VALIDATING SLUMS OF KALABURAGI CITY CREATED BY IN-SITU DATASETS AND UFS (URBAN FRAME SURVEY) MAPS FOR SPATIAL DATABASE CONCEPTION

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1. Introduction

1.1. Slum Mapping

Slum mapping is not standardized, but persistently arises subsequently two types of approaches, promulgated by the World Bank and UNDP. The previous uses an expenditure-based econometric method, established on small area approximation. The concluding uses a value absorbed method, founded on its amalgamated human development indicator. Such presentations are likewise stated to as the 'unconvinced basic necessities' catalogs, used in South America and some European countries. (Baud, Pfeffer, Sridharan, & Nainan, 2009).

A slum is frequently not renowned and addressed by the public consultants as a vital piece of the metropolis. The characteristics related to slums differ from space to berth. Slums are usually identified by urban fallingoff, high proportions of poverty, and loafing. Remote sensing and GIS plays a dynamic role in sharing data; interdepartmental awareness, enhance reaction, justification, post-event retrieval, and development. Consistent, accurate and significant data remain a central gene for all administration exertions. The satellite data are appropriate for the implementation of several development systems and monitoring the spatial and temporal unpredictability at

different scales. Recurrently these data requisite to be assimilated with the data from other sources to meet solicitation necessities. Spatial data in combination with related socioeconomic data, and is, therefore, a complete basis for planning", GIS incorporates spatial information (maps) to some extent with other data that have composed from the field study. For example, a distinctive slum map shows the physical characteristicsof the area, but it does not say anything about their demographiccharacteristics. Thus, the required field survey obligates to collect significant socioeconomic information about the inhabitants and to overlay on the GIS maps. Based on the visual clarification of the image and field survey slum maps can be prepared (On & Node, 2014).

1.2 Urban Frame Survey Maps (UFS)

National Sample Survey Office under Ministry of Statistics and Programme Implementation conducts large-scale surveys on various Socio- Economic subjects to facilitate policy formulation in the country. Urban Frame Survey(UFS) provides frame for sample selection for such surveys in urban areas (Jain, Kumar, Nandraj, & Furtado, 2015).A sampling frame is an essential pre-requisite for organizing and conducting any sample survey. Up datedness, completeness and fairly accurate information of sampling units leading to identifiability are the essential features of a usable frame(NSSO, 2003). In practice, however, it is extremely difficult to get a fairly satisfactory frame. On such occasions, it is customary to make special efforts to build up a sampling frame to meet the specific requirements. Field Operations Division (FOD) of National Sample Survey Office (NSSO) does similar exercise through Urban Frame Survey to prepare the frame for Socio- Economic surveys. A household approach is adopted for collecting data through most socio-economic inquiries(Government of India, 2015). Since the frame for ultimate sampling units (households) is neither available nor feasible to be prepared afresh every time on account of time and cost factors, the sampling methods are so designed as to select the households in successive stages(GOI & Pronab Sen, P.K.Mohanty, J.Dash, 2010). For the rural areas, list of census villages comes in handy as an operationally convenient and readily accessible frame of first stage

units(Government of India, 2015). In the urban sector, however, the population census does not provide an analogous list of geographical units that could be conveniently adopted as a sampling frame. The UFS was conceived and formulated to obviate this particular situation(GOI & Pronab Sen, P.K.Mohanty, J.Dash, 2010). Each UFS block has been envisaged to be a compact areal unit consisting of 80-200 households in general and the block is bounded by well-defined, clear-cut and natural/permanent boundaries. The blocks are mutually exclusive and exhaustive so that the blocks carved out in any given town add up to the total area of the town(RAY report, 2013). The blocks are so formed that they depict permanent landmarks and corner points; they are distinguishable from one another; and, are identifiable over time. While thetown is a big aereal entity, UFS block is a small areal unit. Striking a compromise between the two, the concept of Investigator Unit has been evolved in the UFS(Pronab Sen, P.K.Mohanty, J.Dash, 2010). Investigator Unit (IV Unit) is a well-defined and clearly demarcated geographical area consisting of about 20 to 50 blocks. IV Unit maps are drawn in standard-sized map sheets.During the last UFS Phase (2007-12) a survey of more than 7000 towns including newly declared Census towns involving updating/formation of more than 6 lakhs UFS blocks was undertaken. Ladakh region of Jammu & Kashmir state was brought under the coverage of UFS and formation of blocks in Leh and Kargil towns was carried out for the first time in the history of NSSO which would pave way for future surveys in the region(Mehta & Mehta, 2012).

