried out considering due to limitations during the historic monument sites survey of the damage, some of HMS them begin for renovation. The field survey of flood impacts, water flood in Ayutthaya on October – December, 2011 and drainage of moisture in the soil need time to prevent damage to structure of the CHS (Wittaya Daungthima, Kazunori Hokao, 2013).

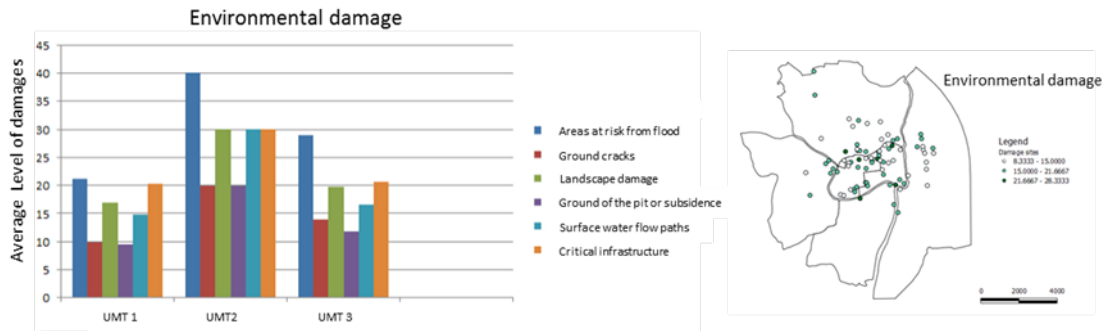


Figure 6: Types of Environmental Damage [Source: Author, 2013].

Table 2 Assessing Impacts of flood Environmental Damage.

Custer	High Risk 21.67- 28.33	Med Risk 15.01-21.66	Low Risk 8.33-15.00	Total
Damage site	6	37	41	84

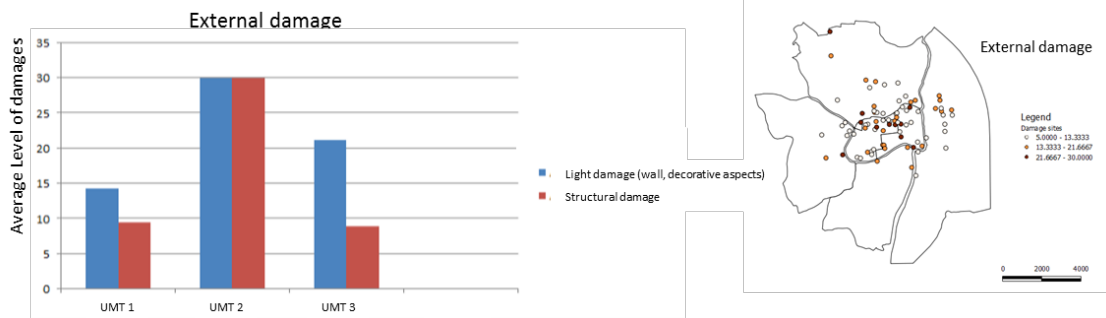


Figure 7: Types of External Damage [Source: Author, 2013].

Table 3 Assessing impacts of flood External Damage.

Custer	High Risk 21.67- 30.00	Med Risk 13.34-21.67	Low Risk 5.00-13.33	Total
Damage site	11	23	50	84

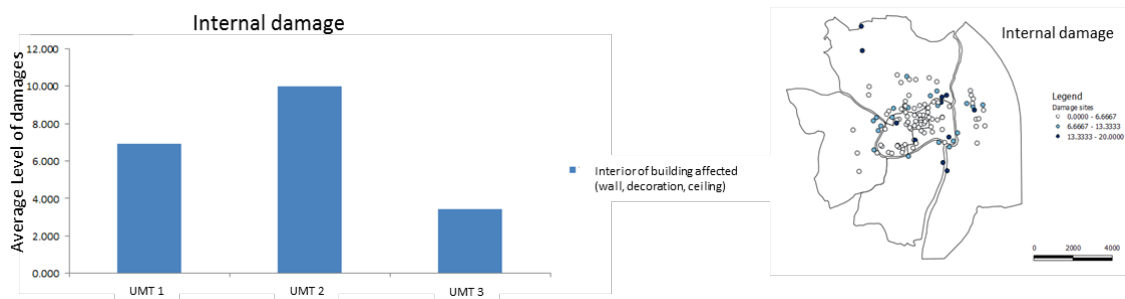


Figure 8: Types of Internal Damage [Source: Author, 2013].

