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The Global Administrative Unit Layers (GAUL)

Technical Aspects

EC-FAO Food Security Programme

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Objective

The Global Administrative Unit Layers (GAUL) is an initiative implemented by FAO within the EC-FAO Food Security Programme funded by the European Commission. GAUL aims at compiling and disseminating the most reliable spatial information on administrative units for all countries in the world. The GAUL Project intends to a) overcome the fragmentation of the global dataset occurring when administrative units layers are digitized on a country-by-country basis, b) promote a unified coding system that reduces maintenance efforts and c) keep historical track of changes occurring on the shapes and extent of the administrative units. The GAUL provides a contribution to the standardization of the spatial dataset representing administrative units.

GAUL Overview

The GAUL responds to the need of several international agencies to maintain a consistent global layer of administrative units which would be compliant with the standards introduced by the UN Cartographic Unit. The GAUL approach is based on two fundamental elements:

- Updates of administrative boundaries are carried out on global layers at the first and second administrative levels and on individual country layers at lower levels (when available).
- The structure of the coding system used to identify administrative units is designed to maintains vertical and horizontal uniqueness of the codes; that is, administrative unit codes are unique within the same level (i.e. communes - vertical uniqueness) and across levels (i.e. between communes and provinces - horizontal uniqueness). The main advantage of the GAUL coding system is the low maintenance effort required to synchronize codes of external tables and datasets when changes in the administrative units occur. Hence, codes only change when the shapes of the correspondent administrative units are modified, while codes of a given administrative unit level are not necessarily affected by changes occurring in their correspondent higher administrative unit level. GAUL codes are unstructured and only used as identifiers of administrative units. This implies that each code does not include information about higher level administrative units (i.e. a code of an administrative unit at the first level does not include its country code a as subset of the code string).

The GAUL keeps track of locations, shapes and names of administrative units changed or dismissed in the past. Obsolete administrative units are maintained in layers referring to the time interval in which these units were existent. Consequently, the GAUL product is not a single layer but a group of layers, named “GAUL Set”, in which each layer represents the instance of the administrative units of the world that is valid until a documented modification of these units has occurred. Each layer of the GAUL Set is associated to the year in which a re-organization of the administrative units of one or more countries has been made. The “Reference Year” of a layer of the GAUL Set is the year in which it is known that one or more administrative unit(s) has been modified and for which older and newer boundaries are available.

Example:

An administrative unit has been modified in 1999; a new layer having the year 1999 as Reference Year can be added to the GAUL Set.

Data might not be officially validated by authoritative national sources and can not be distributed to the general public. A disclaimer should always accompany any use of the GAUL data.

1.1. Overall Methodology

The implementation of the GAUL initiative is based on a collaborative work among international agencies and national authorities generating and/or collecting spatial information on administrative units. The role of FAO is to maintain active this network of collaborators, to evaluate and compile data from available sources, to establish procedures for data integration, to generate the GAUL codes and to

periodically disseminate the GAUL Set. The overall methodology consists in a) collecting the best available data from most reliable sources, b) establishing validation periods of the geographic features (when possible), c) adding selected data to the global layer based on the international boundaries provided by the UN Cartographic Unit, d) generating codes using the GAUL Coding System and e) distribute data to the users. The procedures used to implement the above steps are described in detail in Section 5. Section 3 provides a description of the structure of the GAUL Set and a summary of the main criteria applied for the compilation of the spatial features and for structuring the coding system.

1.2. GAUL Lifetime and Periodicity of the Releases

The GAUL Set is released once a year and the maximum temporal resolution of each layer of the GAUL Set is 1 year. Changes of administrative units will be conventionally applied from the 1st of January of the year in which these changes have occurred, irrespectively to the effective dates in which changes were made official.

A new GAUL Set is released when at least one of the following cases occur:

1. At least one administrative boundary segment is updated because more reliable and accurate data is available. Changes are implemented in all layers of the GAUL Set containing the corrected boundaries
2. At least one administrative unit has expired and new and old boundaries are available. Changes are implemented in all layers of the GAUL Set that refer to the interval of years in which these boundaries were officially valid

The lifetime of a layer of the GAUL Set starts from the 1st of January of its reference year until the 31st of December of the Reference Year of the next released layer of the GAUL Set.

The GAUL project does not implement changes dated before 1990.

1.3. Filenames of the GAUL Set

Each release of the GAUL Set is identified by the Year of the Release; it includes groups of layers that refer to the available Reference Years. Each group consists of three layers, one for each administrative level:

- A layer of country boundaries (Level 0)
- A layer of first level administrative units (Level 1)
- A layer of second level administrative units (Level 2)

Accordingly, the GAUL filenames are structure to include the above mentioned information to facilitate the user in the identification of each individual layer.

