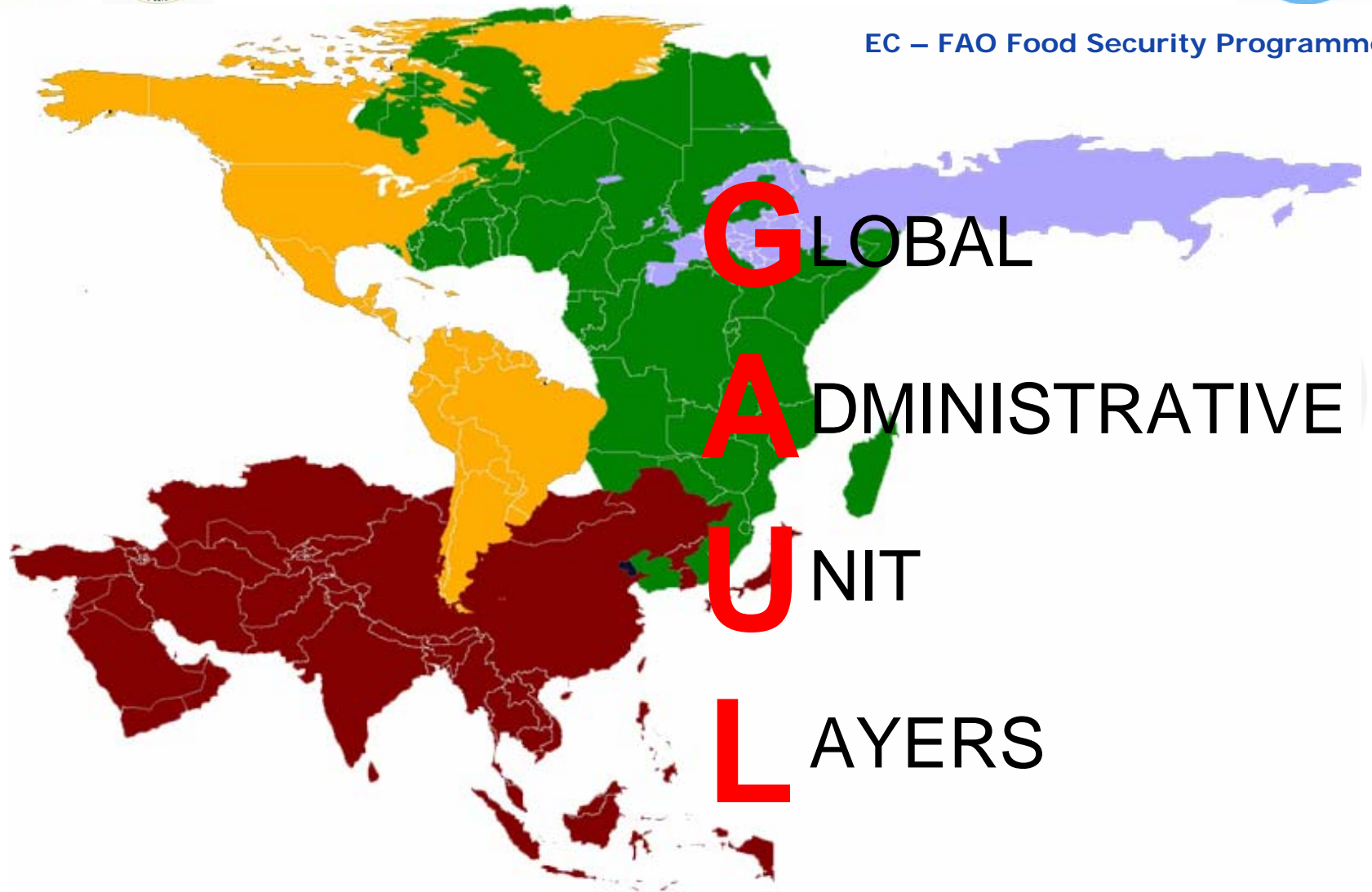


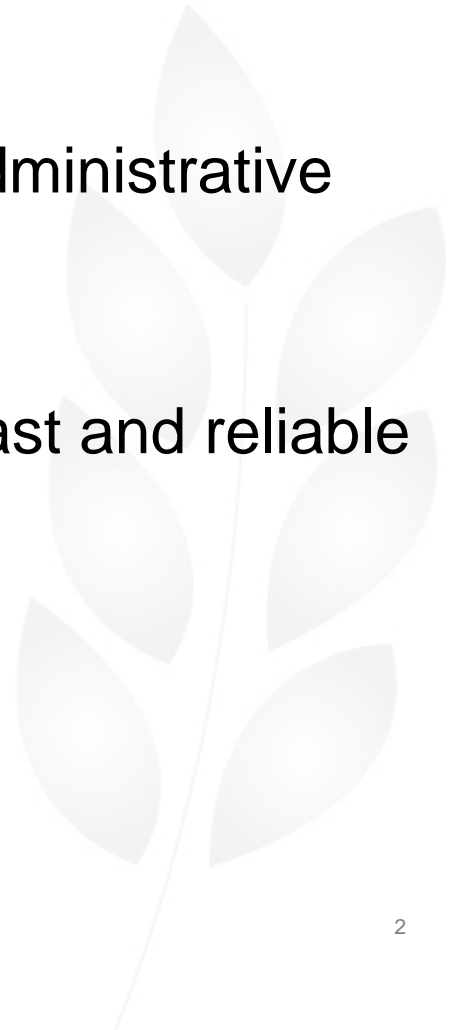


EC – FAO Food Security Programme



Common user needs

- Global Administrative layers of the world, as reference for current and past admin units
- Common view to implement and update administrative layers
- Easy management of the global layer for fast and reliable updating of the boundaries