Table 4 Assessing impacts of flood Internal damage.

Custer	High Risk 13.34- 20.00	Med Risk 6.67-13.33	Low Risk 0.00-6.66	Total
Damage site	10	18	56	84

Table 5 Assessing impacts of flood.

Custer score	High Risk (181-240) 17.04- 23.33(%)	Med Risk(121-180) 10.74 - 17.03 (%)	Low Risk(60-120) 4.44 -10.73(%)	Total
Damage site	11	30	43	84
Average	214.29	146.77	96.74	125
Min	190	130	60	60
Max	240	180	120	240

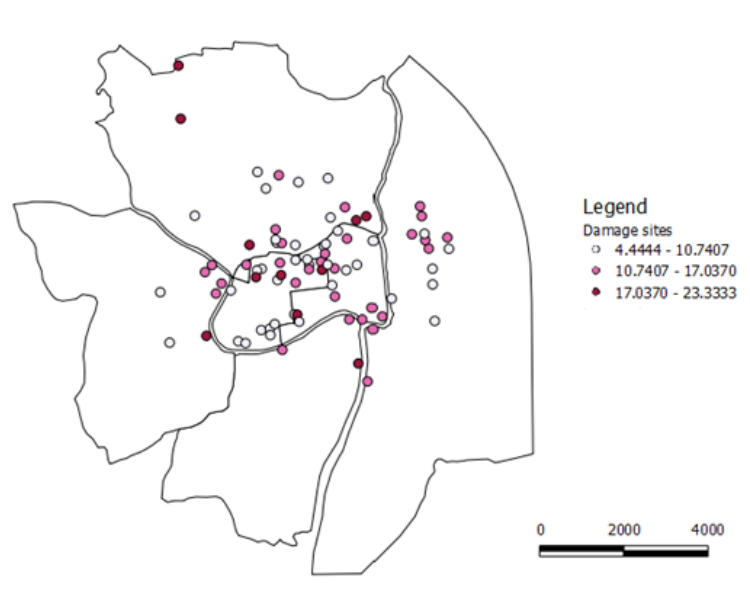


Figure 9: Assessing Impacts of Flood [Source: Author, 2013].

Integrated assessment to support urban scale and local neighborhood scale.

The scale and level of flood effects to urban area and cultural heritage had required to the will require local governments and civil society. Some cultural heritage sites are beginning to require local governments meet urban flood protection of cultural heritage sites. However, it is at the local level that most protection, the process made-by public officials, practitioners and citizens in cities. That process not included decisions process about flood protection and cultural heritage sites. City planners and local decision makers generally lack the tools and means needed to make informed choices about the flood risk and cultural heritage implications or to measure their effects. Policy makers and regulators at all urban scales, as well as their political constituents and stakeholders, need decision support tools that illustrate the flood protection and cultural heritage implications of urban morphology type so relevant land use, conservation areas decisions.

This research focuses on the presents and ideal tools or integrated with spatial information for support decision maker on urban flood and cultural heritage sites in

the previous study. This integrated urban flood risk and cultural heritage sites to evaluate the relative urban morphology classification benefits of alternative development approaches in a city ranging from the building scale to the local neighborhood to city settlement level. It summarizes the relationship between morphology and flood risk, particularly in the flood mitigation arena and to presents a framework that illustrate how integrated tools are already being proposed in Ayutthaya Historical City (AHC) as part of the urban planning and urban design process. This study shall present an idea to overcome investigate safety and security of their local areas, and draw up the results in to map for decision making sharing of information transfer of powerful experience and architectural design measures to live safely from the current to the future.

