2021

Administrative Boundaries

DATA SHARING GUIDE V3.0

NELSON RIBEIRO

Contents

INTRODUCTION

Hand-in-Hand (HiH) is an evidence-based initiative, using multi-sectorial geospatial data to address a wide-spectrum of problems with a system approach. Trustable and interoperable data hinge on high quality administrative boundaries as a fundamental core dataset for location-based integration. Country and regional teams are privileged partners with access to national geospatial and cartographic data, opening the prospect of gathering, harmonizing, and standardizing the most UpToDate and correct datasets.

In this context, this document outlines the data specification and the steps needed for the preparation, encoding, production, and sharing of administrative boundaries information.

The data specification is based on the Second Administrative Level Boundaries (SALB) initiative of the United Nations (UN Geographic Information Section, 2018).

This guide is divided in three parts:

1. data specification.
2. geodatabase use guide and.
3. quality check list for administrative boundaries.

DISSEMINATION POLICY: The Hand-in-Hand initiative avails the final products including geospatial datasets over the internet for visualization and non-commercial purposes. Institution/Member States retain all intellectual property rights, including copyright, and shall grant to FAO United Nations a non-exclusive, indefinite, free license.

For data sharing, the HiH initiative geospatial analysis team, provides a reference geodatabase and the present document detailing the procedures for loading, validating and editing. The AdminBound_V2.0.mdb supports:

1. Editing the administrative unit dataset to UN borders compliance.
2. Implementing SALB data specification.
3. Validating topological correctness.
4. Document metadata.

Compliance to UN recognized borders is mandatory for data publishing (FAO LEG, 2012) and fundamental in the production of a harmonized global administrative units dataset based on the UN Geospatial Information Section map (UN-GIS, 2018).

Data is delivered in one single feature class (dataset) at the highest administrative level. A field identifying code/name attribute for the lower levels must be present to allow aggregation of regions/units into larger polygons of the lower level.

National coding systems, local language names, and other information should be supplied in additional tables and linked (geodatabase relationships) using the coding system (ADMCD) as primary key.

ISO 19115 standard metadata documentation is fundamental and can be created in the geodatabase container or in FAO map catalogue (GeoNetwork).

1. DATA SPECIFICATION

CRS: GCS_WGS_1984 WKID: 4326 Authority: EPSG

Spatial Resolution (recommended) - 1/1milion scale

Language – English;

Geometry type –Polygon

Encoding and format: Feature Class, SHP, GDB, GPKG;

CLASS

Feature Type Name: Administrative Unit (P)
Feature Type: Polygon
Feature Type Definition: The administrative units and related entities in the form of an area.
Feature Type Code:
Feature Type Aliases: Admin Units
Feature Attribute Code:
ISO3CD
ADM1NM
ADM1CD
ADM2NM
ADM2CD
DATSOR

ATTRIBUTES

FEATURE ATTRIBUTES (ADMINISTRATIVE UNITS)

Feature Type:	Administrative units (polygons)
Feature Attribute Code:	ISO3CD
Feature Attribute Name:	ISO Country Code 3
Description:	ISO-3166-1 three letter code
Type:	Text
Length:	3
Rule:	Mandatory
Feature Attribute value:	ISO-3166-1 3 letter code for administering country of boundary line
Feature Attribute example:	SEN [Senegal]

Feature Type:	Administrative units (polygons)
Feature Attribute Code:	ADM1NM
Feature Attribute Name:	Administrative unit level 1 name
Description:	Administrative unit name in Romanized characters, see LANGAGE
Type:	Text
Length:	256
Rule:	Mandatory
Feature Attribute value:	Specific name for the administrative unit
Feature Attribute example:	Kédougou [located in Senegal]