GAUL starting point

- **at national level**

- International Boundary map of the world (UNCS)
- ISO codes
- other international coding systems

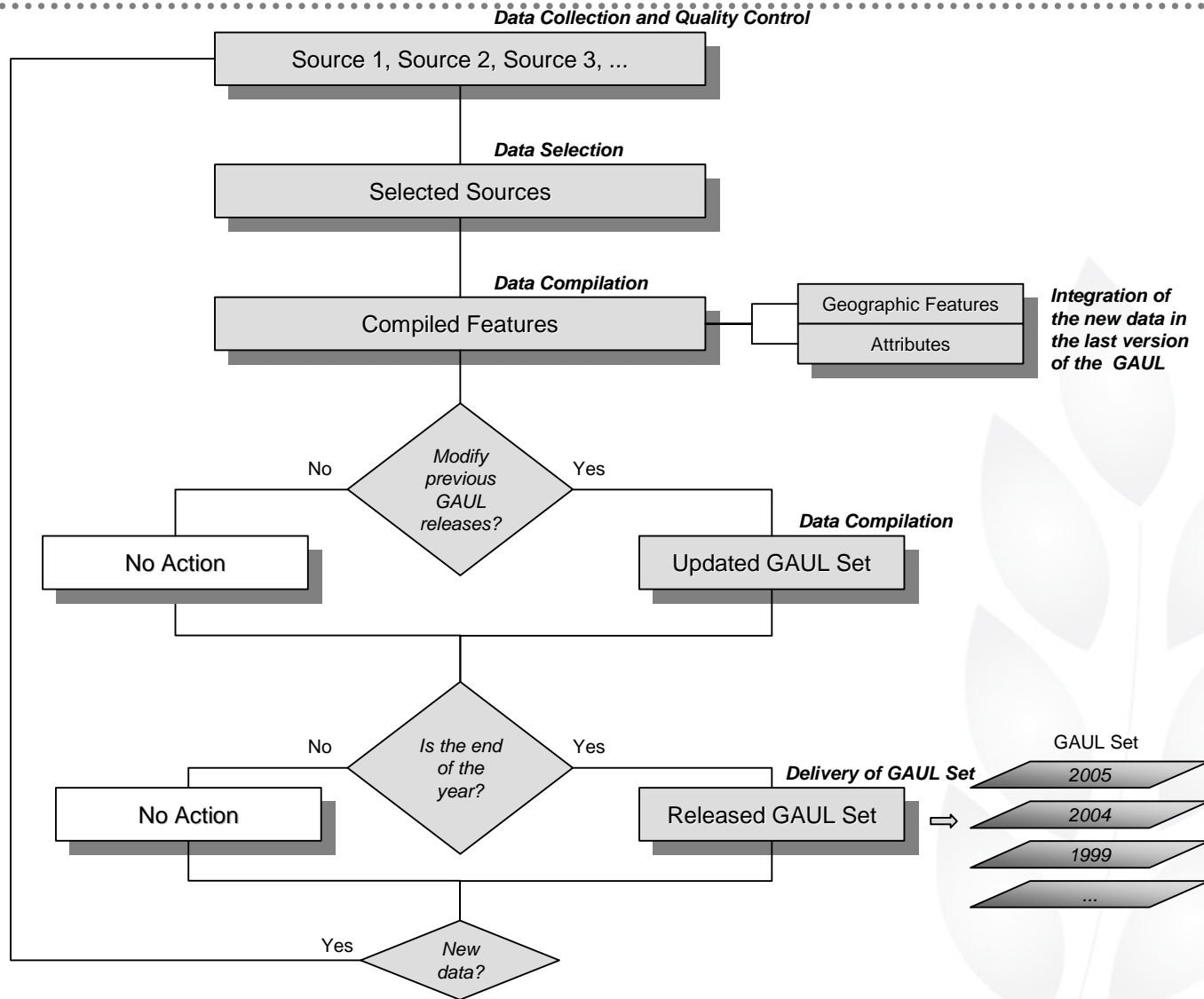
- **at subnational level**

- SALB maps delivered on a country basis only for some of the UN member states
- SALB codes and tables only for some of the UN member states

GAUL objectives and requirements

- **GAUL aims at creating a reference for current and past admin units**
 - Compliant with the **UNCS International Boundary map**
 - Compliant with the available **SALB maps**
- **GAUL aims at overcoming the fragmentation of the global dataset :**
 - **Global coverage** is always maintained (at national and sub-national levels: GAUL Set)
 - Management of **disputed areas** (as integrated part of the database)
- **GAUL aims at reducing maintenance efforts**
 - Application of a **unified coding system** to:
 - allow an easy management of the updates of admin units
 - facilitate maintenance of the links between the GAUL and thematic tables (agricultural production, etc.)