The structure of the filenames is the following:

Start Digit	No. of Digits	Value/Format	Description
1	1	G	The first letter of the word “GAUL”. It is present in every layer
2	4	yyyy	The Year of Release (i.e. 2005)
6	1	“_”	Underscore used as separator
7	4	yyyy	The Reference Year (i.e. 1999)
11	1	“_”	Underscore used as separator
12	1	0, 1 or 2	The administrative level the layer refers to

Example:

A GAUL Set is released in the year 2005 and includes layers for the following Reference Years: 1995, 1999 and 2004.

According to the structure above the filenames will be:

- G2005_2004_0
- G2005_2004_1
- G2005_2004_2

} Reference Year 2004; Year of the Release 2005

- G2005_1999_0
- G2005_1999_1
- G2005_1999_2

} Reference Year 1999; Year of the Release 2005

- G2005_1995_0
- G2005_1995_1
- G2005_1995_2

} Reference Year 1995; Year of the Release 2005

If the Reference Year is unknown, digits 7 to 10 will be set to “0000”.

Example:

A GAUL Set is released in the year 2005 and includes layers for the following Reference Years: unknown, 1999 and 2004.

According to the structure above the filenames will be:

- G2005_2004_0
- G2005_2004_1
- G2005_2004_2

} Reference Year 2004; Year of the Release 2005

- G2005_1999_0
- G2005_1999_1
- G2005_1999_2

} Reference Year 1999; Year of the Release 2005

- G2005_0000_0
- G2005_0000_1
- G2005_0000_2

} Reference Year Unknown; Year of the Release 2005

Structure of the GAUL Set

A GAUL Set is a spatial dataset representing locations and shapes of administrative units. It consists of two types of information: geographic features and attribute data. The first type provides information on the physical location of the units while the second type stores descriptive information associated to the administrative units (i.e. administrative unit names). For convenience, geographic features and their attributes are dealt with in separate paragraphs.

The GAUL backbone is the global layer of country boundaries created by the UN Cartographic Unit, except for the costal line that has been updated according to the satellite images for some countries (e.g. Timor-Leste),

The GAUL project maintains disputed areas in such a way to preserve national integrity for all disputing countries.

1.4. Geographic Features

In its current form, each layer of the GAUL Set includes three levels of administrative boundaries and units:

- Level 0 (ADM0): International or country boundaries. National boundaries as provided by the UN Cartographic Unit (disputed area boundaries are also included). This is the highest level.
- Level 1 (ADM1): First level administrative boundaries. These boundaries are entirely contained within the Level 0, without exceptions
- Level 2 (ADM2): Second level administrative boundaries. These boundaries are entirely contained within the Level 1, without exceptions. This is the lowest level currently considered under the GAUL project

In addition, when data is available, the GAUL provides layers on a country by country basis down to third, fourth and lowers levels.

The GAUL Set must only include administrative boundaries. Any other feature not explicitly related to such boundaries is excluded (i.e. water body shorelines and rivers are only retained when they coincide with administrative boundaries).

The administrative boundaries are considered to be coincident with the centerline of a water stream when the following situations occur at the same time:

- The scale of representation allows to map both banks of the water stream as distinct vector lines
- Segments of water streams are known to coincide with the administrative boundaries, but the exact location of these boundary lines is not specified in the source data

First level administrative boundaries are arbitrarily extended inside water bodies and water streams if their location is not explicitly reported in the source data. The boundaries inside water bodies and water streams are extended by maintaining as much as possible the direction of the edge of the boundary. If not available in the source data, the second level administrative boundaries are not extended inside water bodies; the shorelines are taken as limits of the units. In this case, the polygons inside the water bodies do not represent the second level administrative units and are coded as “Administrative unit not available”.

The GAUL Set reports the international, first level and second level administrative boundaries delimiting, or falling within, the disputed areas in a way to enable the re-construction of the administrative units as they are specified by the individual disputing countries.

Modifications of the boundaries’ locations are implemented in two different modes:

- Correction mode: occurs when boundaries are modified in order to improve on their positional accuracy. Boundaries might need to be corrected when more reliable data source or new sets

of control points are available. The correction mode implies a cascade modification of all the boundaries of all layers of the GAUL Set that include the affected administrative units

- Update mode: occurs when boundaries are modified in order to reflect political deliberations on changes in the administrative units. The update mode implies a cascade modification of only those layers of the GAUL Set whose lifetime coincides with the lifetime of the modified units.

