On Geo Coding

Office of the Registrar General, India

Introduction

From UN Handbook on GIS and Digital Mapping : 2000

One of the earliest steps required in census planning pertains to the codification of the administrative areas for which census data will be reported.

Introduction

From UN Handbook on GIS and Digital Mapping : 2008 (Draft)

Census preparations involves creating a list of all administrative and statistical reporting units in the country, and the definition of relationship between all types of administrative and reporting unit boundaries.
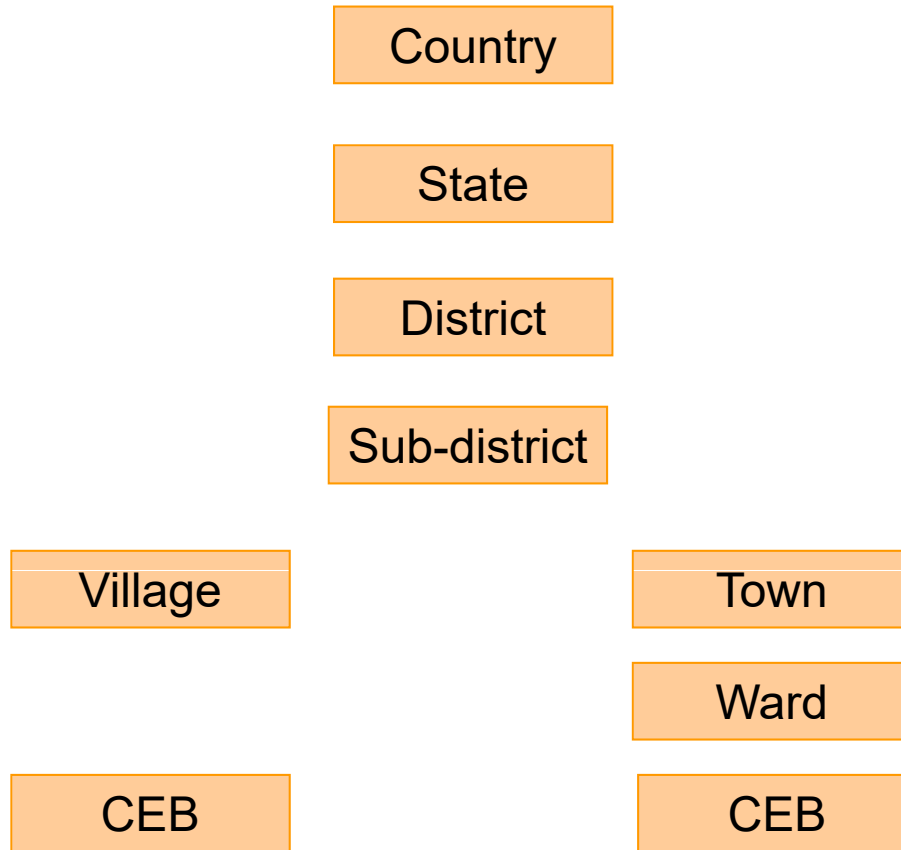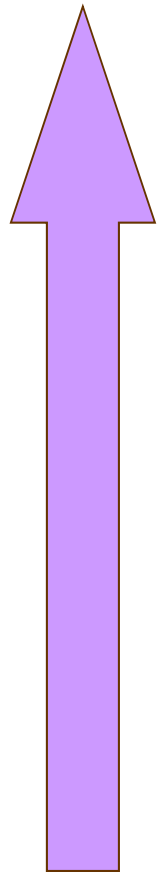
Introduction

From UN Handbook on GIS and Digital Mapping : 2008 (Draft)

Every country has its own specific administrative hierarchy, that is, a system by which the country and each lower-level set of administrative units (except the lowest) are sub-divided to form the next lower level.

