Feasibility of Integrating Mahabhulekh data with Cadastral Shapfile

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Dated – 10.2.19

Cropping pattern data is critical for water budget computation as it is representative of actual cropping pattern in the zone and same can be used to evaluate the new zoning criteria. Currently we are running plugin over entire region (cluster) with different crops. If we get the cropping data consistent with the cadastral maps, then it can be used to compute the water budget of the region with respect to its cropping pattern.

Land records related data is collected by Mahabhulekh for Maharashtra. A sample data is obtained from Mahabhulekh with following objectives.

- To analyse its comparability with cadastral shapefile; i.e. ratio of surveys in cadastral are also present in Mahabhulekh data.
- Extraction of cropping pattern for matched surveys number.
- A presentation of work done by Sudhanshu related to above is available on the link below. https://www.cse.iitb.ac.in/~pocra/Analysis%20of%20Cropping%20Data.pdf

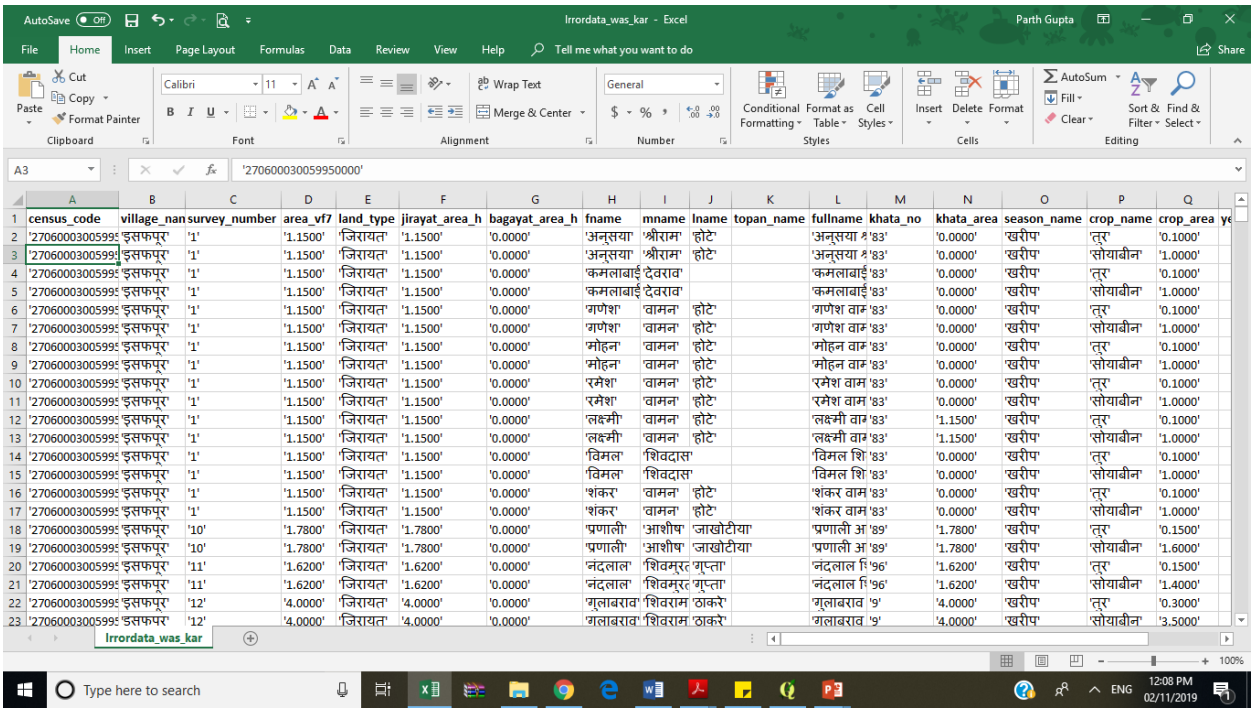

Fig1 – Data format of Mahabhulekh data

The database contains the attributes like census code, village name, survey number, survey number area, land type, area under different land types, farmers name, khata number, crop season, crop name, area under different crops and type of water source fig 1. Against each survey number, the land is divided among different farmers. The cropping pattern and area under different crops is same for different farmers in the data provided. This makes it easy to extract the cropping data for each survey number. For each survey number this cropping pattern and area is extracted and linked with the survey number available in the cadastral shapefile.