1.5. Attribute Table

The following table describes the attributes associated to the geographic features of the GAUL Set:

Field Name	Description	Data Type	Length	Format
ADM0_NAME	UN country name	String	100	
ADM0_CODE	GAUL country code	Long Integer		
ADM1_NAME	name of administrative units at first level	String	100	
ADM1_CODE	GAUL code of administrative units at first level	Long Integer		
ADM2_NAME	name of administrative units at second level	String	100	
ADM2_CODE	GAUL code of admin units at second level	Long Integer		
LAST_UPDATE	date of the last update	Long Integer		yyyymmdd (19990101)
STR_YEAR0	creation year of the administrative unit at country level	Long Integer		yyyy (1999)
STR_YEAR1	creation year of the administrative unit at first level	Long Integer		yyyy (1999)
STR_YEAR2	creation year of the administrative unit at second level	Long Integer		yyyy (1999)
EXP_YEAR0	expiry year of the administrative unit at country level	Long Integer		yyyy (1999)
EXP_YEAR1	expiry year of the administrative unit at first level	Long Integer		yyyy (1999)
EXP_YEAR2	expiry year of the administrative unit at second level	Long Integer		yyyy (1999)
CONTINENT	Continent name	String	50	
REGION	UN Region name (updated to the UN classification 2005)	String	50	
SALB0	SALB country code	String	10	
SALB1	SALB code of administrative units at first level	String	10	
SALB2	SALB code of admin units at second level	String	10	

The GAUL coding system is implemented using the “ADMx_CODE” field series (where “x” indicates a generic administrative level). Links to other official coding systems such as ISO3 or ISO2 are provided in separate tables delivered in association to the GAUL Set and described in the paragraphs below. Links to national and local coding systems for Level 1 and Level 2 administrative units, if available, could also be provided.

1.5.1. Coding System

GAUL codes are numeric and unique for all administrative units at any of the administrative hierarchical level.

Any GAUL code is independent from the codes of its higher levels (i.e. a code of a unit at Level 2 does not include the code of the correspondent unit at Level 1)

GAUL codes assigned to administrative units of a given country are not necessarily sequential numbers. A new code is a number created from the largest code occurring in the GAUL Set and incremented of 1 unit.

New_code = largest_GAUL_code + 1

A code that has been used within the GAUL Coding System can never be reused. Consequently, a code belonging to an administrative unit that has expired (and therefore deleted from the relevant layers of the GAUL Set) cannot be reassigned to another administrative unit.

The GAUL coding system does not accept NULL or "0" codes. GAUL codes are always consistently assigned to the attributes ADM0_CODE, ADM1_CODE and ADM2_CODE. If information on administrative units for a given administrative level is not available (i.e. boundaries of administrative units at level 2 are missing; boundaries of administrative units at level 2 inside a lake are not available), GAUL codes are assigned to its attribute (i.e. ADM2_CODE), but the value of the correspondent ADMx_NAME will be: "Administrative unit not available". If data for any of the missing administrative units become available at a later stage, new GAUL codes are to be assigned to the newly included units and the previous codes are to be dismissed.

The ADMx_NAME attributes of administrative units whose names are unknown, but whose boundaries are available, are given the value of "Name Unknown".

Example 1:

Administrative units at Level 2 are unknown. The field ADM2_NAME will be set to "Admin unit not available".

ADM0_CODE	ADM0_NAME	ADM1_CODE	ADM1_NAME	ADM2_CODE	ADM2_NAME
6	Egypt	14	Al Jizah	1456	Administrative unit not available
6	Egypt	56	Al Bahr	2357	Administrative unit not available

Example 2:

Administrative units at Level 2 inside the Lake Victoria are unknown. The field ADM2_NAME will be set to "Admin unit not existing".

ADM0_CODE	ADM0_NAME	ADM1_CODE	ADM1_NAME	ADM2_CODE	ADM2_NAME
126	Uganda	132	Kampala	34700	Administrative unit not available
126	Uganda	789	Masaka	2167	Administrative unit not available

Example 3:

Administrative units at Level 2 exist but their names are unknown. The field ADM2_NAME will be set to "Name Unknown".

ADM0_CODE	ADM0_NAME	ADM1_CODE	ADM1_NAME	ADM2_CODE	ADM2_NAME
76	Haiti	345	Grand Anse	45678	Name Unknown
76	Haiti	345	Grand Anse	3213	Name Unknown

The tables below show examples of relationships among codes of different administrative unit levels.

ADM0_NAME	ADM0_CODE
Armenia	1
Afghanistan	2
Albania	3

ADM0_CODE	ADM1_CODE
1	547
1	2548
1	501

ADM0_CODE	ADM1_CODE	ADM2_CODE
1	547	35000
1	547	7901
1	547	15248

The main benefit of the GAUL Coding System is that changing in the codes of an administrative unit might not imply a change of codes of the correspondent units at lower levels. This means that the effort to maintain the links between thematic data and associated administrative units is reduced to the minimum.