GAUL approach



GAULSet lifetime

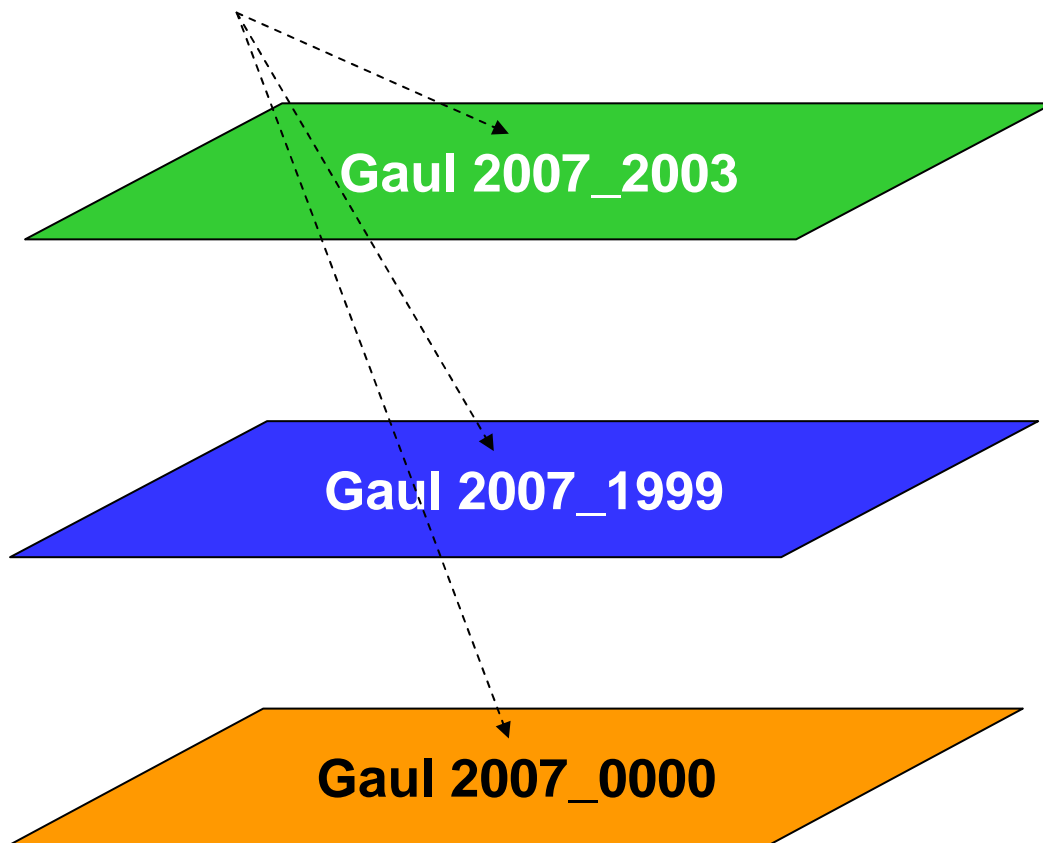
- At least **one administrative unit is updated**. Changes are implemented in all layers of the GAUL Set containing the corrected boundaries
- At least **one administrative unit has expired and new and old boundaries are available**. Changes are implemented in all layers of the GAUL Set for which these boundaries were officially valid

The GAULSet is delivered once a year

The GAUL project does not implement changes dated before 1990.

GAULSet time series

date of the release



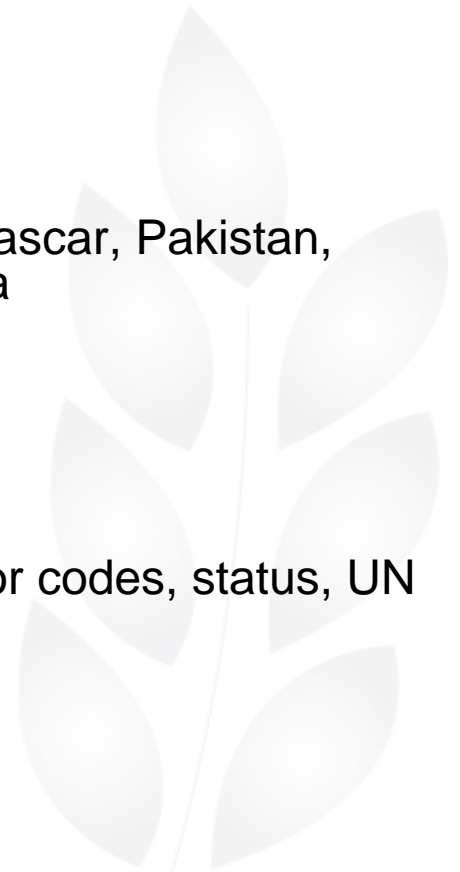
Start Date: 2003

Start Date: 1999

Start Date: unknown

The GAULSet

- **for each time series:**
 - **maps in GIS format** (e.g. coverages, shapefiles)
 - **world maps** at:
 - country level
 - first level
 - second level
 - **country maps** at:
 - third level:
 - » Burkina Faso, China, Ethiopia, Madagascar, Pakistan, Myanmar, Nepal, Timor Leste, Uganda
 - fourth level:
 - » Uganda
- **for each release:**
 - **tables in dbf format:**
 - **international country attributes** (iso3 codes, color codes, status, UN regions, UN country codes, etc.)
 - **updated countries**
 - **disputed areas**