The results of matching and extraction of data for four villages namely wai, isafpur, Akhatwada and Marodi is shown in fig 2, fig 3, fig 4, fig 5 and table 1. From wai excel file, cropping pattern for total of 175 gat numbers was extracted successfully. This data was matched with MRSAC cadastral data. In cadastral shapefile total 202 survey numbers were present. Out of 202 survey numbers cropping data for 142 survey numbers was matched successfully with the mahabhulekh data. This has been shown in fig 2. Green color shows the result for matched values and blue color for unmatched values.

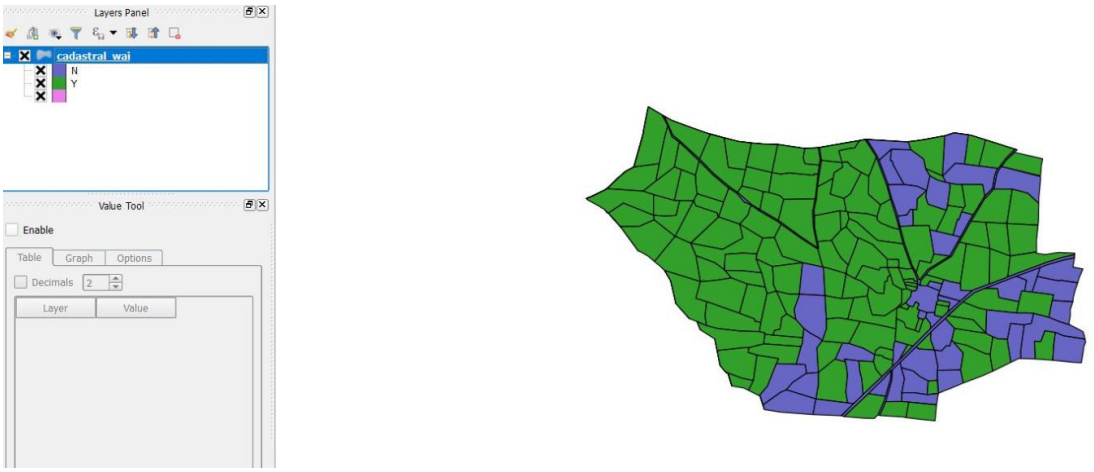

Fig 2 Cropping data analysis for Wai, Washim

In case of Isafpur village, cropping data extracted from the mahabhulekh data is more than the survey numbers available in cadastral shapefile. This has been shown in table 1 and fig 3. Green color shows the result for matched values and blue color for unmatched values.

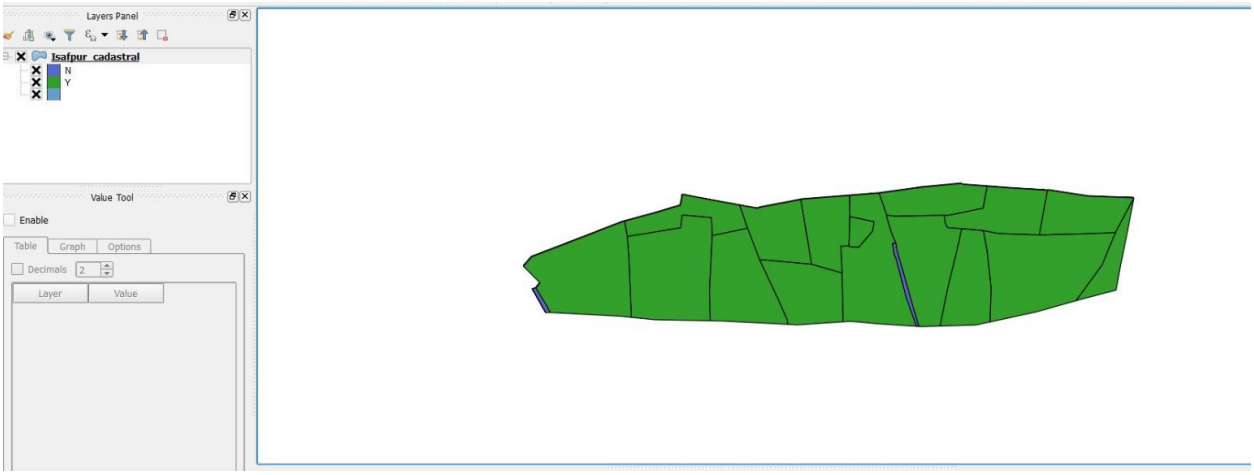

Fig 3 Cropping data analysis for Isafpur, Washim

In case of Akhatwada village, data extracted from the mahabhulekh excel is more than cadastral shapefile. This has been shown in table 1 and fig 4. Green color shows the result for matched values and blue color for unmatched values.