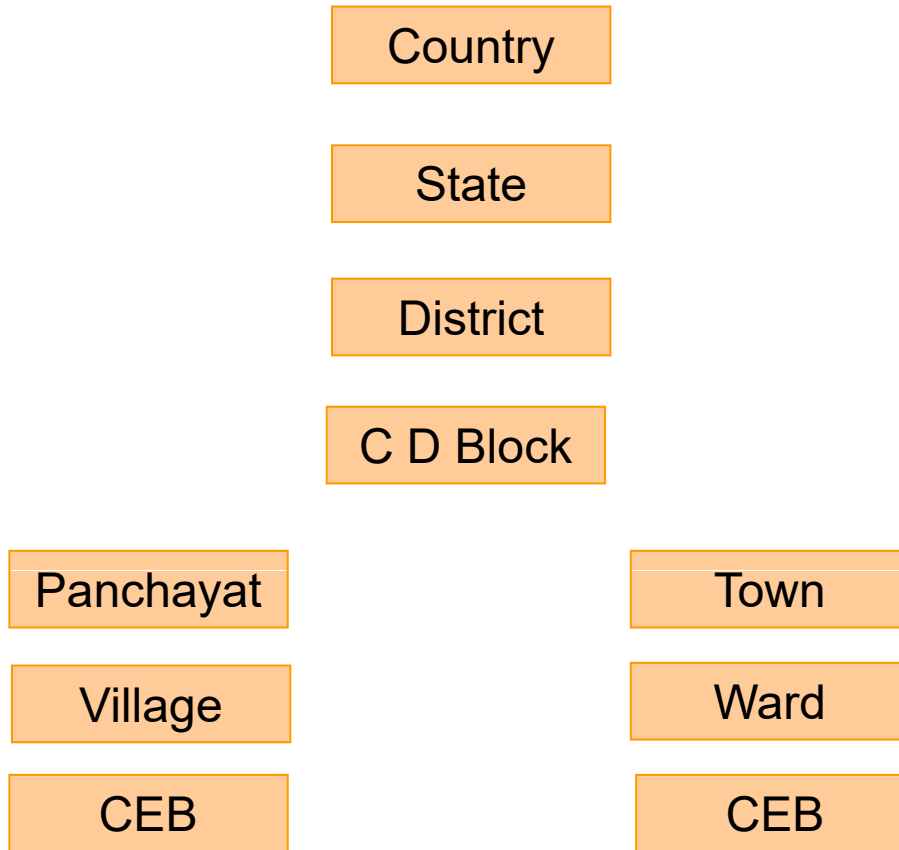# What is Geo-Coding?

- The more general process of assigning geographic codes to features in a digital database

- Collecting precise data at the level of point locations (or very low geographic level such as a city block) and assigning codes for use in dissemination.

- Codes cover each geographic unit and have a combinational relationship to distinguish different units (Enumeration Areas/Blocks).

Introduction

Country

State

District

Sub-district

Village

Town

Ward

CEB

CEB

Revenue set-up in India

Designing Loaction Code Structure for 2011 Census

Introduction

Development Set-up

Country

State

District

C D Block

Panchayat   Town

Village   Ward

CEB   CEB
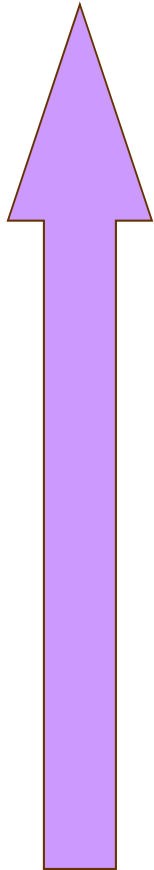
Other Country

US Census:

United States
Region
Division
State
County
County Sub-division
Place (or part)
Census tract (or part)
Block group (or part)
Census block

Other Set of Areas

- Electoral districts
- Postal zones
- Health regions
- Labour market areas
- Cultural or tribal areas
- Urban agglomerations or metropolitan areas
- Agricultural or economic census units
- Land tiling or cadastral units
- Utility zones (water or electricity supply districts)

Criteria for demarcating EBs

- They should be mutually exclusive (non-overlapping) and exhaustive (cover the entire country)
- They should have boundaries that are easily identifiable on the ground
- They should address the needs of government departments and other data users
- They should be consistent with the administrative hierarchy
- They should be useful, also, for other types of censuses and data collection activities

- From UN Handbook on GIS and Digital Mapping : 2000

Designing Loaction Code Structure for
2011 Census

Criteria for demarcating EBs

- They should be compact without pockets or disjoint sections

- They should be approximately equal population size

- They should be small enough and accessible to be covered by an enumerator within the census period

- They should be small and flexible enough to allow the widest range of tabulations for different statistical reporting units

- They should be large enough to guarantee data privacy.