Coding System criteria

- **Codes shall be unique**, to link data in safety and unambiguously
- **Codes shall be modified in accordance with an updating protocol** based on the following basic rule:

“Codes shall be modified only when it’s strictly necessary, to reduce user maintenance of codes”

- » Codes need to be modified only when the shape of the polygons changes
- » A used code is never re-used
- » Obsolete codes are never delete

SALB codes...WHY NOT?

SALB Coding system schema



- **Country code: ISO3_CODE**

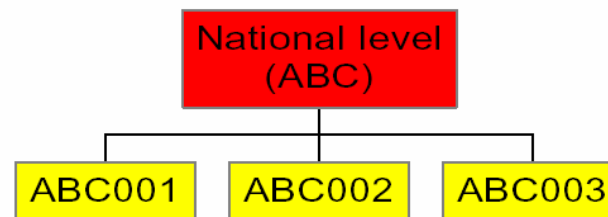
e.g. LBN = Lebanon

- **Code of Admin units at first level (Adm1_code):**

ISO3_CODE + 00X

e.g. ABC001= code of the first province (in alphabetic order) of the ABC country

It depends on the country code



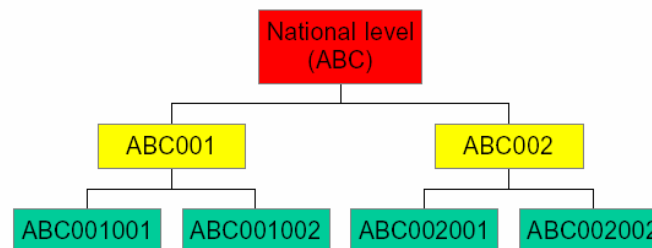
- **Code of Admin units at second level (Adm2_code):**

ISO3_CODE + 00X + 00Y

e.g. ABC001002= code of the second district (in alphabetic order) of the 001 province of the ABC country

It depends on the country code

and Adm1_code



GAUL Coding system schema

- Country code (CNT_code):



Country	Adm0_code
Armenia	1
Afghanistan	2
Albania	3

- Code of Admin units at Level 1 (Adm1_code):

It doesn't depend on the country code



Country	Adm0_code	Adm1_code
Armenia	1	47
Armenia	1	2548
Armenia	1	501

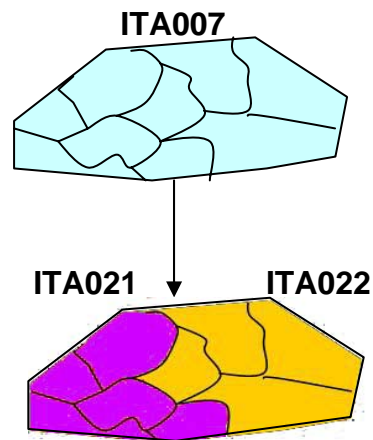
- Code of Admin units at Level 2 (Adm2_code):

It doesn't depend on the country code and on the code of the admin units at first level



Country	Adm0_code	Adm1_code	Adm2_code
Armenia	1	47	35000
Armenia	1	47	5
Armenia	1	47	15248

Coding system SALB: SPLIT



ITA007 shall never be assigned to another admin unit

ITA021 and **ITA022** are the first two new codes available, after the last numerical code used for admin units of Italy at first level

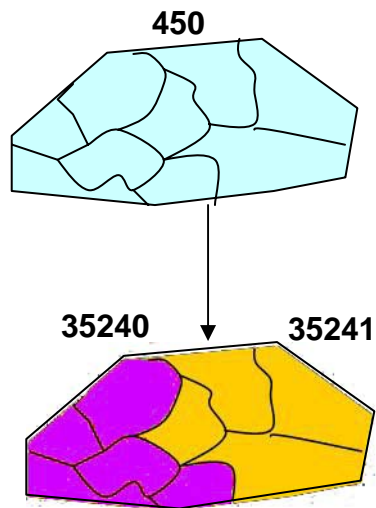
Country_name	Adm0_code	Adm1_code	Adm2_code
Italy	ITA	ITA001	ITA001001
Italy	ITA	ITA001	ITA001002
...
Italy	ITA	ITA021	ITA021001
Italy	ITA	ITA021	ITA021002
Italy	ITA	ITA021	ITA021003
Italy	ITA	ITA021	ITA021004
...
Italy	ITA	ITA022	ITA022001
Italy	ITA	ITA022	ITA022002
Italy	ITA	ITA022	ITA022003
Italy	ITA	ITA022	ITA022004
Italy	ITA	ITA022	ITA022005
...