The current UFS Phase 2012-17 has been initiated for updating of UFS blocks. All the IV units and UFS maps of thelast phase have been electronically stored and linkage of the details of blocks with the maps made. UFS maps and records on demand are supplied to Government department free of cost and to the private institution and research scholars as per the laid down procedure(Government of India, 2015).

2. Data and Software used:

2.1. Study Area:

Kalaburagi city *(erstwhile Gulbarga city)* which means stony land in Kannada is an

upcoming city situated in the north eastern part of Karnataka State (Figure 1). It is the administrative headquarters of Kalaburagi District. Kalaburagi city has an area of 64.00 km^2. Kalaburagi is known for its historical monuments built during the reign of theBahamani kings, religious places and is, more importantly, a commercial hub for the Hyderabad Karnataka region. It is primarily a regional market and service center for the district and also an educational center. Since the city is located in the economically under developed region, it became a nodal center for many developmental activities. Hence, Kalaburagi started attracting the rural folk from neighbouring districts (Kalaburagi district website). The city is undergoing rapid changes in terms of population growth as well as in the degree of urbanization and the slum population started slowly increasing. Thus, slums became an integral part of rapid urbanization. As per provisional reports of Census India, population of Kalaburagi in 2011 is 532,031; of which male and female are 272,451 and 259,580 respectively. As per data released by Govt. of India for Census 2011, Kalaburagi is an urban Agglomeration coming under "C" category of Class UAs/Towns for HRA. Kalaburagi is governed by Municipal Corporation situated in Kalaburagi Urban Region (Census of India, 2011).
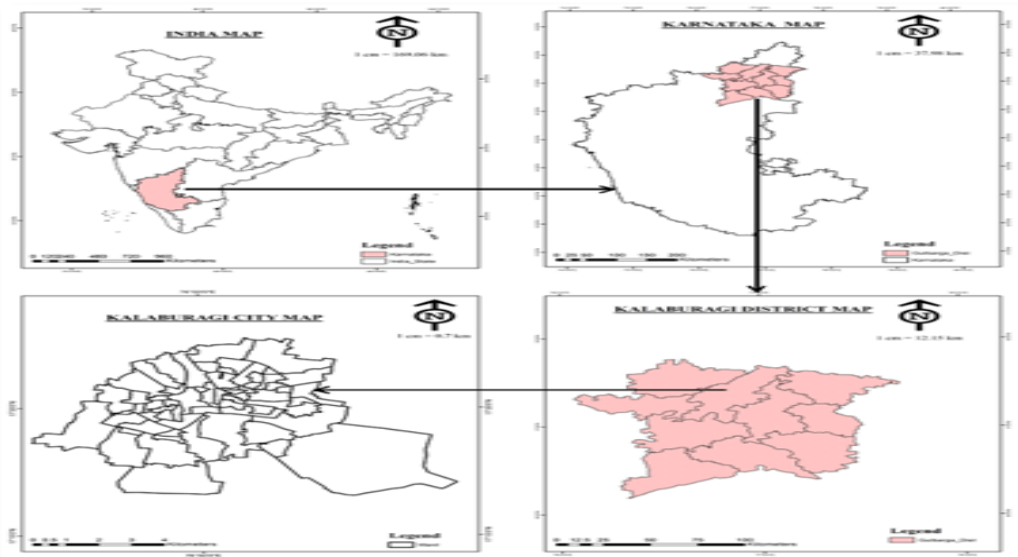

Fig 1: Location of Study area (Kalaburagi city)

2.2. Datasets used:

➢ **Slum Base Map**provided by Karnataka Slum Development Board Kalaburagi.

