Role of GIS in documentation and conservation of Chivas and Chaityas

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Abstract

Brief Introduction about Chiva

Chivas and Chaityas are Buddhist shrines established by the general public in and around Kathmandu valley, Nepal. This culture of establishing monuments by the general public is one of a kind in the world and this tradition which was started centuries ago is continued today. They can be found in public places, public roads, alleys, courtyards, hilltops, private lands etc and are estimated to be somewhere between 2000 to 2500 in numbers in the Kathmandu Valley.

It is said that even during the time of Lord Buddha (around 500BC), Chivas had been established (Stupa Chaitya (The Origin of Buddhist Art and Architecture), Bajracharya, 2007). As such, some of the Chiva Chaitya in Kathmandu Valley are found to be about 1500 years old (The Nepalese Caitya: 1500 Years of Buddhist Votive Architecture in the Kathmandu Valley, Gutschow, 1997). Some of the older Chivas were erected in the Licchavi period (6th century) (The Traditional Newar Architecture of the Kathmandu Valley, Korn, 2015).

People establish Chiva as a remembrance to deceased relatives or just for respect to the Buddhist philosophy or in respect to scriptures and holy items. Establishing a Chiva has to follow set rules in presence of a Buddhist priest and shall contain specific steps including list of deities in the foundation (A survey of the Caityas of Kantipur, Bajracharya, 1998). Some Chivas are as large as 50 meters in height (like Khasti-Boudhnath or Swoyambhu) while some are small as 30cm. Most we find will be the height of around 2m. Primarily made of stone carving, some are made of brick and some from clay. The carvings of Buddha along with other Buddhist deities has become an example of stone carving skills.

The Chiva is a symbol of a distinct and authentic form of Buddhism practised by the indigenous Newar people of Kathmandu. They are prayed daily by the Buddhist community and visited by non-Buddhist as well just to view and admire their beauty. These are old, with archaeological, historical and religious values. Due to these Chivas, Kathmandu is known as ‘City of Temples’.

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Current issue

Although Chivas and Chaityas have always been admired and respected, unplanned urban development in Kathmandu Valley has led to encroachment of Chivas and sometimes even outright destruction of them. To add to the problem, since Chivas are established by the general public, there is not yet a reliable source that has information of all Chivas. Hence, it will not be known when a Chiva is damaged or removed due to a lack of record. In realizing these issues, a group of volunteer heritage enthusiasts started to log the Chivas by taking photographs of the Chivas and writing the estimated address in spreadsheets.

a *b*

Fig. 1.a, b Chivas in need of restoration, Kathmandu (© Chiva Chaitya Organization)

As photos were collected and Chivas logged, it was realised that this method would cause problems in future. Many photographs and address would be collected, but it became quite impossible to go through each one before heading out to the new area. Because of the immense count of these ancient heritages, manual record-keeping without the use of sustainable technology would be impossible. They needed a visual input of a map of where they had inspected.

The Geographic Information System (GIS) Solution

The GIS solution needed to be low cost, user friendly and be integrated into the current workflow. It would be optimal if it was possible to generate location (co-ordinate) data from the photographs that had been collected. Upon closer inspection, it was found that some photographs had coordinate EXIF data embedded into them. Even photographs that had been captured with a digital camera without GPS had location tags. Google Photos would automatically embed location tags to uploaded photos based on Google Location History of the User. This was quite accurate and helpful.

After reviewing different products, it was decided that software called Feature Manipulation Engine (FME) would be best suited to the project. A script was then created in FME which would read all photographs, the associated excel spreadsheets and then group the photos into ones having location data and ones without.

For the ones that did not have location data, the coordinates were looked up using Google maps and updated in a spreadsheet. The photos would then be updated with the coordinates found by this method via a separate script in FME. After successfully updating the photographs with co-

ordinate EXIF data, an FME script was generated which would create new point geometry feature record with embedded photo for each Chiva site. After this processing was completed, the resulting layer was exported in a Keyhole Markup Language (KML) format.

The KML file could then be viewed on apps such as Google Earth or MAPS.ME in smartphones. The team, while on the field, was now able to easily distinguish which Chivas had already been documented and which had not yet been. It is also used in QGIS desktop application for location data analysis like creating heatmaps and creating a separate layer of Chivas which required restoration.

This solution was easily integrated into current workflow as teams continue to take photos as before with smartphone with location data enabled. The photos would then be run through the same FME script which would update the map. As of 10 August 2020, the details of 946 Chivas and Chaityas in and around Kathmandu Valley have been documented and mapped.

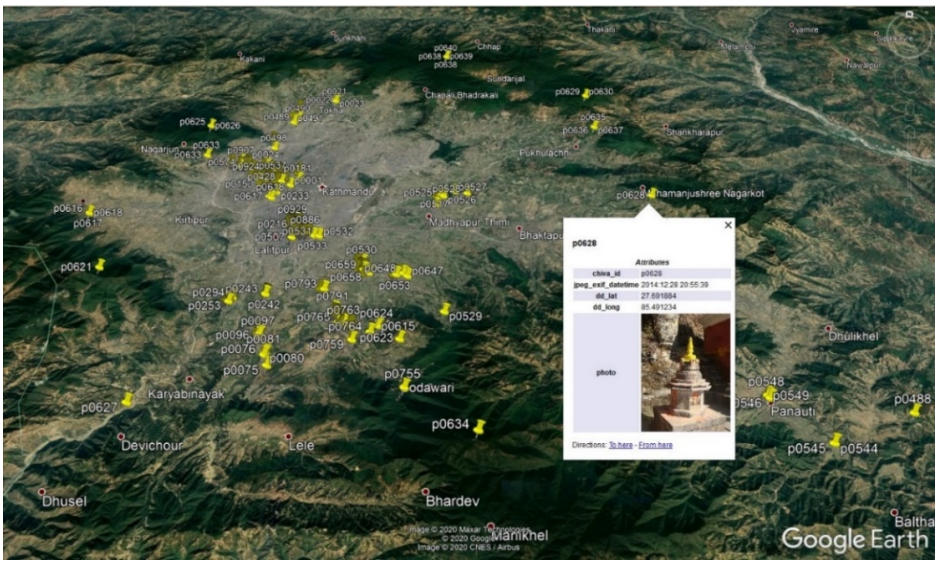

Fig. 2 Map of Chivas and Chaityas documented till 10 August 2020 viewed in Google Earth (© Chiva Chaitya Organization)

The output has enhanced the capability for documentation of these important heritages spread in a wide area which otherwise, would have been impossible to manage. It has helped to identify and work on sites which are at risk of destruction. Also, by presenting historical and quantitative data, it has helped to increase awareness and respect for heritage in the local and tourist community. By documenting and protecting these sites, the aesthetic of Kathmandu Valley will be preserved, which in turn will attract more tourists and provide economic benefits. Needless to say, this technology has enabled protection for cultural heritage that is unique in the world.

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