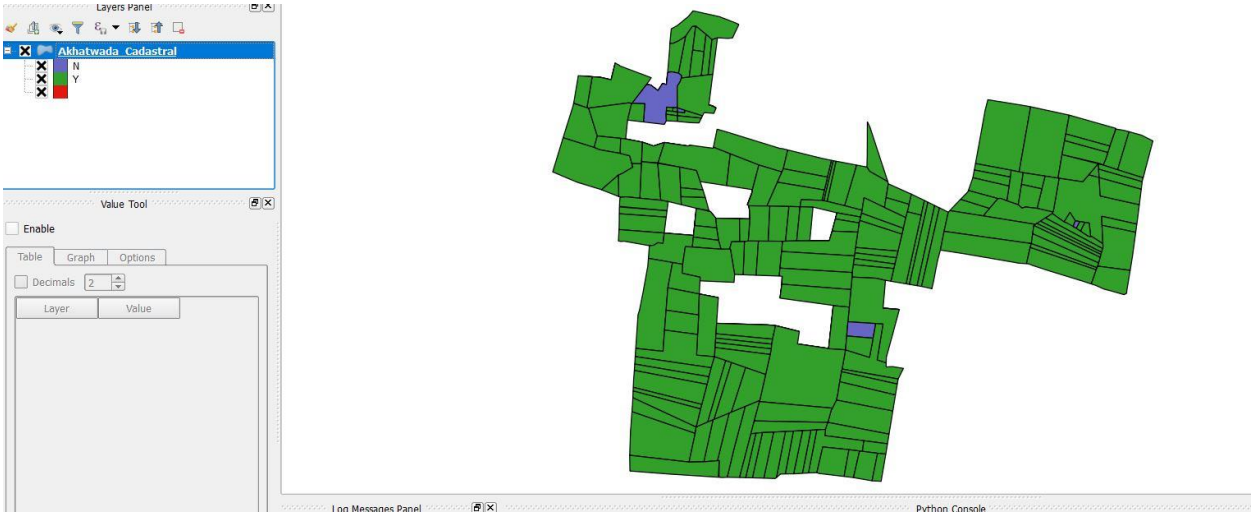

Fig 4 Cropping data analysis for Akhatwada, Akola

In case of Marodi village, data extracted from the mahabhulekh excel is more than cadastral shapefile. This has been shown in table 1 and fig 5. Green color shows the result for matched values and blue color for unmatched values.

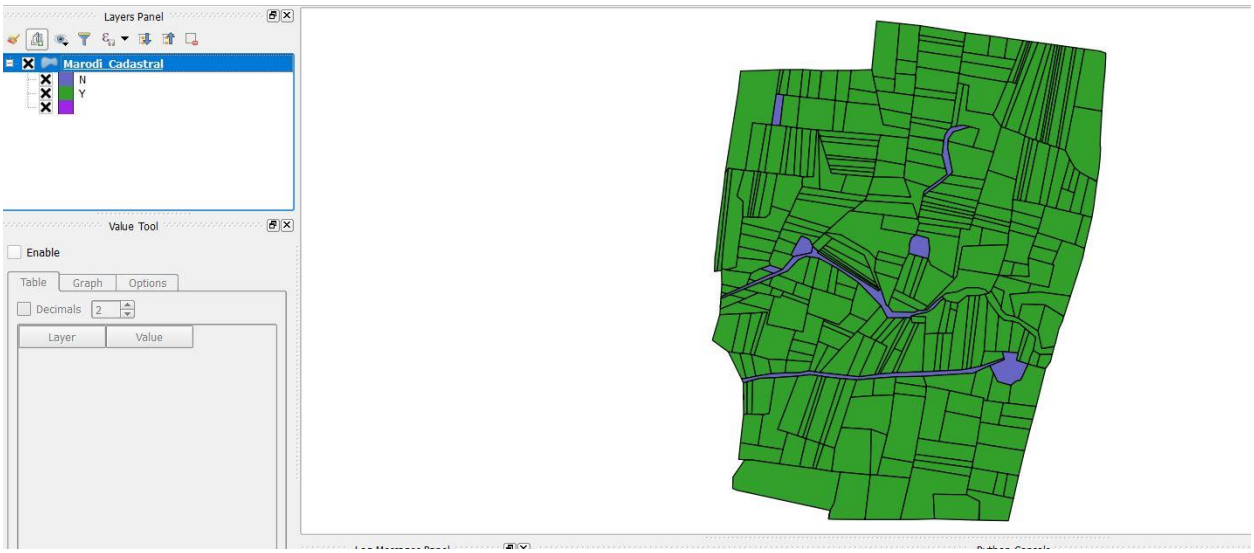

Fig 5 Cropping data analysis for Marodi, Akola

The result for 4 villages is summarized in the table 1.