- From UN Handbook on GIS and Digital Mapping : 2000

Supervisory Circles

- Supervisory Circles consists of groups of usually 6 Enumeration Blocks. In some countries the Circle may contain 8 to 10 EBs

- Share some of the same characteristics as EBs

- The EBs included in one Supervisory Circle must be compact to minimize travel time

- As far as possible should have equal population size

- Should be included in the same field office area.

- From UN Handbook on GIS and Digital Mapping : 2008 (Draft)

Consistency with past censuses

- A census provides a cross-sectional view of the size and characteristics of the population of a country
- One of the most important uses of census is to analyse changes in the composition of the population over time
- Usually this change analysis is done at fairly aggregate levels only
- Changes in local areas are equally important, since dynamics in local population affect local planning decisions
- This is only possible, if the EBs remain compatible between censuses.

- From UN Handbook on GIS and Digital Mapping : 2000

Consistency with past censuses

- In designing the census geography, the Census Organisation, should therefore attempt to preserve, inasmuch as possible, boundaries from previous census

- In case when the increase in population might require demarcating new EBs, it is preferable to subdivide an existing EB rather than to change the boundaries

- In this manner, it is easy to aggregate a subdivided enumeration zone to enable comparison of information between the two censuses

- This can be facilitated by compiling a compatibility or equivalence file.

- From UN Handbook on GIS and Digital Mapping : 2000

Designing Loaction Code Structure for
2011 Census

2001 Census - India

2001 Census Code - India

- In Census, location codes are assigned in an orderly manner always beginning from North-West point and proceeding to South West point.

Who assigns the Codes?

- State Codes – Assigned by ORGI

- District, Sub-district, Town and Village Codes – Assigned by the Census Directorates

- Wards, EBs within the Ward and EBs within village – Assigned by Charge Officers

Designing Loaction Code Structure for
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Location Codes – 2001 Census

Administrative Area	Number of digits
State/Union territory	Two digits (within the country)
District	Two digits (within the state/UT)
Sub-district	Four digits (within the district)
Village	Eight digits (within the state/UT)
Town	Eight digits (within the district)
Ward	Four digits (within the town)

Location Codes – 2001 Census

STATE	DISTRICT	SUB-DISTT	TOWN_VILL	WARD	EB	LEVEL	NAME	TRU	No_HH
02	01	0000	00000000	0	0	DISTRICT	Chamba	Total	87029
02	01	0000	00000000	0	0	DISTRICT	Chamba	Rural	79618
02	01	0000	00000000	0	0	DISTRICT	Chamba	Urban	7411
02	01	0005	00000000	0	0	TEHSIL	Dalhousie(T)	Total	8234
02	01	0005	00000000	0	0	TEHSIL	Dalhousie(T)	Rural	6327
02	01	0005	00000000	0	0	TEHSIL	Dalhousie(T)	Urban	1907
02	01	0005	00067700	0	0	VILLAGE	Sanjpoi (41)	Rural	33
02	01	0005	00067800	0	0	VILLAGE	Samleu Uperla (40)	Rural	595
02	01	0005	00067900	0	0	VILLAGE	Sanjap (42)	Rural	18
02	01	0005	40102000	0	0	TOWN	Dalhousie (CB)	Urban	482
02	01	0005	40102000	1	0	WARD	Dalhousie (CB) - Ward No.1	Urban	482
02	01	0005	40103000	0	0	TOWN	Dalhousie (M Cl)	Urban	1425
02	01	0005	40103000	1	0	WARD	Dalhousie (M Cl) - Ward No.1	Urban	341
02	01	0005	40103000	2	0	WARD	Dalhousie (M Cl) - Ward No.2	Urban	136
02	01	0005	40103000	3	0	WARD	Dalhousie (M Cl) - Ward No.3	Urban	145
02	01	0006	00000000	0	0	TEHSIL	Bhattiyat(T)	Total	7444
02	01	0006	00000000	0	0	TEHSIL	Bhattiyat(T)	Rural	6329
02	01	0006	00000000	0	0	TEHSIL	Bhattiyat(T)	Urban	1115
02	01	0006	00080300	0	0	VILLAGE	Aled (120)	Rural	19

Designing Loaction Code Structure for
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Existing codes and need to change

State Codes:

- **NW – SE principle followed**
- **Codes unique within the country**
- **Beginning with '01'**
  for Jammu & Kashmir
- **Ending with '35'**
  for A & N Islands.