➢ **Urban Frames Survey (UFS) maps 2011 census from NSSO, Kalaburagi office:** The maps prepared in the UFS are not drawn to scale, but while forming such map points like direction and sense of proportion is kept in mind. 14 UFS maps purchased from NSSO (National Sample survey office), Hubli. These maps were used by the enumerators at the time of collection of census data, and which are of actual Enumeration Blocks and they were compared with Google earth maps. Slum enumeration block maps are prepared based on the field observation. This will include not only notified and non-notified slums but also identifiedslums based on the census definition. Hence validating with the enumeration block map is very important to assess the reliability of the map prepared by this research fig 2 shows the illustration of UFS maps.
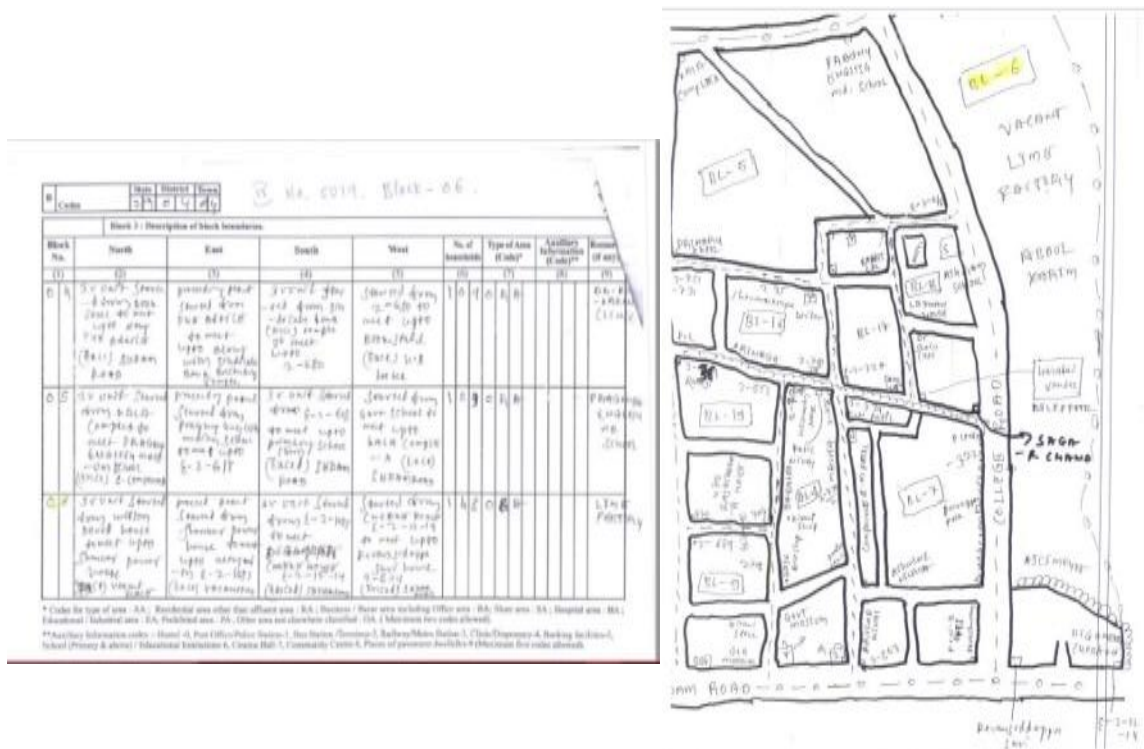

Fig 2: Urban Frame Survey Maps

➢ Slum boundary map created by PGIS.

➢ **In-situ location data from handheld GPS device:** Insitu data in form of slum locations were collected using handheld GPS instrument. These datasets were exported to software for better interpretation of values being collected.

➤ Google Earth for site validation.