Table 1 Result of mahabhulekh data extraction and matching with cadastral shapefile

District	**Village**	**Gat present/ Total survey nos**	**Total survey nos extracted from cropping data**	**Comments**
Washim	Wai	142/202	175	Nearly 60 % surveys matched with cadastral
Washim	Isafpur	27/30	62	Cropping data has more survey nos than total gat in cadastral
Akola	Akhatwada	189/194	174	Mora data matched (189>174) as few polygons having same survey no
Akola	Moradi	298/307	292	Mora data matched (298>292) as few polygons having same survey no

Discrepancies in the Mahabhulekh data

Data for complete district is provided in Postgres format by Mahabhulekh.

For a given district and taluka, the ccode (census code for village), Location and Gat number count and cropping pattern can be obtained for all the villages. There are some issues found with Mahabhulekh data during analysis given below.

1. Missing Survey numbers in villages
2. Non-Standard formats for survey number representation
3. Number of villages covered is significantly less than known number of villages present in taluka
4. Some talukas are missing

Action taken:-

- Analysis on the cadastral data (PoCRA) is performed to figure out “what” and “how much” is missing.

Analysis on cadastral data (MRSAC)

From Mrsac cadastral shapefile, village wise gat numbers were calculated for each district and stored in the csv format for comparison with Mahabhulekh results.

ccode	location	gat_no_count
5.00040001004977E+016	Agar	1035
5.00040002005028E+016	Akhatwada	178
5.00040006005119E+016	Akkalkot	38
5.00040006005125E+016	Akola (Rural)	151
5.00040007005131E+016	Akoli Bk.	43
5.00040007005132E+016	Akoli Kh.	67
5.00040002005032E+016	Aliyabad	131
5.00040001004991E+016	Amanatpur	160
5.00040002005013E+016	Ambikapur	288
5.00040002005029E+016	Anakwadi	132
5.00040005005096E+016	Anvi	86
5.00040002005016E+016	Apatapa	201
5.00040002005024E+016	Apoti Bk	254
5.00040002005017E+016	Apoti Kh	135
5.00040005005093E+016	Babhulgaon	477

Some issues were observed in shapefile during the analysis.

- Wardha does not have Location information.

- The id assigned for survey number is not unique
- In some cases the district_id field is missing
- PIN column has missing values which is being used to identify the location of survey number.

Action taken:-

- The discrepancies have been reported to PoCRA.
- For now, the “gid” field in the data is used for counting as it is unique across the table.

Comparative Analysis on both data

Table 2 and 3 were made to take corrective actions or to convey discrepancies to respective agencies. It gives the comparison of count of fields extracted from the MRSAC shapfile and Mahabhulekh.

Table 2 Taluka wise count of village in MRSAC and Mahabhulekh data

Data Analysis:

Parameter	Mahabhulekh	Cadastral (PoCRA)
District Count	13	15

District Name:- Akola

Parameter	Mahabhulekh	Cadastral (PoCRA)
Taluka Count	7	7
Village Gat Number Count for Taluka		
Taluka name	Mahabhulekh Gat No. Count	Cadastral (PoCRA) Gat No. Count
Akola	19	199
Akot	6	180
Balapur	2	103
Barshitakli	4	159
Murtijapur	2	162
Patur	3	96
Telhara	4	106

Table 3 Village wise count of survey numbers in MRSAC and Mahabhulekh data

ccode	location	gat_no_count	cad_gat_no_count
2.7050004005015E+017	दापुरा	19	96
2.7050004005019E+017	माराडा	8	303
2.7050004005055E+017	पळसा खुद	12	111
2.7050004005014E+017	आबकापुर	2	288
2.7050004004974E+017	तारापुर	4	77
2.7050004005003E+017	खानापूर	196	119
2.7050004005043E+017	रामगाव	1	161
2.7050004005009E+017	एकलारा	16	310
2.7050004005022E+017	घुसरवाडा	14	111
2.7050004005139E+017	बादरखड सिसा	82	299
2.7050004005021E+017	म्हाताडा	32	411
2.7050004005098E+017	मिझापुर (पळसा मडळ)	23	204
2.7050004005097E+017	अन्वा	91	86
2.7050004004996E+017	निभारा	162	358
2.7050004005049E+017	दाहगाव गावड	21	194
2.7050004004989E+017	कानडा	1	167
2.7050004005039E+017	सागळुद बु.	181	663
2.7050004005042E+017	बाहरखड	1	118
2.7050004004973E+017	चादपुर	54	163