2001 Census:
2 digit code beginning with '01'

- **Should it be same?**
- **Or, should the states be alphabetically arranged and assigned codes as in 1991 Census or earlier?**

Existing codes and need to change

District Codes:

- **NW – SE principle followed**
- **Codes unique within the state**
- **Begins at 01 in a new state**
- **Haryana:**
  - **Panchkula 01**
  - **..**
  - **..**
  - **Faridabad 19**
- **Again begins with '01' in the nest state.**

2001 Census:
2 digit code beginning with '01'

- **Should it be same?**

- **Or, should the districts be alphabetically arranged and assigned codes as in 1991 Census or earlier?**

Existing codes and need to change

Sub-District Codes:

- **NW – SE principle followed**
- **Codes unique within the district**
- **Begins afresh in new district**
- **Haryana: District 1**
  - **Tahsil 1: 0001**
  - **..**
  - **..**
  - **Tahsil 4: 0004**

2001 Census:
4 digit code

- **Should it be same?**

- **Or, should the sub-districts be alphabetically arranged within a district and assigned codes as in 1991 Census or earlier?**

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Existing codes and need to change

Village Codes:

- **NW – SE principle followed**
- **Codes unique within the state**
- **Uttaranchal**
  - **Village 1: 00000100**
  - **..**
  - **..**
  - **Village 658: 00065800**
- **A & N Islands**
  - **Village 1:   00000100**
  - **..**
  - **..**
  - **Village 547: 00054700**

2001 Census:
8 digit code, usually ending with '00'.

- **Should it be same?**

- **Or, should the villages be alphabetically arranged within a sub-district and assigned codes as in 1991 Census or earlier?**

Existing codes and need to change

Town Codes:

- **NW – SE principle followed**
- **Pre-fix '4' distinguishes a town**
- **District Code included in the Town Code for identification**
- **Codes unique within the State**
- **Problem, if the town spreads over more than one district.**

Examples:

- **Kupwara (NAC) '40101000'**
- **Handwara (NAC) '40102000'**
- **Doda (NAC) '40904000'**

2001 Census:
8 digit code, beginning with '4' and ending with '000'.

- **Should it be same?**
- **Or, should the villages be alphabetically arranged within a sub-district**
- **Should not be permanent.**
- **Should it be shown as one entity under state.**

Existing codes and need to change

Ward Codes:

- Boundary of each ward is notified by the Municipal Authority
- Ward is usually known by Ward Number.
- The code representing a ward is same as the ward number in a town.

Examples:

- Srinagar (MC) Ward No. 1: '1'
- DMC (U) Part - Ward No.128: '128'

2001 Census:
Same as Ward Number

- **Should it be same?**
- **Should it be permanent.**

Existing codes and need to change

Code to represent Outgrowths (OGs):

- **To be assigned continuous number within a town after the number of last ward**

Examples:

- **A city with 25 Wards and 3 OGs will have OG codes as 26 to 28.**
- **In case OG is a part of a village where one part is a village and the other part has become OG, separate Codes will be assigned to the two parts.**

2001 Census:
Usually same as Ward No.

Existing codes and need to change

Code to represent Permanent CEBs:

- To assign 4-digit continuous number in a State/District
- Separate for Rural and Urban areas
- Geographic representation of the centroid of the CEB by indicating its latitude and longitude.