1.5.2. Other Information Included in the Attribute Table

- *Names of the administrative units*: The fields "ADMx_NAME" store the names of the administrative units. Names are provided in English.
- *Date of digitization/update of the administrative units*: The field "LAST_UPDATE" stores the date of the most recent update of the geographic feature (i.e. a segment of an administrative unit boundary). This date is not related to the date in which the administrative unit was established.
- *Year of creation of the administrative units*: The field "STR_YEARx" store the reference year in which the administrative units were established. When blank, the units are conventionally assumed to exist before 1990.
- *Year of expiry of the administrative units*: The field "EXP_YEARx" store the reference year in which the administrative units have been dismissed or changed. When blank, the units are conventionally assumed to be still in existence.
- *Name of the Continents*: The field "CONTINENT" stores the name of the continent the administrative unit belongs to.
- *Name of the Region*: The field "REGION" stores the name of the UN geographic regions (i.e. South East Asia, North Africa, etc.) the administrative unit belongs to.
- *SALB codes:* The fileds "SALBx" store the SALB codes. In accordance with the SALB data policy, SALB codes have been added for those countries already validated by SALB (Second Administrative Level Boundary project).

The following example illustrates the uses of the START_YEAR and EXPIRY_YEAR fields for administrative units of Level 1 of a hypothetical layer of the GAUL Set whose reference year is 1998:

ADM1_CODE	STR_YEAR1	EXP_YEAR1	Comments
671	-	1999	Refers to a unit dismissed in 1999 and for which its year of creation is unknown. The unit is assumed to be valid from before 1990 to the 31st December 1999.
8564	1993	2000	Refers to a unit created in 1993 and dismissed in 1999. The unit is assumed to be valid from the 1st January 1993 until the 31st December 2000 *.
902	1998	-	Refers to a unit created in 1998 and for which its duration is unknown. The unit is assumed to be valid until today's date. ***This year coincides with the reference year of the considered layer of the GAUL Set.***

* The EXPIRY_YEAR is entered as soon as the information is available; its value may refer to a year more recent than the reference year of the considered layer of the GAUL Set (i.e. 1998 in the example)

1.6. Data Associated to the GAUL Set

The following information is provided as ancillary data of the GAUL Set:

- *International Coding Systems*: Link to other international coding systems at country level
- *National Coding Systems*: A template to be used to relate national coding systems to the GAUL codes

The sections below provide detailed information of the structure of the above tables. External data is linked to the attribute tables of the GAUL Set using the GAUL Coding System. The link with the attribute tables of the GAUL Set is made using only one field named "ADM_CODE". Because of the vertical and

horizontal uniqueness of the codes, in fact, there is no ambiguity in the reference of external information to the appropriate administrative units.

1.6.1. International Country Codes and Attributes

ADM0_CODE (integer)	UN_CODE (integer)	ISO_CODE (string)	ISO3_CODE (string)	FAO_CODE (integer)	COLOR_CODE (string)	STATUS (string)	CAPITAL (string)
3	51	AM	ARM	121	ARM	Member State	Yerevan
41	41	CH	CHI	22	CHI	Member State	
126	...	...	...	...	...	...	...

1.6.2. National Coding System and Attributes

ADMX_CODE (integer)	NAT_CODE (integer)	NAT_DENOM (string)
3	A25	Governorate
2357	PG87	District
126	...	...

Updating Protocol

Hereafter the method used to update and recode the administrative units which were subject to changes is described. The basic criterion is that a unit is recoded only if a change in its shape occurs. This can take place when a unit is a) split into more units, b) merged with other units or c) reshaped due to a change of the location of its boundaries.

Updates occur in the following two cases:

1. When the shape of a unit is changed: changes may or may not affect the administrative units of the level below (i.e. changes in Level 1 affect, or do not affect, the correspondent units in Level 2).
2. When an administrative unit is renamed

Special cases are the disputed areas for which a double coding is required in order to simultaneously maintain the administrative units of all disputing countries.

1.7. Updates of Administrative Units Not Affecting Lower Levels

The cases reported below refer to updates which do not affect shapes and codes of the corresponded administrative units of the lower level(s).

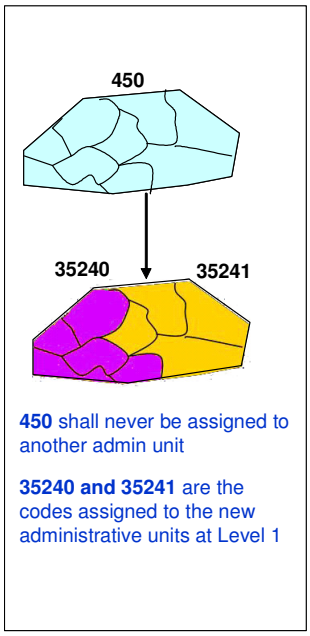
1.7.1. Creation of a New Administrative Unit (Split)

This case occurs when an administrative unit is divided into two or more units as a result of a re-aggregation of the administrative units at its lower level.

Actions:

1. Recode the field “ADMx_CODE” of the changed administrative unit

Example: Split of an administrative unit at Level 1



ADM0_NAME	ADM0_CODE	ADM1_CODE	ADM2_CODE
Italy	106	17	745
Italy	106	17	47302
…	….	…..	
Italy	106	35240	256
Italy	106	35240	7856
Italy	106	35240	4153
Italy	106	35240	14536
…	….	…..	
Italy	106	35241	4589
Italy	106	35241	6598
Italy	106	35241	12548
Italy	106	35241	26894
Italy	106	35241	69843
…	….	…..	….