Adm2_code	Stunting
ITA001001	12%
ITA001002	25%
.....	40%
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....
ITA022001	25%
ITA022002	5%
ITA022003	7%
ITA022004	3.2%
ITA022005	7.8%

Adm2_code	Rural Population
ITA001001	12%
ITA001002	25%
.....
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....
ITA022001	25%
ITA022002	5%
ITA022003	7%
ITA022004	3.2%
ITA022005	7.8%

Adm2_code	Fish production
ITA001001	12%
ITA001002	25%
.....
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....
ITA022001	25%
ITA022002	5%
ITA022003	7%
ITA022004	3.2%
ITA022005	7.8%

Coding system GAUL: SPLIT



450 shall never be assigned to another admin unit

35240 and 35241 are the first new codes available, after the last numerical code used for admin units of the world at first level

Country_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%

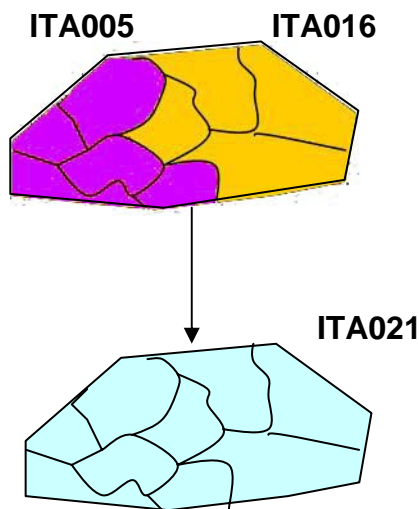
Adm2_code	Rural Population
745	12%
47302	25%
.....
256	25%
7856	40%
4153	50%
14536	3%
...	...
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

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 DISTRICTS PASS FROM ONE PROVINCE TO ANOTHER WITHOUT CHANGING THEIR CODES!



Coding system SALB: MERGE



ITA005 and ITA006 shall never be assigned other admin units

ITA021 is the first new code available, after the last numerical code used for admin units of Italy at first level

Country_name	CNT_code	Adm1_code	Adm2_code
Italy	ITA	ITA001	ITA001001
Italy	ITA	ITA001	ITA001002
Italy	ITA	ITA001	ITA001001
...
Italy	ITA	ITA017	ITA017002
Italy	ITA	ITA017	ITA017003
Italy	ITA	ITA017	ITA017004
Italy	ITA	ITA017	ITA017005
...
Italy	ITA	ITA021	ITA021001
Italy	ITA	ITA021	ITA021002
Italy	ITA	ITA021	ITA021003
Italy	ITA	ITA021	ITA021004

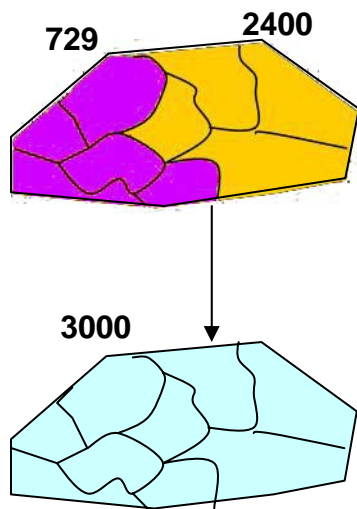
Adm2_code	Stunting
ITA001001	12%
ITA001002	25%
.....
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....	...
ITA020001	25%
ITA020002	5%
ITA020003	7%
ITA020004	3.2%
ITA020005	7.8%

Adm2_code	Rural Population
ITA001001	12%
ITA001002	25%
.....
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....
ITA020001	25%
ITA020002	5%
ITA020003	7%
ITA020004	3.2%
ITA020005	7.8%

Adm2_code	Fish production
ITA001001	12%
ITA001002	25%
.....
ITA021001	25%
ITA021002	40%
ITA021003	50%
ITA021004	3%
.....
ITA020001	25%
ITA020002	5%
ITA020003	7%
ITA020004	3.2%
ITA020005	7.8%



Coding system GAUL: MERGE



729 and 2400 shall never be assigned to other admin units

3000 is the first new code available, after the last numerical code used for admin units of the world at first level