2001 Census:
No separate structure, continuous numbering for each village, town

1 to n

Proposed Modifications

Modifications proposed in 2011

- **In Census, the concept of temporary and permanent codes was introduced in 2001 Census**

- **Only the villages were assigned Permanent Location Code Numbers (PLCNs)**

- **In effect it means that all other codes were not permanent**

- **In 2011 Census it is proposed to continue the same principle, except that towns are also proposed to be given permanent location codes.**

Designing Loaction Code Structure for
2011 Census

2011 Codes - Changes

State Codes

- **No change proposed as no new state has been formed after 2001 Census**

- **State Code would remain to be 2-digit code**

- **State would have the same codes as in 2001 (i.e., 01- J&K …………. 35 – A&N Islands)**

- **However, at the time of publishing the output tables, the states would be arranged alphabetically, unlike in 2001 Census when these were arranged code wise.**

2011 Codes - Changes

District Codes

- **No change in code structure - 2-digit code to continue as in 2001 Census**

- **As per information available, there are 629 districts in the country today**

- **The serpentine principle of allotting code beginning NW within the state would continue**

- **New codes allotted would be unique in the state. Actual code might change while accommodating new district(s)**

- **However, at the time of publishing the output tables, the districts would be arranged alphabetically, unlike in 2001 Census when these were arranged code wise.**

Designing Loaction Code Structure for
2011 Census

2011 Codes - Changes

Sub-district Codes

- Change in code structure - 2-digit code to replace 4-digit codes in 2001 Census

- As per information available, there are … sub-districts in the country today

- The serpentine principle of allotting code beginning NW within the district would continue

- New codes allotted would be unique in the district. Actual code might change while accommodating new sub-district(s)

- However, at the time of publishing the output tables, the sub-districts would be arranged alphabetically, unlike in 2001 Census when these were arranged code wise.

2011 Codes - Changes

Town Codes

- **To be allotted permanent codes as like villages**

- **In 2001 Census, the elements of Town Codes were:**

  - **4 – as prefix to identify that the code represents a town**

  - **'99' – 2-digit code representing district code**

  - **'99' – 2-digit code representing the serial number of town in the district**

  - **'000' – Dummy digits as suffix to tally the field length as in case of village (i.e., 8-digit)**

2011 Codes - Changes

Town Codes

• **In 2011 Census, the elements of Town Codes proposed:**

- **4 – as prefix to identify that the code represents a town**

- **'99999' – 5-digit code representing town serial number within the country (At present there are 5,161 towns)**

- **'00' – Dummy digits as suffix to accommodate new towns in future**

- **Example - Indore - 40123400**

- **Or, if the town is spread over more than one district, last two '00's could also be utilised to designate the part it represents**

- **Example: Srinagar 4 00001 00**
  [Part 1: 4 00001 01; Part 2: 4 00001 02]

Designing Loaction Code Structure for
2011 Census

2011 Codes - Changes

Village Codes

- **No change in code structure - 8-digit code to continue**

- **Village codes to remain permanent and same as in 2001 Census**

- **Example: '00067700' – Village X**

- **New villages would be allotted new codes contiguous to the geographical location of the village from which it has originated**

- **Fresh additions to use tenth position**

- **Example : '00067700' – Village X**
  '00067710' – Village X New 1
  '00067720' – Village X New 2.

Designing Loaction Code Structure for
2011 Census

Ludhiana district : Punjab

PUNJAB
LUDHIANA DISTRICT
(SHOWING TAHSIL, VILLAGE BOUNDARY
AND NETWORK OF ROADS)

KILOMETRES

1 0 1 2 3 4 5 6

NAWANSHAHR DISTRICT

JALANDHAR DISTRICT

RUPNAGAR DISTRICT

MOGA DISTRICT

SANGRUR DISTRICT

FATEHGARH SAHIB DISTRICT

From Jalandhar
From Zira
From Moga
From Malerkotla
To Morinda
To Rajpura

JAGRAON TAHSIL
LUDHIANA EAST TAHSIL
LUDHIANA WEST TAHSIL
RAIKOT TAHSIL
PAYAL TAHSIL
KHANNA TAHSIL
SAMRALA TAHSIL

LUDHIANA
MULLANPUR
JAGRAON
AKALGARH
RAIKOT
MALOUD
PAYAL
KHANNA
DEHLON
SAHNEWAL
SAMRALA
MACHHIWARA

BOUNDARIES;