Feature Type:	Administrative units (polygons)
Feature Attribute Code:	ADM1CD
Feature Attribute Name:	Administrative unit level 1 code
Description:	Administrative unit code of first level administrative boundaries, in the form of ISO3-3166-1 three letter code; numeric code for administrative level 1 of 3 number sequence, based on alphabetically classified Administrative unit name. The code is therefore: ISO3-3166-1 three letter code + XXX
Type:	Text
Length:	7
Rule:	Mandatory
Feature Attribute value:	Specific code for the administrative unit level 1
Feature Attribute example:	SEN007 [Kédégou - Senegal]

Feature Type:	Administrative units (polygons)
Feature Attribute Code:	ADM2NM
Feature Attribute Name:	Administrative unit level 2 name
Description:	Administrative unit name in Romanized characters
Type:	Text
Length:	256
Rule:	Mandatory
Feature Attribute value:	Specific name for the administrative unit
Feature Attribute example:	Saraya [located in Kédégou, Senegal]

Feature Type:	Administrative units (polygons)

Feature Attribute Code:	ADM2CD
Feature Attribute Name:	Administrative unit level 2 code
Description:	Administrative unit code of second level administrative boundaries, in the form of ISO-3166-1 three letter code; AND numeric code of 3 number sequence, based on alphabetically classified Administrative unit name; AND code for administrative level 2 numeric of 3 number sequence, based on alphabetically classified Administrative unit name. The code is therefore: ISO3-3166-1 three letter code + XXX + XXX
Type:	Text
Length:	11
Rule:	Mandatory
Feature Attribute value:	Specific code for the administrative unit level 2
Feature Attribute example:	SEN007003 [located in Kédégou, Senegal]

Feature Type:	Administrative units (polygons)
Feature Attribute Code:	DATSOR
Feature Attribute Name:	Date of Source
Description:	Date of the receipt of the dataset.
Type:	Date
Length:	10
Rule:	Mandatory
Feature Attribute value:	Date in the form of DD/MM/YYYY
Feature Attribute example:	05/04/2010

2. GEODATABASE USE

This section details the ArcGIS steps to edit and load administrative boundary data using the geodatabase provided to support data sharing in a standardized schema. 'AdminBound_V2.0.mdb' personal geodatabase is available with pre-defined schema, topology rules and domain (ISO country codes).

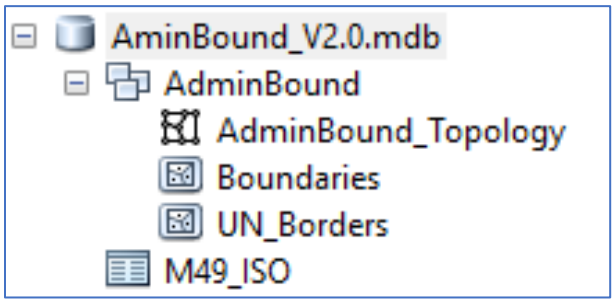


Figure 1 - Geodatabase contents

The geodatabase is composed of:

1. Geodatabase feature dataset - AdminBound
    a. Geodatabase topology - *AdminBound_Topology*.
    b. Geodatabase feature class – *Boundaries*.
    c. Geodatabase feature class – *UN_Borders*.
2. Geodatabase Table – M49_ISO (Domain)