Country_name	CNT_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%

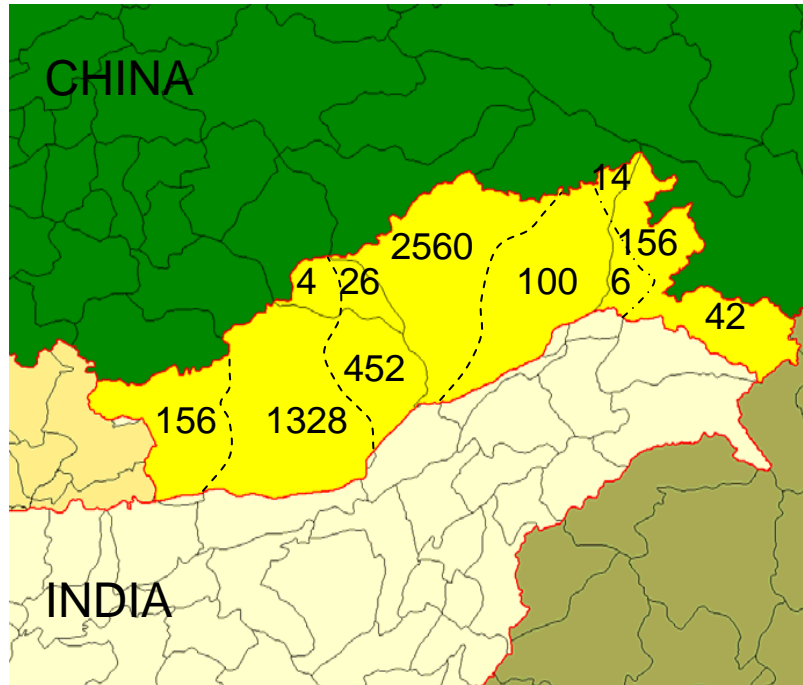
Adm2_code	Rural Population
745	12%
47302	25%
.....
256	25%
7856	40%
4153	50%
14536	3%
...	...
4589	25%
6598	5%
12548	7%
26894	3.2%
69843	7.8%

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%

THESE DISTRICTS PASS FROM ONE PROVINCE TO ANOTHER WITHOUT CHANGING THEIR CODES!



How the coding system manages “Disputed areas” in the GAUL database?

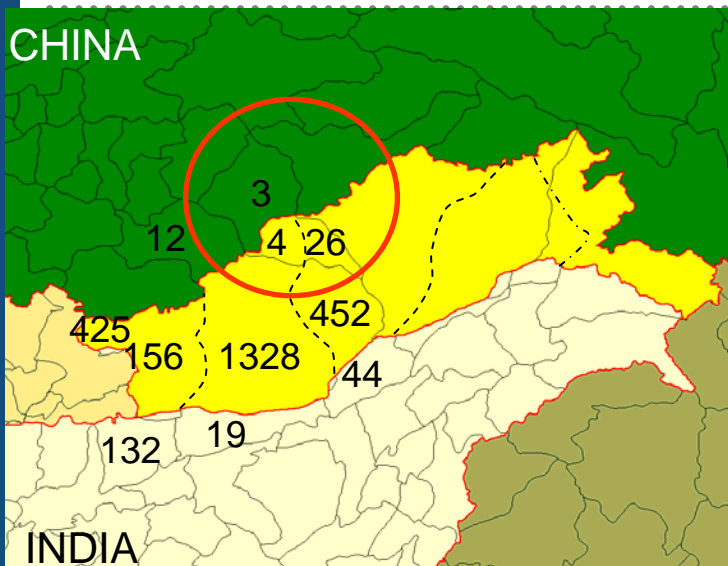


Arunashal Pradesh

- China Admin divisions
- India Admin divisions

- **COUNTRY_CODE**: a unique code independent 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 tables** including country code and admin codes which user shall consider when he/she has to extract a country (i.e. China or India) from the global administrative map

Disputed areas



——— China Admin divisions
 - - - - - India Admin divisions

Country_name.....	Country_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

Country	Country_code	Disputed_code	Disputed_Adml	Adml_code
China	41	704	156	425
China	41	704	1328	12
China	41	704	452	12
China	41	704	26	3
China	41	704	4	3

Country_name	Country_code	Disputed_code	Disputed_Adml	Adml_code
India	100	704	156	132
India	100	704	1328	19
India	100	704	452	44
India	100	704	26	44
India	100	704	4	19



Actions taken

- Establishment of a **network of contacts** with national and international institutions for Data Collection
- Definition of the **GAUL Methodology**
- **Definition of procedures** for an easy management and updating of the map in terms of both features and attributes
- **Data collection from national and international institutions**
- **Data Compilation and integration** with the UNCS international boundary map
- Generation of the **new coding system which manages also disputed areas**
- **Release of the GAULSet for the years 2005 – 2006**
- **Metadata definition and distribution of the released GAULSet through the FAO Geonetwork application** (web-based catalogue for geographic data)

Next Steps

- **New Release GAUL 2007:** it will be delivered at the end of this year 2006
 - around 20 countries will be updated
 - some countries at third and fourth level will be distributed
 - Examples of time series
- **New metadata** that will include:
 - the list of the SALB maps integrated in the GAUL
- **New legal disclaimer** defined in accordance with the FAO Legal Department
- **New attribute tables:**
 - SALB codes will be added for all the countries validated by SALB