DISTRICT
TAHSIL
VILLAGE
URBAN AREA
NATIONAL HIGHWAY
STATE HIGHWAY
OTHER ROAD
RAILWAY, BROAD GAUGE

OFFICE OF THE REGISTRAR GENERAL, INDIA

Code No.	Village Name	Code No.	Village Name
716	Chak Lohat	777	Lalangarh
732	Mand Fatehgarh	772	Lashowki Kalan
735	Mand Jodhewal	721	Bhagwanpura
738	Mand Jhamuali	752	Mithewal
741	Sahnewal Khurd	73+	Shahbazpur
742	Sahnewal Kalan	131	Chak Sango
744	Mand Sidhwal	130	Gopalpur Sukaderwal
745	Sidhwali Kalan	133	Mand Chaunka
746	Kahlab Kalan	148	Idawal
752	Kahlab Khurd	211	Karabad
754	Panjgarain	245	Par Isp Singhwala
755	Tanda Kuchal Singh	360	Auradanpura
763	Sukhewal	361	Rattura Sogran
764	Mubarakpur	364	Gulabewal Kalan
765	Agewal Rajputan	366	Fatehgarh Gulran
766	Agewal Jattan	367	Mana Khurd
768	Bainsi Khurd	362	Rajgawal
772	Chakti Manga	362	Talwandi Khurd
773	Chak Samun		

2011 Codes - Changes

Village Codes

- **Map Division is required to plot the new villages in the sub-district level map in consultation with the local Survey / Revenue Department or Tahsildar, etc.**

- **The final updated maps showing new villages and other changes are required to be certified by the authority who are holding charge of such authentication on behalf of the Revenue Department (ex: Deputy Commissioners, District magistrates, Sub-divisional Officers, Tehsildars, ..)**

- **A separate circular is under issue from Map Division on this subject**

- **This work takes about two years to complete.**

2011 Codes - Changes

Village Codes

- At the Data Users Conference, there were suggestions for incorporating information on nature of terrain within the PLCN

- For instance, such information on the type of terrain such as, Hilly, Plan, Undulating plain, desert, etc would be important when specific plans for such villages are prepared. (Comment: We can accommodate this question in the Village Directory data)

- ORGI is also exploring the viability of providing 'Geographical area' of a village or town in the database. This would help to ensure full coverage during the Census.

2011 Codes - Changes

Village Codes

- There were also suggestions to provide small area statistics, like for hamlet, Enumeration Blocks

- Census does not compile list of hamlets – if decided, the list could be obtained from the M/O Rural Development or compiled fresh.

Expert Committee on metadata and data standards for land area codification

Chairman:

Additional Secretary (RGI)

Objective:

To graphically and uniquely describe a land region on satellite image or linear map, with the objective to feature a geographical area through multi layered mapping of locations of various establishments.

Expert Committee on metadata and data standards for land area codification

Databases:			
Country	Country Name	Name in English	Local language
State	State Code	Name in English	Local language
District	District Code	Name in English	Local language
Sub- District	Sub- district Code	Name in English	Local language
Village	Village Code	Name in English	Local language
Town	Town Code	Name in English	Local language
Geo-code	Latitude	Longitude	Height

Designing Loaction Code Structure for
2011 Census

Expert Committee on metadata and data standards for land area codification

Highlights of proposals under consideration:

- Country name code as defined under International Standard ISO 3166 – 1, 3a (that is, till three places) (Ex: IND)

- State Code: 2-digit; Unique at National level, Geo-code (state level)

- District Code: 2-digit; Unique within a state [(a)suggested to have 3-digit code, extra digit code set to '0' to accommodate splits, (b) also assign unique code within the country]; Geo-code (district level)

- Sub-district: 4-digit as in ORGI, need to give unique code in the country; Geo-code (sub-district level)

- Village Code: 8- digit; Unique at National level; Geo-code at Revenue Land Region

- Town Code: 8-digit; Permanent location code of the town; unique at National level Geo-code at Revenue Land Region

Expert Committee on metadata and data standards for land area codification

- The Expert Committee is likely to meet shortly to decide on the subject

- During deliberations a consensus is emerging in designating ORGI as the organisation to be in charge of updating location codes

- However, they have suggested that the latest list should always be made available at the Census site for others to use

- With all these modifications, as well as with the addition of information on latitude/longitude, the Code List is likely to be more useful to the user fraternity.

Designing Loaction Code Structure for
2011 Census

Thank you