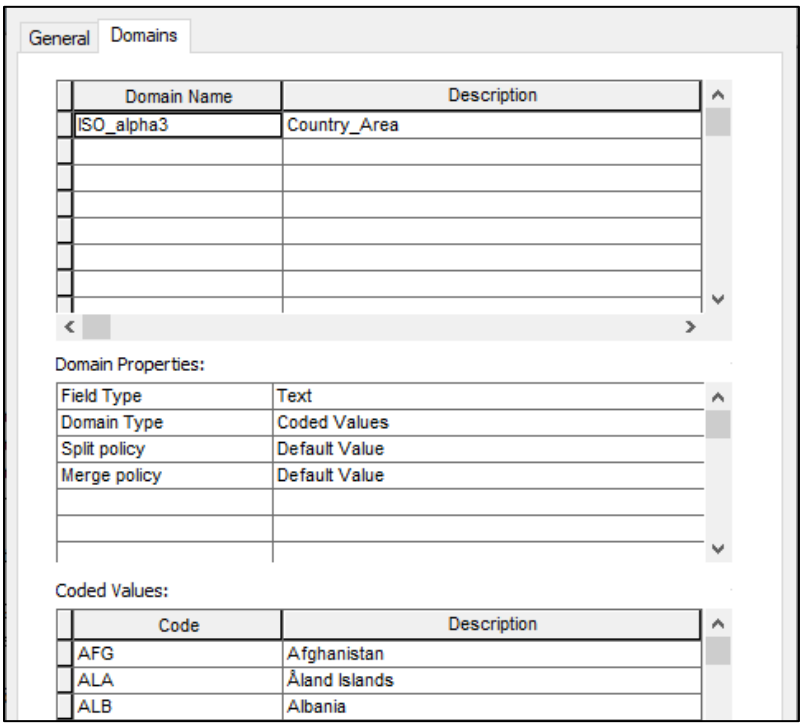


Figure 2 - ISO alpha3 domain

Implemented topology rules are:

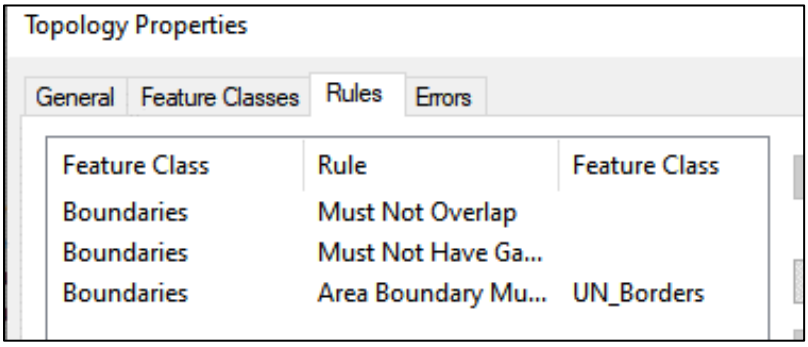


Figure 3 - Topology Rules

Where 'Must Not Overlap' and 'Must not Have Gaps' are applied to the *Boundaries* feature class, and 'Area Boundary Must Be Covered By Boundary Of' is used to align *Boundaries* feature class polygons to (administrative layer) to *UN_Borders* feature class.

'Boundaries' feature class 'level_1_2' implements SALB data model/structure:

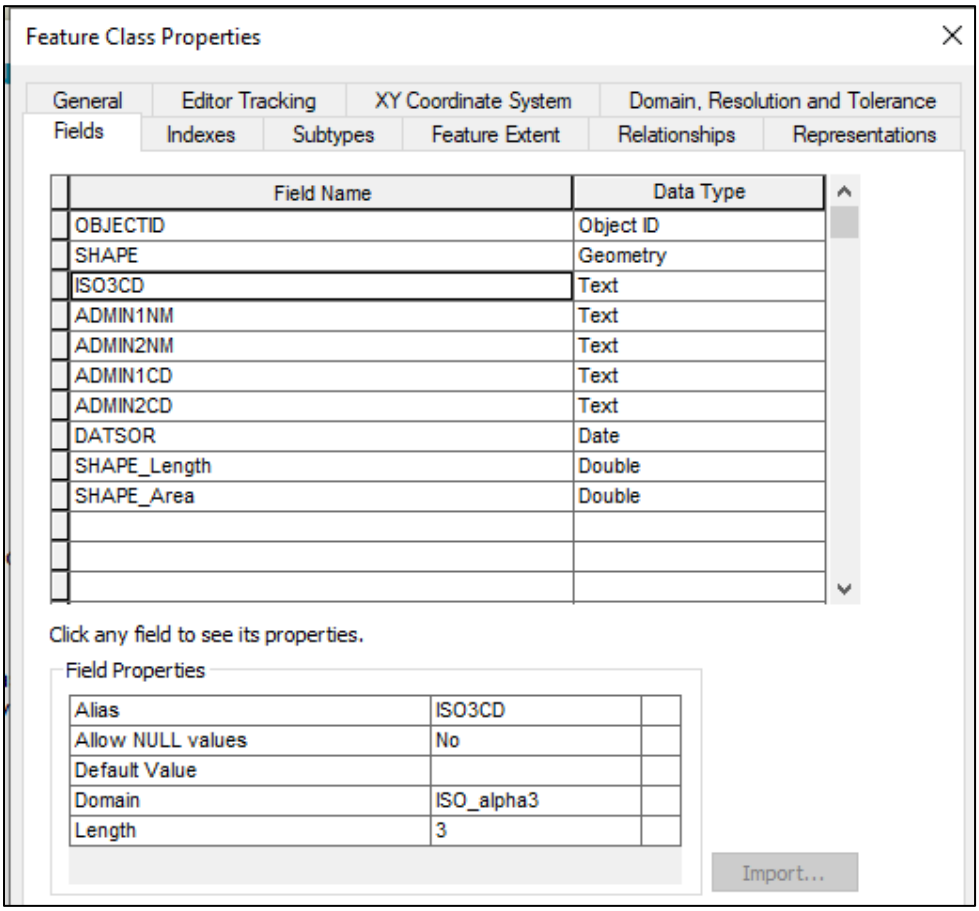


Figure 4 - Boundary feature class properties

To edit the data and load the geodatabase, the following steps are required:

1. Export the country administrative units shapefile to excel and edit to SALB structure (1. Data Specification Section pag.3) using the tool - *table to excel*.
2. Convert back to ArcGIS table (ArcGIS dbf) using *excel to table* tool and join it with the original SHP.
3. After joining the tables, clean all unnecessary fields - secondary, duplicated, non-essential - to a final SHP with SALB structure (1. Data Specification Section pag.3) and save/export a clean/final SHP.
4. Check and Repair geometry using ArcMap tools.
5. Clip the administrative units layer to UN_Borders feature class.
6. Using the Catalog Tree context menu, launch the *Simple Data Loader* and load the final SHP into the geodatabase feature class mapping the fields.