2.3. Software Used:

   ➤ ESRI ArcGIS 10.x

   ➤ QGIS

2.4. Methods used for validating the slum boundaries created by PGIS using UFS maps:

Figure 3 illustrates the steps followed to get thelocation of different slums in the city.
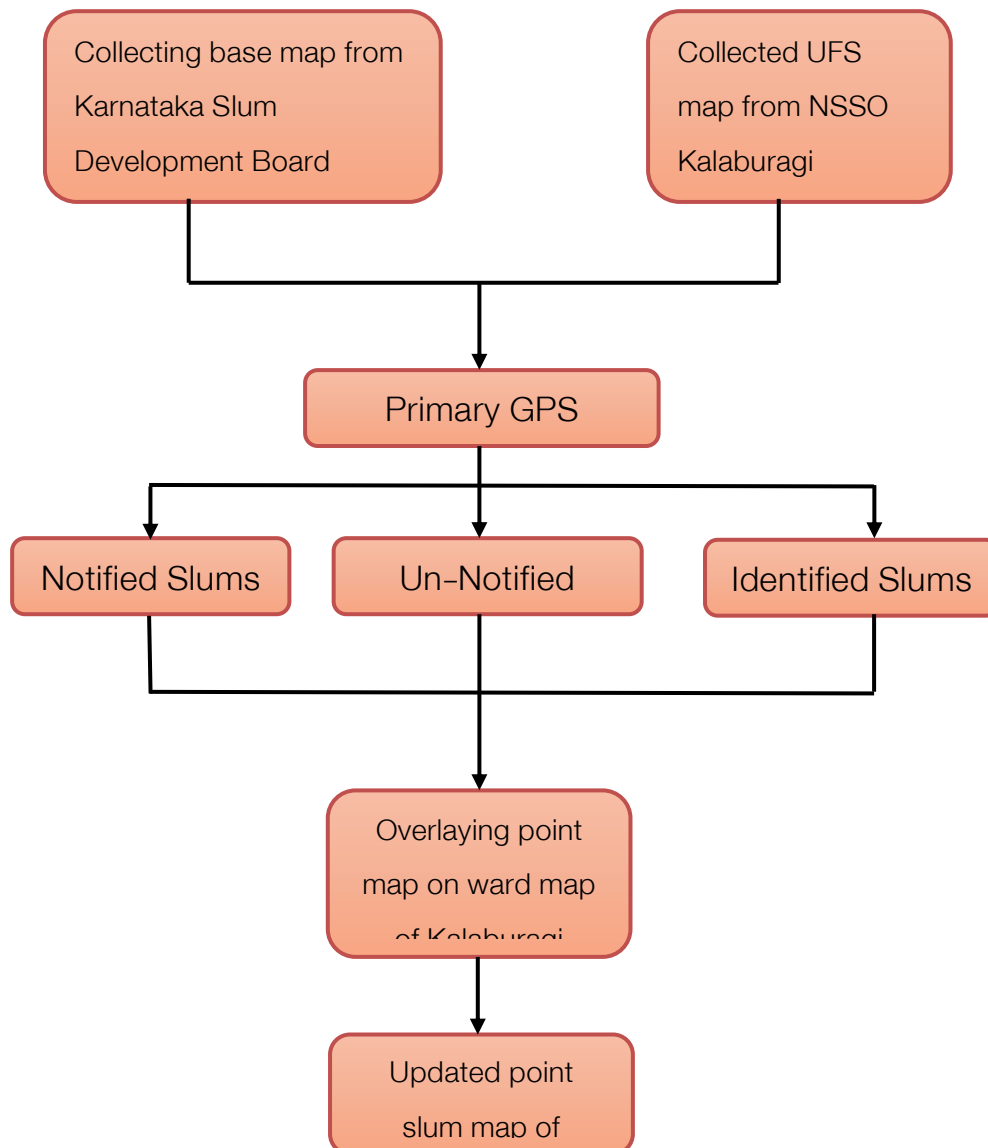

Fig 3: Steps for Slum Map Generation

➢ Raw data of slums locations from Karnataka Slum Development Board located at Kalaburagi city were collected for marking locations of slums on the map.

➢ Sequentially Urban Frame Survey (UFS) maps from Field Operations Division (FOD) of National Sample Survey Office (NSSO),Kalaburagi were collected.

➢ Afterward, aprimary survey using GPS instruments were conducted for notified,unidentified and identified slums.

➢ Point map was overlaid on the ward map of Kalaburagi city.The Kalaburagi slums locations were updated.