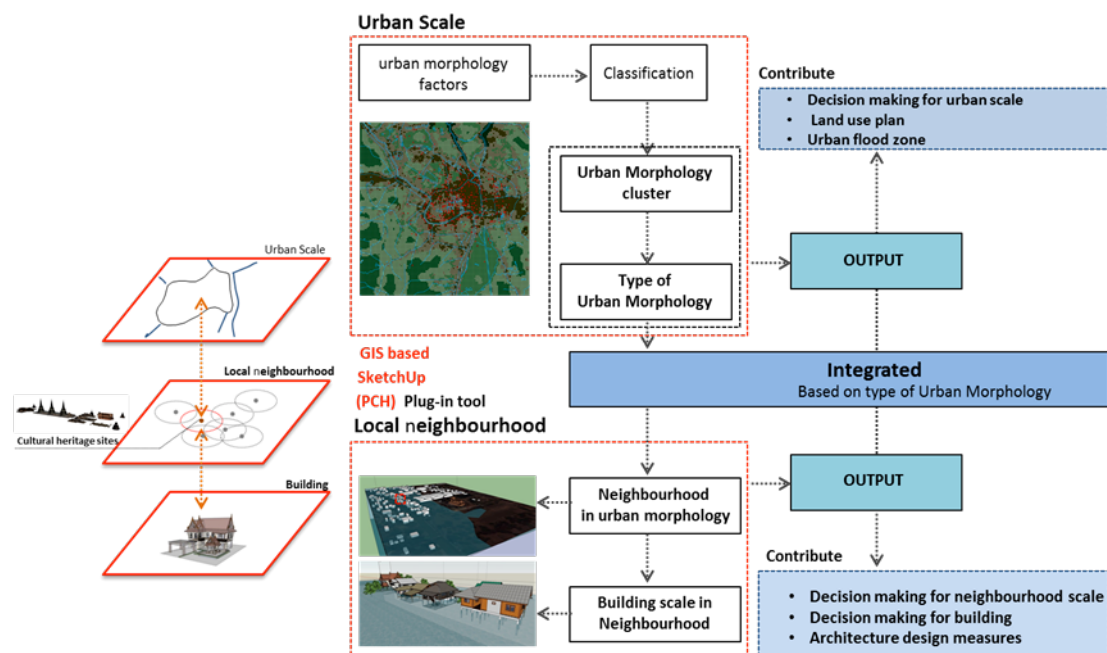


Figure10: Integration spatial Information for Support Decision Making.
[Source: Author, 2013].

Conclusions

The results of this study indicated that there are importance for both the composition and configuration of possible physical impact of flood disaster and field survey. The description of the quantitative relationships of seven the disaster vulnerability factors with the urban flood disaster, found seven factors that are most important to analysing the possible physical impact of flood, altitude or elevation, drainage system & soil, density of resident, distance to main river, distance to hydrology, slope and distance to road. This research expands our scientific understanding of the effects of flood disaster on urban cultural heritage and CHS. The possible physical flood impacts are quite similar to field survey of CHS.

These results have important theoretical and management implications. Urban planners and Urban Architects attempting to mitigate the impact of flood disaster on CHS can gain insights into the importance of the priorities of CHS conservation and renovation.

The results are consistent with those previous research assessing impact and value of CHS. It is important to assess the damages in terms of environmental damage, external damage and internal damage. The levels of damage; high risk, medium risk and low risk respectively, are also assigned. Furthermore, the cultural heritage values are ranked as high (Ayutthaya historical city), medium (registered) and low values (on the list). These two factors are employed as indicators for setting the priorities of CHS conservation.

The investigate safety and security of their local areas for two scale (urban and local neighborhood). Difference urban morphology types and neighborhood is difference for the investigation safety and security of local areas

Contributions in this study, to encourage greater interest in local safety and security, as well as sharing of information and to investigate the safety and security of their local areas, spatial information for support decision makers on cultural heritage distributions and hierarchical for cultural heritage conservation and management.

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