GAUL users in FAO

- **Global Information and Early Warning System (GIEWS)**
 - **GIEWS Workstation**
<http://www.fao.org/giews/workstation/page.jspx>
- **Environment and Natural Resources Service (SDRN)**
 - the South-East Asia poverty mapping project
- **Land and Water development division (AGLW)**
 - **AgroMaps**: A global spatial database of agricultural land-use statistics aggregated by sub-national administrative districts
<http://www.fao.org/landandwater/agll/agromaps/interactive/index.jsp>
 - **Aquastat**: FAO's Information System on Water and Agriculture
<http://www.fao.org/ag/agl/aglw/aquastat/countries/egypt/index.stm>
- **Fishery Marine Resources Service (FIRM)**
 - **FIGIS**: Fisheries Global Information System
<http://www.fao.org/figis/servlet/static?dom=root&xml=index.xml>
- **Statistics Division**
 - **CountryStat**: <http://faostat.fao.org/site/578/default.aspx>
- **Information Technology Department (AFIP)**

other UN GAUL users

- **Joint Research Centre (JRC)** *“The GAUL allows us to exchange and to share our data and our value added products with UN institutions and even inside EU and JRC on a same administrative structure..”*
 - The GAUL is used in the context of the **Africa Observatory for Sustainable Development** where most up to date and standardized administrative boundaries are very relevant for the developed database and information
 - The GAUL is used for **integrating continental, regional or national thematic layers** (i.e. land cover, forest, fire) with the admin boundaries in order to get statistics.
- **Consultative Group on International Agricultural Research (CGIAR)**
 - The GAUL is used for mapping activities and spatial analyses
- **World Health Organization (WHO)**
 - The GAUL is used in context of several **mapping initiatives** related to public health, disease control, and disaster management.
 - The GAUL can be a useful support for the Service Availability Mapping (SAM) surveys which aims at providing detailed information on health facility coverage.

Hoping to become GAUL users soon...

- **Famine Early Warning System Network (FEWSNET)** <http://www.fews.net/>
 - The GAUL could become a significant part of the GIS component of a new integrated system development project which FEWSNET is developing.
- **World Vision International** <http://www.wvi.org/wvi/home.htm>
 - The GAUL could be used as reference for a password-protected intranet mapserver application used for program planning and fieldwork
- **Food Security and Analysis Unit (FSAU)** <http://www.fsasomali.org>
 - The GAUL could support analyses of relevant food security & livelihood information on emergency situations
- **Global Monitoring for Food Security sponsored by the European Space Agency (GMFS)** <http://www.gmfs.info/>
 - The GAUL could be used as reference for crop estimates analysis derived from remote sensing products

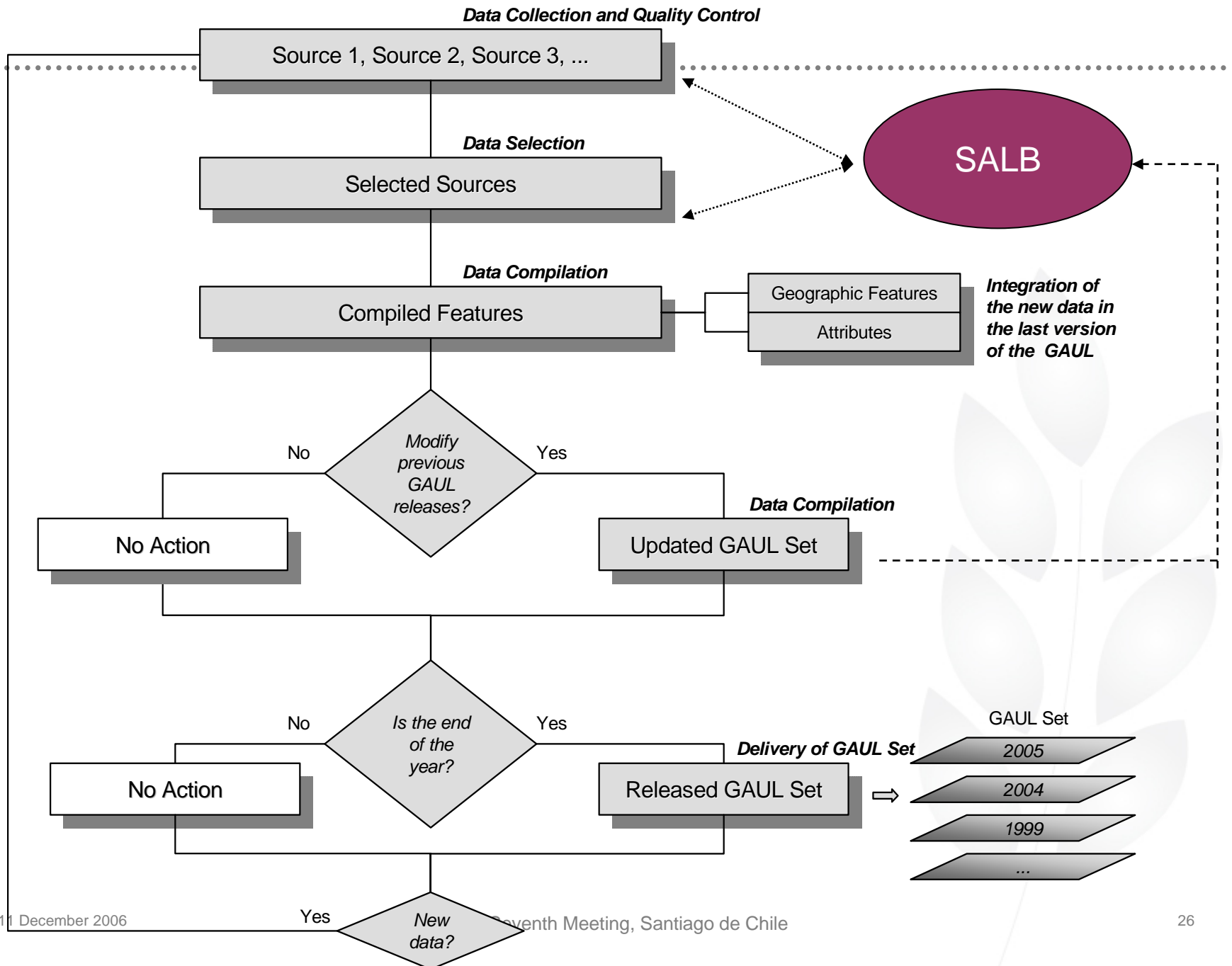
Hoping to become GAUL users soon...