Figure 4: Demonstrates the steps followed to validate Slum boundaries created by PGIS using UFS maps.
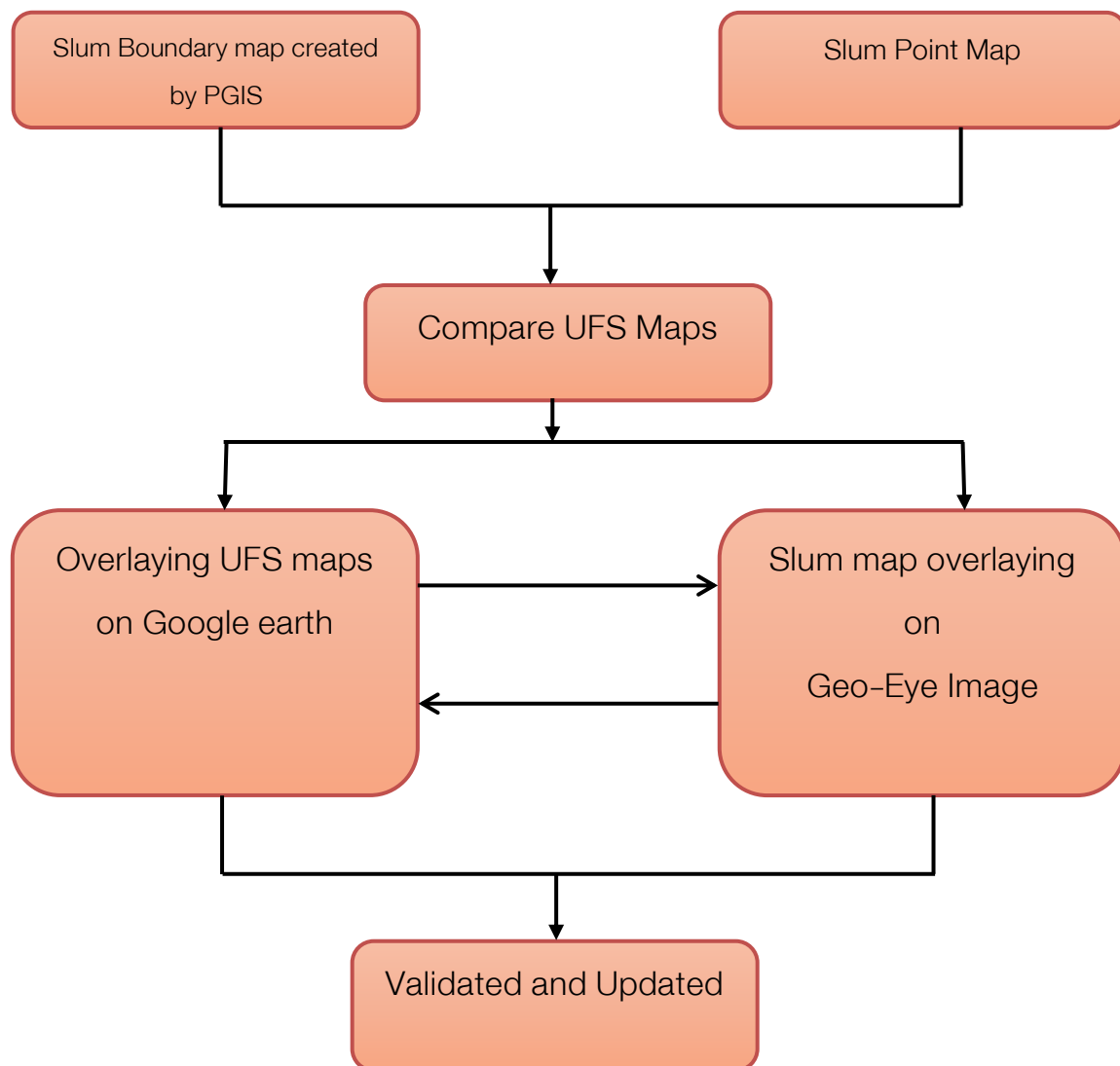

Fig 4: Illustrationof Slum Validation Process

➢   The slums identified as apoint on the map with reference to the insitudatasets being collected through the GPS instrument.

➢   Validated the slum boundary created by PGIS using UFS maps.

➢   UFS maps were compared with Google Earth by overlaying the slum map prepared by using UFS maps.

➢   Slum map was later overlayed on the GeoEye image for validating and updating.