Adm2_code	Fish production
745	12%
47302	25%
…..	…….
256	25%
7856	40%
4153	50%
14536	3%
…	…
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

Adm2_code	Rural Population
745	12%
47302	25%
…..	….
256	25%
7856	40%
4153	50%
14536	3%
…	…
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

Adm2_code	Fish Production
745	12%
47302	25%
…..	…..
256	25%
7856	40%
4153	50%
14536	3%
…	….
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

These Level 2 units are reassigned to the new Level 1 unit without changing their codes.
No changes are required to the Level 2 codes and to the associated thematic data (tables on the right)

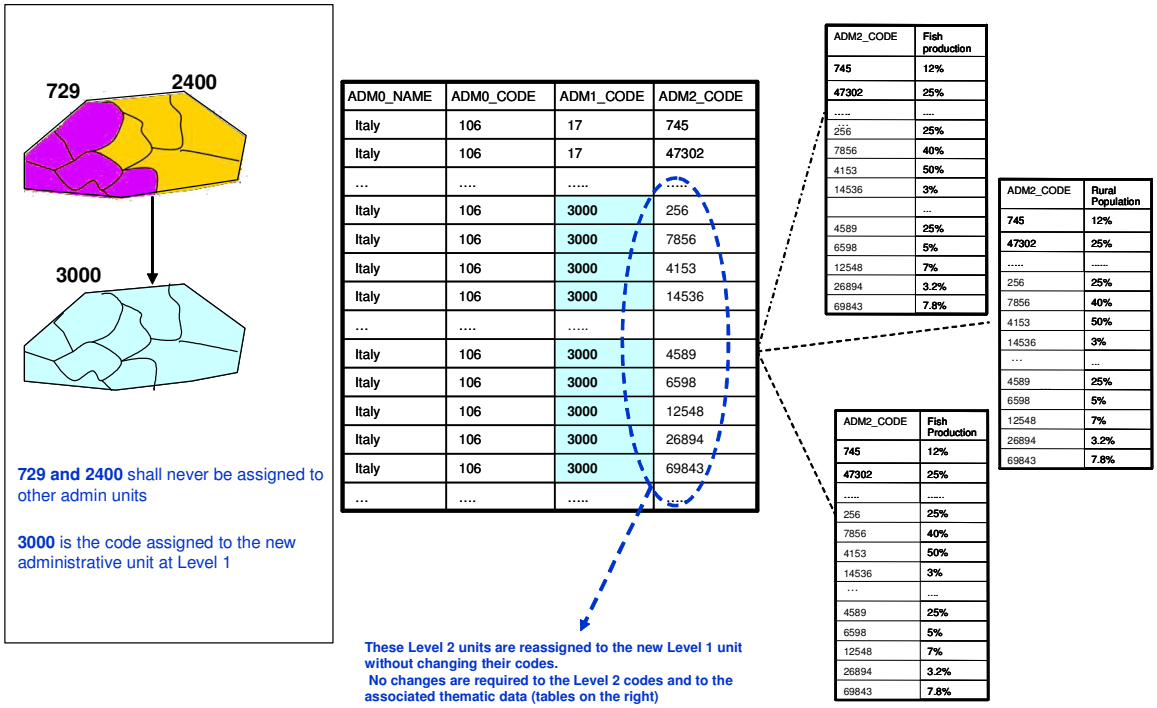
1.7.2. Deletion of an Administrative Unit (Merge)

This case occurs when two or more administrative units are merged into one unit.

Actions:

1. Recode the field “ADMx_CODE” of the changed administrative units

Example: Merge of two administrative units at Level 1



ADM0_NAME	ADM0_CODE	ADM1_CODE	ADM2_CODE
Italy	106	17	745
Italy	106	17	47302
…	….	…..	…..
Italy	106	3000	256
Italy	106	3000	7856
Italy	106	3000	4153
Italy	106	3000	14536
…	….	…..	…
Italy	106	3000	4589
Italy	106	3000	6598
Italy	106	3000	12548
Italy	106	3000	26894
Italy	106	3000	69843
…	….	…..	…

ADM2_CODE	Fish production
745	12%
47302	25%
…..	….
256	25%
7856	40%
4153	50%
14536	3%
…	…
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

ADM2_CODE	Rural Population
745	12%
47302	25%
…..	…..
256	25%
7856	40%
4153	50%
14536	3%
…	…
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

ADM2_CODE	Fish Production
745	12%
47302	25%
…..	…..
256	25%
7856	40%
4153	50%
14536	3%
…	….
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

1.8. Updates of Administrative Units Affecting Lower Levels

The cases reported below modify the administrative units in such a way that changes also affect shapes and codes of the corresponded administrative units of the lower level(s).