- **University of Rome “La Sapienza”**
<http://www.uniroma1.it/>
 - The GAUL is requested for a **pilot research project** in Sudan.
- **San Diego State University and University of California**
<http://www.sandiego.edu/>, <http://www.ucsd.edu/>
 - The GAUL is requested for **pilot research projects** in Egypt and Jordan.
- **Aston University, UK** <http://www.seas.aston.ac.uk>
 - The GAUL is requested for **pilot projects** in some african countries (zambia, zimabwe, namibia, tanzania, malawi, mozambique, botswana, angola).
- **University of Carolina North Carolina** <http://www.unc.edu/>
 - The GAUL could be used as reference for spatial analyses for the **MEASURE Evaluation project**. In this context the GAUL is requested for supporting the generation of administrative maps displaying the location of health facilities in the Eastern Caribbean region

Many thanks
for your attention!

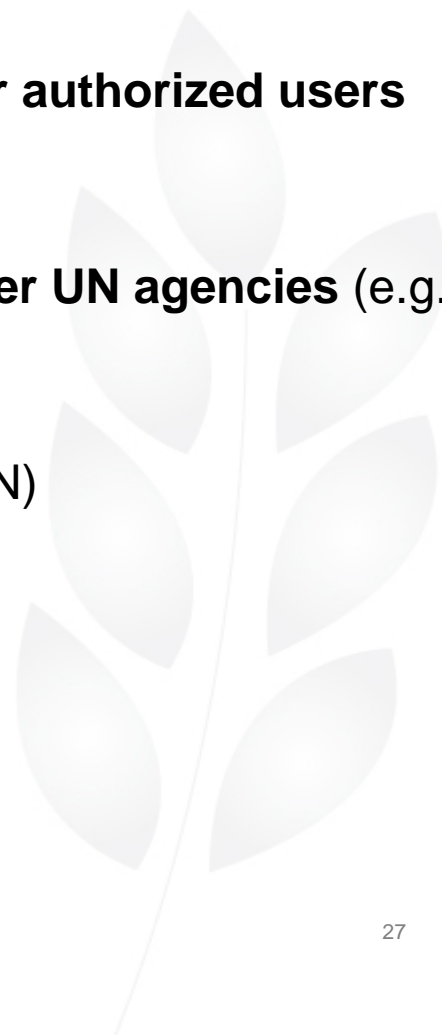
Michela Marinelli
Environmental Engineer - GIS Specialist
ESCG, FAO
Tel: +39-06-57053496
Email: michela.marinelli@fao.org





GAUL characteristics

- Always maintains a **global coverage with a unified coding system**
- All or part of the coverage **might not be validated** by national authorities
- It is only distributed to the **UN community and to other authorized users** (i.e. partner international organizations)
- It is **compliant with the standards introduced by other UN agencies** (e.g. UNCS at country level and SALB at subnational level)
- It is distributed **once a year** through Geonetwork (SDRN)



GAUL - SALB

GAUL	SALB
Objective	Objective
to prepare global layers of the administrative units up to the second administrative level using the best available data from national and international sources .	to establish a certified and copyrighted version of the administrative units up to the second administrative level.
Outputs:	Outputs:
Global maps including also areas with controversial boundaries (sovereignty unsettled), tables that links GAUL codes with UN codes (ISO, ISO3, etc.), and SALB codes	Maps on country-by-country basis , tables including SALB codes and historic changes
Target beneficiary	Target beneficiary
UN community and other authorized international and national institutions/agencies.	Entire user community
Delivery Time	Delivery Time
once a year	unpredictable





SALB coding system	GAUL coding system	
Codes are unique and user can link other data in safety and unambiguously	Codes are unique and user can link other data in safety and unambiguously	
Codes allow the user to easily understand at which level they belong, as they include higher level codes	Cascade update of the codes is NOT required for changes of administrative units (a change in level 1 <u>doesn't</u> imply a change in level 2)	
	Code length comparably small (in digits)	strengths
	Codes are <i>numerical</i> and suitable for raster data	
	Clear mechanism to manage “disputed” areas	
Cascade update of the codes is required for changes of administrative units (a change in level 1 implies a change in level 2)	Codes don't allow the user to understand at which level they belong to, as they don't include higher level codes	
Code length comparably large (in digits)		
Codes are <i>alphanumeric</i> and cannot be used for raster data.		
“disputed” areas are not dealt with		