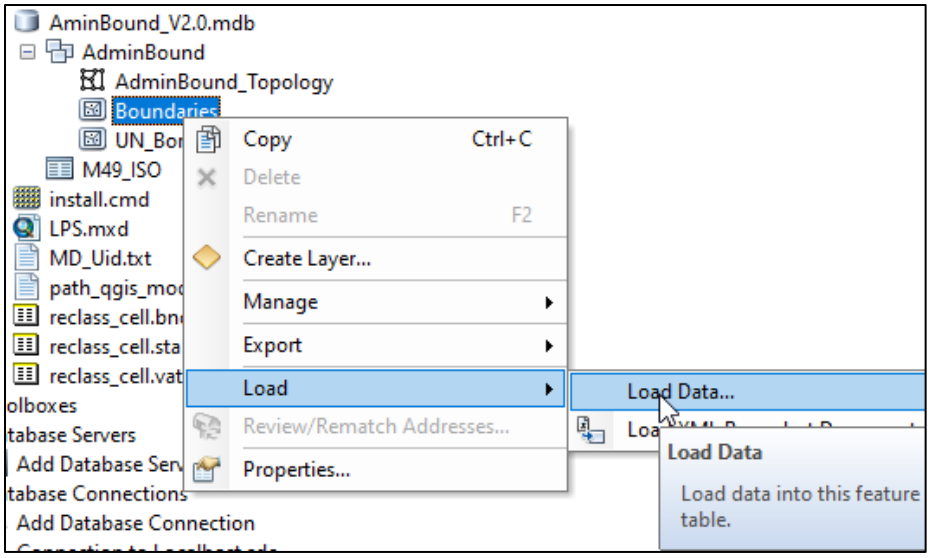
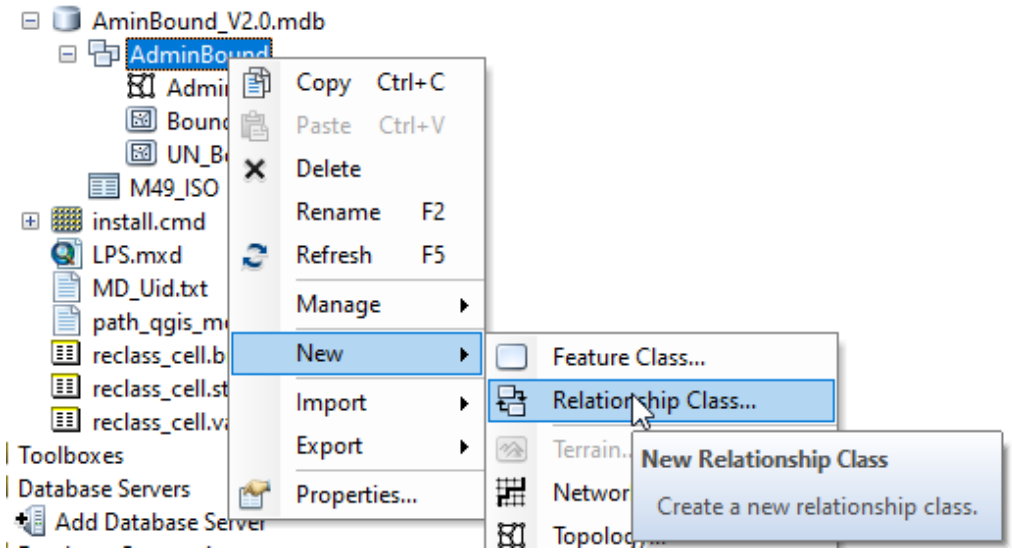


Figure 5 - Geodatabase loading

7. Validate topology and edit/correct or mark as exception errors.
8. National coding systems, local language names, alternative names and other information must be loaded in additional tables and linked (geodatabase relationships) using the coding system (ADMCD) as primary key.



9. Conclude by creating/editing the respective Metadata using the description tab for the geodatabase and feature class. National coding systems, alternative or local language names, additional table schema and attributes, should also be documented.