3. Results and Discussions

Based on the PPGIS, the slums were identified and the slum map was prepared (Figure 5). The same was validated with the UFS (Urban Frame survey) map. The following snapshots (Figure 6 and Figure7) shows the matching of UFS maps with Google earth display for initial understanding and later on the same was compared with the slum map (Figure 8).
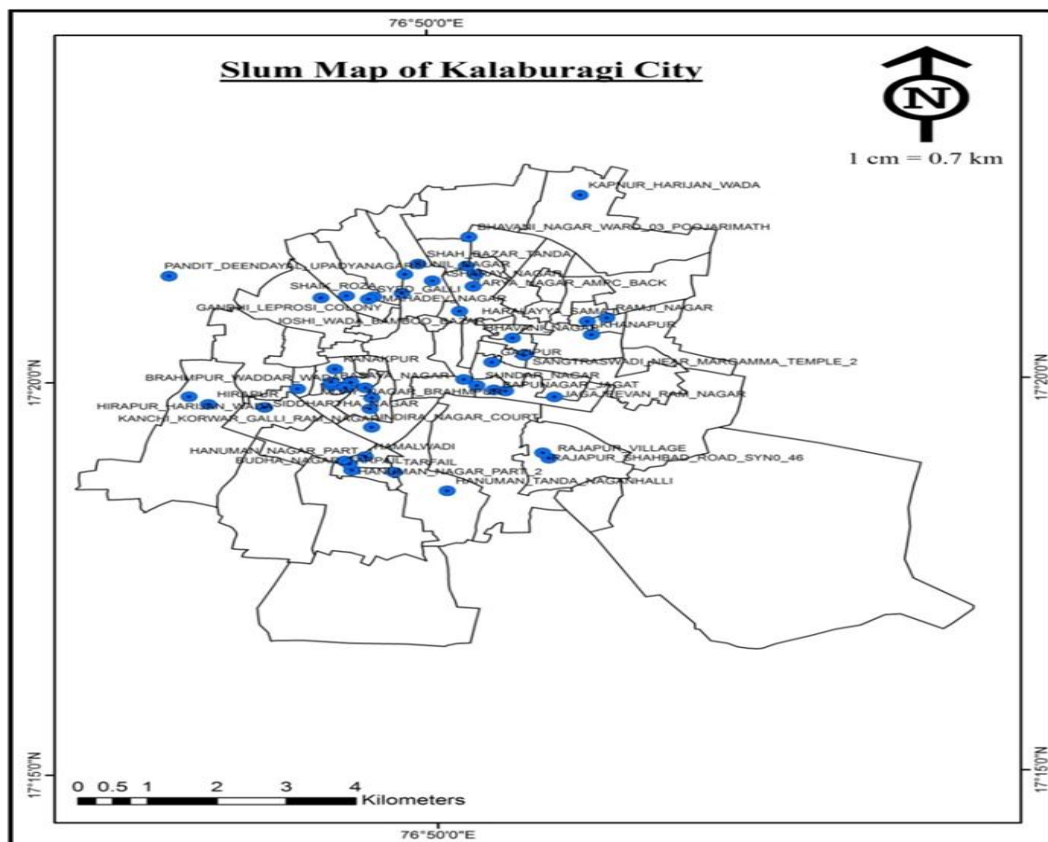