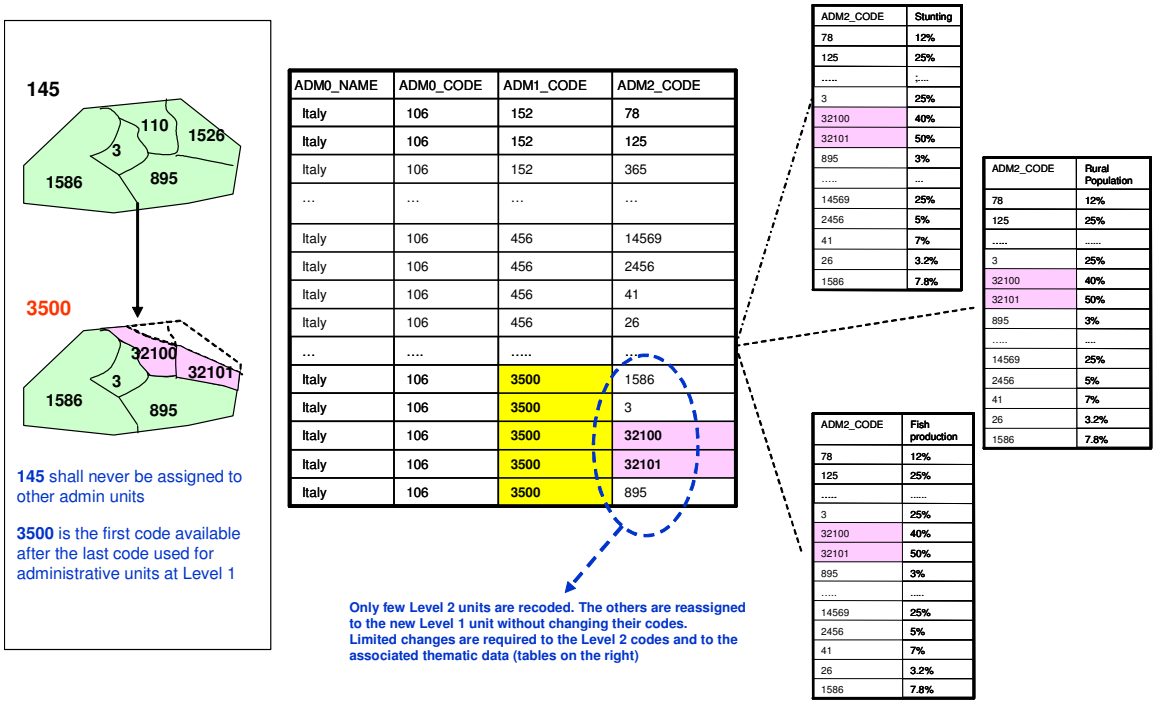
1.8.1. Modified Coordinates of the Boundaries

This case occurs when the boundaries of an administrative unit have changes their coordinates. The new position of the boundaries affects all or some of the administrative units at the lower level(s).

Actions:

1. Digitize the new boundaries and remove the old ones
2. Recode the field “ADMx_CODE” of the changed administrative unit
3. Recode the field “ADMx_CODE” of the administrative units at lower levels that are affected by the changes

Example: Modify an administrative unit at Level 1



ADM0_NAME	ADM0_CODE	ADM1_CODE	ADM2_CODE
Italy	106	152	78
Italy	106	152	125
Italy	106	152	365
…	…	…	…
Italy	106	456	14569
Italy	106	456	2456
Italy	106	456	41
Italy	106	456	26
…	….	…..	…
Italy	106	3500	1586
Italy	106	3500	3
Italy	106	3500	32100
Italy	106	3500	32101
Italy	106	3500	895

ADM2_CODE	Stunting
78	12%
125	25%
…..	;….
3	25%
32100	40%
32101	50%
895	3%
…..	…
14569	25%
2456	5%
41	7%
26	3.2%
1586	7.8%

ADM2_CODE	Rural Population
78	12%
125	25%
…..	…..
3	25%
32100	40%
32101	50%
895	3%
…..	….
14569	25%
2456	5%
41	7%
26	3.2%
1586	7.8%

ADM2_CODE	Fish production
78	12%
125	25%
…..	…..
3	25%
32100	40%
32101	50%
895	3%
…..	…..
14569	25%
2456	5%
41	7%
26	3.2%
1586	7.8%

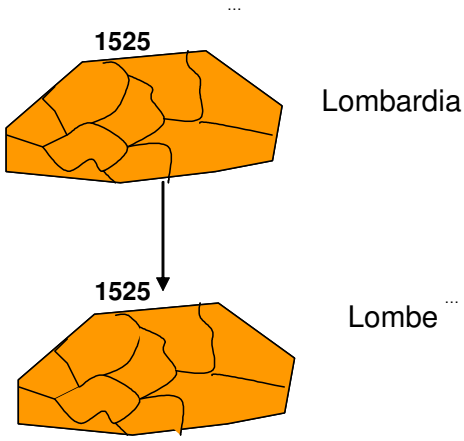
1.9. Renaming of Administrative Units

The renaming of administrative units does not involve any modifications of boundaries and codes at any administrative levels.