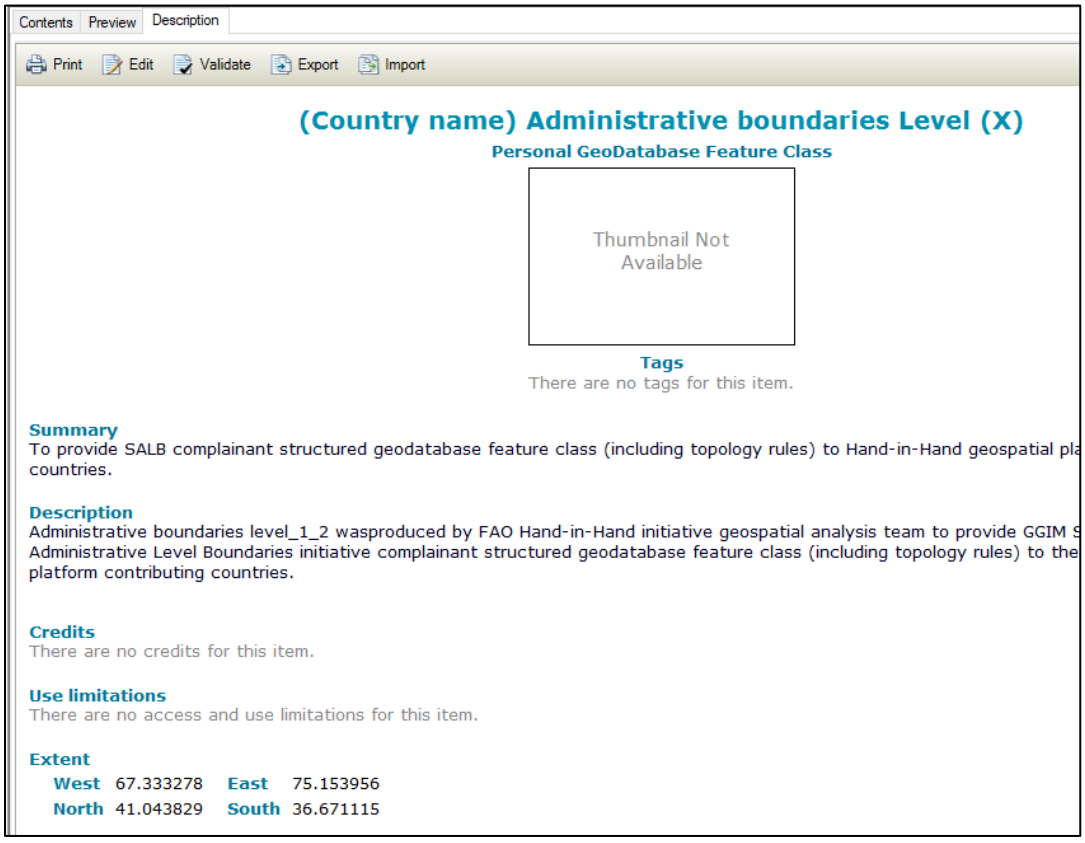


Figure 6 - METADATA documentation

Notes:

a) When sharing higher administrative level boundaries (level_3, _4, _n), previously edit the feature class properties to create the corresponding attributes: ADMIN3CD, ADMIN3NM, …,ADMINnCD, ADMINnNM.
b) Data type mismatches between specification and dataset schema must be corrected before geodatabase loading.
c) Questions and support should be directed to: Nelson Ribeiro nelson.rosasribeirofilho@fao.org

1. DATA QUALITY CHECKLIST

The following auxiliary checklist can be used to verify original dataset data quality.

1.	Administrative boundaries are closed polygons.
2.	Administrative Levels are nested: If provided in distinct feature datasets, polygons of one admin level fall into one and only one polygon at the next largest level. Polygon borders/edges polygon layers are consistent.
3.	There are no missing polygons: all admin units at a given level are represented.
4.	If there are multiple distinct polygons, they are represented as a single record (multipart geometry).
5.	Topology: Polygons of the same administrative boundary level are topologically clean (no overlaps, gaps, voids or superfluous lines). Geodatabase adoption can assist topology checking.
6.	Projection/Coordinate System: GCS_WGS_1984 WKID: 4326 Authority: EPSG - correct and consistent among different administrative boundary unit layers.
7.	The national boundary is Admin level_0. subsequent subdivisions are numbered / named consistently: level_1, level_2, level_3, …, level_n.
8.	Only the essential fields are included; other information can be provided as ancillary tables.
9.	Field names and codes must follow SALB specification.
10.	Attribute names: should be in proper case, not all caps.
11.	Additional information: Local language(s) and national coding system should be made available in separate tables linked by ADMINCD (admin code).
12.	Metadata must be documented.
13.	File Formats: Shapefile, Feature class, geodatabase, geopackage.

Adapted from UN OCHA information management wiki[1]

[1] https://sites.google.com/site/ochaimwiki/cod-fod-guidance/administrative-boundaries

REFERENCES

FAO LEG. (2012). *FAO Administrative circular 2021/13*. *SEPTEMBER*, 17–19.

UN-GIS. (2018). *Guidance for the Publication of Maps*. United Nations.

UN Geographic Information Section. (2018). *Second Administrative Level Boundaries Data Product Specification*. www.unsalb.org