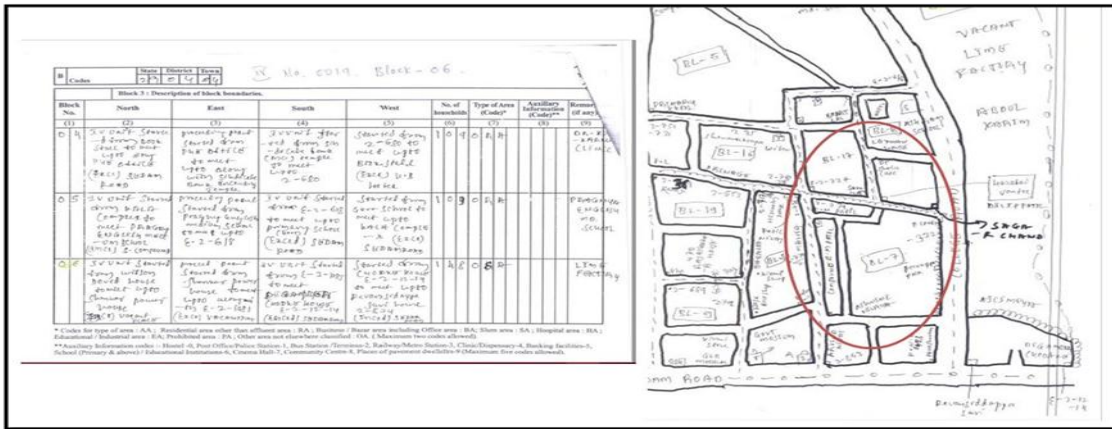Figure 5: Slum Map of Kalaburagi City

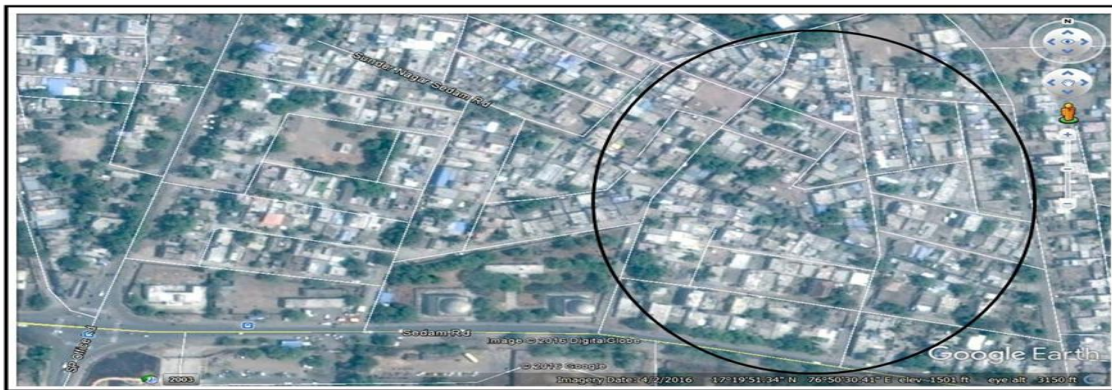Figure 6: Validating using Urban Frame Survey maps (Source: UFS Map from NSSO Kalaburagi)

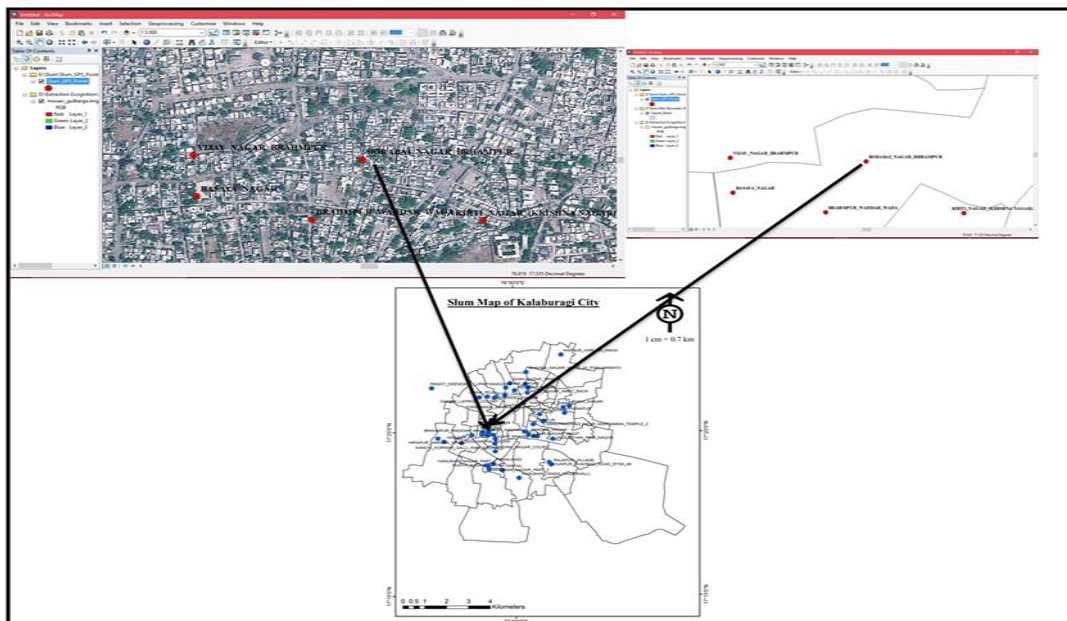Figure 7: Very High-Resolution data (Source: Google Earth)

Figure 8: Validating with slum map

4. Conclusions:

UFS maps were used as enumeration block maps for counting the slum population during census 2011 these enumeration blocks are useful for slum mapping since they can delineate not only existing notified slums and non-notified slums but also identify new slums. Hence the UFS maps are used for validating the slum boundaries created by PGIS.

5. Reference:

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