Actions:

1. Replace names the field “ADMx_NAME” of the changed administrative units

Example: Renaming of an administrative unit at Level 1



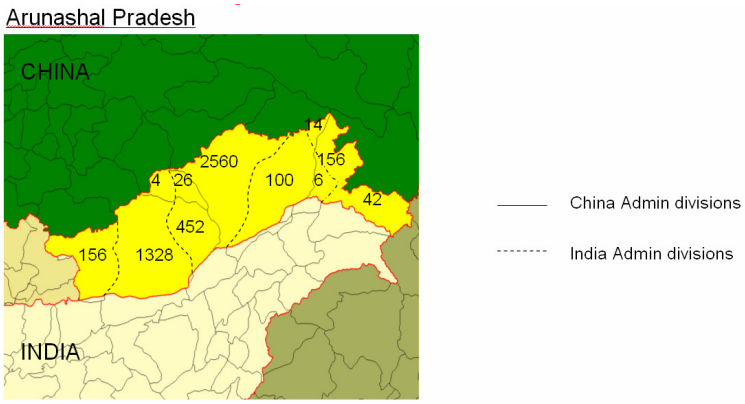
1.10. Disputed Areas

From the point of view of the data structure, the GAUL project deals with disputed areas as individual entities, not dependent from countries. Each disputed area is identified by a code stored in the field "ADM0_CODE".

The GAUL Set includes administrative units of the disputed country as geographic features entirely contained inside the disputing boundaries. Administrative units of different disputing countries may not coincide and therefore may intersect splitting the administrative units in various polygons (areas). The GAUL project deals with each fragment of administrative unit as an individual element and identifies it through a unique code. Consequently, an administrative unit of a given disputed country might be represented by more than one polygon. The re-aggregation of polygons to re-build a given disputing country is done with the support of an external table (disputed_areas.dbf), which includes codes and names of the disputing countries.

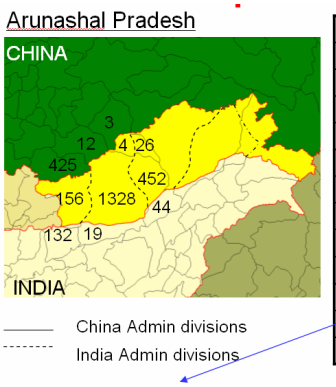
The example below shows how GAUL project manages the Level 1 administrative units of China and India inside the Arunashal Pradesh disputed area (boundaries inside the disputed area are hypothetical and do not represent actual boundaries).

Example: Codes of administrative units at Level 1 for disputed areas (1)



- **ADM0_CODE**: a unique code, different from both China and India country codes (i.e. 704)
- **ADM1_CODE**: unique codes for each polygon created by the admin divisions of both China and India (i.e. 156, 1328, 452, etc.)
- **Linked table** including country codes and admin codes of both China and India

Example: Codes of administrative units at Level 1 for disputed areas (2)



ADM0_NAME	ADM0_CODE	ADM1_CODE
China	41	425
China	41	12
China	41	3
....	....	....
Arunashal Pradesh	**704**	**156**
Arunashal Pradesh	**704**	**1328**
Arunashal Pradesh	**704**	**452**
Arunashal Pradesh	**704**	**26**
Arunashal Pradesh	**704**	**4**
....	....	.....
India	100	19
India	100	44

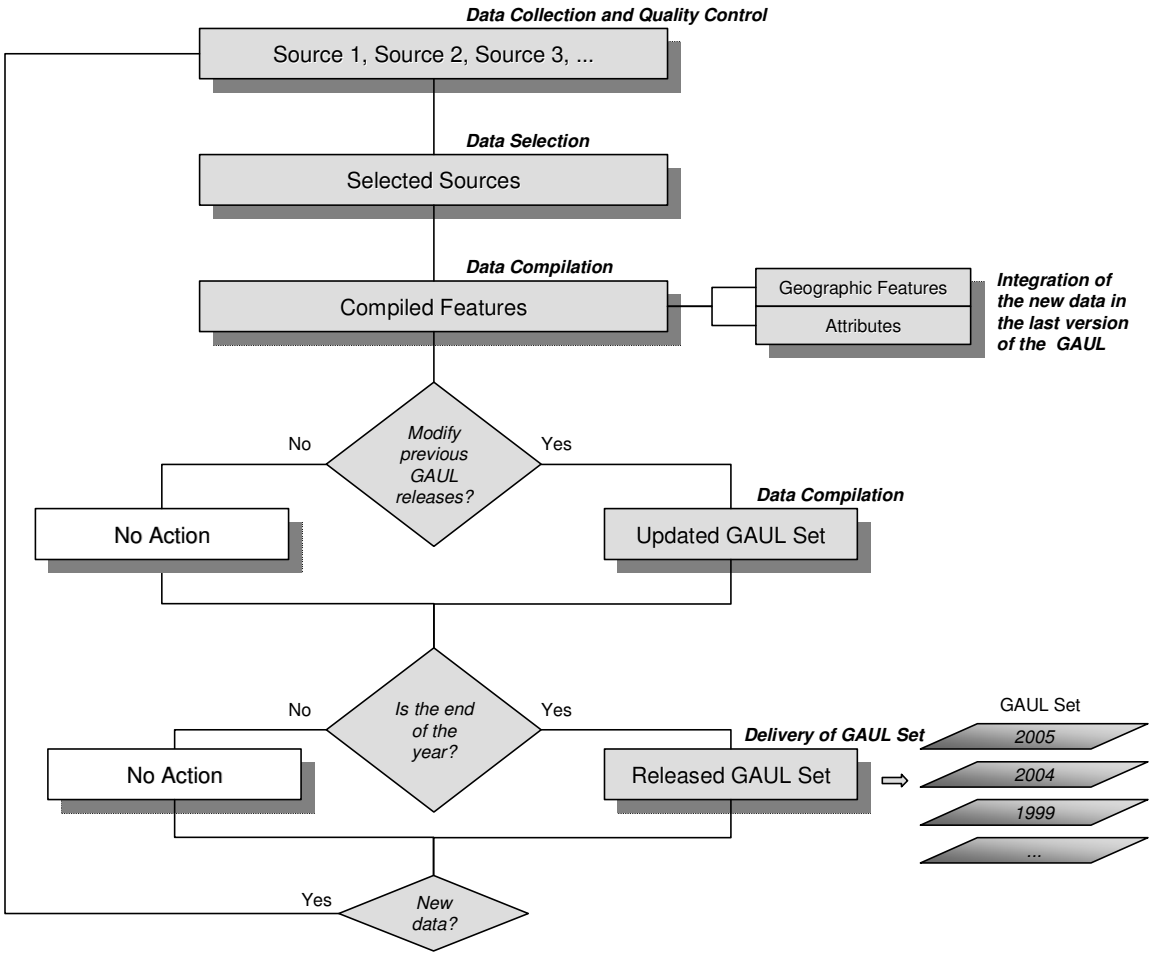
ADM0_NAME	ADM0_CODE	DIS0_CODE	DIS0_NAME	DIS1_CODE	ADM1_CODE
China	41	**704**	Arunashal Pradesh	**156**	**425**
China	41	**704**	Arunashal Pradesh	**1328**	**12**
China	41	**704**	Arunashal Pradesh	**452**	**12**
China	41	**704**	Arunashal Pradesh	**26**	**3**
China	41	**704**	Arunashal Pradesh	**4**	**3**

ADM0_NAME	ADM0_CODE	DIS0_CODE	DIS0_NAME	DIS1_CODE	ADM1_CODE
India	100	**704**	Arunashal Pradesh	**156**	**132**
India	100	**704**	Arunashal Pradesh	**1328**	**19**
India	100	**704**	Arunashal Pradesh	**452**	**44**
India	100	**704**	Arunashal Pradesh	**26**	**44**
India	100	**704**	Arunashal Pradesh	**4**	**19**

Procedures

The overall procedure applied for the implementation of the GAUL project is described in the diagram below:

Main Procedural Steps for the Creation of the GAUL Set



Step 1: Available data from international and national sources are collected, reviewed and quality controlled.

Step 2: Data not considered reliable is discarded. Metadata information of the selected data is compiled.

Step 3: Boundaries of the selected sources are merged in a single layers and original international boundaries are replaced with the ones of the UN Cartographic Unit; GAUL codes are assigned to the units; time limits for the layer's validity are set.

Step 4: Updates are carried out to all layers of the GAUL Set that include the affected boundaries and units

Step 5: At the end of the year, a new GAUL Set is released; the set includes the updates carried out during the previous 12 months.

Steps 1 to 5 represent an iterative cycle that is repeated every time a new data source is identified and selected.

1.11. Identification and Selection of Data

Available data from international and national sources are collected and reviewed. The quality control process involves a verification of the following parameters:

1. Quality of digitization
2. Availability of accurate reference system parameters
3. Completeness of the attribute tables (availability of administrative units' names)
4. Authority of the source
5. Coherency with other data sources

It should be noted that sufficient information on the accuracy and reliability of the data is not always available; in these cases, a thorough control of the accuracy of the boundaries can not be performed.

1.12. Creation and Updating of GAUL Set

The updating of the GAUL Set is a continuous activity that implies modifications of the current and previous datasets. Newly acquired data, evaluated more reliable that the one used for the latest release, replaces obsolete boundaries through semi-automated procedures. The codes are recreated or modified accordingly after the completion of the updating of the boundaries.

GAUL Contacts

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